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Medical end-of-life decisions in stillbirths, neonates and infants

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"There's no tragedy in life like the death of a child. Things never get back to the way they were."

- Dwight D. Eisenhower

This dissertation is dedicated to my beautiful daughters Nova* and Nisa.

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Part 1
General introduction

Chapter 1: Introduction

Chapter 1

Introduction

When talking about death, dying and end-of-life care, people often automatically envision a dying adult while infant mortality is often overlooked. However, currently, in about 7,9 in 1000 births in Flanders the infant dies shortly before birth or before they even reach the age of one year[1]. Despite the fact that medical treatment options for ill neonates have both expanded and improved during the last decades, causing a decline in infant death during the last trimester of pregnancy and the first year of life[2], there has been little improvement in the prevalence of preterm birth and congenital malformations[3]. Due to improvements in prenatal diagnostic tools such as genetic techniques and prenatal imaging techniques, an increasing number of these congenital malformations can now be diagnosed prenatally instead of after birth[4,5]. The diagnosis of these severe or lethal anomalies before or after birth is often the start of an extremely difficult decision-making process regarding the prognosis and possible treatment options for the child.

The leading causes of foetal and infantile mortality in Belgium hardly changed over the last ten years[1]. Among all foetal deaths in Flanders, the main causes of death are congenital malformations such as chromosomal abnormalities or spina bifida (30%) and factors relating to either a maternal medical condition and/or complications during pregnancy and childbirth such as problems with the placenta or infections (28,7%)[6]. In live-born infants, congenital malformations and factors relating to a maternal medical condition and/or a complication during pregnancy and childbirth are also among the main causes of death with 24,6% and 23,4% respectively[6]. Prenatal and neonatal morbidity and mortality introduces the debate on whether or not all available means of treatment should be used in all circumstances. The most common neonatal situations where providing treatment to prolong life could possibly be seen as futile are: extremely preterm infants who are born at the limit of viability, neonates with life threatening or life limiting congenital anomalies, and acutely deteriorating ill newborns admitted to neonatal intensive care units (NICUs)[7]. In some cases, providing treatment might even cause suffering for the already dying child, and the decision to forgo treatment is easier[8]. However, within the grey zone where futility of treatment is suspected but not always clear, resuscitation and intensive care can be provided, or treatment can be withheld or withdrawn and palliative care can be discussed and provided[8].

Previous research indicated that the death of a neonate is often preceded by a possibly life-shortening end-of-life decision[9–11]. Aside from these medical decisions after birth, due to improvements in the detection of congenital anomalies before birth, end-of-life decisions can, and are, taken prenatally[4,5,12]. The ethical dilemma in some of these cases between saving the life of the foetus or neonate, and not knowing what the burden of suffering will be later on needs thoughtful and professional deliberation of the parents and involved healthcare professionals. Even though these ethical dilemmas need to be evaluated on a case-by-case level, considering the specific characteristics and medical situation of the child, population data on what occurs in similar situations could be valuable for the involved healthcare providers in cases of uncertainty or disagreement between involved actors. Currently, available research both within the Belgian context and abroad is either incomplete or outdated, and thus not helpful as a guide to aid healthcare providers in current daily practice. Within the studies included in this doctoral thesis, we therefore focused on key characteristics of end-of-life decisions in a vulnerable population of children from a viable term of pregnancy up until they reach the age of one year. The aim of this dissertation was twofold: 1) to provide an account of what happens on a population level by means of providing prevalence rates on end-of-life decisions and their clinical and demographic

characteristics; and 2) to go deeper into what it means to make these decisions in daily practice by mapping out attitudes, views and experiences on neonatal end-of-life decision-making of involved healthcare providers, namely neonatologists and neonatal nurses, in order to adequately frame these numbers in daily practice.

This chapter includes an introduction of my dissertation on end-of-life decision-making before and after birth. Firstly, the conceptualization used in this dissertation will be discussed, including a definition of used concepts, and an overview of the conceptual framework we used to classify prenatal and neonatal end-of-life decisions. Secondly, a short overview of the legal context of these decisions in Belgium and in other European countries will be given. Thirdly, some important considerations on these prenatal and neonatal end-of-life decisions will be discussed. Fourth, I will give an overview of the currently available evidence on all aspects regarding prenatal and neonatal end-of-life decisions discussed in this dissertation, followed by a short reflection on roles of different actors in neonatal end-of-life decision-making, specifically focussing on physicians and nurses as their perspective was studied within this dissertation. Lastly, the research questions, the study design and methodologies used in this dissertation are described, and the outline of this dissertation is specified.

1.1 Conceptualisation used in this dissertation

1.1.1 Definition of concepts

Before we go into detail on what is already known on the topic of end-of-life decisions before and shortly after birth, some key concepts used in this dissertation need to be defined. When used hereafter in this dissertation, these definitions will be implied.

Foetal death Every stillbirth of a child with a birth weight of more than 500 grams[1]. This often concurs with a gestational age of 22 weeks, and is internationally considered to be the limit of foetal viability[13–15].

Neonatal death Every death of a live-born infant with a birth weight of more than 500 grams up until the age of 28 days after birth[1].

Infant death Every death of a live-born infant with a birth weight of more than 500 grams up until the age of one year[1].

Perinatal death The sum of foetal death (stillbirth from 22 weeks of gestation or a birth weight of 500 gram or more) and early neonatal death up until the live-born infant reaches the threshold of seven days[1].

Foetal-infantile death The sum of foetal death and infant death, therefore spanning stillbirth from 22 weeks of gestation or a birth weight of 500 gram or more or death of an infant up until he/she reaches the age of one year[1].

End-of-life decisions Within this dissertation, end-of-life decisions are defined as decisions regarding medical practices with a (potentially) life-shortening effect performed by a physician or a team. An overview of the possible end-of-life decisions both prenatally and neonatally, is given under the following 'conceptual framework' section.

Late termination of pregnancy We define late termination of pregnancy as terminations of a pregnancy from a viable age of the foetus (22 weeks of gestation) and onwards.

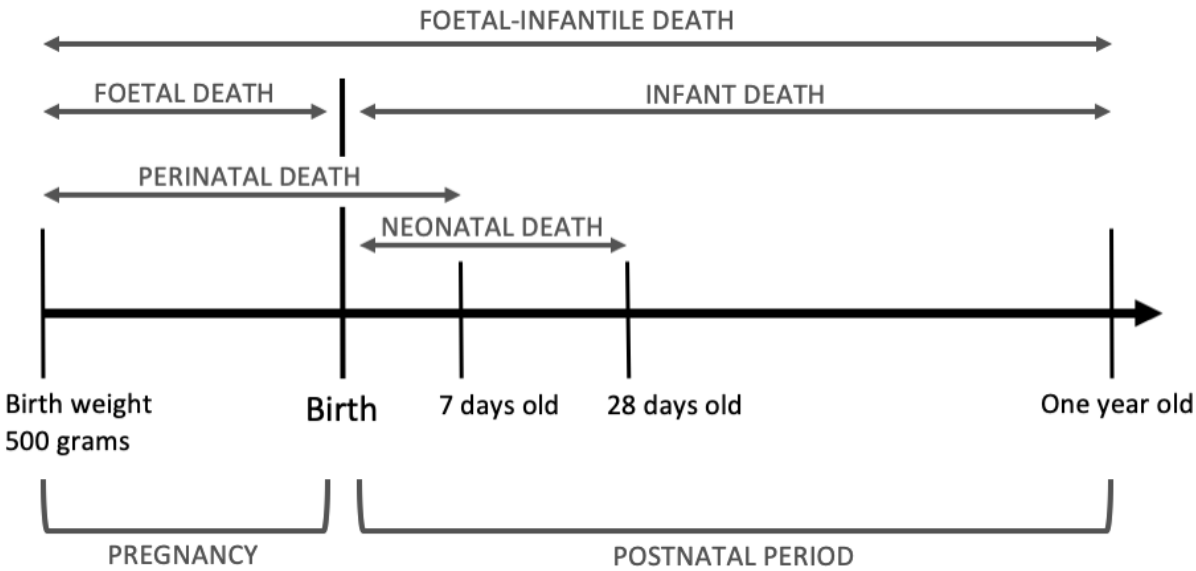

Figure 1.1 Schematic overview of concepts used to indicate foetal or infant death.

1.1.2 Conceptual framework

A comprehensive framework on which end-of-life decisions are possible within the foetal-infantile period was only partially available at the start of this dissertation, focussing solely on neonatal end-of-life decisions. We therefore adjusted this previously existing and validated framework of end-of-life decisions in neonates[16] to accommodate both prenatal and neonatal decisions, see chapter 2 of this dissertation for a detailed description of the development of this framework. A comprehensive framework was needed to make valid comparisons possible prenatally and neonatally. Two dimensions of the pre-existing framework were included, namely the dimension of the medical act, and the dimension of the intention of the physician.

The medical act concerns the type of medical decision that is made. This dimension distinguishes non-treatment decisions such as withholding or withdrawing treatment, and administrating drugs or performing a medical intervention[17,18].

The intention of the physician on the other hand, distinguishes what the life-shortening intention of the medical act was. This could either be no intention to shorten life but the potentially life-shortening effect was taken into account, a co-intention

where the potentially life-shortening effect was not the main goal but it was partly intended, or an explicit intention to shorten the life of the foetus or infant[17,19].

To cover all decisions that could possibly influence the death of a foetus or infant, both dimensions should be taken into consideration. The resulting framework, including clinical examples, can be found below.

Medical-technical classification	Life-shortening Intention	End-of-life practices prior to stillbirth	End-of-life practices in neonates and infants
Non-treatment decisions	No intention	e.g. no tocolysis in preterm labour at 24 weeks' gestation	e.g. no antibiotics
	Co-intention		e.g. no cardiac surgery
	Explicit intention	e.g. no intrauterine transfusion for an anaemic foetus	e.g. withdrawing ventilation
Drug administration or medical intervention	No intention		e.g. start-up of anticonvulsive therapy
	Co-intention		e.g. administering morphine
	Explicit intention	e.g. termination of pregnancy with feticide	e.g. administering muscle relaxant

Table 1.2 A comprehensive framework of end-of-life practices in the foetal-infantile period.

As is the case neonatally, we distinguish two types of prenatal medical decisions. A first option includes non-aggressive obstetric management or abstinence, where the decision is made to forgo medical interventions before and after birth such as foetal monitoring, ultrasound surveillance, caesarean delivery or life support in a level III unit[20]. The second prenatal medical act includes terminating the pregnancy, hereby actively ending foetal life[4,5] by preterm induction of labour either with or without feticide (administering medication to intentionally end the life of the foetus before birth) prior to the termination[13].

Some similarities between end-of-life practices prior to stillbirths, and in neonates and infants can be noted. First of all, non-obstetric management can be seen as a non-treatment decision, more specifically withholding life-sustaining treatment, since treatments that are necessary to sustain the life of the foetus are not implemented. Secondly, termination of pregnancy can be compared to deliberately ending life since the death of the foetus is actively hastened. However, an important difference between both research populations seems to be the absence of a 'grey area' in the life-shortening intention prenatally. Where in neonates, decisions exist that are beneficial for the child with an additional, partially intended life-shortening effect that was not considered the main goal, the life-shortening intention prenatally is always either non-existent or explicitly intended. Additionally, end-of-life practices where drugs or interventions are provided without explicit intention to hasten the death of the foetus, such as alleviation of pain or symptoms by means of medication that could possibly shorten the life of a child, are not possible before birth.

1.2 Legal framework

1.2.1 The Belgian legal framework

When severe or lethal foetal anomalies are identified during pregnancy, healthcare professionals and parents can decide on end-of-life decisions such as abstinence of treatment[4,5,12] or termination of pregnancy[4,5,21]. In the Belgian legal framework, termination of pregnancy is legal before 12 weeks of gestation. However, terminations after 12 weeks of gestation are also legally possible, only when completing the pregnancy presents a serious threat to the women's health or when it is established that, when born, the child will suffer from a particularly severe ailment, acknowledged to be incurable at the time of diagnosis[22–25]. Therefore, deciding on termination of pregnancy from the viable age of 22 weeks and onwards, as is the scope of this dissertation, is currently legal only when these clinical criteria are met. However, from a viable gestational age onwards, the diagnosis of severe or lethal foetal anomalies can also lead to the decision to forgo aggressive management[20]. Non-aggressive management or abstinence of treatment prenatally is made in cases where the infant is expected to die on its own, either before or shortly after birth[20]. In these cases, the treatment options have been deemed futile by the prevailing medical standards at that time, and physicians are legally permitted to refuse pointless treatment in consultation with the parents.

After birth, the Belgian legal framework becomes more complicated. Life-sustaining treatments can legally be withheld or withdrawn when they are deemed futile. Aside from withholding or withdrawing treatment, medication to relieve pain and/or symptoms with a potentially life-shortening effect can be given. Ethically, some physicians stand behind the doctrine of double effect[26], where the wish of doing something morally good such as relieving suffering justifies the accompanied yet undesired effect of doing something morally bad by hastening death, as long as the 'side-effect' wasn't intended. In this case, respiratory failure may be foreseen or expected, but it is important that this was not the intended effect[26]. The doctrine of double effect follows the assumption that hastening death is always considered as undesirable and morally bad, which is often debated. Furthermore, this doctrine determines the rightness or wrongness of an act by looking at the intention of the physician. This is followed by most legal systems as intention of a person is often vital for deciding whether or not a crime was committed, indicating that these practices would be legally justified if the intention is to alleviate pain or suffering from symptoms, and if the possible life-shortening effect is merely foreseen but not intended[27]. We can debate whether or not this distinction between the explicit or implicit intention of the physician to hasten death should even be made, as the consequence of the infant dying was always foreseen. Following this, many ethicists even reject the theory that allowing for an infant to die by withholding or withdrawing treatment, and administering medication to explicitly hasten death are morally different, as the end result is the same.

Within the Belgian legal framework, active termination of life on request is only legally allowed under strict circumstances in adults and recently for capable minors without formal age restriction[28]. In neonatal care, the legality of administration of medication with a potential or explicit life-shortening effect can be debated. There is a strong presumption that the deliberate administration of lethal drugs is illegal, since neonates are not capable of determining their wishes regarding active termination of life. However, it remains an open question under what

circumstances allowing a neonate to die would count or not count as illegal. The legal haziness concerning neonatal end-of-life decisions creates somewhat of a peculiar context for end-of-life decision making in perinatal care, as prenatally termination of pregnancy is possible but from the moment the infant is born, legal options might be considered as limited due to the lack of a clear framework.

1.2.2 Short overview of the European context

Laws regarding late termination of pregnancy differ across countries. In some countries, termination of pregnancy for foetal anomalies is illegal regardless of the gestational age, as is the case in for example Malta and Ireland[29]. Other countries allow termination of pregnancy in case of foetal anomalies only up until viability is reached at 22 weeks of gestation, such as for example in Denmark, Estonia, Lithuania, Norway, Slovakia, Spain and Sweden[30]. After the viability threshold is reached, some countries allow terminations up until 23 (e.g. Iceland), 24 (e.g. Finland, Latvia, the Netherlands) or 25 (e.g. Greece) weeks of gestation[30]. Lastly, some countries do not pose gestational age limits on whether or not late termination of pregnancy is legal in case of foetal anomalies, as is the case in for example France, Germany, Slovenia or Switzerland[30]. However, when the foetal anomalies are deemed lethal, other countries such as the Netherlands, Norway, Portugal and Denmark follow this trend and revoke their gestational limit[29]. Termination of pregnancy to save the life of the mother on the other hand, was legally permitted in 98% of all world countries at the end of the twentieth century[31].

In neonates, most European countries are very consistent with the current Belgian legal framework. Life-supporting treatments can legally be withheld or withdrawn when deemed futile, which includes an interpretation of the physician on whether or not futility is indicated. In Europe, deciding to withhold or withdraw life-prolonging treatment in infants with absolutely no chance of survival is considered good practice, since a majority of European physicians indicate that the primary obligation in care for these infants is letting them die with a minimal amount of suffering[10,32]. When the infant would survive with a considerably poor quality of life, the majority of European neonatologists consider forgoing or not initiating life-sustaining treatment acceptable if both the medical team and the parents agree that treatment is not in the best interest of the child[10]. When a neonate is no longer dependent on medical treatments but suffering cannot be relieved, not a single country legally permits requests of parents to explicitly end the life of a newborn with lethal (doses of) medication[10]. The only country that currently legally condones actively ending the life of a neonate under strict conditions is the Netherlands, where the Groningen protocol imposes requirements that must be fulfilled before deciding on intentionally shortening the life of newborns with lethal (doses of) medication[10]. Three distinct medical cases of unbearable suffering were described, namely 1) physiological futility of treatment in newborns with absolutely no chance of survival; 2) infants who may survive after a period of intensive treatment, but their actual or foreseen suffering in the near future is severe and unbearable; and 3) infants with an extremely poor prognosis who do not depend on technology for physiological stability but whose suffering is severe and cannot be alleviated[33]. In all cases, the diagnosis and prognosis must be certain, and hopeless and unbearable suffering must be present[10]. Furthermore, the diagnosis, prognosis and unbearable suffering must be confirmed by at least one independent doctor, and both parents must give informed consent[10,33]. Despite the Netherlands being the only country with a clearly formulated legislation regarding administering

drugs with an explicit life-shortening intention, this practice happens outside of the existence of a legal framework across Europe[34].

1.3 Important considerations on foetal-infantile end-of-life decisions

Deciding whether or not to resort to these end-of-life decisions brings with it extremely difficult medical, ethical and moral discussions for parents and involved healthcare providers. In Flanders, all neonatal intensive care units issued a formal consensus to withhold a priori intensive care when an infant is born before 24 weeks of gestation, including both treatments before and after birth[35]. Furthermore, a previous study showed that perinatal healthcare professionals would recommend limiting life-supporting treatment both in cases where death in the near future was very likely, and in cases where patients could possibly live for months to years with continued aggressive treatment, indicating that quality of life is thus also an important factor in the decision-making process[36]. We can therefore state that the dilemma of withholding or withdrawing life-supporting treatment, considered futile either because death is imminent or because the future quality of life would be extremely poor, can be seen as part of regular clinical perinatal practice. The ethical doctrine of doing and allowing clearly demarcates between non-treatment decisions where the child is 'allowed to die' by stopping or not starting futile treatment, and actively intending for the child to die by means of medication[7,37]. Terminating a pregnancy when congenital anomalies are diagnosed[38] or administering medication to intentionally shorten the life of a severely ill live-born child[19] when following this doctrine can be seen as intentionally intervening whilst non-treatment decisions are more interpreted as a (passive) acceptance that death of the child is imminent[7]. However, the conceptual distinction between doing and allowing as ground for morality has often been challenged[39], as it is difficult to believe that the way in which an outcome is achieved could be morally more important than the actual outcome itself[40]. As a conclusion, we can state that end-of-life decisions, which are part of daily neonatal practice, are cause for a lot of ethical and legal debate. Dealing with death and end-of-life care, especially in neonatal and prenatal care, is thus by no means easy for parents and involved healthcare professionals.

End-of-life decisions should be, and are generally, made in the best interest of the child, meaning that the benefits and burdens of a particular medical intervention are balanced, together with the future quality of life and whether or not death is imminent[38]. However, newborns or viable foetuses can not define their own best interest, nor can they participate in the decision-making process, indicating that a surrogate decision-maker needs to make these decisions for them[41]. Currently, these decisions are most commonly shared between parents and involved healthcare professionals, with both parties having an active role in end-of-life decision-making[42]. Consensus should always be sought[43], but when disagreements between healthcare professionals and parents arise, the extent to which the wishes of the parents or the medical opinion of the healthcare professionals dominates depends on the individual situation.

1.4 Current evidence on aspects of foetal-infantile end-of-life decisions discussed in this dissertation

1.4.1 The prevalence of foetal-infantile end-of-life decisions

An important starting point in examining end-of-life practices before and after birth is to provide insight into how often end-of-life decisions occur. In Belgium, stillborn babies are officially registered by means of a death certificate from 180 days of gestation (about 26 weeks) onwards by the Flemish Agency of Care and Health, and registration from 22 weeks onward is encouraged but not mandatory, causing underreporting of stillborns by means of death certificates in this group. Additionally, all births (liveborn and stillborn) with a birthweight of 500 grams or more are registered through the Study Centre for Perinatal Epidemiology (SPE). However, both of these registrations only encompass information regarding the presence of congenital malformations, without detailed information on the reason for stillbirth such as whether or not the pregnancy was actively terminated. They can therefore not be used to provide insights into the prevalence of end-of-life decisions in the prenatal period. Additional to the registrations of stillbirths, a registration of the practice of abortion in Belgium exists, which is reported on biennially. However, the last report dates back to abortion practices in 2010 and 2011 and since then, no reports have been published. For reliable prevalence rates, we thus have to look towards reliable, population-based studies where all stillborns are considered irrespective of the diagnosis of the child, the decisions made, or the setting in which the stillbirth occurred. In Belgium, only two previous population-based studies on end-of-life practices in late term pregnancy exist, namely the MOSAIC study performed in 2003[22] and the European register-based study of Garne and colleagues in 2000-2005[24]. The first studied registered pregnancy terminations and its proportion in stillbirths in a specific region in Flanders[22]. The second study is based on the EUROCAT register (European network of population-based registries for the epidemiologic surveillance of congenital anomalies), which registers all liveborn, stillborn and terminated congenital anomalies[24,44]. Based on the information gathered in these sources, the estimated number of late terminations of pregnancy should be at least four times higher than that reported by the evaluation committee of abortion practices.

In liveborn neonates, most studies on end-of-life decision-making are either limited to single centre studies or focused solely on non-treatment decisions. Available data was mostly based on reviews of medical records in NICUs at a specific hospital. These studies show that between 40% and 93% of deaths in the NICU follow withdrawal of life-sustaining treatments[11,45–47], varying by region and physician attitudes[9,48]. The EURONIC study was one of the only larger scale studies, albeit not population-based, on physicians' self-reported practices and attitudes. This study was performed across a sample of 143 European NICUs (Belgium not included) in the 1990s[49]. Population-based studies, where all death cases are considered, are ideal to study incidences of end-of-life decisions, without a bias on whether or not the child and/or mother were admitted to a level three hospital unit such as a NICU. However, the only population-based studies in neonates are from the Netherlands[50] and one from Belgium that dates back to 2000[19]. In the Netherlands in 2000, 63% of all deaths under the age of one year was preceded by an end-of-life decision[51]. Most of these decisions could be classified under non-treatment decisions, and only 1% of the decisions included the administration of medication to deliberately hasten death. In Belgium we saw that almost 60% of deaths before the age of one year were preceded by an end-of-life

decision[19]. Similar to the Netherlands study, most of these decisions were classified as non-treatment decisions such as withholding or withdrawing treatment, while 7% consisted of administrating medication to deliberately hasten death[19].

This overview on what is currently known on prenatal and neonatal end-of-life decisions reveals some major gaps. **Firstly**, no Belgian incidence rates on end-of-life decisions in viable foetuses exist, making it very difficult to provide an overview of current healthcare practice. Previous studies[22,24] only looked at the prevalence of termination of pregnancy (deliberately ending life with an explicit life-shortening intention). Therefore, not much is known about the full scope of end-of-life practices, including non-treatment decisions, and their decision-making process. Moreover, both existing studies only included data from two separate provinces in Belgium, only one situated in Flanders. **Secondly**, foetuses and neonates where a life-limiting disorder is diagnosed are in essence the same patient. The only difference is the occurrence of birth and not necessarily a difference in disorders or congenital anomalies[21], while the impact on parents and involved caregivers is very similar. Where previous research failed to consider the entire foetal-infantile period by looking solely at end-of-life decisions prenatally or neonatally, we will aim at developing a solid research methodology to examine both simultaneously. Hereby, we will be able to study shifts in end-of-life decisions in the entire foetal-infantile period, that would otherwise be missed. The advanced technologies in prenatal screening and consequent rise in prenatal diagnoses of congenital disorders[4,5] could for example cause an increase in late terminations of pregnancy and a decrease in some end-of-life decisions neonatally. **Thirdly**, prior to the development of the studies in this dissertation, both prenatal and neonatal Flemish healthcare professionals stated the need for more recent, population-based data on the prevalence of end-of-life decisions. Both the studies mentioned in the paragraph regarding prenatal end-of-life decisions and late termination of pregnancy, and the studies in the paragraph on neonatal end-of-life decision-making, collected data in the early 2000s[19,22,24]. In light of ever changing societal, legal and clinical influences, we thus base important clinical decisions and recommendations in daily practice on outdated population-data. Important societal changes took place that could possibly impact end-of-life practice, including in the unborn and newborn population. There was the implementation of laws on patient rights, palliative care and euthanasia in adults in 2002, and the law on euthanasia for children with decisional capacity in 2014[52]. Neonates do not fall under this euthanasia law, which is limited to adults and capable minors, yet a possible impact on prenatal and neonatal practice cannot be excluded. Internationally, the Groningen protocol in the neighboring Netherlands could possibly have an impact on Belgian prevalence rates. Aside from legal changes, the rise in medical treatment options for extremely ill neonates[5,53] could possibly have changed medical practice. Therefore, a need for current and reliable incidence rates of Flemish end-of-life decisions is indicated, not only by researchers but also by Flemish representatives from all eight neonatal intensive care units. Within this dissertation, we will therefore aim to examine these incidences on a population level, in infants who died before the age of one year.

1.4.2 Attitudes of healthcare providers concerning foetal-infantile end-of-life decisions

Previous research showed that, even in newborns with the same pathology, variability between types of end-of-life decisions can be noted[54,55]. This is because end-of-life decisions can be

influenced by a number of contextual variables such as available hospital resources and the parents' and clinicians' social, cultural and religious beliefs[54]. Aside from these contextual variables, attitudes of caregivers play a crucial role in end-of-life decision-making[19]. And even within a care team, important differences between physicians' and nurses' attitudes towards end-of-life decisions have been found[56]. Personal characteristics of healthcare providers may thus play a crucial role in end-of-life decision-making in neonates[9,19,57,58].

An attitude survey study in 10 European countries in 2000 found that the likelihood of limiting life-supporting treatments in neonates is dependent on the country of residence, reported religion of the physician, their gender, whether or not the physician has children, and the amount of very low-birth-weight infants that are admitted to their NICU[48]. Furthermore, a self-report questionnaire combined with retrospective medical chart review revealed that an unintentional life-shortening effect of administering opioids is considered acceptable for most NICU and paediatric intensive care (PICU) nurses[59]. These studies are however limited, since they fail to include attitudes towards decisions that could have been made before the baby was born. Because attitudes and decisions before or after birth could possibly influence each other, and neonatologists are often consulted in prenatal end-of-life decisions[60], attitudes towards prenatal and neonatal end-of-life decisions should thus be included into one overarching study to make valid comparisons possible. Because of their relevance for clinical practice, a separate part of this dissertation will be devoted to the examination of attitudes regarding foetal-infantile end-of-life decisions of the most involved healthcare providers in neonatal end-of-life decision-making, namely neonatologists and neonatal nurses.

1.4.3 Barriers to and facilitators of the neonatal end-of-life decision-making process for healthcare providers

Despite the severe impact of end-of-life decision-making on NICU staff members[61], few studies have focused on what the involved neonatologists and neonatal nurses find either helpful or difficult in making these end-of-life decisions. Qualitative studies with NICU staff members in Norway on deciding whether or not to continue life-sustaining treatment show that the lack of certainty in the prognosis of the child and what their suffering will be later on[62] can be seen as an important barrier in decision-making. Furthermore, these Norwegian studies show that the ambivalence between wanting to include parents and wanting to spare them some of the pain, can cause indecision regarding whether, when and how certain information about the prognosis needs to be given by the healthcare providers to the parents[62,63].

Previous studies on these barriers and facilitators in neonatal end-of-life decision-making are limited in that they mainly focus on specific end-of-life practices such as withholding and withdrawing of treatment[9,19,50,51,64] rather than focusing on the entire spectrum of end-of-life decisions, or that they mainly focus on the experiences of parents[42,64–67], hereby excluding healthcare providers as an important co-actor in the decision-making process. A separate chapter in this dissertation will therefore focus on examining which factors neonatologists and neonatal nurses experience as either helpful or difficult in neonatal end-of-life decision-making in a NICU. Knowledge on which factors could either benefit or hinder the neonatal end-of-life decision-making process from the viewpoint of the most involved healthcare providers could be a crucial starting point in formulating recommendations to aid future practice.

1.4.4 Psychological support in end-of-life decision-making for healthcare providers

Neonatologists and neonatal nurses who work in a neonatal intensive care unit often experience stressors and moral distress due to the high demands of their occupation[68,69]. Especially in times when an infant in their care can no longer benefit from aggressive or even futile treatment and an end-of-life decision needs to be made[68,70]. Similarly to paediatric intensive care unit staff, they experience sadness, helplessness and frustration when they are unable to do more when a child dies[71]. They can even be called disenfranchised grievers, since they are generally not recognized as a bereaved person by society or their work environment[72]. Because of this distress, neonatologists and neonatal nurses are prone to developing compassion fatigue or burnout when the emotional price of caring becomes too high for them to cope[73–75]. Psychosocial support for NICU staff members is currently included in recommendations for NICU practices[76–78], however most recommendations and guidelines concerning this psychosocial support focus on providing neonatologist and neonatal nurses with concrete tools to optimally attend to parents in their decision-making process and grief[79–81]. Furthermore, research on how supported they actually feel is lacking.

To our knowledge, only one study included specific recommendations solely focusing on the benefit to NICU staff members in a neonatal end-of-life palliative care protocol[70]. Catlin & Carter[70] recommended formal meetings or counselling sessions as part of regular work hours, instead of on a voluntary basis or during unpaid time. Furthermore, they recommended that both neonatologists and nurses should be able to opt out of end-of-life care by taking on other assignments. A last part of this dissertation therefore focusses on the experienced psychological support of healthcare providers working in a neonatal intensive care unit as an important aspect of the foetal-infantile end-of-life decision-making context. Caring for the ones responsible for the care of critically ill infants could be a crucial step towards providing better support for both patients and grieving parents in a neonatal intensive care unit[74,76].

1.5 The role of neonatologists and nurses in foetal-infantile end-of-life decision making

Since foetuses and newborns are unable to make decisions for themselves, it is important to consider their surrogate decision-makers. The parents' right to decide for their children in less serious clinical situations is generally well accepted[82]. They are motivated by the child's best interest, and above all, parents are generally considered as having the main authority over their child[82]. However, when talking about end-of-life decisions that are likely to result in the death of the infant, the role of parents is less clear. Healthcare providers might want to protect parents from possible negative psychological consequences of deciding on if and when their child is allowed to die[83]. Furthermore, while some parents want to be the ultimate decision-maker[84] or want to at least be actively involved[84–86], others indicated that they preferred that the decision was made by the involved medical team[87].

Both healthcare providers and parents play an active role in end-of-life decision-making[42]. The viewpoint of parents who focus on their specific case, and healthcare providers who have a

multitude of (end-of-life) experiences, is fundamentally different and when recommendations for the improvement of future practice are made, both should be considered. However, in this dissertation, we chose to solely focus on providing the viewpoint of healthcare providers. By drawing upon their multitude of experiences, we hope to be able to compare what differentiates between a good and a bad experience, instead of just being able to discuss the decision-making process of a single infant, as would be the case in bereaved parents.

In a NICU setting, neonatologists and neonatal nurses work closely together. They fulfil fundamentally different but crucial roles in prenatal and neonatal end-of-life decision-making. Physicians are experts in understanding the prognosis and possible outcomes of the infants[58]. They are often the ones who ultimately decide on the end-of-life decision and therefore take final responsibility[88]. Depending on the country or even the NICU ward, nurses can sometimes also be involved in these end-of-life discussions[89]. One of the most important tasks of involved nurses is taking care of the child during the end-of-life phase[89]. Because of their presence at the bedside of the infants, they are often more emotionally involved with parents and infants than physicians[61], and nurses are often the first to recognize and accept the possibility of impending death[64]. Physicians and nurses thus have unique and important roles in the prenatal and neonatal end-of-life decision-making process, making a reflection on roles, attitudes and viewpoints of both healthcare providers essential.

1.6 Study objectives and research questions

The main focus of this dissertation is end-of-life decision-making in stillbirths, neonates and infants on a population level, across centres, patients and physicians. The following two aims, each with specific research questions, guided this dissertation:

The ***first aim*** is to examine end-of-life decisions in stillbirths, neonates and infants in Flanders, Belgium on a population level. The following research questions will be answered:

1. Which methodology can be used to reliably study the prevalence of various end-of-life decisions, taken before and after birth? Which population-level databases can be used to study both prenatal and neonatal end-of-life decisions, and how can we anonymously contact the physician involved in these stillbirth or death cases?
2. What is the prevalence of various end-of-life decisions made in the neonatal period? Did the prevalence change over time compared to the previous data-collection in 1999-2000? What are the clinical and demographic characteristics of infants whose death was preceded by various types of end-of-life decisions? Which circumstances are associated with various types of end-of-life decisions in neonates?

The ***second aim*** of this dissertation is to map the attitudes, views and experiences of involved healthcare providers, namely neonatologists and neonatal nurses, on neonatal end-of-life decision-making. The following research questions will be answered within this aim:

3. What are the attitudes of neonatologists and neonatal nurses concerning prenatal and neonatal end-of-life decision-making? What are the differences between physicians and

nurses in attitudes towards these decisions? Which attitudes concerning prenatal and neonatal end-of-life decisions and which demographic characteristics are associated with possible treatment options that are considered acceptable in a hypothetical case?

4. Which factors involved in the decision-making process can, according to experiences from neonatologists and neonatal nurses, facilitate or impede the neonatal end-of-life decision-making process in a Flemish neonatal intensive care unit?
5. In what way are neonatologists and neonatal nurses supported by colleagues, psychologists and the hospital ward during the difficult process of end-of-life decisions in a Flemish neonatal intensive care unit? How sufficient is the current psychological support for caregivers working in a Flemish neonatal intensive care unit?

1.7 Methods used in this dissertation

To answer the research questions and study objectives of this dissertation, several data-collection methods and data sources were used, namely a mortality follow-back survey, an attitude survey and a qualitative study with face-to-face semi-structured interviews.

1.7.1 The mortality follow-back survey

This section only touches briefly on the mortality follow back survey-method since the research protocol for this data-collection method is explained in detail in chapter 2 of this dissertation. A short summary of the mortality follow back survey-method will be provided. This data-collection method was used to examine end-of-life practices and decisions in stillbirths, neonates and infants in Flanders, Belgium on a population level.

This survey follows the design of a mortality follow-back survey on a population-level based on all death certificates of stillborns from 22 weeks of gestation or a birth weight of 500 gram onwards, and neonates or infants who died before the age of one year. All included stillbirths or deaths occurred in Flanders or Brussels and concerned foetuses or infants whose mother was a Flemish resident at the time of death. The design of this study was identical to a survey conducted from August 1999 to July 2000[19], with the exception of a longer inclusion period from September 2016 to December 2017 (12 months in 1999-2000 versus 16 months in 2016-2017).

Within three months after death, every certifying physician received a four-page questionnaire through the Flemish Agency for Care and Health who is responsible for processing the death certificates with an introductory letter containing patient identification characteristics. To guarantee anonymity, a lawyer served as an intermediary between the responding physicians, the Flemish Agency for Care and Health, and the researchers[90]. The intermediary ensured that completed questionnaires could never be linked to specific patients, physicians or hospitals.

Two separate questionnaires were used during the survey namely one questionnaire to accompany death certificates that certified a stillbirth and one questionnaire to accompany death certificates that certified the death of an infant before the age of one year. The questionnaires used in the survey aimed to inquire about possible prenatal and neonatal end-of-life decisions that preceded the death or stillbirth reported on the death certificate. A validated questionnaire

used to survey neonatal end-of-life decision making developed in the 1999-2000 study was used as the basis for the current 2016-2017 questionnaires to ensure comparability of data[19]. Both questionnaires first asked whether the death of the neonate had been sudden and unexpected. If answered negatively, an end-of-life decision was considered possible and physicians were asked whether any end-of-life decisions preceded the death or stillbirth. The questionnaires never asked about the end-of-life decision categories as denoted in our conceptual framework, but rather classified the medical decisions based on a series of core questions following the two dimensions of the conceptual framework (see the conceptual framework on page 15-16), namely:

1. Which act or omission was used (the medico-technical dimension)
2. Which life-shortening intention was associated with the act or omission (the medico-ethical dimension)

When more than one end-of-life decision with the same life-shortening intention was noted, administration of drugs (active) prevailed over withholding or withdrawing treatment (passive). In case of an end-of-life decision, follow-up questions were asked such as: by how much time was the life of the infant shortened, what was the most important reason for deciding on the end-of-life decision, and who was included in the decision-making process. Demographic information from the death certificates was anonymously linked with their respective questionnaire data after data-collection was finished. The used questionnaires (in Dutch) can be found in Appendix 1 and 2.

Ethical approval was obtained by the ethics committee of the University Hospital of Ghent and additionally from the National Privacy Commission (CBPL), the Sectoral Committee of Social Security and Health, and the National Disciplinary Board of Physicians.

1.7.2 The attitude and psychological support survey

In order to examine the attitudes and perceived psychological support of involved healthcare providers in neonatal end-of-life decision-making, a full population mail survey was set up in all neonatologists and neonatal nurses working in a Flemish neonatal intensive care unit. All Flemish neonatal intensive care units participated in this study. These neonatal intensive care units were situated in the following hospitals: Ghent University Hospital, Brussels University Hospital, Leuven University Hospital, Antwerp University Hospital, AZ Sint-Jan Brugge-Oostende, Hospital Oost-Limburg Genk, Hospital GZA St Augustinus and ZNA Middelheim.

Data was collected between May 1st and May 31st of 2017. The gatekeeper method was used, where a representative physician working in each neonatal intensive care unit handed out the questionnaire to every neonatologist and every neonatal nurse in their respective ward. Physicians and nurses were invited to fill out the questionnaire and send it back by means of a prepaid envelope to the researchers within the period of one month.

The questionnaire used in this survey was developed based on an existing Flemish attitude questionnaire from the year 2000 on neonatal end-of-life decisions[19], and an American study on compassion fatigue, burnout and compassion satisfaction of neonatologists in a neonatal

intensive care setting[91]. A multidisciplinary team consisting of three sociologists, two psychologists, three neonatologists and one gynaecologist developed the final questionnaire. Afterwards, this questionnaire was cognitively tested on five neonatologists from four separate hospitals, three neonatal nurses from two separate hospitals and one gynaecologist in order to ensure validity of the items. The questionnaire consisted of six separate parts:

1. ***Socio-demographic information of the participants***
   The questionnaire consisted of seven socio-demographic questions, including gender, age, years of experience working in a neonatal intensive care unit, education level, religion or belief, whether or not their religion or belief plays a role in end-of-life decision-making, and whether or not they lost someone close to them.
2. ***Attitudes concerning end-of-life decisions in neonates***
   Within the questionnaire, six attitude items focussed on neonatal end-of-life decisions, meaning end-of-life decisions that can be made in a live-born infant with a severe or lethal diagnosis. Attitudes were measured by indicating whether or not participants agreed with the statements, scored on a five-point Likert scale ranging from 'totally disagree' until 'totally agree'.

3. ***Attitudes concerning prenatal end-of-life decisions from a viable age onwards***
   Six attitude items regarding prenatal end-of-life decisions were added to the questionnaire. Within these six items, we gaged their attitudes towards termination of pregnancy from a viable age of the foetus onwards, in case of a severe or lethal foetal diagnosis. Similar to the neonatal attitude items, attitudes were measured on a five-point Likert scale.
4. ***Hypothetical cases where prenatal and/or neonatal end-of-life decisions could be considered***
   Two hypothetical cases were presented. One regarded a prenatal hypothetical case with severe spina bifida at 25 weeks of gestation, leading to paralysis of the lower limbs, incontinence, and possibly a cognitive deficit. The second case regarded a neonatal case of an infant born at 27 weeks of gestation with severe additional complications. In both cases, participants were given several treatment options, including continuing life-prolonging treatment and considering several end-of-life decisions. Participants were asked to indicate whether they would consider each treatment option on a four-point Likert scale ranging from 'not a good treatment option' until 'a very good treatment option'.
5. ***End-of-life policies of the ward and the hospital***
   A fifth part of the questionnaire consisted of seven questions regarding the existence of formal or informal policies on prenatal and neonatal end-of-life decisions within their ward, and whether or not they supported these policies. Similar to the other parts of the questionnaire, participants indicated whether or not they agreed with the provided statements on a five-point Likert scale ranging from 'totally disagree' until 'totally agree'.
6. ***Psychological support for healthcare providers regarding foetal-infantile end-of-life decisions***
   The final part of the questionnaire consisted of seven questions regarding perceived stress, professional psychological support provided by the neonatal intensive care unit and psychological support provided by colleagues. The psychological support statements

were scored on a 5-point Likert scale, ranging from 'totally disagree' until 'totally agree'. Three of the seven questions differed between neonatologists and nurses because while physicians are the ones deciding the end-of-life decisions, nurses are often not included in the decision-making process and are consequently only involved in implementation

Ethical approval for this attitude survey was obtained from the Ethical Committee of Ghent University Hospital. Respondents took part in the survey on a voluntary basis. Sending back a filled-out questionnaire was seen as giving informed consent. A more detailed description of the methods can be found in chapter 4 and 6, used questionnaires (in Dutch) can be found in Appendix 3 and 4.

1.7.3 Face-to-face semi-structured interviews with neonatologists and neonatal nurses

In order to examine which factors, involved in the decision-making process, that could facilitate or impede neonatal end-of-life decision-making according to healthcare providers, we used a qualitative approach. This in order to fully cover the complexity and subtlety of the individual experiences of healthcare providers in the end-of-life decision-making process.

In-depth, semi-structured interviews were used because it allowed participants to tell their story freely without interruption or fear of not being able to speak openly in group conversations such as focus groups. Furthermore, semi-structured interviews are flexible, allowing us to collect richer qualitative data, whilst still being able to provide some structure in order to make sure that key research questions were formulated similarly in every interview.

Two groups of healthcare providers were included in the study, namely neonatologists and neonatal nurses working in a neonatal intensive care unit. Neonatologists were required to be a resident physician at a neonatal intensive care unit in one of the four participating hospitals, as opposed to an assistant physician in training. Furthermore, they should have been the attending/treating physician to at least one child that died at the ward where the death was preceded by an end-of-life decision in the past year. Neonatal nurses were also required to work in a neonatal intensive care unit in one of the four participating hospitals. Additionally, they should have been the most involved nurse to at least one child that died at the ward where the death was preceded by an end-of-life decision in the past year.

Recruitment took place at four hospitals, namely Ghent University Hospital, Brussels University Hospital, Leuven University Hospital and AZ Sint-Jan Brugge-Oostende. All neonatologists and nurses in the four neonatal intensive care units were notified of the study by a recruitment letter from the researchers, distributed by a representative neonatologist at their own ward. Purposeful sampling was used to select participants. Both neonatologists and nurses were free to participate on a voluntary basis. Participants were recruited and interviewed between December 2017 and July 2018. Interviews took approximately one hour on average and took place either at the neonatal ward in a secluded meeting room, or in the comfort of their own home. Data was collected until no new information emerged for both neonatologists and nurses separately, and data saturation was achieved.

A concise topic guide was used during all interviews. This topic guide (in Dutch) can be found in Appendix 5 and 6. After every interview an evaluation took place so that necessary alterations to the topic guide could be made, since this is inherent to qualitative research. At the beginning of every interview, participants were asked to fill out some questions regarding their demographic characteristics such as gender, age, years of experience working in a neonatal intensive care unit and education level.

Interviews were audiotaped and transcribed verbatim. Two researchers coded the interviews independently and openly by means of inductive coding during which they searched for facilitators and barriers that influenced the end-of-life decision-making process. The first eight interviews were coded by both researchers. After five interviews a first discussion on code nodes and trees occurred. The other 22 interviews were coded by one of the researchers. Code nodes and trees were discussed amongst both researchers at regular meetings, and during two separate meetings afterwards with all co-authors. When coding discrepancies occurred, consensus was sought.

Ethical approval was obtained from the ethical committees of the participating hospitals, namely Ghent University Hospital, Brussels University Hospital, Leuven University Hospital and AZ Sint-Jan Brugge-Oostende. A more detailed description of the methods can be found in chapter 5.

1.8 Dissertation outline

This doctoral dissertation is divided into four parts. Part I starts with a general introduction to end-of-life decision-making in the prenatal and neonatal context. Following this general introduction, the objectives and research questions of this dissertation are stated, including the different methodologies used to examine them. Chapters 2-6 are based on articles which have been published, accepted or submitted for publication. All of those chapters can also be read independently.

The two main research aims of this dissertation are addressed in two separate parts (part II and part III). Each part consists of a couple of chapters that answer the specific research questions of each aim.

Part II offers an overview on the methodology used to study foetal-infantile end-of-life decisions on a population level in Flanders, and a detailed description of the prevalence and trends of these end-of-life decisions in neonates. This part aims to describe the mortality follow back survey-method in the foetal-infantile period as mentioned on page 23, and to answer research questions 1-2 as mentioned on page 24.

Part III consists of an exploration into attitudes, views and experiences of healthcare providers involved in neonatal end-of-life decisions. Within this part, we transcend frequencies and prevalence, and attempt to describe how involved healthcare providers actually experience these end-of-life decisions in daily practice. Part III covers research questions 3-5, as described on page 24-25.

Part IV of this dissertation consists of a thorough reflection on its strengths and limitations, an overview of the main findings of the doctoral study, an overall discussion of the findings, and a discussion on the implications of these findings for prenatal and neonatal practice, policy, and future research.

Lastly, an English and Dutch summary of the main findings, curriculum vitae and list of publications, and appendices conclude the dissertation.

1.9 Reference list chapter 1

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Part 2
Medical end-of-life decisions in stillbirths, neonates and infants in Flanders

Chapter 2: A post-mortem population survey on foetal-infantile end-of-life decisions: a research protocol

Chapter 3: End-of-life decisions in neonates and infants: a repeated population-level mortality follow-back study

Chapter 2

A post-mortem population survey on foetal-infantile end-of-life decisions: a research protocol

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Abstract

Background: The death of a child before or shortly after birth is frequently preceded by an end-of-life decision (ELD). Population-based studies of incidence and characteristics of ELDs in neonates and infants are rare, and those in the foetal-infantile period (>22 weeks of gestation – one year) including both neonates and stillborns, are non-existent. However, important information is missed when decisions made before birth are overlooked. Our study protocol addresses this knowledge gap.

Methods: First, a new and encompassing framework was constructed to conceptualise ELDs in the foetal-infantile period. Next, a population mortality follow-back survey in Flanders (Belgium) was set up with physicians who certified all death certificates of stillbirths from 22 weeks of gestation onwards, and infants under the age of a year. Two largely similar questionnaires (stillbirths and neonates) were developed, pilot tested and validated, both including questions on ELDs and their preceding decision-making processes. Each death requires a postal questionnaire to be sent to the certifying physician. Anonymity of the child, parents and physician is ensured by a rigorous mailing procedure involving a lawyer as intermediary between death certificate authorities, physicians and researchers. Approval by medical societies, ethics and privacy commissions has been obtained.

Discussion: This research protocol is the first to study ELDs over the entire foetal-infantile period on a population level. Based on representative samples of deaths and stillbirths and applying a trustworthy anonymity procedure, the research protocol can be used in other countries, irrespective of legal frameworks around perinatal end-of-life decision-making.

2.1 Background

Recent decades have seen an increase in possible medical and technical interventions for critically ill neonates and infants[1]. However, in Flanders, Belgium about 8.7 per thousand children still die during the foetal-infantile period, i.e. from foetuses of more than 500 grams or 22 weeks of gestation up until one year after birth[2]. This is comparable with death rates reported, for instance, in the United States[3]. Many of these deaths occur at neonatal intensive care units (NICUs) and are preceded by a possibly life-shortening end-of-life decision (ELD)[4–6]. In neonates, these include non-treatment decisions such as withholding or withdrawing life-sustaining treatment, intensification of alleviation of pain and/or other symptoms with a potential life-shortening effect and intentionally ending life with lethal drugs[7]. Additionally, prenatal diagnostic techniques (genetic techniques, prenatal imaging techniques) have evolved considerably, leading to an increasing number of congenital malformations being diagnosed prenatally instead of after birth[8,9]. Some decisions such as abstinence from treatment[8–10] or termination of pregnancy (TOP)[8,9] can be made during gestation in cases of the detection of serious abnormalities[11–13]. For stillbirths from 22 weeks of gestation and onwards – which is considered as the definition of a viable foetus by the WHO – TOPs are considered late terminations. Stillborns and deceased neonates cannot be seen as separate patient populations, since they are in essence the same patient where an ELD can be made either before or after birth. The only difference is therefore the occurrence of birth and not necessarily a difference in disorders or congenital anomalies. Research into end-of-life decision-making on a population level should therefore take into account the foetal-infantile period in its entirety (instead of both periods separately). This is needed to provide reliable incidence rates and information on the decision-making process in this vulnerable population. Evaluation and monitoring of ELD practice in the entire foetal-infantile period could lead to better understanding of current prenatal and neonatal health care and detect points of improvement since there have been no all-inclusive guidelines up to the present.

Population-based studies (i.e. with *all* death cases as the focus) are ideal to study the incidence and characteristics of ELDs, but such studies are rare in neonates and infants[14–16] and, to our knowledge, non-existent in stillborns. In neonates, results are mostly based on reviews of medical records of a NICU at a particular hospital. In these studies 40% to 93% of deaths in a NICU follow withdrawal of life-sustaining treatments[6,17–19]. The larger scale EURONIC study was based on physicians' self-reported practices within 143 European NICUs in the 1990s[20]. The only population-based studies are from the Netherlands (in 2014) [15] and Belgium (in 2000)[14]. These studies found an ELD being made in 60% of all deaths of neonates and infants. In stillborns, previous studies in 2003[11] and in 2000-2005 [13] have only looked at the prevalence of late TOP[11,13,21]. Not much is known about the entirety of end-of-life practices (including decisions other than TOP) and their decision-making process, or about patient characteristics besides gestational age and the presence of foetal anomalies.

We developed a study design to evaluate and monitor ELDs and their decision-making process across the entire foetal-infantile period in Flanders, Belgium. The study design involves the development of a validated conceptual framework of ELDs spanning the entire foetal-infantile period (based on existing frameworks) and the development of a survey methodology that addresses the particular difficulties in capturing and surveying stillbirths and neonatal deaths, and provides opportunities for comparison of ELD practices between hospitals.

2.2 Methods

This population study has the design of a mortality follow-back survey based on all death certificates of stillbirths and neonates. Questionnaires are either sent to the certifying physicians by post or are provided at maternity wards. In order to develop these questionnaires, adjustments to an existing neonatal ELD framework needed to be made.

2.2.1 Conceptual framework of foetal-infantile ELDs

Prenatal ELDs should be taken into account when presenting a reliable and complete picture on foetal-infantile ELD practices. However, to date these prenatal ELDs have not been included in a comprehensive framework with neonatal ELDs. We adjusted a previously existing and validated framework of ELDs in neonates[7] in order to include both prenatal and neonatal ELDs. This framework[7] includes three dimensions: 'medico-technical', 'medico-ethical' and 'consultation with parents'. The dimension 'consultation with parents' was excluded from our own framework since no decision can be made prenatally without at least the mother consenting to an intervention. Furthermore, the dimension 'consultation with patients' is also excluded from the adult ELD framework where the medical decision and its intention are the only determinants of an ELD. However, this dimension is still very important which is why consultation with parents will still be addressed in detail by means of additional questions outside the ELD framework. These encompass the following:

1. The **medico-technical classification or medical acts**[7,22]:
   - non-treatment decisions such as withholding or withdrawal of life-sustaining treatment
   - administering drugs or medical interventions
2. The **medico-ethical classification or the life-shortening intention** of the physician can be[7,14]:
   - no intention but taking into account a potentially life-shortening effect
   - the potentially life-shortening effect is not the main goal but partly intended (co-intention)
   - an explicit life-shortening intention.

To cover all possible decisions that could possibly influence the death of a foetus or infant, both dimensions should be taken into consideration. As a side note, intentionally ending the life of a child is illegal, meaning that in this case, the medico-ethical dimension is considered to be all the more important since no emphasis is put on the medico-technical classification specifically.

We presented this framework for validation to gynaecologists in eight individual interviews and two expert panels representing seven different hospitals. The gynaecologists were asked to give clinical examples for all possible ELD categories applied to the prenatal context, and to add more categories in case any were missing. As soon as a realistic example was given and agreed on by others, that ELD was considered possible and included in the framework (Table 2.1). The resulting foetal-infantile ELD framework was then thoroughly reviewed by three neonatologists.

Literature on end-of-life practices prior to stillbirth distinguishes between non-aggressive obstetric management and TOP[9,10,23]. Non-aggressive obstetric management (or abstinence from treatment) is the denial of interventions which are needed to sustain the life of the foetus because of a poor foetal prognosis[8–10]. TOP however, actively ends foetal life[8,9] by preterm induction of labour either with or without feticide (administering medication to intentionally end the life of the foetus before birth) prior to the termination[24].

Medical-technical classification	Life-shortening Intention	End-of-life practices prior to stillbirth	End-of-life practices in neonates and infants
Non-treatment decisions	No intention	e.g. no tocolysis in preterm labour at 24 weeks' gestation	e.g. no antibiotics
	Co-intention		e.g. no cardiac surgery
	Explicit intention	e.g. no intrauterine transfusion for an anaemic foetus	e.g. withdrawing ventilation
Drug administration or medical intervention	No intention		e.g. start-up of anticonvulsive therapy
	Co-intention		e.g. administering morphine
	Explicit intention	e.g. termination of pregnancy with feticide	e.g. administering muscle relaxant

Table 2.1 A comprehensive framework of end-of-life practices in the foetal-infantile period.

2.2.2 Questionnaires

Based on this adjusted framework, two separate but similar questionnaires were developed for ELDs in stillborns and ELDs in neonates respectively, since both populations have their own specificities. Both questionnaires include questions about ELDs, the decision-making process, the involvement of parents in this process, the involvement of colleagues and experts, and the ELD policy of the hospital.

For neonates and infants, previously validated questionnaires that focus on end-of-life decisions in minors and neonates[14,16,25] were used as the basis for our questionnaire. We mainly focused on updating the terms and grammar used, term ambiguity, length of the questionnaire and comparability to the previous ELD study[14]. The resulting questionnaire was thoroughly pilot tested and validated with eight neonatologists who represented all eight Flemish NICUs, researchers in the field of end-of-life care and an ethicist.

For ELDs in stillborns a new questionnaire was developed based on previously validated questionnaires on TOP after 22 weeks[11,12], questionnaires on ELDs in minors and neonates[14,16,26], and the newly developed framework for end-of-life practices in the foetal-infantile period. This questionnaire was thoroughly pilot tested and validated with eight gynaecologists, three

neonatologists, researchers in the field of end-of-life care, an ethicist and a lawyer in the field of end-of-life care.

Neither questionnaire asks directly about categories of ELDs but classifies these based on a series of core questions following the two dimensions of the conceptual framework about 1) which act or omission was used (medico-technical), and 2) which life-shortening intention was associated with the act (medico-ethical). Additional questions were asked about the ways in which parents were involved in the decision-making process (parent consultation).

2.2.3 Population and setting

The population includes: all stillbirths from 22 weeks of gestation or more and/or a birthweight of 500g or higher (i.e. the internationally acknowledged limit of viability of the foetus[24,27,28]) and all deceased neonates and infants under the age of one year occurring in Flanders and Brussels where the mother is a Flemish resident. No sample is drawn; the full population is included over a data collection period of 12 months for stillbirths and 16 months for neonates and infants. The longer observation period for neonate and infant deaths was chosen because these deaths are less common than late termination stillbirths[2] and we wanted to obtain a population large enough to make reliable prevalence estimates of end-of-life practices.

Deaths to be included in the study are identified using the death certificate. Every death of a Flemish resident in Flanders and Brussels must be declared by means of a death certificate to the Flemish Agency for Care and Health of the Ministry of the Flemish Community or the Brussels Health and Social Observatory respectively. The physician, in our study most probably a neonatologist, paediatrician or gynaecologist, completes the main part of the death certificate which indicates the sex of the child, the date of birth and the date of death, medical information such as the cause of death, whether or not the child was alive at the time of birth, and the time and place of death[29]. The physician then signs the certificate and adds his or her medical registration number. The death certificate is then sent to the civil registrar of the municipality where the death took place where additional information is completed on the death certificate such as socio-demographic information about the child and its parents. Certificates are then processed by the provinces before being sent to the central administration authorities. It can take up to three months for death certificates to reach these administration authorities.

2.2.4 Design and procedures

A mortality follow-back procedure is followed**,** slightly modifying well-established procedures in adults[22] and minors[26]. Modifications concern a more stringent anonymity procedure and an alternative identification procedure for stillbirths between 22 and 26 weeks. As for the anonymity procedure, ethical and legal considerations (criminal prosecution is possible for reported illegal ELDs) make it necessary to pay greater attention to the protection of confidentiality of the physician, to the privacy of the deceased, the parents and the relatives, and to the security of the data that will be obtained in the survey. By ensuring total anonymity, both the response rate and the reliability of the responses can be improved. The different stages of the

survey i.e. the mailing, receiving and processing of the questionnaires will be separated and performed by four separate entities (see figure 2.2).

1. ***The death certificate administration authorities*** (namely Flemish Agency for Care and Health of the Ministry of Welfare, Health and Family of the Flemish Government) is responsible for construction and management of the mailing database and the mailing of the questionnaires. Each case is ascribed a unique coded number derived from the death certificate number. These unique numbers are used at the end of the study to link the questionnaires to the demographic and morbidity data (such as ICD-10 codes of the cause of death) of the deceased, derived from the death certificates, in a database provided by the administration authorities. An accompanying letter is included with the questionnaire providing the physician with enough patient characteristics to identify the patient. These include sex, date of (still)birth, date of death and municipality of death; for stillborns the date of death is replaced by the date of birth of the mother. When the lawyer (see below) receives the questionnaire he or she reports back to the Flemish Agency for Care and Health; all identifiable data related to the patient and the physician in question is then removed from the study database. A follow-up mailing of three reminders is performed 14, 28 and 42 days after the initial questionnaire was sent (following the Total Design Method[30]).
2. ***The physician*** identifies the deceased or stillborn child based on the patient characteristics provided, fills out the questionnaires and returns these to a lawyer using a postage paid envelope. In case the certifying physician is not the treating or attending physician he or she is given specific instructions to pass the questionnaire to the treating physician if possible.
3. ***The lawyer***, who is bound by confidentiality, safeguards the anonymity of the questionnaires. He or she codes the participating hospital wards so that comparisons can be made, and removes any possible identifying information of hospital, physician or patient, removes the unique numbers and reports these to the administration authorities. Additionally, place of death will not be sent to the researchers in order to ensure anonymity of the participating hospitals. The lawyer links the questionnaires with the information on the database from the death certificate administration authorities, and at the end of the data collection sends the linked database to the researcher group in which all identifiers will be removed and information can no longer be traced back to the corresponding death certificate.
4. ***The research group*** receives questionnaires and ensures that both in processing and analysing the database it will not be possible to determine the identity of the patient or the physician.

An alternative identification procedure for stillbirths between 22 and 26 weeks is included because the death certificate method proves to be challenging for stillbirths in that age group. Filling in death certificates of stillbirths between 22 and 26 weeks of gestation by a physician is not mandatory, which makes the death certificates a potentially incomplete sampling framework. We provided questionnaires to the ten biggest maternity wards in Flanders and the Flemish hospitals of Brussels so that physicians can fill out this questionnaire for every stillbirth from 22 weeks of gestation onwards and/or child with a birthweight from 500 g onwards. These maternity wards were chosen based on the presence of a NICU at the hospital, because of a high

birth rate and/or because they are tertiary centres for prenatal diagnostics. For each stillbirth for which a questionnaire is completed, the physician is also asked to fill out a death certificate. This makes it possible for the lawyer to link the answers in the questionnaire to the clinical and demographic characteristics of the stillborn child (for a schematic overview of this procedure, see figure 2.3). The physician sends the questionnaire, together with a separate letter containing patient identification details to the lawyer and sends the certificate to the official death certificate agency. Because the latter sends patient identification details of death certificates for stillbirths to the lawyer, the lawyer can then determine whether a questionnaire has already been received for that death and notify the Flemish agency for Care and Health via email. In this case, no questionnaires are sent by the death certificate agency. The separate letter with patient identification details is destroyed as soon as the questionnaire is linked to the corresponding death certificate. If a physician did not fill out the questionnaire available in the maternity ward but did file a death certificate, they will still receive a questionnaire through the regular postal survey.

2.2.5 Improving response rates

To increase response, we follow the Total Design Method (TDM)[30]. Therefore, physicians will receive a maximum of three follow-up postal mailings. In order to further improve the response rate both in stillborns and in neonates and infants we will add an additional general follow-up. Every three to four months one of the researchers will visit all eight Flemish NICUs and all ten participating maternity wards to inquire about the course of the study. During visits, physicians will be able to ask questions, voice concerns or give general feedback. These visits are also meant to counter responder fatigue by stimulating motivation for the study duration. Furthermore, three consortium meeting will be organised to discuss the progress of the study with representatives of every NICU (one before the start, one half way through and one at the end of the study). Lastly, the study is also presented at relevant conferences and meetings.

2.2.6 Ethical aspects and data protection

The sensitivity of the research population and the delicate nature of our questionnaire makes it necessary to follow a rigorous ethical approval procedure. Ethics approval was obtained from the ethics committee of the University Hospital of Ghent and additionally from the Privacy Commission (CBPL), the Sectoral Committee of Social Security and Health, and the National Council of the Order of Physicians. For our parallel procedure in the ten biggest maternity wards, we obtained ethics approval from the ethics committees of all participating hospitals.

To ensure privacy and anonymity, as well as the precautions that have already be taken by using a lawyer, we strive to ensure full data protection. The data are always password protected and stored on a protected server. The database is not replicated or shared with third parties; all copies needed for analysis are destroyed afterwards.

2.2.7 Data-analysis

An SPSS 24.0 (SPSS Inc.) file is set up by the research group with a coding scheme for a certified data management company that will enter the data. The researchers will perform all data cleaning through SPSS syntax operations. Data will be analysed with descriptive statistics (valid percentages), bivariate and multivariate association statistics.

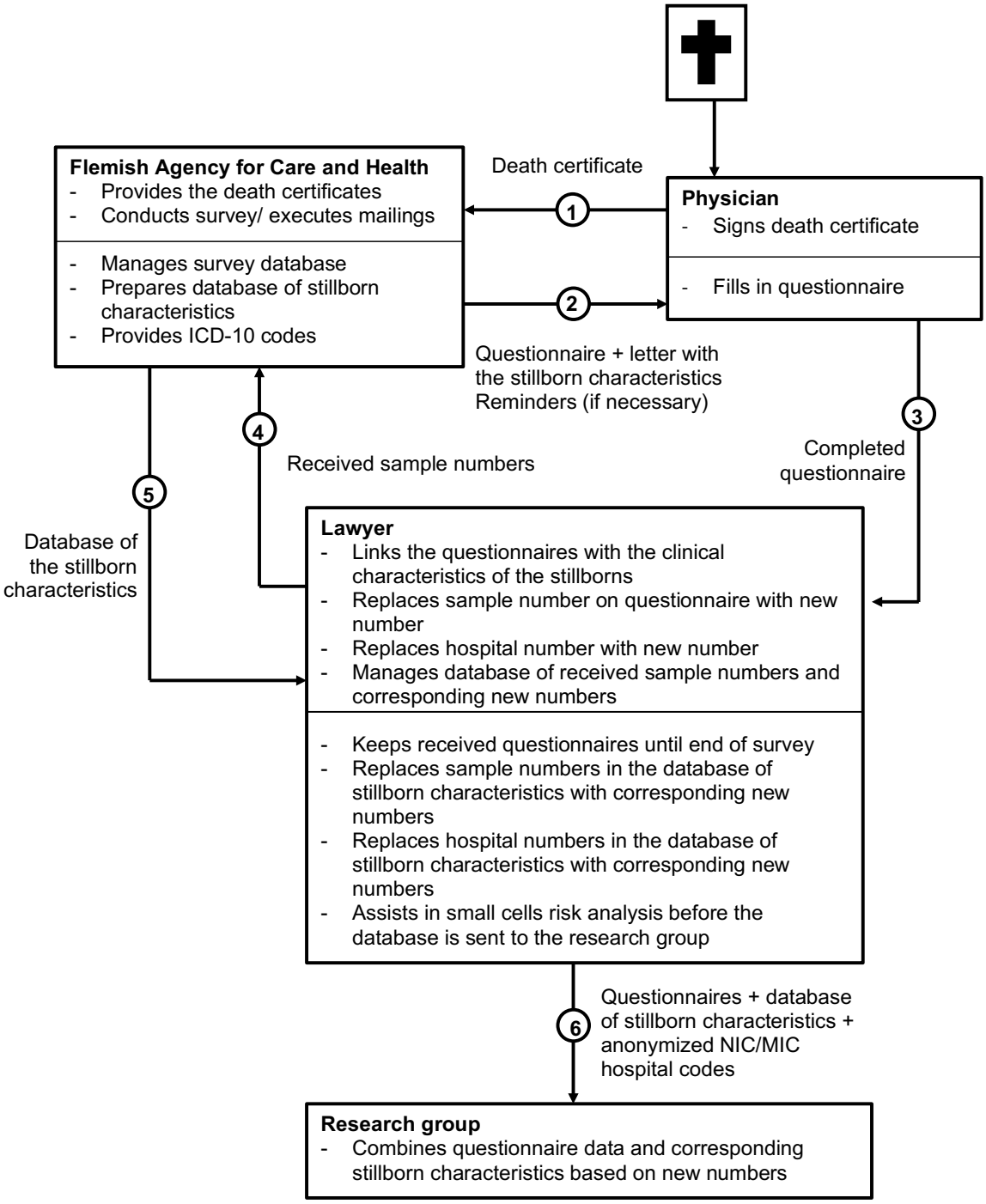

Figure 2.2 Schematic overview of the mailing and anonymity procedure.

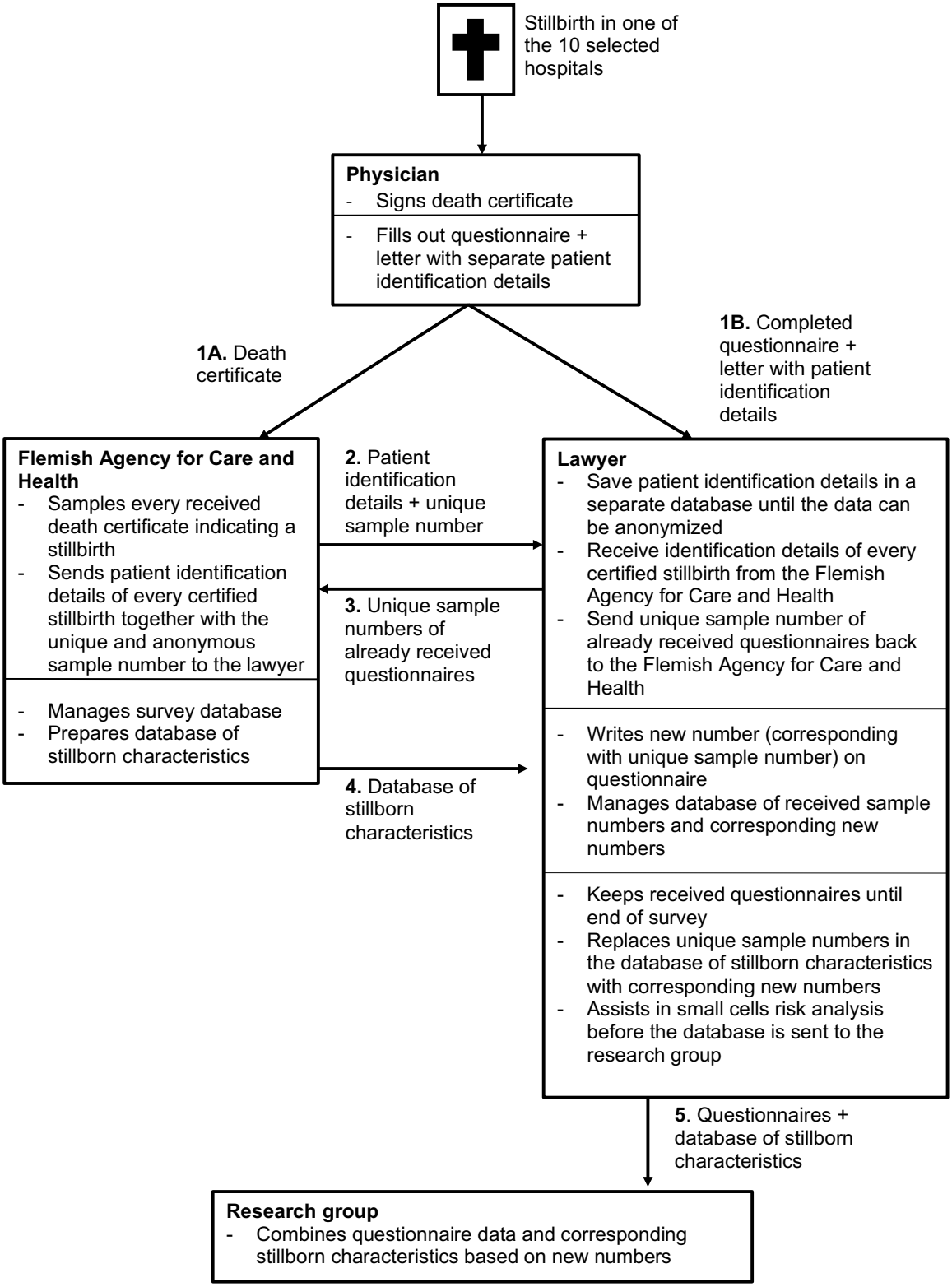

Figure 2.3 Schematic overview of the parallel procedure in the ten biggest maternity wards.

2.3 Discussion

The objectives of this population study are to evaluate and monitor ELDs and their decision-making process in the foetal-infantile period including ELDs in the foetal and the neonatal period. This study design has several potential strengths as well as some limitations associated with the study population and the survey method.

2.3.1 Strengths

Our study is the first to examine foetal-infantile ELDs in their entirety. The results will broaden knowledge on which medical decisions are made in cases of congenital anomalies or severe disorders from the moment of viability, regardless of whether or not the child has been born. Even though ELDs have been researched both prenatally[11,13,21] and in neonates[14,16,31], the continuity of care and the overarching decision-making process has been missed in previous studies and therefore key elements (such as whether the ELD was made prenatally but performed after the child is born) could be overlooked.

Even though there are some studies comparing late TOP practices across European countries[11,13,21], not much is known about the full scope of end-of-life practices before birth (including non-treatment decisions) and their decision-making process. However, non-treatment decisions such as non-aggressive obstetric management with or without explicit intention to shorten the life of the foetus can also occur. One of the strengths of our study is therefore the inclusion of all types of possible ELDs in neonates and also before birth. Furthermore, even when the child died postnatally we inquire about decisions being made prenatally and thereby provide a full overview of ELDs without prior focus on one specific ELD.

Most research on ELDs in prenatal[11,13] and neonatal[6,17,20] settings is limited to single centre studies and based on reviews of medical records. Population-based studies based on officially registered death certificates, like ours, are however far more capable of obtaining robust data and reliable incidence rates since a nationwide scope ensures that the entire population is included. These could in turn lead to better understanding of current end-of-life care and detect points of improvement to benefit future parents and children with severe disorders. The only population-based study on Belgian neonatal ELDs dates back to 2000[14] and since then, important societal changes such as questioning futile medical end-of-life care and refuting the idea of curative treatment as being necessarily beneficial could possibly have had an effect on end-of-life practice in unborn babies and neonates[32].

Aside from population specific strengths, some strengths can be attributed to the death certificate method in particular. These include international comparability, lack of patient burden and consequent attrition rates, reliability of the data, anonymity, and exclusion of possible selection bias by selecting certain physicians for the study. An overview of the strengths related to the death certificate method, which has successfully been implemented in adults[33], minors[26] and neonates[14], can be found in the research protocol of Chambaere et al. (2008)[29].

2.3.2 Limitations

One of the weaknesses of the study is that the death certificate method provides a challenge in the case of stillbirth between 22 and 26 weeks of gestation because completing a death certificate is not mandatory at this age. Despite our added data collection method, we cannot guarantee 100% coverage of stillbirths. Nevertheless, the reports from the Flemish centre of Perinatal Epidemiology, which registers every birth, will be available after the study and will make it possible to estimate the number of missing cases. Furthermore, despite the additional data collection method there is also no way to ensure that physicians will always complete a death certificate (as it is not obligatory), even when they fill out the questionnaire. It is therefore possible that we will receive questionnaires which we are not able to link to a death certificate which will therefore be unusable for this study.

Delays in the processing of death certificates can reach up to four months before the questionnaire is sent to the physician in the first method[29]. Therefore, a recall bias cannot be excluded. However, no other registration of deaths up to the age of one year exists and the only other registration of all births (live and stillbirths) occurs at the Flemish centre of Perinatal Epidemiology. This consists of fewer missing cases, however, and the delay in processing these documents can be up to one year which would drastically decrease the reliability of the responses. Furthermore, this method of registration is due to be merged with the existing death certificate registration, making our method the most reliable for future trend research.

We include all stillbirths from 22 weeks of gestation onwards because this is internationally acknowledged to be the limit of viability of the foetus[24,27,28]. However, some congenital anomalies can be detected before this viability threshold so we cannot exclude an ELD having been made before the 22 weeks cut-off used in this study. Furthermore, most Flemish neonatology wards only consider viability from 24, 25 or even 26 weeks of gestation which could also have an impact on whether or not a death certificate is filled out.

2.3.3 Implications for future research and practice

Regular repetition of this study in the future is needed in order to monitor and evaluate changes in end-of-life practices in the foetal-infantile group. Because this study design allows application in other countries, we recommend international comparative studies to provide us with better insight into foetal-infantile end-of-life practices and incidence rates so that international foetal and neonatal care at the end of life can be optimised.

This can eventually aid the development of obstetrical, neonatal and paediatric guidelines to support an ethical end-of-life decision-making process.

2.4 Declarations

2.4.1 Ethics approval and consent to participate

For the neonatal part of this study, approval was obtained from the Ethics Committee of Ghent University (Belgian Registration Number B670201628795), the Privacy Commission (CBPL, registration number SA3/VT005071970), the National Council of the Order of Physicians (registration number BD/wc/89997) and the Sectoral Committee of Social Security and health (registration number SCSZG/16/234). For the prenatal section of this study, approval was obtained from the Central Ethics Committee of Ghent University (Belgian Registration Number B670201730997), the Local Ethics Committees of the participating hospitals in Flanders, the Privacy Commission (CBPL, registration number SA3/VT005071970), the National Council of the Order of Physicians (registration number BD/wc/89997) and the Sectoral Committee of Social Security and health (registration number SCSZG/17/029). Sending back the questionnaire was seen as consent to participate.

2.4.2 Funding

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Chapter 3

End-of-life decisions in neonates and infants: a repeated population-level mortality follow-back study

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Abstract

Background: Neonatology has undergone important clinical and legal changes in the past two decades and the implications for end-of-life decision-making in seriously ill neonates are unknown. We aimed to examine changes in neonatal end-of-life decisions (ELDs).

Methods: We performed a mortality follow-back survey for a full-population cohort of decedents under the age of one year between August 1999 and July 2000 and September 2016 and December 2017 in Flanders, Belgium. For each death, physicians were asked to complete an anonymous questionnaire about ELD-making preceding death. Questionnaire data were linked to clinical and sociodemographic information from the death certificates.

Findings: The response rate was 87% in 1999-2000 (253/292) and 83% in 2016-2017 (229/276). The proportion of deaths of infants born before 26 weeks of gestation was significantly higher (14% vs 34%, p=0.001). Prevalence of ELDs remained stable at 60%, with non-treatment decisions occurring in about 35% of all deaths and potentially life-shortening intensified administration of medication in about 15%. The use of medication with an explicit life-shortening intention was prevalent in 7% to 10% of all deaths (p=0.15). However, in early neonatal death (< 7 days old) the administration of medication with an explicit life-shortening intention was lower (12% versus 6%); while in late neonatal death (7-27 days old) this was higher (0% versus 26%).

Interpretation: Over a 17-year period the prevalence of neonatal ELDs has remained relatively stable at about three in five of all deceased neonates. In both study periods a non-negligible group of neonatal and infant death was preceded by a decision to intentionally hasten death by administrating medication. These findings call for an open debate and ethical and juridical reflection between healthcare professionals, ethicists and policy makers.

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3.1 Introduction

Despite a rise in prenatal diagnostic procedures and neonatal interventions[1,2], about one in 100 live-born children in developed countries dies before the age of one year[3,4]. Many of these deaths are preceded by a possibly life-shortening end-of-life decision (ELD)[5–7]. Neonatal ELDs include non-treatment decisions such as withholding or withdrawing potentially life-prolonging treatment, or administering pain and/or symptom relief medication, all with a potential or explicit life-shortening effect[7,8]. This raises the need for ethical and moral discussions among healthcare professionals and parents regarding the potential benefits of aggressive treatment versus reducing suffering by not unnecessarily prolonging life[9].

Despite attitude surveys indicating that healthcare professionals are in some cases prepared to make neonatal ELDs[7,10–12], studies on actual prevalence are rare. Most research is limited to single-centre studies, showing that between 40% and 93% of deaths follow withdrawal of life-sustaining treatments[6,13–15]. The larger scale international EURONIC studies reported non-treatment decisions as part of regular practice at the end of life of a neonate, and administration of drugs with explicit life-shortening intention, as rare in most European countries[5,16,17]. However, in these studies, the physician is the unit of study meaning reliable estimates of prevalence are impossible; to provide them, population-based studies are required[7,18,19] with the total population of neonatal deaths as denominator. Previously the only population-based studies were from the Netherlands and Belgium[7,19]. They show that a majority of neonatal deaths were preceded by an ELD, the most common being a non-treatment decision[7,19], and that intentionally hastening death by means of medication does occur in neonatal clinical practice[5,7].

As medical practice continued to evolve and new and improved treatment options have become available[2], end-of-life decision-making in neonates might have changed, suggesting new information is required. The only trend figures available are from death certificate studies in 1995, 2001, 2005 and 2010[19] in the Netherlands, indicating shifts in the prevalence of types of ELDs such as an increase in the percentage of non-treatment decisions and a decrease in drug administration with explicit life-shortening intention[19]. However, these findings might have limited external validity due to the existence of the Groningen protocol, under which intentionally hastening death in neonates with a severe condition under strict guidelines[20] is not prosecuted, creating a unique context that might not be relevant to other countries[20]. Therefore, an evaluation of changes to and prevalence of neonatal ELDs in different jurisdictions is warranted.

In this paper, we address the following research questions: 1) to what extent has the prevalence of different ELDs in neonates in Flanders (Belgium) changed over time 2) have the underlying reasons for the ELD changed over time and 3) have the socio-demographic and clinical profiles of infants whose death was preceded by these ELDs changed over time.

3.2 Methods

3.2.1 Design

We conducted a population-level mortality follow-back survey based on a cohort of all infants under the age of one year residing in Flanders who died between August 1999 and July 2000[7] (wave 1) and September 2016 and December 2017 (wave 2). The design of both studies was identical. STROBE guidelines for reporting cross-sectional research were used[i].

3.2.2 Setting and participants

All infants aged under one who died within the inclusion periods in Flanders or Brussels whose mother was a Flemish resident. Flanders and Brussels are two of the three semi-autonomous regions of Belgium with autonomy over the quality of health care. All deaths occurring in both regions are processed by the same central administration authority (the Flemish Agency for Care and Health). We included only deaths of Flemish residents to provide prevalence rates in a set population within one semi-autonomous region. The longer inclusion period in wave 2 was specifically chosen to ascertain a population large enough to ensure significant power to provide reliable trend analysis, based on information from the central administration authority[21].

All cases were identified through the death certificates signed within the inclusion period. Deaths must be declared by means of a death certificate. The physician fills out the main part, indicating demographic information (sex, date of birth, date of death) and relevant clinical information e.g. cause of death[8]. For each death, within four months of its occurrence the attending physician was asked to complete a questionnaire. The study design, mailing and anonymity procedure are described elsewhere[8]. To ensure reliability and avoid socially desirable answers, a robust method was implemented using a trusted third party as intermediary to ensure anonymity[8]. The Total Design Method was followed, including a maximum of three follow-up postal mailings[22].

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[i] The Strengthening the Reporting of Observational studies in Epidemiology (STROBE) guidelines were developed to improve quality in reporting observational studies. It is a checklist for authors to ensure adequate reporting (what was planned, done, found, and concluded) as well as assessment of the strengths and weaknesses of the study.[30]

3.2.3 Questionnaire and variables

The validated questionnaire developed in the 1999-2000 study was used as a basis to ensure comparability of data[7]. Both questionnaires first asked whether death had been sudden and unexpected; if not, an ELD was considered possible and physicians were asked whether they had:

- withheld or withdrawn life-prolonging medical treatment taking into account or explicitly intending hastening death
- intensified administration of medication, taking into account or co-intending hastening the death or
- prescribed, supplied or administered medication with the explicit intention of hastening death.

An ELD was thus defined as a medical decision with the potential or certain effect of hastening death. When more than one ELD was noted, that with the most explicit life-shortening intention was deemed most important; if more than one ELD with the same life-shortening intention was noted, administration of drugs ('active') prevailed over withholding or withdrawing treatment ('passive'). Follow-up questions were asked, including what was the most important reason for the ELD.

The same demographic and clinical patient data (place of death, sex, age at death, gestational age at birth and cause of death) were obtained from the death certificates in 2016-2017 as in 1999-2000. We used a deterministic linkage procedure to link death certificate with questionnaire data, and small cells analysis to ensure that linked death certificate data would prevent reidentification.

A clinically relevant categorization for the cause of death was developed to achieve homogenous groups with a similar cause of death without revealing detailed case-specific information. This categorization (see Table 3.1 for a description) was evaluated, in terms of completeness to classify all possible causes of death and clarity of descriptions, by four physicians working in neonatal and prenatal care. Cases were sorted into one of seven categories by a neonatologist (FC) and a researcher with experience in neonatal end-of-life care research (LDm) based on the underlying cause of death, denoted by ICD-10 codes, on the death certificate. When main cause of death was inconclusive, ICD-10 codes of other associated causes of death were taken into account. Categories are mutually exclusive.

The following cause of death categories were identified:

- Prematurity and related disorders: Death due to a direct cause of prematurity, immaturity or disorders related to prematurity. For example, necrotizing enterocolitis, intraventricular haemorrhage, respiratory distress syndrome, or death due to (extremely) low birth weight or low gestational age.
- Congenital anomalies - singular: Death due to a single congenital anomaly with a defect in one organ or organ system. For example, a congenital malformation of the heart or a spina bifida.
- Congenital anomalies - multiple or systemic disorders: Death due to the presence of multiple congenital anomalies in different organ systems, or due to a disorder that affects multiple organ systems. For example, chromosomal disorders, multiple congenital malformations diagnosed in one infant, or an inborn error of metabolism.
- Complications of pregnancy with repercussions on foetal growth or development: Infant died due to complications of pregnancy that had an influence on the growth or the health of the baby prenatally. For example, a cytomegalovirus infection with congenital infection of the foetus, or pre-eclampsia with severe intrauterine growth restriction.
- Acute complications of pregnancy and/or birth in a previously healthy foetus. For example, a placental abruption or birth trauma causing oxygen deprivation.
- Disorders acquired after birth: Death due to a non-congenital disorder, acquired after birth of a previously healthy baby. For example, infectious diseases resulting in multiple organ failure.
- Other: Cause of death was sudden, without previous diagnoses. Examples are sudden infant death syndrome, accidents or trauma.

Table 3.1: Cause of death categories in neonatology.

3.2.4 Statistical analysis

Demographic variables (place of death, age at death, sex, gestational age at birth, and cause of death) of all cases with a response from the physician were compared separately for both study periods by means of chi-square tests, Fisher's exact tests or Kruskal Wallis tests to examine non-response bias.

Chi-square tests and two-tailed Fisher's exact tests were used to compare changes over time in the prevalence of different types of ELDs and the socio-demographic and clinical characteristics associated with different types of ELDs (sex, age at death, gestational age at birth, and cause of death). Multivariable binary logistic regression was performed with ELD (yes/no) as dependent variable, and study period, age at death, gestational age at birth and cause of death as independent variable to account for possible confounding of the demographical variables. Additionally, a multivariable binary logistic regression model with these main effects and the interaction effects of these with the study period was performed to examine shifts in prevalence of an ELD in certain demographical groups over both periods, controlling for confounding of study period, age at death, gestational age at birth and cause of death. Multivariable analysis for the separate types of ELDs were not made due to small sample sizes.

3.2.5 Ethical approval

Ethical approval was obtained from the Ethics Committee of Ghent University (Belgian Registration Number B670201628795), the Privacy Commission (CBPL, registration number SA3/VT005071970), the National Council of the Order of Physicians (registration number BD/wc/89997) and the Sectoral Committee of Social Security and health (registration number SCSZG/16/234). This study was supported by all eight Flemish Neonatal Intensive Care Units.

3.2.6 Role of the funding source

This study was funded by a grant from the Research Foundation Flanders (FWO) and the special research fund of Ghent University (BOF). K. Beernaert is a Postdoctoral Fellow of the Research Foundation Flanders (FWO). The funding sources had no role in the conception and design of the study, nor in the data-collection, analysis and interpretation of the data, or the writing of the manuscript.

3.3 Results

We received 229 completed questionnaires for 276 deaths between September 1st 2016 and December 31st 2017 (83% response rate), and 253 questionnaires for 292 deaths between August 1st 1999 and July 31st 2000 (87% response rate). No significant differences in demographic characteristics between deaths with and without a response was found for both survey waves, therefore weighing of results was not necessary.

The 2016-2017 and 1999-2000 cohorts were similar in terms of place of death (respectively 92% vs 89% in hospital), age at death (55% vs 50% in the first seven days of life) and sex (Table 3.2). Statistically significant differences between both cohorts were found for gestational age (proportion of infant decedents born before 26 weeks of gestation was higher in wave 2 [34%] than wave 1 [14%]; p-value= 0.001) and cause of death (higher proportion of complications of pregnancy with [12 to 17%] and without repercussions for the foetus [8 to 15%], less 'other' causes of death [16 to 7%] in wave 2 than wave 1; p-value = 0.01).

	1999-2000 12 months		2016-2017 16 months		
All infant and neonatal deaths in study period	292		276		
All infant and neonatal deaths for which a response was received (response percentage)	253 (87%)		229 (83%)		
	N	**%**	**N**	**%**	**P-value**
Place of death[a]					0.34[a]
Hospital	225	89	210	92	
NICU		N/A	115	50	
Other hospital ward		N/A	95	41	
Home	18	7	15	7	
Other	10	4	4	2	
Age at death[b]					0.11
Early neonatal death (<7 days)	127	50	125	55	
Late neonatal death (7-27 days)	34	13	43	19	
Post neonatal death (>27 days)	92	36	61	27	
Sex[c]					0.46
Male	147	58	135	59	
Female	106	42	94	41	
Gestational age at birth[b]					0.001
< 26 weeks	36	14	72	34	
26-28 weeks	38	15	28	13	
29-31 weeks	19	8	10	5	
32-36 weeks	57	23	25	12	
≥ 37 weeks	101	40	76	36	
Cause of death[d, e]					0.01
Prematurity and related disorders	47	19	47	21	
Congenital anomalies singular	39	16	38	17	
Congenital anomalies multiple or systemic disorders	48	19	34	15	
Complications of the pregnancy with repercussions on foetal growth or development	30	12	40	17	
Acute complications of pregnancy and/or birth in a previously healthy foetus	20	8	34	15	
Disorders acquired after birth	26	10	19	8	
Other	41	16	17	7	

Percentages are column percentages calculated with all cases for which a response was received as the denominator. Missing values were limited: dataset of 1999-2000: gestational age, n=2 (0.8%), cause of death, n=2 (0.8%). Dataset 2016-2017: gestational age, n=18 (7.9%). Percentages were calculated without these missing cases.

[a] Differentiation between NICU and other hospital wards was only possible in the 2016-2017 dataset. Chi-square analysis were performed with three categories (hospital, home, other).

[b] Kruskal Wallis tests were used to compare differences for age at death and gestational age at birth between both time periods

[c] Two-tailed Fisher's exact tests were used to compare differences in sex between time periods.

[d] Pearson Chi-square tests were used to compare differences in cause of death between time periods.

[e] See Table 3.1 for description of the cause of death categories

N/A: not asked.

Table 3.2: Demographic and clinical characteristics of deceased neonates and infants in 1999-2000 and 2016-2017

No statistically significant differences in prevalence of types of ELDs were found between waves for the full population of deceased infants both in univariable and multivariable analysis (Table 3.3). An ELD was made in 61% of all deaths in wave 2 and 57% in wave 1. The most common ELD in both study periods was a non-treatment decision (37% of deaths in wave 2 and 34% in wave 1). Administration of medication taking into account a possible life-shortening effect was intensified in 14% of deaths in wave 2 and 16% in wave 1. Medication with an explicit intention to shorten life was administered in 10% (24 cases) of all deaths in wave 2 and 7% (17 cases) in wave 1. In wave 2, opioids were used in 20 cases, in 11 of those an additional sedative (barbiturates or benzodiazepines) and in four an additional muscle relaxant. In two cases a sedative only was given and in one a muscle relaxant only (not in table, type of drug info was missing for one case in 2016-2017). In wave 1 opioids were used in 14 cases; in five a muscle relaxant was administered in association. In three cases, potassium chloride was used.

	1999-2000 (12 months) n= 253[b]		2016-2017 (16 months) n= 229[b]		p-value[a]
	N	%	N	%	
No ELD possible (death entirely sudden and unexpected)	59	23	46	20	0.23
ELD possible, but not made (death non-sudden)	51	20	43	19	0.73
ELD made	143	57	140	61	0.31
Non-treatment decision	86	34	85	37	0.51
Withholding treatment	32	13	27	12	0.78
Withdrawing treatment	54	21	58	25	0.33
Use of drugs	57	23	55	24	0.75
Medication with hastening death taken into account or co-intended	40	16	31	14	0.52
Medication with an explicit intention to hasten death	17	7	24	10	0.15

When more than one ELD was noted by physicians, only the most important decision was used. The most important decision is the decision with the most explicit life-shortening intention. When more than one ELD with the same life-shortening intention was noted, administration of drugs (active) prevailed over withholding or withdrawing treatment (passive).

[a] Fisher's exact test: independent variable = study period, dependent variable = ELD type present yes/no.

[b] Column percentages: percentage of cases in that study period with that type of ELD category.

Table 3.3: Prevalence of end-of-life decisions (ELDs) in neonatology in Flanders, Belgium in 2016-2017 vs 1999-2000

Significant and substantial changes occurred within subpopulations depending on age at death (Table 3.4). In wave 2 ELDs were made significantly less often than in wave 1 in infants under the age of seven days (p-value = 0.01; 55% vs 72%). In those who died between seven and 27 days and those over 27 days, ELDs were made significantly more often in 2016-2017 than in 1999-2000 (74% vs 50% and 64% vs 38% respectively, p-values = 0.03 and 0.003). The increase can mostly be seen in those who died after withdrawal of treatment (26% vs 9% between 7-27 days and 31% vs 16% over 27 days old) and those who received intensified administration of medication with an explicit life-shortening intention (26% vs 0% between 7-27 days and 10% vs

2% over 27 days). The statistically significant differences between the two study periods in the prevalence of ELDs depending on the age of the infant were confirmed when controlling for possible confounding in the multivariable binary logistic regression (data not shown).

Univariate analysis revealed that, in infants born at full term (>37 weeks of gestation), the decision to withdraw treatment was made more often in wave 2 (34%) than in wave 1 (20%, p-value = 0.04) (table 3.4). No other differences in sociodemographic or clinical patterns for the specific ELDs were observed between cohorts.

Comparison between both study waves in reasons for making an ELD was invalid due to the possibility of indicating multiple reasons in wave 2 and only one in wave 1. In 60% of all ELD cases in wave 2, 'no real chance of survival' was indicated and in 50% 'no hope of a bearable future' (not in table). Where treatment was withheld or withdrawn, or medication without an explicit life-shortening intention was given, the main reason given was 'no real chance of survival' (62%, 76% and 62% respectively). Where medication was administered with an explicit life-shortening intention, the main reason was 'no hope of a bearable future' (91%).

	Any ELD[a]			Non-treatment decision[a]						Use of drugs[a]					
				Withholding			Withdrawing			Medication with a potentially life-shortening effect			Medication with explicit intention to hasten death		
	1999-2000	2016-2017	p-value[b]	1999-2000	2016-2017	p-value[b]	1999-2000	2016-2017	p-value[b]	1999-2000	2016-2017	p-value[b]	1999-2000	2016-2017	P-value[b]
Sex															
Male	58%	64%	0.33	14%	13%	0.86	20%	26%	0.32	16%	13%	0.40	7%	12%	0.15
Female	55%	57%	0.78	10%	10%	0.99	23%	24%	0.87	15%	15%	0.99	7%	9%	0.79
Age at death															
Early neonatal death (<7 days)	72%	55%	0.01	18%	18%	0.99	28%	22%	0.31	13%	10%	0.43	12%	6%	0.12
Late neonatal death (7-27 days)	50%	74%	0.03	15%	2%	0.08	9%	26%	0.08	26%	21%	0.60	0%	26%	N/A
Post neonatal death (>27 days)	38%	64%	0.003	4%	7%	0.71	16%	31%	0.05	15%	16%	0.99	2%	10%	0.06
Gestational age at birth															
< 26 weeks	61%	57%	0.84	25%	19%	0.62	11%	18%	0.41	17%	10%	0.35	8%	10%	0.99
26-28 weeks	74%	71%	0.99	16%	11%	0.72	29%	21%	0.58	18%	21%	0.77	11%	18%	0.48
29-31 weeks	68%	80%	0.67	16%	0%	N/A	11%	30%	0.31	21%	30%	0.66	21%	20%	0.99
32-36 weeks	49%	56%	0.64	9%	8%	0.99	28%	32%	0.79	11%	4%	0.43	2%	12%	0.08
≥ 37 weeks	51%	64%	0.07	9%	7%	0.78	20%	34%	0.04	17%	14%	0.84	5%	9%	0.37
Cause of death															
Prematurity and related disorders	64%	60%	0.83	15%	11%	0.76	23%	23%	0.99	15%	17%	0.99	11%	9%	0.99
Congenital anomalies singular	72%	74%	0.99	18%	16%	0.99	23%	34%	0.32	23%	16%	0.57	8%	8%	0.99
Congenital anomalies multiple	75%	71%	0.80	25%	12%	0.17	27%	29%	0.99	15%	21%	0.56	8%	9%	0.99
Complications of the pregnancy with repercussions for the foetus	67%	68%	0.99	13%	23%	0.37	17%	20%	0.77	30%	10%	0.06	7%	15%	0.45

Acute complications of the pregnancy and/or birth in a healthy foetus	75%	56%	0.24	10%	6%	0.62	30%	32%	0.99	30%	9%	0.06	5%	9%	0.99
Disorders acquired after birth	38%	63%	0.14	0%	5%	N/A	27%	16%	0.48	8%	16%	0.64	4%	26%	0.07
Other	10%	12%	0.99	0%	0%	N/A	7%	12%	0.62	0%	0%	N/A	2%	0%	N/A

Data was analysed by means of individual chi-square tests for each demographic characteristic (example all females) with study period as independent variable and the prevalence of the type of ELD (any ELD, withholding treatment, withdrawing treatment, medication with a potentially life-shortening effect and medication with an explicit life-shortening effect) as dependent variable.

[a] Row percentages. Percentage of infants with that sociodemographic or clinical characteristic that received that type of ELD within each study period. Example: percentage of male infants in 1999-2000 that died without an ELD.

[b] P-values represent the significance of difference of the Chi-square test. When significant, the percentage of cases with that clinical or sociodemographic characteristic (ex. Male) is significantly different in that category of ELD (including no ELD) in 1999-2000 compared to 2016-2017.

Missing values in gestational age: 2 cases in 1999-2000 and 18 cases in 2016-2017. Missing values in cause of death: 2 cases in 1999-2000.

N/A: not applicable, one of the cells in the comparison was equal to zero.

Table 3.4: ELD prevalence in different patient groups by sociodemographic and clinical characteristics over time; 1999-2000 versus 2016-2017

3.4 Discussion

This population-level mortality follow-back survey indicates that, when comparing a cohort of all infant decedents under the age of one year between August 1999 and July 2000 and September 2016 and December 2017, relatively modest changes have occurred in end-of-life decision-making practices. Despite changes in the clinical profile of the decedents (e.g. the proportion of neonatal deaths of extremely premature infants increased), deaths preceded by an ELD remained at about 60%, with non-treatment decisions being about 35%. In both study waves a non-negligible group of deaths was preceded by a decision to intentionally hasten death by administrating medication (7% in 1999-2000, 10% in 2016-2017). Prevalence of ELDs has substantially decreased in early neonatal death (<7 days), and substantially increased after the first seven days of life now compared to 17 years ago.

3.4.1 Strengths and limitations

Despite the sensitivity of the topic, we achieved high response rates (83% and 87%) by using a robust design with a rigorous follow-up procedure, making conclusions valid for the entire population of deceased infants under the age of one year irrespective of care setting or diagnosis. The questionnaire was developed based on existing and previously validated questionnaires on end-of-life decisions in neonates[7,19], minors[23] and adults[24,25], ensuring comparability over time, settings, countries and age groups. Socially desirable answers or unwillingness to participate were reduced by ensuring anonymity. Comparison of the response and non-response groups revealed no significant differences, indicating that results are generalizable to the entire population of Flemish deceased neonates.

In a mortality follow-back study recall and memory bias cannot be excluded since questionnaires were filled out up to four months after death. However, a death certificate is the population register with the shortest processing delay, making it the best method to study ELDs on a population level. Although other important actors in the decision-making process such as parents or nurses can provide useful information, we deemed the physician perspective as most important to report on the medical decisions made. A questionnaire with closed multiple-choice answers is less suitable for in-depth study of the decision-making process, as it fails to reflect the depth and reasoning behind a decision; however, it is the most reliable method of studying the prevalence of ELDs without demanding too much of responding physicians.

3.4.2 General discussion

An interesting finding in our study is the non-negligible proportion of infants who died after administration of medication with an explicit life-shortening intent, namely 7% of all deaths 17 years ago and 10% now. This result contrasts sharply with the decrease in the use of medication with explicit life-shortening intention which was seen in the Netherlands from 8% of all neonatal deaths in 2005 to 1% in 2010[19]. In the Netherlands, intentionally hastening death in extremely ill neonates is not prosecuted under strict guidelines in the Groningen protocol[20]. Evaluation of whether all due care criteria were applied in a specific case happens retrospectively, after which a decision is made whether or not a prosecution is warranted[20]. In Belgium such a protective

framework is lacking and intentionally hastening death by means of medication is thus not legally permissible. Possibly, the Groningen protocol, by setting up specific and detailed rules and procedures, has discouraged physicians in the Netherlands from engaging in practices to intentionally hasten death. Alternatively, it might have led to a different understanding of what constitutes death-hastening medical interventions with an explicit life-shortening intention in extreme cases and administering medication taking into account a possible life-shortening effect in other cases. It is also possible that Flemish and Dutch physicians make different rationalizations when reporting on identical questions.

Increased doses of sedatives and opioids were reported in the majority of cases where medication with an explicit life-shortening intention was administered. We can presume that this medication was administered to relieve the suffering of the neonates and infants for whom there was no hope of a bearable future or those who would not survive without life sustaining interventions, even when death was hereby hastened. This clinical practice fits within a palliative care context and decisions are probably made in the best interest of the child. It should be noted that the prevalence of administering medication with an explicit life-shortening intention in Flanders is considerably higher in neonates and infants (10%) as compared to minors (8%)[23] and adults (6%, including euthanasia)[26], raising the question of whether this practice needs to be monitored and evaluated more closely in such a vulnerable patient group.

In 2016-2017 the prevalence of administering medication with an explicit life-shortening intention and the withdrawal of life-sustaining treatment was higher after the first seven days of life than in 1999-2000. Availability of improved medical treatments[2] might have led to a more active initial therapeutic approach in severely ill neonates, who previously would have died shortly after birth. It seems that these treatments prove to be successful, as birth rates in Flanders increased by 4% in wave 2[3,27], yet neonatal and infant mortality in both periods remained stable despite a longer inclusion period in 2016-2017. However, as not all infants continue to benefit from this active approach and risk having a life with poor quality if intensive care is continued, it might have resulted in an increase in decisions to withdraw life-sustaining treatment or even administer medication with an explicit life-shortening intent after the first week of life. This is corroborated by our data indicating an increase in the use of medication with explicit life-shortening intention due to poor expected quality of life in 2016-2017, rather than due to the child not having any real chance of survival.

The decrease of the use of ELDs in the first week of life can possibly be related to the noticeable change in the population of neonatal deaths with a larger proportion of decedents now being extremely premature (<26 weeks of gestation). In contrast with 17 years ago, intensive care can now be offered to infants born at 24 weeks' gestation in Flanders[28]. Mortality in these extremely premature infants is still high, however[29], and they often die during the first week of life despite active treatment, without an ELD.

Despite changes in the prevalence of ELDs in specific age groups, the overall prevalence of ELDs stays relatively stable at about 60% of all neonatal deaths in Flanders, which is similar to that in the Netherlands (63%)[19], the only other country with reliable population-based prevalence rates. Similarly, the proportion of ELDs is higher in neonates than in children aged one to 17 years (36%)[23] and adults (48%)[26]. This is not surprising since deaths occurring in adults and minors are more often sudden and

unexpected, such as accidents or trauma, making ELDs impossible. The most prevalent neonatal ELDs are non-treatment decisions (35%), specifically withdrawing of life-prolonging treatment, which occurs in about one in four cases, a prevalence estimate comparable with non-population-based studies across Europe[6,13–15]. In a similar percentage of deaths in both study periods, intensive life-saving treatment was thus started only to be foregone at a later stage.

3.4.3 Conclusion

Over a 17-year period, the proportion of infant deaths in Flanders preceded by an ELD has remained relatively stable at about three in five, confirming that non-treatment decisions as well as intentionally hastening death by means of medication continue to be an integral part of medical practice in severely ill neonates. The difference between a non-negligible prevalence of administering medication with an explicit life-shortening intention in Flanders - a region where this practice is currently not regulated by means of a protocol or a law - and a low prevalence of the same practice in the Netherlands - which provides guidelines and regulations for best practice with the Groningen protocol – is remarkable. It may provide input for a societal debate about the need for revised guidelines, protocols or laws to shape end-of-life practice in neonatal and infant care and about the need for further research and evaluation to monitor and understand these decisions.

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3.6 Reference list chapter 3

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Part 3
Attitudes, views and experiences of healthcare providers on neonatal end-of-life decision-making

Chapter 4: Neonatologists and neonatal nurses have positive attitudes towards perinatal end-of-life decisions, a nationwide survey

Chapter 5: Barriers to and facilitators of end-of-life decision-making by neonatologists and neonatal nurses in neonates: a qualitative study

Chapter 6: Psychological support in end-of-life decision-making in neonatal intensive care units: full population survey among neonatologists and neonatal nurses

Chapter 4

Neonatologists and neonatal nurses have positive attitudes towards perinatal end-of-life decisions, a nationwide survey

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Abstract

Aim: Perinatal death is often preceded by an end-of-life decision (ELD). Disparate hospital policies, complex legal frameworks and ethically difficult cases make attitudes important. This study investigated attitudes of neonatologists and nurses towards perinatal ELDs.

Methods: A survey was handed out to all neonatologists and neonatal nurses in all eight neonatal intensive care units in Flanders, Belgium in May 2017. Respondents indicated agreement with statements regarding perinatal ELDs on a Likert-scale and sent back questionnaires via mail.

Results: The response rate was 49.5% (302/610). Most neonatologists and nurses found non-treatment decisions such as withholding or withdrawing treatment acceptable (90-100%). Termination of pregnancy when the foetus is viable in cases of severe or lethal foetal problems was considered highly acceptable in both groups (80-98%). Physicians and nurses do not find different ELDs equally acceptable, e.g. nurses more often than physicians (74% versus 60%, p=0.017) agree that it is acceptable in certain cases to administer medication with the explicit intention of hastening death.

Conclusion: There was considerable support for both prenatal and neonatal ELDs, even for decisions that currently fall outside the Belgian legal framework. Differences between neonatologists' and nurses' attitudes indicate that both opinions should be heard during ELD-making.

4.1 Background

Despite increased possibilities to detect and treat congenital anomalies [1], perinatal deaths still range from 1.1 to 4.8 per 1,000 births across European countries [2]. Many of these deaths occur either at maternity wards or neonatal intensive care units (NICUs) and are often preceded by an end-of-life decision (ELD) [3–5], such as withholding or withdrawing life-sustaining treatment, possibly life-shortening alleviation of pain and, or, other symptoms or deliberately ending life with a lethal dose of drugs [6] or third trimester or late termination of pregnancy (TOP) [7,8]. These ELDs can hasten death, in this study this includes both the passive decision to not prolong life and the active decision to (possibly) shorten life. The ethical dilemma in some of these situations between saving the infant's life and not knowing what the burden of suffering will be [9] needs thoughtful and professional deliberation of all parties involved in the decision-making process. These decisions are further complicated by disparate NICU policies, even within countries [10], and complex legal frameworks, making the attitudes towards prenatal and neonatal ELDs of the professionals involved integral to the process.

Although the neonatologist actually carries responsibility for the ELD, nurses are also involved in end-of-life discussions and the provision of care for the child and the family [11]. Physicians and nurses are key figures who have an influence both on each other and on the parents during an end-of-life decision-making process. Previous research has shown that, even in new-borns with the same pathology, there is variance between types of ELDs taken [12,13]. As well as the characteristics of the NICU staff [12], their attitudes may play a crucial role in end-of-life decision-making [3,14–16]. Even within a care team working closely together, important differences between physicians and nurses in attitudes towards ELDs have been found [17].

Previous studies on attitudes on ELDs for severely ill neonates in NICUs [14,15,18–20] are limited in several ways. Some population studies about attitudes towards neonatal ELDs date back almost two decades making it impossible to assess attitudes under current medical practice and legislation [14,15], others were limited to single centre studies [15,20]. In other studies on attitudes in perinatal care, the scope of the study was lacking. Firstly, some studies only included attitudes on appropriate treatment or non-treatment for infants born at the limit of viability (16,21,22) which fails to cover ELDs when a life-limiting foetal condition is diagnosed or when extremely ill neonates are born at term limiting the scope to a very specific group of infants. A second group of studies focusses on only prenatal or neonatal ELDs separately. Since attitudes and decisions before or after birth could possibly influence each other, and neonatologists are often consulted in prenatal ELDs [21], we feel like attitudes on both prenatal and neonatal ELDs should be included into one study. This is why our study focusses on attitudes on all perinatal ELDs instead of focussing on either prenatal or neonatal ELDs separately.

Therefore, this study addressed following research questions: what are the attitudes towards prenatal and neonatal end-of-life decision-making of neonatologists and neonatal nurses? What are the differences between neonatologists and neonatal nurses in their attitudes? And what is the influence of sex, age, profession and attitudes of neonatologists and neonatal nurses on the decisions they would consider as possible options in a hypothetical neonatal case?

4.2 Methods

4.2.1 Design and participants

We performed a full-population mail survey of all neonatologists and neonatal nurses in all eight NICUs in Flanders, Belgium; 83 physicians and 527 nurses were identified in total by means of personnel files at each NICU.

4.2.2 Data collection

A representative working at each NICU handed out the questionnaire to every neonatologist and neonatal nurse in their respective NICU on 1 May 2017 and invited them to fill it out and send it back by means of a prepaid envelope to the researchers before 31 May 2017.

4.2.3 Questionnaire

The questionnaire was based on an existing Flemish attitude questionnaire from the year 2000 on neonatal ELDs [14], adding questions about prenatal ELDs and describing a hypothetical and medically complex case. A multidisciplinary team consisting of three sociologists, two psychologists, three neonatologists, one gynaecologist developed the final questionnaire which was cognitively tested on five neonatologists from four separate hospitals, three neonatal nurses from two separate hospitals and one gynaecologist to ensure content validity of the items.

4.2.4 Measures

The questionnaire consisted of seven socio-demographic questions and 12 items on perinatal ELDs. Six of these attitude items focussed on neonatal ELDs and six items focussed on prenatal ELDs (late TOP). Attitudes were measured by indicating whether or not they agreed with the statements, scored on a five-point Likert scale. These ELD statements can be classified based on two dimensions. The first dimension is a medico-technical classification of the medical act as either a non-treatment decision, the administration of drugs or the implementation of medical interventions [22]. The second dimension is a medico-ethical classification of the life-shortening intention. We also presented a hypothetical case of a foetus born at 27 weeks gestation with additional complications; participants were given seven possible treatment options and were asked to indicate whether they would consider each option on a four-point Likert scale. Furthermore, it is important to note the legal context of ELDs in Flanders, Belgium, which is represented in Table 4.1.

In Belgium, termination of pregnancy after 12 weeks of gestation is possible when: - completing the pregnancy presents a serious threat to the woman's health - the child will suffer from a particularly severe ailment, acknowledged to be incurable at the time of diagnosis Deliberately ending the life of a neonate is not legally possible in Belgium. The only country that currently legally condones actively ending the life of a neonate under strict conditions is the Netherlands, in the following three distinct cases [23]: - physiologic futility of treatment in newborns with no chance of survival - infants who may survive after a period of intensive treatment, but their actual or foreseen suffering in the near future is severe and unbearable - infants with an extremely poor prognosis who do not depend on technology for physiological stability but whose suffering is severe and cannot be alleviated

Table 4.1: Legal framework

4.2.5 Statistical analyses

The data on attitude items were analysed with separate Kruskal-Wallis tests with group (neonatologists and neonatal nurses) as independent variable and the six ELD or six late TOP attitude items as dependent variables using SPSS 24.0 (SPSS Inc., Chicago, Illinois). A post-hoc Friedman test was performed to examine the differences in acceptance of the different types of neonatal ELDs. This Friedman test was performed in neonatologists and nurses separately and was adjusted for multiple testing by means of a Bonferroni correction. The Likert scale items were rescaled from a five-point to a three-point scale, indicating disagreement, neutrality and agreement. Next, a Principal Component Analysis (PCA) was performed on all attitude items to reveal the underlying structure of attitudes.

For the hypothetical case, we ran Kruskal-Wallis tests with group as independent variable and the six treatment options as dependent variables. All answers were dichotomised into not considering the option which includes not a good option and less good option and considering the option which includes good option and very good option. A separate multivariable ordinal logistic regression (PoLytomous Universal Models) was fitted for each treatment option with a 4-point Likert scale in order to estimate their association with sociodemographic characteristics and standardised scores on the PCA attitude components. Nonsignificant variables were eliminated from the final model by means of a backwards stepwise approach, significance levels were set at 0.05. Since age and years of experience working in an NICU setting are highly correlated, we opted not to include both into the same model and tested two alternative full models with these variables. When both stepwise eliminations for each statement did not result in the same results, we opted for the model with either age or years of experience, depending on which provided the best fit. When the same result was obtained, that was considered as the model

with the best fit. Odds ratios (OR) and 95% confidence intervals (CI) were provided. A professional statistician was consulted.

4.2.6 Ethical considerations

Ethical approval was obtained from the Ethics Commission of Ghent University Hospital (Registration number: B670201731709). If a filled-out questionnaire was sent back, this was seen as giving consent to participating in this study.

4.3 Results

Across all eight NICUs, the response rate was 63% (52/83) for neonatologists and 46% (250/527) for nurses. An overview of all demographic characteristics can be found in Table 4.2.

	Neonatologists N= 52 (%)	Neonatal nurses N= 250 (%)	P value[a]
Sex			<0.001
Female	37 (71.2)	237 (95.2)	
Male	15 (28.8)	12 (4.8)	
Age			0.73
< 30	12 (23.1)	75 (30.2)	
30-39	15 (28.8)	65 (26.2)	
40-49	11 (21.2)	53 (21.4)	
≥ 50	14 (26.9)	55 (22.2)	
Years of experience working in a			0.02
NICU	22 (42.3)	58 (23.3)	
< 5 years	8 (15.4)	34 (13.7)	
5-10 years	9 (17.3)	77 (30.9)	
11-20 years	13 (25)	80 (32.1)	
> 20 years			
Function of physicians		N/A	N/A
Neonatologist	39 (75)		
Specialist in training	13 (25)		
Degree nurses[b]			N/A
Graduate	N/A	3 (1.2)	
Bachelor	N/A	229 (92.3)	
Master	N/A	16 (6.5)	
Extra specialisation[c]		94 (37.9)	

Missing values: varied from 0.4% for sex and years of experience to 0.8% for age and degree in nurses. There were no missing values in neonatologists.
[a] Pearson chi-square
[b] Categories are not mutually exclusive
[c] Overview of the specific specialisations: 87.2% advanced bachelor neonatology and paediatrics, 2.1% advanced bachelor emergency and intensive care, 4.3% professional title in neonatology and paediatrics, 3.2% midwifery, 3.2% postgraduate

Table 4.2: Demographic characteristics of the study participants.

4.3.1 Attitudes towards neonatal ELDs

Overall, acceptability of all types of neonatal ELDs in certain cases of neonates with severe conditions is high in both neonatologists and nurses (60-100%) (Table 4.3). All neonatologists and 90.4% of nurses agreed that not initiating treatment for a neonate, taking into account the possibility that this could hasten the end of life, is acceptable (p=0.023). Acceptance of the administering of medication taking into account that it could hasten the end of life was higher in neonatologists (96.2%) than neonatal nurses (83.6%; p=0.024). Acceptance of administering medication with the explicit intention to hasten the end of life was higher in neonatal nurses (73.6%) than in neonatologists (59.6%; p=0.017).

Fewer neonatologists agree to actively administering medication with the explicit intention of hastening the end of life than they agree to withholding (p=0.013) or withdrawing treatment (p=0.013) taking into account the possibility that it could hasten the end of life (Table 4.4). This was also found in neonatal nurses. Furthermore, neonatologists agree more with administering medication taking into account the possibility that it could hasten the end of life than with administering medication with the explicit intention of hastening the end of life (p=0.042), while no significant difference between the two options was found for nurses. Other differences between the attitudes towards neonatal ELDs of neonatologists and nurses were not significant.

Item	Group	Disagree (%)	Neutral (%)	Agree (%)	P value (Kruskal Wallis)
Attitudes towards neonatal end-of-life decisions					
In certain cases of newborns with severe conditions it is acceptable: **not to initiate treatment**, taking into account the **possibility** that this could hasten the end of life	Neonatologist	0.0	0.0	100	0.023
	Neonatal nurse	4.0	5.2	90.4	
not to initiate treatment with the **explicit intention** of hastening the end of life	Neonatologist	0.0	0.0	100	0.081
	Neonatal nurse	1.6	4.0	94.4	
to withdraw treatment, taking into account the **possibility** that this could hasten the end of life	Neonatologist	5.8	5.8	88.5	0.154
	Neonatal nurse	7.6	12.8	79.6	
to withdraw treatment with the **explicit intention** of hastening the end of life	Neonatologist	7.7	5.8	86.5	0.992
	Neonatal nurse	3.6	10.4	86.0	
to administer medication, taking into account the **possibility** that this could hasten the end of life	Neonatologist	3.8	0.0	96.2	0.024
	Neonatal nurse	4.0	12.4	83.6	
to administer medication with the **explicit intention** of hastening the end of life	Neonatologist	21.2	19.2	59.6	0.017
	Neonatal nurse	7.2	19.2	73.6	
Attitudes towards prenatal end-of-life decisions and late termination of pregnancy					
Termination of pregnancy in the case of a viable foetus should be completely **prohibited**	Neonatologist	100.0	0.0	0.0	0.002
	Neonatal nurse	84.4	10.8	4.8	
Termination of pregnancy in the case of a viable foetus **at the request of the mother** is acceptable	Neonatologist	44.2	26.9	28.8	0.476
	Neonatal nurse	33.6	39.6	26.0	
If the **mother is healthy**, termination of pregnancy at a viable stage is acceptable in the case of a **lethal foetal medical problem**	Neonatologist	0.0	1.9	98.1	0.201
	Neonatal nurse	1.2	5.2	93.6	
If the mother is healthy, termination of pregnancy at a viable stage is acceptable in the case of a **severe foetal problem**	Neonatologist	1.9	5.8	92.3	0.041
	Neonatal nurse	4.8	14.8	80.4	
If the foetus is healthy, termination of pregnancy at a viable stage is acceptable when the **life of the mother is in danger**	Neonatologist	19.2	17.3	63.5	0.688
	Neonatal nurse	13.6	21.6	64.4	
If the foetus is healthy, termination of pregnancy at a viable stage is acceptable when the **mother has a severe psychological problem**	Neonatologist	61.5	23.1	15.4	0.474
	Neonatal nurse	54.8	30.0	15.2	

All attitude items were translated by a language editor

Table 4.3: Attitudes of neonatologists and neonatal nurses towards prenatal and neonatal end-of-life decision-making.

	Not initiating treatment taking life-shortening into account		Not initiating treatment with explicit life-shortening intention		Withholding treatment taking life-shortening into account		Withholding treatment with explicit life-shortening intention		Administering medication taking life-shortening into account		Administering medication with explicit life-shortening intention	
	Neonatologists chi-square (p value)	Nurses chi-square (p value)	Neonatologists chi-square (p value)	Nurses chi-square (p value)	Neonatologists chi-square (p value)	Nurses chi-square (p value)	Neonatologists chi-square (p value)	Nurses chi-square (p value)	Neonatologists chi-square (p value)	Nurses chi-square (p value)	Neonatologists (chi-square)	Nurses (chi-square)
Not initiating treatment taking life-shortening into account			-0.346 (1)	-0.353 (0.526)	0 (1)	-0.122 (1)	-0.385 (1)	-0.131 (1)	-0.125 (1)	-0.217 (1)	**-1.221 (0.013)**	**-0.542 (0.018)**
Not initiating treatment with explicit life-shortening intention	0.346 (1)	0.353 (0.526)			-0.346 (1)	-0.476 (0.068)	-0.038 (1)	-0.223 (1)	-0.221 (1)	-0.137 (1)	-0.875 (0.256)	-0.189 (1)
Withholding treatment taking life-shortening into account	0 (1)	0.122 (1)	0.346 (1)	0.476 (0.068)			-0.385 (1)	-0.253 (1)	-0.125 (1)	-0.339 (0.645)	**-1.221 (0.013)**	**-0.665 (0.001)**
Withholding treatment with explicit life-shortening intention	0.385 (1)	0.131 (1)	0.038 (1)	0.223 (1)	0.385 (1)	0.253 (1)			-0.260 (1)	-0.086 (1)	-0.837 (0.339)	-0.412 (0.211)
Administering medication taking life-shortening into account	0.125 (1)	0.217 (1)	0.221 (1)	0.137 (1)	0.125 (1)	0.339 (0.645)	0.260 (1)	0.086 (1)			**-1.096 (0.042)**	-0.325 (0.785)
Administering medication with explicit life-shortening intention	**1.221 (0.013)**	**0.542 (0.018)**	0.875 (0.256)	0.189 (1)	**1.221 (0.013)**	**0.665 (0.001)**	0.837 (0.339)	0.412 (0.211)	**1.096 (0.042)**	0.325 (0.785)		

All significant results (p value <0.05) are indicated in bold.

Table 4.4: Friedman test neonatal ELDs.

Attitudes towards late Termination of Pregnancy

All neonatologists disagreed with the statement that TOP when the foetus was viable should be prohibited, this was more than 84.4% of neonatal nurses (p=0.002). Almost all physicians and nurses agreed on the acceptance of late TOP in cases of a lethal foetal medical problem (98.1 vs 93.6 % respectively). Neonatologists found TOP when the viable foetus has a severe problem more often acceptable (92.3%) than nurses did (80.4%; p=0.041). When the viable foetus was healthy but the mother suffered from severe psychological problems 62% of neonatologists and 55% of nurses disagreed with termination of pregnancy.

4.3.2 ELD attitude components

The PCA resulted in four components. Items with a loading on a component higher than 0.5 were retained in that component. A first component included favourability toward neonatal ELDs with explicit intention of hastening the end of life. The second component indicated favourability towards neonatal ELDs where the possibility that the end-of-life could be hastened is taken into account. The third included favourability towards TOP at a viable stage and the last component included favourability towards late TOP for reasons concerning the mother (Table 4.5).

Item	Favourable towards neonatal ELDs with explicit intention to hasten the end of life	Favourable towards neonatal ELDs taking into account the possibility that it could hasten the end of life	Favourable towards late termination of pregnancy when the foetus is viable	Favourable towards late termination of pregnancy for maternal reasons
In certain cases of neonates with severe conditions it is acceptable **not to initiate treatment**, taking into account the **possibility that this could hasten the end of life**	-	0.741	-	-
In certain cases of neonates with severe conditions it is acceptable **to withdraw treatment** with the explicit intention of **hastening the end of life**	0.767	-	-	-
In certain cases of neonates with severe conditions it is acceptable **not to initiate treatment** with the **explicit intention of hastening the end of life**	-	0.699	-	-
In certain cases of neonates with severe conditions it is acceptable **to withdraw treatment** with the **explicit intention of hastening the end of life**	0.814	-	-	-
In certain cases of neonates with severe conditions it is acceptable to administer medication, taking into account the possibility that this could hasten the end of life	-	0.604	-	-
In certain cases of neonates with severe conditions it is acceptable to administer medication with the explicit intention of hastening the end of life	0.790	-	-	-
Termination of pregnancy in the case of a viable stage at the request of the mother is acceptable[a]	-	-	0.451	-
Termination of pregnancy in the case of a viable stage should be completely prohibited	-	-	0.732	-
If the foetus is healthy, termination of pregnancy at a viable stage is acceptable when the life of the mother is in danger	-	-	-	0.806
If the foetus is healthy, termination of pregnancy at a viable stage is acceptable in case of a where the mother has a severe psychological problem	-	-	-	0.783
If the mother is healthy, termination of pregnancy at a viable stage is acceptable in the case of a lethal foetal medical problem	-	-	0.724	-
If the mother is healthy, termination of pregnancy at a viable stage is acceptable in the case of a severe foetal problem	-	-	0.642	-
Cronbach's alpha	0.818	0.734	0.596	0.544

Standardised scores were calculated by attributing a weight equal to the component loading to each salient variable. A higher standardised score indicates more agreement with the items included in the component. The only exception to this rule is the item 'Termination of pregnancy in the case of a viable foetus should be completely prohibited', which was rescaled indicating that a higher score for this item corresponds with less agreement.
*this item loaded equally high on two components which is why we made the executive decision to place it within the component that best matched the content of that item. Also, this item was rescaled to match the other items in the PCA, indicating that a higher score for this item corresponds with less agreement to this item.

Table 4.5: Principal component analyses: component loadings.

4.3.3 ELD treatment options in a hypothetical neonatal case

In a neonatal case of a premature neonate with complications leading to severe long-term morbidity (Table 4.6), 81% of the neonatologists and 87% of the nurses did not find starting or continuing life-prolonging treatment a good to very good treatment option for them personally (p=0.34). We found significant differences between what neonatologists and nurses considered as good options for the following possible treatment options: not initiating treatment both with explicit intention (75% and 50.4% respectively) and taking into account the possibility of hastening the end of life of the neonate (88.5% and 63.3% respectively) and withdrawing treatment both with explicit intention (67.3% and 52.2% respectively) and taking into account the possibility of hastening the end of life (82.7% and 66.8% respectively). No significant differences were found for administering medication. Administering medication with the explicit intention of hastening the end of life of the foetus was indicated as a good option by 29% of neonatologists and 39% of nurses (p=0.16). While no large differences can be seen in the percentage of physicians and nurses who found non-treatment decisions (withholding and withdrawing treatment) acceptable with (86% and 100%) and without (80% and 100%), explicit life-shortening intention, we do see a lower percentage of both physicians and nurses finding non-treatment decisions with explicit life-shortening intention to be a good treatment option (50% and 75%) than non-treatment decisions without an explicit life-shortening intention (63% and 89%).

Hypothetical neonatal case of prematurely born infant with additional complications				
Aside from what parents (and physicians[a]) want, which of the following options are possible options for you personally regarding this case?	Group	Not a good or less good option (in %)	Good or very good option (in %)	P value (Kruskal Wallis)[b]
Starting or continuing life-prolonging treatment for the child	Neonatologist	86.5	13.5	0.338
	Neonatal nurse	80.9	19.1	
Not initiating treatment taking into account the possibility that this could hasten the end of life of the patient	Neonatologist	11.5	88.5	<0.001
	Neonatal nurse	36.7	63.3	
Not initiating treatment with the explicit intention of hastening the end of life of the patient	Neonatologist	25.0	75.0	0.001
	Neonatal nurse	49.6	50.4	
Withdrawing treatment taking into account the possibility that this could hasten the end of life of the patient	Neonatologist	17.3	82.7	0.024
	Neonatal nurse	33.2	66.8	
Withdrawing treatment with the explicit intention of hastening the end of life of the patient	Neonatologist	32.7	67.3	0.047
	Neonatal nurse	47.8	52.2	
Administering medication taking into account the possibility that this could hasten the end of life	Neonatologist	31.4	68.6	0.064
	Neonatal nurse	45.5	54.5	
Administering medication with the explicit intention of hastening the end of life of the patient	Neonatologist	71.2	28.8	0.159
	Neonatal nurse	60.7	39.3	

Case description: Liza is a twin, born at 27 weeks with extreme intra-uterine growth retardation. Her birth weight was only 500 g. The first few days of her life are remarkably uneventful: she breathes independently with the help of non-invasive respiratory support and enteral nutrition is introduced carefully. The ultrasound scan of her brain is completely normal. When she is eight days old, however, she has a gastric perforation leading to severe septic shock with multiple organ failure. The situation stabilises after a few days and her organs start functioning again. She appears to have entered a recovery phase, which is complicated, however, by severe dehiscence of the abdominal wound, exposing the intestines. This will certainly need a surgical intervention (if not several), but this is not yet possible at this stage. In addition, the brain ultrasound performed a few days later, shows rapidly progressing multicystic leukomalacia suggestive of widespread white matter damage. During a multidisciplinary discussion, the doctors agree that this will certainly lead to severe spastic quadriparesis. At this point, she is three weeks old, breathing autonomously with non-invasive respiratory support and haemodynamically stable, but obviously fed parenterally.

[a] This was added for questionnaires of neonatal nurses only.

[b] Difference between neonatologists and neonatal nurses.

Table 4.6: Treatment options neonatologists and neonatal nurses consider to be good options in a hypothetical neonatal case.

4.3.4 Relationship of attitudes, demographics and hypothetical treatment options

Those under 30 years old and those between 30 and 39, more than those over 50, indicate that continuing life-prolonging treatment is an acceptable treatment option in the hypothetical case (OR 3.45, 95% CI 1.82-6.54 and OR 1.91, 95% CI 1.01-3.61, respectively). In this case, men more than women agree that withdrawing treatment taking into account that this could hasten death is an acceptable treatment option (OR 5.72, 95% CI 1.32-24.83) (Table 4.7).

By using the PCA attitude components, we found that general attitudes were associated with which treatment options were considered as good to very good in a concrete hypothetical case (Table 4.7). A higher score on the first PCA component, 'favourability to neonatal ELDs with the explicit intention of hastening the end of life', indicates that respondents find ELDs with an explicit life-shortening intention more acceptable than others. Those with a high score on this first component are less likely to consider the treatment option of life-prolonging treatment than others (OR 0.75, 95% CI 0.66-0.85). This group is also more inclined to consider not initiating treatment (OR 1.50, 95% CI 1.32-1.70), withdrawing treatment (OR 1.60, 95% CI 1.41-1.82) and administering medication with the explicit intention of hastening the end of life (OR 1.59, 95% CI 1.39-1.82) as possible treatment options. A higher score on the third PCA component, 'favourability of termination of pregnancy when the foetus is viable', indicates more acceptance of late TOP than those with a low score. The group who scores high on this third component is more likely to consider administering medication taking into account the possibility that it could hasten the end of life as a possible treatment option (OR 1.22, 95% CI 1.01-1.47). All other demographic characteristics did not have a significant relation to which treatment options were considered acceptable in the hypothetical case.

	Continuing life-prolonging treatment[c]		Not initiating treatment, no explicit intention[d]		Not initiating treatment, explicit intention		Withdrawing treatment, no explicit intention[d]		Withdrawing treatment, explicit intention		Administering medication, no explicit intention[d]		Administering medication, explicit intention	
Predictor	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Function														
Neonatologist (vs nurse, ref category)	a	a	3.65	(1.48-9.00)	2.86	(1.59-5.16)	a	a	a	a	a	a	0.56	(0.32-0.98)
Sex														
Male (vs female, ref cat)	a	a	a	a	a	a	5.72	(1.32-24.83)	a	a	a	a	a	a
Age (ref cat 50+ yrs)														
< 30	3.45	(1.82-6.54)	a	a	a	a	a	a	a	a	a	a	a	a
30-39	1.91	(1.01-3.61)	a	a	a	a	a	a	a	a	a	a	a	a
40-49	1.65	(0.84-3.25)	a	a	a	a	a	a	a	a	a	a	a	a
Acceptance of neonatal ELDs with explicit intention[e]	0.75	(0.66-0.85)	a	a	1.50	(1.32-1.70)	a	a	1.60	(1.41-1.82)	a	a	1.59	(1.39-1.82)
Acceptance of neonatal ELDs, no explicit intention[e]	a	a	1.37	(1.11-1.70)	a	a	1.44	(1.17-1.78)	a	a	1.47	(1.18-1.84)	a	a
Acceptance of TOP[e]	a	a	a	a	a	a	a	a	a	a	1.22	(1.01-1.47)	a	a
Model fitting information, pseudo R-square[f]	0.13		0.11		0.18		0.10		0.19		0.11		0.20	

OR = odds ratio.
Presented figures are ORs and 95% Cis. Independent variables that have no significant relationships are not presented in the table. Experience in a NICU and attitudes towards acceptability of late termination of pregnancy for maternal reasons were entered in the regression but were not significant for any of the statements and were, therefore, eliminated from the table. Separate ordinal regression models were performed for each dependent variable. The full description of the statements is presented in Table 5, a full description of the PCA attitude factors can be found in Table 4.
[a] Entered in the regression but not significant and consequently eliminated from the model.
[b] Reference category.
[c] Threshold from 'less good option' to 'good option' is not significant in this model.
[d] Due to a violation of the parallel lines assumption in multivariate ordinal logistic regression (the regression lines were not parallel for each level of the dependent) we combined 'not a good option' and 'less good option', and 'good option' and 'very good option' into a binary logistic regression.
[e] Components as a result of the PCA, see table 6.
[f] Nagelkerke.

Table 4.7: Factors predicting acceptance of possible treatment options in the hypothetical neonatal ELD case.

4.4 Discussion

In this full-population survey study we distributed attitude questionnaires concerning perinatal end-of-life decisions amongst all neonatologists and neonatal nurses working in Flemish NICUs. The majority of both groups accept (acceptance rate of over 60%) both prenatal and neonatal end-of-life decisions. However, some differences can be noted, such as a higher acceptance for actively ending the life of a neonate by means of medication with an explicit life-shortening intention (active ELDs) by nurses compared to physicians. Moreover, we found that attitudes towards late TOP and neonatal end-of-life decisions have a significant impact on the treatment options they would consider in a hypothetical neonatal case.

Actively administering medication with explicit life-shortening intention was considered acceptable by more than half of neonatologists and three quarters of nurses and was even considered as a good treatment option in the hypothetical case in a third of neonatologists and two fifths of nurses. This indicates a high acceptance of an ELD that currently falls outside the legal framework in Belgium and most other countries. A possible hypothesis is that NICU staff might prefer not to prolong unnecessary neonatal suffering by administering a lethal dose of medication even when this might have legal complications[14]. This corroborates previous studies reporting the occurrence of hastening death in neonates taking place both in Belgium [14] and across Europe [3] even though the only country where actively ending the life of a neonate is currently legislatively condoned under strict conditions is the Netherlands [24]. However, physicians and nurses in our study were significantly more acceptable towards non-treatment decisions with a potentially life-shortening effect than they are towards actively ending the life of a neonate with medication. In our opinion, neonatologists and nurses in our study would prefer a non-treatment decision, with or without extra comfort care, when possible. However, in some cases, the intention to reduce suffering by shortening the life of a child with a severely life-limiting diagnosis cannot always be achieved solely by a non-treatment decision. In these cases, as indicated in our results, three out of five neonatologists and three quarters of nurses agree that, in some cases, shortening the life with a lethal drug is acceptable. The positive attitude towards these active ELDs of a substantial proportion of people caring for extremely ill neonates and their occurrence across Europe can be seen as support, or can be the basis for an ethical and legal discussion of installing a legislation similar to that of the Netherlands.

We found that a higher proportion of nurses than physicians accept the use of medication with an explicit intention to hasten death. A possible explanation can be that physicians adopt a more cautious approach towards ELDs falling outside the legislation because they are ultimately still the ones who are legally responsible for medical decisions at the end of a neonate's life. Similar results were found in research in adult end-of-life decision-making that shows that physicians are less in favour of euthanasia (i.e. intentionally ending a life by a physician at the patient's explicit request) than nurses [25]. Another possible explanation could be that nurses are more exposed to the suffering of the infant and the resulting discomfort in parents, since they are present at the bedside of neonate for more extended periods of time compared to the neonatologist. They could therefore be pressed to limit this suffering as much as possible while physicians might prefer to attempt additional treatment or less invasive ELDs first.

Non-treatment decisions regardless of life-shortening intention were considered acceptable by 80% or more of all NICU physicians and nurses. Also, late TOP in case of a severe or lethal foetal anomaly when the mother is healthy was considered acceptable by over 80% of both neonatologists and neonatal nurses. This high acceptance of late TOP in these cases could partly be ascribed to the possibility of late abortion in cases of severe foetal malformations in Belgian legislation, see Table 4.1 [26–29]. This positive attitude could thus be less frequent in countries with a more limited late TOP law such as Malta, where late TOP is prohibited, or Italy and Finland where it is only legal before 28 weeks of gestation [30]. Additionally, in countries where late TOP is possible without gestational age limit when the severe congenital disorders are lethal or when the disorders would lead to severe and incurable impairment such as the Netherlands [30], we might expect to see similar attitudes.

While no large differences could be found between the proportion of physicians and nurses who found non-treatment decisions acceptable either with or without explicit life-shortening intention, we could however see differences in the hypothetical case; the proportion of physicians and nurses who found non-treatment decisions to be a good option in the hypothetical case does seem to be lower when the life-shortening intention is explicit rather than implicit. This could be due to the specific nature of the hypothetical case, but it is important to note that these general attitudes may not always be reflected in the actual medical decision-making process. Even in a hypothetical case, even though general attitudes had an influence on which treatment options were considered as good options, both physicians and nurses are more cautious when the explicit shortening of the life of the neonate is intended.

Our results show a difference in influence of the two neonatal ELD attitude components, namely favourability towards ELDs with and without explicit life-shortening intention, on which treatment options neonatologists and nurses would consider in a hypothetical neonatal case. We can thus distinguish a difference in influence of attitudes towards ELDs that have an explicit versus a possible life-shortening intention. This reflects both the importance of the dimension of intention in the classification of neonatal ELDs [6] and the importance of attitudes of both physicians and nurses in clinical practice because of their impact on the possible treatment options they would consider in actual end-of-life practice. Similarly to results from studies on end-of-life decision-making in adults [31], it is possible that the willingness to consider or even perform neonatal ELDs might not only be a matter of whether or not there is a legal possibility but could also partly depend on the attitudes of the attending NICU staff. Additionally, we see an association between having a high acceptance for late TOP because of a foetal condition on considering administration of medication without explicit life-shortening intention as a good possible treatment option in the neonatal case. This supports our suggestion of considering prenatal and neonatal ELDs as one group under perinatal ELDs, since attitudes of physicians and nurses on prenatal ELDs are related to which treatment options are considered to be acceptable in neonates.

We also found that NICU staff under 39 years of age were more inclined to consider life-prolonging treatment as a possible treatment option in the case than those over the age of 50. Furthermore, men are more likely than women to consider withdrawing treatment taking into account the possibility that this could hasten the end of life. We did not find any other demographic variables associated with decision-making in the hypothetical case. In addition to

previous research indicating the importance of social, cultural or religious attitudes of NICU physicians [12], we found that gender and age could also be important characteristics related to end-of-life decision-making.

4.4.1 Strengths and limitations

Whereas most studies in neonatal end-of-life care and late TOP are limited with regard to sample size [15,20], by targeting the entire Flemish population of neonatologists and neonatal nurses working in an NICU we received a response from half of the entire population (63% for neonatologists and 46% for nurses). Our study adds to the existing attitude literature by providing attitudes covering all foetal-infantile ELDs. This study also has limitations. We do not have demographic information about physicians and nurses who did not participate, or their reasons for not doing so. Demographic variables such as religious beliefs, which might have an influence on attitudes, were not included in our questionnaire. No definition of the concept of hastening death was provided in the questionnaire, and despite thorough cognitive testing showing interpretation of 'hastening death' was clear to respondents, responses could be subject to interpretation from the respondents as being either passively deciding to not prolong life or actively deciding to shorten life. Due to ethical considerations, we were both unable to compare the attitudes of all eight Flemish NICUs with each other and unable to link the attitudes of neonatologists and neonatal nurses with actual medical decisions made in clinical practice. We could only use the hypothetical neonatal case to examine which treatment options would be considered in a realistic situation without actually measuring behavioural intentions, which could lead to generalisation of results.

4.4.2 Conclusion

Our study found a large acceptance of both prenatal and neonatal end-of-life decisions in neonatologists and neonatal nurses, even for decisions that currently fall outside the Belgian legal framework. However, physicians and nurses differed slightly in their acceptance of different types of end-of-life decisions, both at an abstract level and in a hypothetical neonatal case. Our findings regarding the impact of attitudes in considering actual medical decision-making indicated the importance of involving both physicians and nurses in clinical practice.

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Chapter 5

Barriers to and facilitators of end-of-life decision-making by neonatologists and neonatal nurses in neonates: a qualitative study

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Abstract

Context: Making end-of-life decisions in neonates involves ethically difficult and distressing dilemmas for healthcare providers. Insight into which factors complicate or facilitate this decision-making process could be a necessary first step in formulating recommendations to aid future practice.

Objectives: This study aimed to identify barriers to and facilitators of the end-of-life decision-making process as perceived by neonatologists and nurses.

Methods: We conducted semi-structured face-to-face interviews with 15 neonatologists and 15 neonatal nurses, recruited through four neonatal intensive care units in Flanders, Belgium. They were asked what factors had facilitated and complicated previous end-of-life decision-making processes. Two researchers independently analysed the data, using thematic content analysis to extract and summarize barriers and facilitators.

Results: Barriers and facilitators were found at three distinct levels: the case-specific context (e.g. uncertainty of the diagnosis and specific characteristics of the child, the parents and the healthcare providers which make decision-making more difficult), the decision-making process (e.g. multidisciplinary consultations and advance care planning (ACP) which make decision-making easier), and the overarching structure (e.g. lack of privacy and complex legislation making decision-making more challenging).

Conclusions: Barriers and facilitators found in this study can lead to recommendations, some simpler to implement than others, to aid the complex end-of-life decision making process. Recommendations include establishing regular multidisciplinary meetings to include all healthcare providers and reduce unnecessary uncertainty, routinely implementing ACP in severely ill neonates to make important decisions beforehand, creating privacy for bad-news conversations with parents and reviewing the complex legal framework of perinatal end-of-life decision-making.

5.1 Background

Despite medical advances over the last decades, a substantial number of children die before they reach the age of one year[1–3]. Many of these deaths are preceded by an end-of-life decision (ELD) with a potentially life-shortening effect, such as withholding or withdrawing medication or actively ending life with lethal medication[4–7]. The medical and ethical dilemmas during end-of-life (EoL) decision-making cause significant distress in neonatologists, nurses and parents[8]. In most countries, including in Belgium, actively ending life with lethal medication is illegal, though previous research shows that some healthcare providers would consider actively ending life acceptable in severe or lethal cases[9], and that it does happen in clinical practice[3,10]. This might make the decision-making process even more difficult. Therefore, research into what could make this process less distressing is imperative.

Both healthcare providers and parents play an active role in EoL decision-making[11]. However, healthcare providers have a range of EoL experiences which makes them ideally placed to reflect on what makes such decision-making easier or more difficult, whereas parents usually have only the one uniquely personal and tragic experience. Since the viewpoint of parents is fundamentally different from that of healthcare providers, but still crucial to neonatal EoL decision-making, a forthcoming paper will focus solely on their experiences. From a healthcare provider perspective, physicians are experts in understanding the prognosis and possible outcomes[12], while nurses are continually present at the bedside and often have a closer personal bond with the parents, making them key figures in building a trusting relationship with the parents[13,14] which is crucial in EoL decision-making. They thus have a unique and important role in the decision-making process, making investigation of both viewpoints essential.

To our knowledge, no studies exist that describe barriers to and facilitators of ELDs in neonates from a healthcare provider perspective. However, previous studies with a broader focus on aspects of ELDs in neonates mention factors influencing decision-making: 1) a French interview study on attitudes and ELD practices revealed that nurses often experience the time between grasping the severity of the situation and actually taking a decision as extremely difficult as they are constantly confronted with suffering of the child[13]; 2) a recent online survey in neonatologists and nurses in Switzerland on decision-making at the limit of viability identified several crucial difficulties such as prognostic uncertainty, difficulties in interpreting the attitude of the parents, insufficient time for decision-making, legal constraints and conflicts between their own principles and unit policy[12].

Furthermore, factors influencing decision-making are mentioned in studies examining overall EoL care in neonates. In one study on EoL experiences, physicians indicated that a bond of trust with parents makes communicating bad news easier[8]; another, on moral obligations experienced by healthcare providers, reveals that an uncertain prognosis and ambivalence about including parents while wanting to shield them from the burden of decision-making are key difficulties[15].

These studies revealed some influencing factors on EoL decision-making in neonates, but did not explicitly focus on barriers and facilitators, making it possible that key factors may have been overlooked. We therefore examine barriers and facilitators in the EoL decision-making process

in neonates, as experienced by neonatologists and nurses. Hereby, we focused on what makes it easier or more difficult in the process to come to or to make the end-of-life decision. We aimed to study these barriers and facilitators, in the expectation that insight into them can usefully shape future EoL decision-making.

5.2 Methods

5.2.1 Study design

A qualitative study was conducted using semi-structured face-to-face interviews with neonatologists and neonatal nurses working in a Flemish neonatal intensive care unit (NICU). We chose a qualitative research methodology to cover the complexity, subtlety and individual specificity of experiences in the end-of-life decision-making process regarding neonates that would be missed by a quantitative approach. Because of the sensitivity of the subject we opted for individual interviews. Criteria for reporting qualitative research from the COREQ guidelines were used[16].

5.2.2 Setting and participants

We recruited neonatologists working as resident physicians at one of four Flemish NICUs (University hospitals of Ghent, Brussels and Leuven, and general hospital Sint-Jan Bruges) between December 2017 and July 2018 who had been the attending/treating physician to at least one child who had died at the NICU where an ELD was made in the past year, and nurses who had been the most involved. No exclusion criteria were used.

5.2.3 Recruitment

A neonatologist of each participating hospital (FC, LG, GN and LC) informed all neonatologists and nurses within their respective NICU of the purpose of the study, and provided contact details of those willing to participate. Researchers contacted them and set up a date for the interview either at their NICU or at their home residency. Purposeful sampling was used to select participants.

5.2.4 Data collection

A topic guide (Table 5.1) was developed by a multidisciplinary team of nine experienced researchers in the fields of end-of-life care and neonatology. Participants were asked what made it easier or more difficult to make ELDs in the NICU. Before the interview, a short questionnaire was administered to collect socio-demographic data. LDm (female, MSc in experimental psychology; Doctoral Researcher) and VP (female, MA in neurolinguistics and BSc in psychology; Doctoral Researcher) performed all interviews with the participants. Data were collected until no new barriers and facilitators emerged for both neonatologists and nurses separately, and data saturation was achieved.

Question type	Question	Prompts
Introduction	I want to discuss the difficult topic of end-of-life decisions and would like to start with which decisions are sometimes being made in this NICU?	
Transition (only for nurses)	In what way are you, as a nurse, involved in taking these end-of-life decisions?	
Key	- What makes it easier for you to decide on end-of-life decisions? - What makes it more difficult to decide on end-of-life decisions? - Do you feel supported by colleagues or parents during this decision-making process?	We would like to focus on your own role as physician/nurse (and not on what makes it easier/more difficult for the parents). Other prompts include: - Why does that make it easier/more difficult *for you*? - How did that make you feel? - Can you give a specific example of a case where this happened? And what decision was eventually made in this instance?

Table 5.1: semi-structured interview guide.

5.2.5 Data analysis

Interviews were audiotaped and transcribed verbatim. NVivo 12 was used for structuring the data and thematic content analysis[17] was used to analyse it. Two researchers coded the interviews independently and openly by means of inductive coding during which they searched for facilitators and barriers that influenced the end-of-life decision-making process. The first eight interviews were coded by both researchers. After five interviews a first discussion on code nodes and trees occurred. The other 22 interviews were coded by one of the researchers. Code nodes and trees were discussed amongst both researchers at regular meetings, and during two separate meetings afterwards with all co-authors. When coding discrepancies occurred, consensus was sought. Data saturation was reached when no new codes emerged for three consecutive interviews in neonatologists and nurses separately, and when a similar number of participants from each participating hospital were recruited. The final model of factors influencing EoL decision-making in neonates was agreed upon by all authors.

5.3 Results

We conducted 15 interviews with neonatologists and 15 with neonatal nurses from four NICUs (Table 5.2), lasting about an hour each. Identified themes regarding barriers and facilitators on the EoL decision-making process were classified into three discrete levels: 1) context level, themes related to the specific EoL case; 2) process level, themes related to characteristics of the decision-making process itself; and 3) structure level, themes related to characteristics of the

overarching determinants of overall policy and practice in the NICU ward or in the wider society (Table 5.3).

	Neonatologists	Neonatal nurses
Number of interviewed caregivers	15	15
Staff in NICU…		
A	4	4
B	3	4
C	4	4
D	4	3
Sex		
Male	7	0
Female	8	15
Age		
< 30 years	0	3
30-39 years	7	5
40-49 years	6	4
> 50 years	2	3
Years of experience in a NICU		
< 5 years	2	5
5-10 years	5	1
11-20 years	4	3
> 20 years	4	6

Table 5.2: demographic characteristics participants

5.3.1 Context level

According to the interviewees, the characteristics of key players such as the child, parents and healthcare providers can have an influence on the decision-making process.

5.3.1.1 Child characteristics

Physicians and nurses mentioned the influence of several child characteristics on the decision-making process including gestational age, prognosis and possible ELD options.

When the child is born at full term, healthcare providers indicated that the decision to transition from curative care to an ELD is more difficult because a healthy, full term baby had a high chance of survival early on, while the survival chances of an extremely premature baby were already lower making everyone prepared for bad news.

"It turns out that I find it more difficult with children born at term than with a 24-25 week baby. With the latter I feel like, let's give it a chance but then nature decides that it won't work. That's different to children who are doing really well up to 38 weeks in the womb, and then they are born and get serious infections. If they had been delivered by caesarean a week earlier, you'd have a perfect child. With a premature baby there's so little you can do when labour starts." - Nurse 12

Both neonatologists and nurses indicate that decisions are easier to make when a bad prognosis becomes evident quickly and is certain, while fluctuations in health lead to doubts about life-expectancy and/or future quality of life.

"It often has to do with pathology, and you know the type of discussion you can have about 'how certain is your prognosis?' That's especially the case with premature babies with extensive brain haemorrhages. I find it easy if they have already been fairly intensively treated and you notice that, well, it's not really working. And then there's a brain haemorrhage on top of all the rest. Then you think, right, well, this really doesn't look good. But, well, if you hear the figures, and they mainly have to do with extremely premature babies, at 25 or 26 weeks, there is quite a lot of debate about that. […] that does lead to quite a difference in opinions." - Doctor 2

Lastly, of the interviewees, only neonatologists discuss the importance of being sure that all options have been explored first, before an ELD is considered. When all curative options failed, and an ELD is the only way to ensure an end to the suffering of the child, the decision is described as being easier than when other treatment options are still possible. Furthermore, when an EoL decision is made, physicians indicate that it is easier if withholding or withdrawing treatment is sufficient rather than when the only possible option involves actively ending life with lethal medication.

5.3.1.2 Parent characteristics

Neonatologists and nurses indicate the same barriers and facilitators in terms of parent characteristics, including cultural and language differences, socio-economic status and therapeutic relationships with parents.

In general, healthcare providers indicate that EoL decision-making is easier when parents have the same culture and language as the physicians and nurses involved. Translations make healthcare providers feel less able to convey the depth and nuances needed to describe the diagnoses and (EoL) treatment options. A difference in cultural background between healthcare providers and parents makes neonatologists and nurses feel they are limited to only discussing certain ELDs.

"… a very difficult context is for example parents with a Muslim background, who want everything to be done for their child no matter the cost, even though there is no possibility of doing anything useful. And you still have to continue on, that you have to do a futile medical act. That makes it more difficult." – Doctor 11

A lower socio-economic status was also indicated as an important influencing factor. When a child will suffer a severe handicap in future, and it is judged that parents will not be able to provide a safe environment for the child financially or emotionally, healthcare practitioners find deciding on an ELD easier than when the child will be cared for and both parents are well-resourced financially and emotionally. The former include unstable household situations with e.g. drug abuse, criminal history, teenage pregnancies and extreme debt. The healthcare providers indicate they find these unstable situations facilitate end-of-life decision-making because they take into consideration the extreme suffering of the child in future, due to their medical condition, combined with a difficult family life. While some participants struggled with the fact that socio-economic status was indicated as an influencing factor, reflection on the ethical ramifications, others stated it as a matter of fact and rationalized this as one of many influencing factors in decision-making.

Lastly, both neonatologists and nurses indicate that the EoL decision-making process is easier when a therapeutic relationship is established with the parents.

5.3.1.3 Healthcare provider characteristics

Previous experience with EoL decisions was mentioned as a factor in making the EoL decision-making process easier, because healthcare providers are better able to anticipate the child's future condition. Furthermore, some nurses indicated that experience with the disability and suffering of treated children later in their lives makes EoL decision-making easier, because they were better able to envisage the child's future quality of life.

> *"I think experience does help... certainly in the learning process surrounding end-of-life decisions. If I think back now to about 14 years ago, the first time I cared for a family with a dying child, well, you still really don't know what you are supposed to ask parents, or suggest to them. And now I really have done quite a lot and then you do end up learning." - Nurse 5*

Lastly, physicians and nurses mentioned the effect of their own ability to relate to the specific case; when they have children of their own or their family situation is similar, deciding on an ELD is more difficult.

5.3.2 Process level

According to neonatologists and nurses the communication between all involved actors (parents, neonatologists, nurses, psychologists, etc.), divergence of opinion and advance care planning are key elements.

5.3.2.1 Communication and multidisciplinary consultations

Healthcare providers mentioned that communication amongst all actors, debriefings after death and formal second opinions are crucial factors during EoL decision-making in neonates.

Intense communication between healthcare providers and parents is imperative in making ELDs. All actors should be aware of the most recent updates on the child, and of each other's views and opinions.

> *"When communication goes badly, I think that those cases are the most difficult. I am thinking about a child that was ill for a long time [...] what the parents wished and how the physician interpreted this did not match." – Nurse 5*

Healthcare practitioners also mentioned communication between practitioners both inside and beyond the team as helpful during the decision-making process, either formally during multidisciplinary team meetings or debriefings, or informally. Multidisciplinary meetings with the entire team, including physicians and nurses, ensures that decisions are supported by all and that everyone is included in the decision-making process. When neonatologists, or more frequently nurses, are excluded from this decision-making process, but are later required to implement the decision, the EoL decision-making process was experienced as being harder.

> *"I wasn't involved then, actually, and then it was difficult at that point, if the decisions have already been made, well, to go back on them. As an outsider, you might say, although of course we had discussed it with each other beforehand. But how it actually happened. And if the child has died, then you think oh dear, we do need to sit down with everyone as soon as possible and discuss it and to see what we need to do differently next time." - Doctor 1*

Only neonatologists expressed the importance of asking for a formal second opinion by an independent physician either within their own hospital (e.g. other disciplines such as cardiology) or from another hospital.

> *"...then I think the second opinion system is a good system. If we have a situation like that, I phone (name) and I say: (name) we are going to refer that child through, give me a fresh opinion." - Doctor 3*

Formal and pre-set debriefings amongst healthcare providers after a child died were indicated as helpful in future EoL decision-making processes. Debriefings provide reflection on what went well and what could be improved while an absence of debriefings can leave other members of the medical team with unresolved questions.

5.3.2.2 Divergence of opinion

When one of the involved actors (parents, nurses, neonatologists) wants to continue curative treatment and others opt for an ELD, compromises need to be made. Differing opinions can put pressure on any one of them to change their minds, making EoL decision-making extremely difficult.

> *"If I'm not on the same wavelength as the parents, that makes it difficult for me. So it can go two ways. If the parents ask to stop (the treatment), but I'm not yet ready*

for that myself or I think it isn't clear enough yet. Those are the things that make it difficult. If I believe that there is no point, and the parents don't agree, I find that difficult too." - Doctor 2

5.3.2.3 Advance care planning (ACP)/ mapping of possible actions

According to neonatologists and nurses, ACP is a crucial factor in EoL decision-making. Considering in advance together with healthcare providers and parents all the directions the child's condition can take and deciding on which medical responses will be made in each leads to easier decision-making than when rushed decisions have to be made due to acute deterioration where ACP did not or could not take place.

"... the parents can already indicate directly at that point that, yes but doctor, if my child is born at 24 weeks and you are talking about haemorrhages that can happen, if that is the case, I want to be certain you won't intervene. Or otherwise I want, if it turns out that you expect my child will have certain disabilities in the future, I don't want that. In the theoretical situation, then, that makes it easy to go back afterwards, when what you discussed actually happens and that you have already discussed it with the parents yourself." - Doctor 7

When an ELD is discussed during the ACP process, the dying process can be planned according to the wishes of parents and the advice of the healthcare providers. Planning includes reserving a private room, making sure the parents are present, that death is not rushed, and creating memories with parents.

"I remember a case where the death was fairly sudden, in a reanimation setting, and the door <of the consultation room> was open. And the nurses for the other children didn't really realise that the child was dying and the father said: one image still sticks in my mind: that is those laughing nurses walking past the desk. And that was very difficult for him and I also reported that back to the nurses here, and they decided to put a lamp on the desk and to use that, actually, as a signal that serenity was needed." - Doctor 11

5.3.3 Structure level

A third important level includes factors relating to the overarching structure of the ward, the hospital and the broader society that could make decision-making and the decision-making process easier or more difficult.

5.3.3.1 Emotional and practical support at the ward

According to healthcare providers, emotional support (or lack thereof) from colleagues is a crucial facilitator (or barrier) in EoL decision-making in neonates. This includes being 'a shoulder to cry on' and being a person to confirm diagnoses or treatment options with. Most

neonatologists and nurses mentioned the lack of psychological support for team members at the NICU.

> *"I think that we need a psychologist, well we have a psychologist at the ward. She is there for the parents and I think that she could mean much more to our ward. […] She <the psychologist> is not there for us, and we see that, that she's not there for us." – Nurse 1*

Participants indicate the positive effect of a ward that promotes collegiality and teamwork culture during EoL care. When other nurses can take over some of your daily tasks or aid in caring for less critical patients, or physicians can cover for each other so that they have the time to allocate solely to the parents, EoL care for a dying neonate is indicated to be easier.

> *"If my other children are taken over by colleagues, so I only have to concern myself with that baby. In terms of the team, if it really starts to be a critical time, not yet leading up to but if they are still stable but if the parents are there then, for example, then I could just concentrate on those people quietly on my own. My colleagues would take over my work, in fact. That is very practical but very important." – Nurse 1*

5.3.3.2 NICU policy, practice and expertise

Healthcare providers mentioned the negative effect of lack of a separate room for privacy, shortage of available trained personnel and differences in expertise across NICUs.

> *"This is the only interview room we have for everyone, for everything, for whoever it is. To talk about going home, release from hospital, follow-up conversations with nurses, trainees. It all happens here. And people just wander in and out. That isn't very pleasant, you just want to be alone with the parents at that point and concentrate on them. Leave your phone with someone else so that you can devote all your attention to those people and that story." - Doctor 14*

Another important aspect of NICU practice mentioned by both healthcare providers is that a shortage of neonatologists and nurses experienced in EoL care leads to a higher burden on qualified staff.

Only neonatologists mentioned that differences in knowledge of certain diagnoses between different NICUs and their accompanying standard treatment plans are, without adequate ways to disseminate this knowledge, an important barrier to providing the best possible care at the end of a neonate's life.

> *"I think that getting an idea of how it is done in other hospitals is already a big thing. Because you don't find out from each other how other hospitals do things. What their criteria are, for example, for stopping treatment in a child with severe peripartal asphyxia. With serious neurological abnormalities. I'd like just to be able to talk*

about that openly. Because everyone can get hold of the literature. But there is still a difference between reading a study and doing it for real in your department." - Doctor 13

5.3.3.3 Legal framework

The current Belgian legislation was also mentioned by some neonatologists and nurses. When mentioned, they stated that the lack of a legal framework - actively ending the life of a neonate is currently not allowed - is seen as an important barrier in contrast to pregnancy, where there is the option to terminate as soon as a life-limiting foetal abnormality has been diagnosed.

"But, well, if the child hasn't had any acute situations or complications yet, there's nothing you can do. And those cases are rare, but they do exist. And then if you also have parents who are really asking urgent questions about ending things, well, there is actually nothing you can do as a doctor and I find that tough." & "But something that concerns healthcare providers is the discrepancy in the legal situation between the prenatal and postnatal period. [...] This implies that prenatal, with lots of things that you can see and know, that you can also go quite a long way towards terminating the pregnancy and that there is probably an even bigger difference there than in what goes on neonatally?" - Doctor 10

Theme	Description When the theme is only a barrier or a facilitator it will be indicated by a (b) or an (f). When the theme can be seen as a facilitator and the opposite can be seen as a barrier, only the facilitator or barrier is mentioned which will be indicated by (f; opposite = b) or (b; opposite = f)	Mentioned by… Neonatologists	Nurses
Context	**Characteristics of the specific case that influence the end-of-life decision-making process**		
Child characteristics	- **Medical diagnosis of the child**:		
	⇨ Certainty of the diagnosis (f; opposite = b)	x	x
	⇨ A bad prognosis is quickly evident (f; opposite = b)	x	x
	- Baby is born at full term (b; opposite = f)	x	x
	- The infant looks healthy (b)	x	x
	- **Medical options**:		
	⇨ Every curative option was explored before considering an end-of-life decision (f)	x	
	⇨ Only possible end-of-life decision is actively ending the life of a neonate (b; opposite = f)	x	
Parent characteristics	- Cultural differences between parents and healthcare providers (b; opposite = f)	x	x
	- Different language (b; opposite = f)	x	x
	- Lower socio-economic status (f; opposite = b)	x	x
	- Having a therapeutic relationship with the parents (f; opposite = b)	x	x
Healthcare provider characteristics	- **Experience**		
	⇨ Experience with end-of-life decisions (f; opposite = b)	x	x
	⇨ Experience with disability and suffering of children later in life (f)		x
	- **Personal characteristics**		
	⇨ Having children of your own (b)	x	x
	⇨ Being/having been in a similar personal situation (b)	x	x
Process	**Characteristics of the decision-making process itself**		
Communication and (multidisciplinary) consultations	- **Formal (organised) and informal (e.g. hallway encounter) communication:**		
	⇨ Clear, efficient, and regular communication between parents and healthcare professionals (f; opposite = b)	x	x
	⇨ Healthcare professionals amongst themselves communicate clearly, efficiently and regularly (f; opposite = b)	x	x
	⇨ Formal debriefings after death to improve the end-of-life decision-making process in the future (f; opposite = b)	x	x
	- **Formal and organised communication with (external) healthcare providers:**	x	
	⇨ A second opinion about the diagnosis and/or the end-of-life decision (f)	x	x
	⇨ Multidisciplinary meetings (f)	x	x
	⇨ Being included/consulted during the end-of-life decision-making process (f; opposite = b)		
Divergence of opinion	- Between parents and healthcare providers (b; opposite = f)	x	x
	- Between healthcare professionals amongst themselves (b; opposite = f)	x	x
Advance care planning/ mapping of possible actions	- Planning the different possible outcomes and treatment options with healthcare providers and parents (f)	x	x
	- Healthcare providers know the norms, values and wishes of the parents (f; opposite = b)	x	x
	- Planning the dying process: Final moments are planned (who, how and when) and serene (f; opposite = barrier)	x	x
Structure	**Characteristics of the overarching structure (society, NICU ward policy and practice)**		
Emotional and practical support at the ward	- Emotional support from colleagues (f; opposite = b)	x	x
	- Support from a psychologist at the NICU is not available (b)	x	x
	- Culture in the NICU of colleagues working together, taking over tasks or assisting each other during the dying process of an infant (f)	x	x
NICU policy, practice and expertise	- Varying knowledge between the different NICUs (b)	x	
	- Not enough healthcare professionals trained in end-of-life care (b)	x	x
	- Absence of separate room to accommodate parents and infants during the decision-making process and before, during and after death (b)	x	x
Legal framework	- Actively ending the life of a neonate with lethal drugs is not included in legal framework (b)	x	x
	- Discrepancies between the legislation prenatally and postnatally (b)	x	

Table 5.3: barriers and facilitators of the neonatal end-of-life decision-making process

5.4 Discussion

In this qualitative interview study with neonatologists and nurses working in a NICU we found factors that may hinder or facilitate end-of-life decision-making in neonates on three distinct levels, namely the case-specific context level, the decision-making process level and the overarching structure level. Key barriers and facilitators identified relate to specific characteristics of the involved actors (such as cultural and language differences, a therapeutic bond with parents and the experience of the healthcare practitioners), uncertainty of the prognosis, ACP and the influence of policy, legislation and medical practice.

5.4.1 Strengths and limitations

By using the qualitative approach of face-to-face interviews with both neonatologists and nurses we were able to give a view of what makes EoL decision-making in neonates easier or more difficult for them. We believe parents could have crucial additional insights which will be reflected on in a forthcoming separate publication; however the experience of bereaved parents fits less well into this study, whose focus is the theoretical generalizability of ELD experiences in neonates and how this can contribute to recommendations on the standard EoL decision-making process in neonates.

5.4.2 General discussion

Our results show there are some modifiable factors which may aid the complex end-of-life decision-making process, though some could be considered more possible to achieve than others.

The lack of privacy and separate rooms for bad-news conversations was mentioned by healthcare providers as a barrier to the EoL decision-making process. Creating privacy for bad-news conversations so that difficult ELDs can be made without unnecessary interference could aid both healthcare providers and parents, indicating that small changes could potentially have a large impact. There are similar findings in previous research into the paediatric intensive care unit, indicating that the intensive care unit is not seen as an ideal environment for EoL decision-making and broader EoL care since privacy cannot be assured[18].

Both neonatologists and nurses mentioned the importance of building into daily practice both multidisciplinary team meetings and debriefings after the death of a neonate. Previous research has already suggested making use of the collective wisdom of experienced healthcare providers to reduce uncertainty in a general intensive care setting[19]. Especially in neonates, prognostic uncertainty is a key theme[20]. Regular multidisciplinary meetings could provide healthcare providers with a higher degree of involvement within these ELDs and with a feeling of certainty that decisions are carried by the entire team, reducing unnecessary uncertainty.

Respondents emphasized the importance of ACP in neonates with a severe prognosis. Previous research already indicates the benefits of routine use of an individualized symptom management plan for neonates during EoL care[21]. In adults, ACP is known to decrease decisional conflict for surrogate decision-makers, since they are more likely to know the patient's wishes[22]. Also, in

adolescents, ACP leads to better communication between adolescent, parents and healthcare providers[23]. Aside from these possible effects of routinely implementing ACP in severely ill neonates, our results also indicate the facilitating effect of having previously planned courses of action for all possible outcomes on the EoL decision-making process for the healthcare practitioners involved.

Another significant factor includes promoting emotional support and a team-work culture amongst staff in a NICU. Making it possible to switch tasks during EoL care to relieve others so they can focus on the dying infant, or providing the opportunity for staff members to indicate whether or not they are willing to be part of an EoL decision-making process at that time, can have an influence on the overall wellbeing of healthcare practitioners themselves[24]. Debriefings and evaluations to discuss emotional wellbeing of staff before, during or after an EoL decision-making process could further promote opportunities for them to support each other.

The need for more experience, and the need for more healthcare providers trained in neonatal EoL care mentioned by physicians and nurses can be linked together under a more general need for education and training in EoL care and ELDs. Previous research indicated that a high number of studies have reported a similar need for formal training in both bereavement care and overall EoL care communication skills, allowing time to learn from others[25]. Including a module on neonatal death and EoL decision-making in standard curricula for healthcare practitioners increases clinical experience and EoL communication skills early on in training, which leads to enhanced confidence and fewer negative experiences with EoL care in the NICU[25].

Although parental involvement in EoL decision-making is currently common practice internationally[11], neonatologists and nurses indicated that when parents have a different cultural background to or speak a different language from the healthcare providers, difficulties in EoL decision-making may arise. Cultural differences can result in misunderstandings and/or fundamentally different views on the acceptability of certain ELDs. As in adults, we think that perinatal palliative care teams should be consulted to mediate as they are trained in difficult conversations[26]. However, no current Belgian perinatal palliative care teams exist.

Some respondents mentioned the difficulty of the EoL decision-making process when severe future suffering is foreseen where withholding or withdrawing treatment would not result in the death of the neonate. This is because actively ending the life of a neonate is illegal within the Belgian legislation which therefore limits the possible options in such cases. Furthermore, previous studies indicate the occurrence of these active ELDs in Flanders[27] and the positive attitude of a high number of neonatal healthcare practitioners towards these types of ELDs[9]. Our results can be the basis for an ethical and legal discussion about initiating legislation similar to that in the Netherlands where actively ending the life of a neonate is currently legislatively condoned under strict conditions[28]. Not having this option is currently seen as a barrier in difficult EoL decision-making processes. Because Belgium has both a euthanasia law in competent minors and adults, and a law allowing late termination of pregnancy in case of severe or lethal foetal anomalies, we can state that the ethical climate in Belgium concerning ending life could be considered fairly permissive compared to other countries. Possibly, these experienced barriers could be different in countries with a less permissive climate.

Finally, some of the influencing factors found in our study are not in the power of healthcare practitioners to modify, including the gestational age of the neonate, lower socio-economic or unfortunate household situations, and the effect on relating to a specific case because of similarities with their own situations. Being aware of these influencing factors during an EoL decision-making process in neonates can be seen as a crucial first step towards an easier decision-making process. In-depth research is needed on the effect of these risk-factors, which could possibly increase the odds of the death of the infant following an end-of-life decision, on the prognosis of the child. Furthermore, providing healthcare providers with concrete tools in improving communication during difficult end-of-life discussions, especially with regard to these risk-factors, should be included in nurse and physician education. Additionally, though participants did not indicate it themselves, training healthcare providers in ethical decision-making might aid in providing clarity when dealing with these complicated situations[29].

5.4.3 Conclusion

Our qualitative interview study revealed barriers and facilitators during the end-of-life decision-making process in neonates as reported by healthcare practitioners. Some modifiable factors were identified to improve the process, such as creating privacy for bad-news conversations, regular multidisciplinary meetings and debriefings to reduce uncertainty, routinely setting up an advance care plan, promoting emotional support and team-work culture amongst healthcare providers, a need for more experience in end-of-life care, a way to deal with cultural or language differences, and navigating a difficult legal framework; these possibly require more fundamental changes in NICU policy or overall society in order to facilitate the end-of-life decision process in clinical practice.

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Chapter 6

Psychological support in end-of-life decision-making in neonatal intensive care units: full population survey among neonatologists and neonatal nurses

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Abstract

Background: Moral distress and burn-out related to end-of-life decisions (ELDs) in neonates is common in neonatologists and nurses working in Neonatal Intensive Care Units (NICUs). Attention to their emotional burden and psychological support in research is lacking.

Aim: To evaluate perceived psychological support in relation to ELDs of neonatologists and nurses working in Flemish NICUs, and whether or not this support is sufficient.

Design/participants: A self-administered questionnaire was sent to all neonatologists and neonatal nurses of all eight Flemish NICUs (Belgium) in May 2017. The response rate was 63% (52/83) for neonatologists and 46% (250/527) for nurses. Respondents indicated their level of agreement (5-point Likert scale) with seven statements regarding psychological support.

Results: 70% of neonatologists and nurses reported experiencing more stress than normal when confronted with an ELD; 86% of neonatologists feel supported by their colleagues when they make ELDs, 45% of nurses feel that the treating physician listens to their opinion when ELDs are made. About 60% of both neonatologists and nurses would like more psychological support offered by their department when confronted with ELDs and 41% of neonatologists and 50% of nurses stated they did not have enough psychological support from their department when a patient died. Demographic groups did not differ in terms of perceived lack of sufficient support.

Conclusions: Even though NICU colleagues generally support each other in difficult ELDs, the psychological support provided by their department is currently not sufficient. Professional ad hoc counselling or standard debriefings could substantially improve this perceived lack of support.

6.1 Background

Neonatologists and nurses working in neonatal intensive care units (NICUs) often experience moral distress[1,2] especially when an infant in their care can no longer benefit from treatment and a life-shortening end-of-life decision (ELD) is made[1,3]. The emotional impact on parents of losing a child and the support needed from both NICU and psychological support staff have previously been studied[4,5] and guidelines on supporting them have been developed by several organisations[3,6,7]. However, research on professional support for NICU staff and their coping and emotional burden has been lacking.

Healthcare professionals often experience suffering and grief as well as moral distress and emotional exhaustion[8,9]. Because of this, ICU healthcare professionals in general are prone to developing compassion fatigue and burnout[10,11]. In NICUs, survey studies estimate the prevalence of burnout to be 30% in neonatologists[12] and 7.5-54.4% in nurses[13]. Developing burnout and compassion fatigue does not only have an impact on their personal life but also affects their ability to care for patients and to have empathy for grieving parents[6,11,12] which could reduce the quality of care overall. Despite these known risks, only one study, after reviewing neonatal end-of-life protocols, recommended colleague and professional psychological support around end-of-life care for NICU staff members[3]. Actual research on perceived psychological support by and for NICU professionals is lacking.

Our study evaluates stress in relation to ELDs, perceived colleague and professional psychological support and whether or not this support is sufficient in neonatologists and nurses working in NICUs and examines whether psychological support differs between socio-demographic or professional groups.

6.2 Methods

6.2.1 Design and participants

We performed a full-population mail survey of all neonatologists and neonatal nurses in all eight Flemish NICUs, with full cooperation from all units. A total of 83 neonatologists and 527 nurses were identified by means of personnel files.

6.2.2 Data collection

A representative working at each NICU handed out the questionnaire to every neonatologist and nurse in their unit in May 2017 (gatekeeper method) inviting them to fill it out anonymously and send it back in a prepaid envelope within one month. This method was preferred to sending a questionnaire directly to every neonatologist and nurse in order to maximise their motivation to participate. Sending back a filled-out questionnaire was seen as informed consent. We obtained ethical approval from the ethical review board of Ghent University Hospital (Registration number: B670201731709).

6.2.3 Questionnaire

The questionnaire items used in this report consisted of seven socio-demographic questions (see Table 1) and seven questions concerning colleague and professional psychological support. The psychological support questions were based on a study from Weintraub et al. on compassion fatigue, burnout compassion satisfaction in a neonatal intensive care unit in the United States[11], and were translated and amended to the Flemish context by a multidisciplinary team consisting of sociologists, psychologists, neonatologists and a gynaecologist. The questionnaire was cognitively tested with five neonatologists (from four separate hospitals), three neonatal nurses (from two separate hospitals) and one gynaecologist, leading to only minor adjustments in wording.

6.2.4 Measures

The questionnaire included statements about perceived stress, professional psychological support provided by the NICU and psychological support provided by colleagues. We included a statement on the option of expressing protest concerning an ELD, which could be an additional source of distress when this is discouraged. The statements were scored on a 5-point Likert scale. Three of the seven questions differed between neonatologists and nurses because, in the Flemish healthcare setting, physicians are the main decision-makers when it comes to making end-of-life decisions for their patients, mostly during physician team meetings. This while nurses are often not involved in this decision-making process, but they are however involved in the implementation of the medical decisions.

6.2.5 Statistical analysis (SPSS 24.0)

Percentages of disagreement ('totally disagree' and 'disagree'), neutrality and agreement ('agree' and 'totally agree') were calculated for neonatologists and nurses separately.

6.3 Results

Across all eight NICUs, the response rate was 63% (52/83) for neonatologists and 46% (250/527) for nurses. In our sample, 71% of neonatologists and 95% of nurses were female (Table 6.1).

	Neonatologists N= 52 (%)	Neonatal nurses N= 250 (%)
Sex		
Female	37 (71.2)	237 (95.2)
Male	15 (28.8)	12 (4.8)
Age		
< 30	12 (23.1)	75 (30.2)
30-39	15 (28.8)	65 (26.2)
40-49	11 (21.2)	53 (21.4)
≥ 50	14 (26.9)	55 (22.2)
Years of experience working in a NICU		
< 5 years	22 (42.3)	58 (23.3)
5-10 years	8 (15.4)	34 (13.7)
11-20 years	9 (17.3)	77 (30.9)
> 20 years	13 (25)	80 (32.1)
Function of physicians		N/A
Neonatologist	39 (75)	
Specialist in training	13 (25)	
Degree nurses	N/A	
Graduate		3 (1.2)
Bachelor		229 (92.3)
Master		16 (6.5)
Religion or beliefs		
Religious	28 (53.8)	164 (66.1)
Not religious	24 (46.2)	84 (33.9)
Belief that their religion or belief has impact on their attitudes towards ELDs		
Yes	13 (25.5)	45 (18.4)
No	38 (74.5)	200 (81.6)

Missing values: varied from 0% for sex, age, years of experience, function and to 1.9% in the impact of religion in neonatologists (n=52) and from 0.4% in sex and years of experience to 2% in the impact of religion in neonatal nurses (n=250)

Table 6.1: demographics of neonatologists and neonatal nurses

Most neonatologists and nurses agreed that making an ELD (neonatologists) or being confronted by one (nurses) in neonates causes more stress than usual (72.5% and 70.2% respectively, Table 6.2). During the decision-making process, most neonatologists (86.3%) agreed that they feel supported by their colleagues. Fewer than half the neonatal nurses (44.6%) agreed that physicians listen to their opinions in making an ELD. While most neonatologists (88.2%) agreed that their NICU provides sufficient opportunity to express protest about certain ELDs, only 31.6% of nurses agreed with this statement. Almost all neonatologists and nurses agreed that they can talk to their colleagues when something is bothering them about an ELD (neonatologists, 94.1%, nurses, 92.4%). When they do not agree with an ELD that has been made, half of neonatologists (52.9%) and 65% of nurses agreed that they can opt to no longer be involved in that case; 57% of neonatologists and 60% of neonatal nurses agreed that they would prefer their NICU to provide more psychological support for staff members when they are being confronted with ELDs. About 40% of neonatologists and half of neonatal nurses agreed that they receive sufficient psychological support from their NICU after a patient dies.

For both groups sex, age (<40 years and ≥40 years), years of experience (≤10 years, >10 years), whether or not they are religious and whether they believe their religion has an impact on their attitudes towards ELDs were added. Additionally, we included function for neonatologists (resident or in training) and diploma for nurses (bachelor, masters or graduate degree). None of the demographic variables had a significant influence (not in table).

Item	Group	Disagree (%)	Neutral (%)	Agree (%)
Stress				
Taking decisions about the end of life causes me more stress than usual	Neonatologist	6 (11.8)	8 (15.7)	37 (72.5)
	Neonatal nurse	N/A	N/A	N/A
Being confronted with an end-of-life decision for a newborn baby in my department causes me more stress than usual[c]	Neonatologist	N/A	N/A	N/A
	Neonatal nurse	44 (17.7)	30 (12.1)	174 (70.2)
Psychological support by colleagues				
I feel that I am being supported by my colleagues in the decisions I make about my patients' end of life	Neonatologist	0 (0)	7 (13.7)	44 (86.3)
	Neonatal nurse	N/A	N/A	N/A
I have the feeling that the treating physician(s) listen to my opinion when an end-of-life decision is taken about a newborn baby with a serious condition[b]	Neonatologist	N/A	N/A	N/A
	Neonatal nurse	68 (27.3)	70 (28.1)	111 (44.6)
There are adequate possibilities offered by the department to express any protests I might have about end-of-life decisions[d]	Neonatologist	2 (3.9)	4 (7.8)	45 (88.2)
	Neonatal nurse	95 (38.5)	74 (30)	78 (31.6)
If something is bothering me about taking an end-of-life decision, I can talk to my colleagues about it	Neonatologist	0 (0)	3 (5.9)	48 (94.1)
	Neonatal nurse	N/A	N/A	N/A
If something is bothering me about a decision made about a patient's end of life, I can talk to my colleagues about it[a]	Neonatologist	N/A	N/A	N/A
	Neonatal nurse	8 (3.2)	11 (4.4)	231 (92.4)
If I don't agree with the outcome of a certain decision about a patient's end of life, I can opt to no longer be involved in that case[a]	Neonatologist	10 (19.6)	14 (27.5)	27 (52.9)
	Neonatal nurse	23 (9.2)	65 (26)	162 (64.8)
Professional psychological support				
I would like my department to offer more psychological help to staff when they are confronted with end-of-life decisions[c]	Neonatologist	6 (11.8)	16 (31.4)	29 (56.9)
	Neonatal nurse	38 (15.3)	61 (24.6)	149 (60.1)
I receive sufficient psychological support from my department after a patient has died in our department[a]	Neonatologist	13 (25.5)	17 (33.3)	21 (41.2)
	Neonatal nurse	85 (34)	40 (16)	125 (50)

All items were translated by a language editor
One neonatologist had missings on all psychological support items and was thus excluded from analysis.
[a] No missing values in nurses [b] 0.4% missing values in nurses [c] 0.8% missing values in nurses [d] 1.2% missing values in nurses

Table 6.2: proportion of neonatologists and neonatal nurses agreeing with psychological support items

6.4 Discussion

In this survey study concerning stress and perceived psychological support by colleagues or professionals during the neonatal end-of-life decision-making process, we found that both neonatologists and neonatal nurses working in a Flemish NICU experience more stress than usual when dealing with ELDs. Even though almost all feel supported by colleagues, only about half feel that the psychological support they receive is sufficient. Lastly, we could not identify a subgroup based on demographic characteristics that had a higher need for psychological support within our population.

Most neonatologists and nurses reported having more stress than usual when they make or are confronted with an ELD. They generally felt that they can talk to their peers when something is bothering them regarding an ELD. However, this support from colleagues does not seem sufficient. Our findings show that other, professional, support is often lacking since about 60% of neonatologists and nurses would like their department to provide more psychological support

when they are confronted with an ELD, and only two out of five neonatologists and half of nurses feel that they receive sufficient psychological support from their department when one of their patients dies. As we did not specify which psychological support the participants would like to receive or which support they are currently lacking, we consulted available studies and recommendations on varying types of psychological support in a NICU such as debriefings and counselling sessions. However, future studies should inquire about the specific nature and content of the psychological support that is currently lacking for Flemish neonatologists and neonatal nurses. Existing guidelines on neonatal end-of-life and palliative care already provide suggestions for staff support, namely regular debriefings and counselling sessions in order to prevent and counteract the negative consequences of stress[3]. This could not only benefit the personal and professional lives of staff by preventing burnout and compassion fatigue[6], but might also improve their ability to care for, and show empathy towards, both neonates and parents[12], thus improving the care and support they provide[13].

Since only 45% of nurses felt that the treating physicians listen to their opinion regarding ELDs and only 32% felt they can express any objections they might have, our study indicates that nurses often feel excluded from the decision-making process. We believe that including nurses could increase the quality of these decisions, because they often have more interaction with the infant and family than physicians do, and are therefore more familiar with their wishes regarding the care and death of the child[1,14]. Another study indicated that higher levels of stress in nurses compared with physicians could possibly be due to them having less impact on ELDs[15]. We thus hypothesise that including nurses in interdisciplinary ELD team meetings could possibly benefit the nurses themselves by reducing moral distress caused by being excluded from the decision-making.

6.4.1 Limitations of the study

Our study contacted all neonatologists and neonatal nurses working in all Flemish NICUs, which is a strength. However, only about 50% completed our questionnaire and we do not have demographic information about those who did not participate, or their reasons for not doing so. Using a 5-point Likert-scale leaves the motivation of the participants to answer in that manner open to interpretation, causing evaluations on the reason behind the lack of support to be hypothetical. Due to ethical considerations, we were unable to identify the NICUs in which the respondents worked and are thus not able to identify which do or do not provide adequate support to their staff. Lastly, we did not examine whether different types of end-of-life decisions such as non-treatment decisions or drug administration with or without an explicit life-shortening intention are associated with different perceived stress levels or needs of psychological support. We therefore recommend future research to examine whether different types of end-of-life decisions bring forth differences in stress levels and whether or not they warrant different means of psychological support.

6.5 Acknowledgements

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6.6 Reference list chapter 6

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Part 4
General discussion and conclusion

Chapter 7: General discussion and conclusion

Chapter 7

General discussion and conclusion

7.1 Introduction

The overarching aim of this dissertation was to examine end-of-life decision-making in stillbirths, neonates and infants on a population level, across centres and clinicians. Firstly, we developed a methodology, namely the mortality follow-back survey, that could be used to reliably study the prevalence of various prenatal and neonatal end-of-life decisions based on the register of death certificates. Using this methodology, we also compared the prevalence of neonatal end-of-life decisions in Flanders from 1999-2000 with 2016-2017. In part two of this dissertation, we explored in depth how healthcare providers in neonatal intensive care units feel towards these end-of-life decisions, and how neonatal end-of-life decisions are experienced in daily practice by means of an attitude survey and face-to-face interviews. Hereby, we focussed on the attitudes of neonatologists and neonatal nurses concerning prenatal and neonatal end-of-life decisions, the factors involved in decision-making that can make end-of-life decisions easier or more difficult for them, and the amount of perceived psychological support they receive during this difficult end-of-life decision-making process.

In this discussion section, the main findings of the included studies are discussed. First, a brief summary of the main findings of the dissertation is given, followed by a discussion of the methodological strengths and limitations of the included study-designs. Next, our findings will be discussed and reflected upon in-depth in relation to current research and clinical practice. Additionally, we formulate a number of implications and recommendations for future policy, practice, and research. Finally, an overall conclusion of this dissertation will be formulated.

7.2 Summary of the main findings

The main findings in relation to each of the research questions of this dissertation are summarized below.

7.2.1 Examining end-of-life decisions in stillbirths, neonates and infants in Flanders, Belgium on a population level

7.2.1.1 Developing a methodology to study the prevalence of end-of-life decisions before and after birth

In chapter 2 we present a study design aimed to evaluate and monitor the prevalence of prenatal and neonatal end-of-life decisions on a population level in Flanders, Belgium. This study design involved the development of a validated conceptual framework of end-of-life decisions across the entire foetal-infantile period and the development of a survey methodology to study these foetal-infantile end-of-life decisions independent of the setting within which the death or stillbirth took place.

We created a new, all-encompassing framework to conceptualize end-of-life decisions in the entire foetal-infantile period, including both deaths before birth from a viable age of the foetus onwards (from 22 weeks of gestation or a birth weight of 500 gram or more[1]) and liveborn

neonates who died before the age of one year. Two dimensions were deemed important, namely the medico-technical dimension that classified the medical act that was performed, and the medico-ethical classification that classified the life-shortening intention of the physician associated with that medical act. In terms of medical acts, a distinction was made between non-treatment decisions such as withholding or withdrawing life-supporting treatment, and administering drugs or performing active medical interventions with a possible life-shortening effect. The life-shortening intention of the physician on the other hand could either be: 1) no intention to shorten life, yet a potentially life-shortening effect was taken into account, 2) a potentially life-shortening effect was partly intended, yet not the main aim of the medical act, and 3) the life-shortening intention was explicit. Based on this framework, we developed two separate but similar questionnaires in order to examine end-of-life decisions in stillborns and neonates respectively.

Our aim was to study end-of-life decisions in live-born infants and stillborns from 22 weeks of gestation onwards on a population level. Based on previous experience in neonates[2], children[3] and adults[4,5], using death certificates as the basis for sending out questionnaires was deemed ideal. For stillbirths between 22 and 26 weeks of gestation, this procedure proved to be challenging as a death certificate is not mandatory under 26 weeks of gestation and thus our sampling framework by means of death certificates could potentially be incomplete. However, using the only other registry of all stillbirths, namely the birth registry (liveborn and stillborn) of the Study centre for Perinatal Epidemiology (SPE), would drastically decrease the reliability of our responses since delays in processing these documents could take up to one year. Therefore, we chose to rely on the robust mortality follow back survey-method for both deceased neonates and stillbirths, with some minor adjustments to improve coverage of stillbirths in the crucial period between 22 and 26 weeks of gestation. The Flemish Agency of Care and Health, which processes all death certificates, started encouraging registration of stillbirths from 22 weeks onwards for epidemiological purposes during the data-collection of our study. In addition to this method, we provided our questionnaires to the ten largest maternity wards in Flanders so that physicians were encouraged to fill them out for each stillbirth from 22 weeks of gestation onwards, in addition to filling out the accompanying death certificate.

Physicians filled out the main part of a death certificate for every neonatal death or stillbirth, which included demographic and medical information. Afterwards, the central administration authorities, in our case the Flemish Agency of Care and Health, received the filled-out certificates. The Agency was responsible for sending out questionnaires and accompanying letters with patient information to physicians for each death certificate denoting the death of a neonate or a stillbirth from 22 weeks of gestation onwards. The physician identified the infant, according to the information on the accompanying letter, and filled out the questionnaire. All filled-out questionnaires were sent to a lawyer, who was bound by confidentiality and thus safeguarded the anonymity of the physician, patient, parents and hospitals. After data collection was finished, the lawyer linked data from the questionnaires with information on the death certificates.

The developed research protocol is the first to study end-of-life decisions in stillborns and deceased neonates and infants under the age of one year on a population level within one

study design. We are convinced that regular repetition of this study in the future is needed in order to monitor and evaluate changes in end-of-life practices under ever changing societal, legal and clinical influences in a vulnerable group of foetuses and infants who are unable to speak for themselves. By basing inclusion of all deaths and all stillbirths on the death certificates, this research method can be used in other countries, irrespective of different legal frameworks regarding perinatal end-of-life decision-making, making international comparative studies possible. Providing these prevalence estimates, not only in Flanders, can eventually aid the development of obstetric, neonatal and paediatric guidelines to support a very difficult ethical end-of-life decision-making process in daily practice.

7.2.1.2 The prevalence of end-of-life decisions in the neonatal period

Chapter 3 of this dissertation focused on providing population estimates of the prevalence of end-of-life decisions in neonates and infants in Flanders over two study periods (1999-2000 and 2016-2017). These estimates were examined by means of the developed population-level mortality follow-back survey we described in the previous paragraphs.

A total number of 276 neonates and infants died between September 1st 2016 and December 31st 2017 (229 filled-out questionnaires received, 83% response rate); and 292 neonates and infants died between August 1st 1999 and July 31st 2000 (253 filled-out questionnaires received, 87% response rate). Study results showed that the prevalence of neonatal end-of-life decisions has stayed relatively stable across both time-points at about 60% of neonatal and infant deaths being preceded by an end-of-life decision. Non-treatment decisions are still the most prevalent at 34% of all neonatal and infant deaths in 1999-2000, compared to 37% in 2016-2017. Withholding treatment occurred in 13% of all neonatal and infant deaths in 1999-2000 and 12% in 2016-2017, while withdrawing treatment was prevalent in 21% of cases in 1999-2000 and 25% in 2016-2017. Administering medication with a potentially life-shortening effect stayed relatively stable at 16% in 1999-2000 compared to 14% in 2016-2017, while the prevalence of administering medication with an explicit life-shortening intention occurred in a similar group of 7% in 1999-2000 and 10% in 2016-2017. Despite stable prevalence rates overall, important shifts in the type of end-of-life decisions being made in different age groups were noted. End-of-life decisions were now significantly more often taken after the first week of life (74% of deaths between 7 and 27 days old was preceded by an end-of-life decision in 2016-2017 compared to 50% in 1999-2000, p=0.03; 64% of deaths after 27 days of life in 2016-2017 compared to 38% in 1999-2000, p=0.003). In deaths occurring in the first week of life, prevalence of end-of-life decisions significantly dropped (55% of deaths in 2016-2017 compared to 72% in 1999-2000, p=0.01). After the first week of life, end-of-life practice in Flanders considerably changed compared to 17 years ago, as decisions to withdraw life-sustaining treatment or administer medication with an explicit life-shortening intention become noticeably more prevalent. In 1999-2000 9% of deaths between 7 and 27 days was preceded by a decision to withdraw treatment and there were no cases where medication with an explicit life-shortening intention was administered, while in 2016-2017 in the same age group, withdrawing treatment and administering medication with explicit life-shortening intention were each prevalent in 26% of cases. After the first 27 days of life, the prevalence of withdrawing treatment rose from 16% in 1999-2000 to 31% in 2016-

2017, and the prevalence of administering medication with explicit life-shortening intention rose from 2% to 10%.

This chapter shows that end-of-life decisions continue to be an integral part of medical practice in extremely ill neonates and infants, with three in five deaths being preceded by such decisions, which indicates the need to discuss their permissibility and requirements for good clinical practice amongst healthcare providers.

7.2.2 Attitudes, views and experiences of healthcare providers involved in neonatal end-of-life decision-making

7.2.2.1 Attitudes of neonatologists and neonatal nurses concerning perinatal end-of-life decisions

In chapter 4 we present the attitudes of neonatologists and neonatal nurses working in a neonatal intensive care unit towards perinatal end-of-life decisions, examined by means of a full-population mail survey.

We found that overall, considerable support for both prenatal and neonatal end-of-life decisions could be noted amongst Flemish neonatal healthcare providers. In terms of prenatal end-of-life decisions, between 80 and 98% of neonatologists and nurses considered termination of pregnancy at a viable term acceptable in case of severe or lethal foetal anomalies. When the foetus is healthy, yet the life of the mother is in danger, more than 60% of neonatologists and nurses found termination of pregnancy at a viable term acceptable. However, when the foetus is healthy but the mother has a severe psychological problem, acceptance rates drop to 15% in both physicians and nurses. In extremely ill liveborn neonates, between 80 and 100% of all participating healthcare providers found non-treatment decisions such as withholding or withdrawing treatment acceptable, regardless of whether the life-shortening effect was solely taken into account or explicitly intended. Aside from general consensus between neonatologists and neonatal nurses on the abovementioned types of prenatal and neonatal end-of-life decisions, some differences in attitudes between both healthcare providers could be noted. Administering medication with a potentially life-shortening effect was considered acceptable by the majority of both healthcare providers, yet neonatologists were significantly more likely to agree to this practice (96%) than nurses did (84%, $p=0.02$). Conversely, though more than half of both healthcare providers found actively administering medication with an explicit life-shortening intention acceptable, the practice was more often considered acceptable by nurses (74%) than by neonatologists (60%, $p=0.02$).

Our study thus found a large acceptance of both prenatal and neonatal end-of-life decisions in neonatologists and neonatal nurses, even for decisions that currently fall outside the Belgian legal framework. However, physicians and nurses differed slightly in their acceptance of different types of end-of-life decisions, which could possibly be related to nurses not carrying the final legal responsibility of these medical decisions. These findings indicate the importance of including both perspectives in these difficult decisions at the end of an infant's life.

7.2.2.2 Barriers and facilitators for neonatologists and neonatal nurses regarding neonatal end-of-life decision-making

In chapter 5, we explored barriers and facilitating factors experienced by neonatologists and neonatal nurses during the end-of-life decision-making process in a neonatal intensive care unit. Hereby, we aimed to provide insight on the complexity of neonatal end-of-life decisions in daily practice, and the individual nature of personal experiences on this topic.

Some barriers and facilitators are linked with the characteristics of **the specific case**. These factors relate to either the ill neonate, the parents or the involved healthcare providers. Decisions seemed easier when the bad prognosis was evident fairly quickly as opposed to when there is a lot of prognostic insecurity, and exploring all curative treatment options first to ensure that the end-of-life decision is the only available option left to reduce suffering of the child helped make decisions easier. Healthcare providers indicate an easier decision-making process when parents have the same culture and language as the physicians and nurses involved. Previous experience of healthcare providers with end-of-life decisions is considered a crucial influencing factor, as they are better able to anticipate the child's future condition.

On a process level, we consider factors that are related to **characteristics of the decision-making process itself**. Intense communication between healthcare providers and parents is imperative for an easier end-of-life decision-making process. Furthermore, communication amongst healthcare providers is essential, for example by planning regular multidisciplinary consultations or debriefings. Additionally, deciding on an end-of-life decision can be made easier by considering all directions the child's condition can take in advance during one or more advance care planning conversations between parents and healthcare providers. Hereby, decisions regarding the medical responses in each situation can be made without being rushed by an acute deterioration of the child.

A final level includes **factors relating to the overarching structure of the ward, the hospital and the broader society** that could influence decision-making. Emotional and practical support from colleagues at the ward, or lack thereof, is crucial in end-of-life decision-making in neonates. Additionally, the lack of separate rooms to ensure privacy during bad-news conversations, and the shortage of available trained personnel in end-of-life care were clearly identified as barriers for end-of-life decision-making. Lastly, the current Belgian legislation was mentioned as an influencing factor. When mentioned, neonatologists and nurses stated that they experience the lack of a legal framework to allow for actively ending the life of a neonate in extreme cases to be an important barrier, especially in contrast to during the pregnancy, where the option to terminate as soon as a life-limiting foetal abnormality is diagnosed is available.

Our qualitative interview study revealed barriers and facilitators during neonatal end-of-life decision-making which could lead to recommendations for improving this process in daily practice. These recommendations include establishing regular multidisciplinary meetings to include all healthcare providers and reduce unnecessary uncertainty regarding the prognosis and the best possible course of action, routinely implementing advance care planning in severely ill neonates to make important decisions beforehand, creating privacy for bad-news

conversations with parents and reviewing the complex legal framework of perinatal end-of-life decision-making.

7.2.2.3 Psychological support in end-of-life decision-making for neonatologists and neonatal nurses

Chapter 6 of this dissertation focussed on the perceived stress that neonatologists and neonatal nurses experience during an end-of-life decision-making process in their neonatal intensive care unit, and their perceived psychological support both from colleagues and from professionals. This was examined by means of a full-population mail survey.

The majority of neonatologists and nurses agreed that making an end-of-life decision (neonatologists) or being confronted by one (nurses) caused more stress than usual (73% and 70% respectively). During the decision-making process for these end-of-life decisions, most physicians (86%) indicated that they felt supported by their colleagues. However, fewer than half of the neonatal nurses (45%) agreed that the physicians listened to their opinions when these decisions were being made. While most neonatologists (88%) agreed that their neonatal intensive care unit provides sufficient opportunity to express any reservations they might have about certain end-of-life decisions, only 32% of nurses agreed with this statement. Almost all of the participating neonatologists and neonatal nurses agreed that they can talk to their colleagues when something is bothering them regarding an end-of-life decision (94% and 92% respectively). Furthermore, when they did not agree with an end-of-life decision that had been made, half of neonatologists (53%) and 65% of nurses agreed that they could opt to no longer be involved in that particular case. Despite the fact that both groups of healthcare providers indicated that they could talk to their colleagues when something regarding end-of-life decision-making bothered them, 57% of neonatologists and 60% of neonatal nurses indicated that they would prefer their neonatal intensive care unit to provide more psychological support for staff members when they were being confronted with end-of-life decisions. Furthermore, only 41% of neonatologists and 50% of nurses agreed that they received sufficient psychological support from their neonatal intensive care unit after one of their patients died.

Our findings seem to suggest that neonatal intensive care units need professional ad hoc counselling or standard debriefings, as we believe they could substantially improve the perceived lack of support indicated by clinicians working at the NICU. Furthermore, we believe that including nurses in interdisciplinary end-of-life discussions could not only increase the quality of these decisions, but could possibly also benefit the nurses themselves by reducing moral distress caused by being excluded from the decision-making.

7.3 Methodological considerations, strengths and limitations

We used three different types of study methodologies in order to answer our research questions. Firstly, a population-based mortality follow-back study was performed, aiming to include all stillbirths from 22 weeks of gestation and onwards, and all deaths of infants under the age of one year during a set period (chapter 2 and 3 of this dissertation). Secondly, a full population mail

survey was performed to study attitudes on prenatal and neonatal end-of-life decisions of healthcare providers (chapter 4), and the amount of psychological support they received (chapter 6). Thirdly, we performed a qualitative study to determine the barriers and facilitating factors that neonatologists and neonatal nurses experience during the neonatal end-of-life decision-making process (chapter 5). We summarized the methods used below and elaborated on the methodological strengths and challenges of the study designs.

7.3.1 General methodological considerations, strengths and limitations of the dissertation

In general, the main strength of this dissertation is the use of a mixed methodology, combining strong quantitative data on neonatal end-of-life decisions and attitudes of healthcare providers on a population level, with elaborate and in-depth qualitative data on the viewpoints and experiences of those same healthcare providers. This multi-method approach provides us with highly detailed personal experiences combined with robust prevalence estimates, giving a more complete overview of daily practice than would be achieved by a single methodology. Another important methodological strength is the support of all Flemish neonatal intensive care units during the course of this dissertation. Because of this support, experts in neonatal care were involved in every step of the presented studies: from the development phase where their input was crucial to ensure content validity of our questionnaires and topic guides; to the data-collection phase where the support of the neonatal intensive care units aided in ensuring high response rates so that conclusions could be generalized across the entire population of deceased neonates and involved healthcare providers; and finally to the discussion phase where yearly consortium meetings with representatives from all Flemish neonatal intensive care units provided much needed clinical feedback on the implications of the collected data. Their involvement throughout this entire dissertation, across all studies, ensured that hypotheses and implications were grounded in daily practice, and that conclusions were supported by experts, making them relevant for clinical practice both nationally and internationally.

A general limitation of this dissertation is that all included studies focus on the viewpoint of healthcare providers. Input from (bereaved) parents is missing from the narrative of this dissertation. The choice to focus solely on healthcare providers in this dissertation was deliberate, as their viewpoint was both crucial and sufficient to answer our aims. Within the attitude survey and the qualitative study, physicians and nurses were included because they have a multitude of experiences and expertise, making them ideally qualified to evaluate end-of-life decisions independent of a specific case. In the mortality follow back survey, the only possible point of contact was the certifying physician, which was ideal as physicians are ultimately responsible for the medical care provided at the end of that patients' life, and they are thus ideally positioned to report on the intent of the decisions made and the impact of these medical decisions on life expectancy of the child. Parental views are a crucial perspective that deserves its own in-depth study. We included it in a separate qualitative study that falls outside of the scope of this dissertation.

7.3.2 The mortality follow-back survey

The method of the mortality follow-back survey based on death certificates has proven to result in reliable estimations of incidence rates of end-of-life decisions in neonates[2], minors[6] and adults[4,7]. By using this thoroughly tested and robust method, we were not only able to provide reliable estimates of end-of-life decisions in neonates and infants, but we were furthermore able to compare these incidence rates across time and age groups. Hereby, evolutions and trends in end-of-life practices in Belgium could be investigated from before an infant is born up until adults die from old age. Additionally, the mortality follow-back survey based on death certificates has been used internationally[8,9], allowing for reliable international comparisons. Due to rigorous follow-up procedures such as use of the Total Design Method[10] and regular visits to all Flemish neonatal intensive care units and the ten biggest Flemish maternity wards in order to continuously motivate all physicians to participate in the study, a high response rate of 83% was achieved.

7.3.2.1 Using death certificates

Use of death certificates offers a myriad of methodological advantages. Firstly, we were able to include the entire population of neonates who died before the age of one year, independent of the care setting within which the death occurred, and the cause of death of the infant. Including the entire population of decedents provides us with unbiased and reliable incidence rates, as opposed to more widely used single-centre studies[11–13] which focus on one or more, often highly specialized, hospital units where incidence rates of end-of-life decisions could possibly be skewed. Secondly, death certificates include contact information for the certifying physician of that specific death case, making it easy to send questionnaires to the person who is best positioned to provide information regarding the end-of-life decision-making process of the deceased infant. Thirdly, using death certificates as the basis for sending questionnaires allows us to link information on the occurrence of end-of-life decisions from the filled-out questionnaires to socio-demographical data available on the death certificates. This way, information such as sex, age, gestational age, cause of death and place of death is readily available without including additional questions to the questionnaire, hereby aiming to avoid incomplete questionnaires or non-response due to lengthy questionnaires.

However, using death certificates also presents some limitations. Firstly, delays in processing the death certificates can reach up to four months before questionnaires could be sent to the physicians[4]. Therefore, a recall and memory bias cannot be excluded. Recall bias includes physicians not being able to recall every detail with regard to the end-of-life decision-making process of an infant who died four months prior to receiving the questionnaire. Memory bias on the other hand, includes a shift in the content of the recalled memory causing physicians to remember facts differently, especially in regard to value-laden memories such as the death of an infant. Both the issue of recall bias and memory bias were present in previous studies using the mortality follow back survey-method[2–4]. However, similar to studying end-of-life decisions in minors, we do expect the recall bias to have played a smaller role compared to studying end-of-life decisions in adults[14]. This is because the death of an infant or minor is a far more rare and intense event for involved healthcare providers, leading us to expect that physicians would recall circumstances of their deaths more clearly. Memory bias on the other hand might

be expected to be equally present, if not more, than in adults since the death of a neonate at the beginning of their life might be even more value-laden. To mitigate recall bias and memory bias, physicians were encouraged to consult the medical file of the infant in question when filling out the questionnaires. Secondly, the physician mentioned on the death certificate was not always the attending physician. To overcome this problem, physicians were asked to pass on the questionnaire to the physician who was best suited to answer questions regarding that particular patient in the letter accompanying the questionnaire. Thirdly, contrary to mortality follow back surveys in adults, in the majority of neonatal deaths before the age of one year, the infant was treated by a very select number of physicians specialized in neonatology and paediatrics. Some physicians have therefore almost certainly certified multiple deaths within our study population. Since the number of questionnaires per physician was not limited in order to investigate the entire population of infant deaths under the age of one year, responder fatigue may have occurred, which could possibly lead to non-response. However, as all Flemish neonatal intensive care units participated in the study and were thus highly motivated, and response rates were high, we do not expect this to have played a major role.

7.3.2.2 The questionnaires

Some strengths of the mortality follow back survey-method can be related to the questionnaires used to study prenatal and neonatal end-of-life decisions. Firstly, the questionnaires used in the mortality follow back survey-method described in this dissertation were developed based on existing and previously validated questionnaires on end-of-life decisions in stillborns[15,16], neonates[2,8], minors[6] and adults[4,17] ensuring comparability over time, settings and age groups. Furthermore, the questionnaires used were rigorously pilot tested and validated in order to ensure content validity. As was the case in previous questionnaires on end-of-life decisions, our questionnaires used descriptive questions to identify which end-of-life decisions were taken in that specific patient instead of using loaded concepts such as euthanasia in new-borns, or abortion. As these terms are often subject to different interpretations and they can incite a strong emotional and/or moral reaction, they may lead to socially desirable answers or even unwillingness to participate in the study.

7.3.2.3 Ethical considerations and anonymity

Prenatal and neonatal end-of-life decisions are understandably a very sensitive topic among involved healthcare providers with immense ethical, moral and legal weight attached to the practice. We can therefore not ignore the possibility of underreporting certain neonatal end-of-life practices, especially those that are currently not considered legal within the Belgian legal framework. Furthermore, due to this sensitivity, social desirability bias cannot be excluded. To account for this, a thorough and rigorous anonymity procedure was used for data-collection. A complex mailing procedure was set up involving a sworn-in lawyer as a trusted third party who acted as intermediary between the Flemish Agency for Care and Health, the participating physicians and the researchers. The study methodology was approved by the ethics committee of the University Hospital of Ghent, the Privacy Commission (CBPL), the Sectoral Committee of Social Security and Health, and the National Council of the Order of Physicians.

7.3.3 The attitude and psychological support survey

Contrary to most surveys in prenatal and neonatal end-of-life decisions[18,19], our study targeted the entire population of neonatologists and neonatal nurses working in a neonatal intensive care unit. Therefore, our survey did not include any selection bias by focusing for example on healthcare providers within a single centre[18,19]. Additionally, instead of focusing solely on prenatal or neonatal end-of-life decisions separately within one study, attitudes of neonatal experts were examined on both end-of-life decisions prenatally and neonatally, as this is the domain where their expertise might be relevant. Furthermore, we included not only the perspective of physicians but also the perspective of neonatal nurses, who are an essential part of end-of-life decision-making[20–22] but are often forgotten in research. Despite the fact that targeting the full population of neonatologists and neonatal nurses working in a Flemish neonatal intensive care unit is a strength, only about 50% filled out a questionnaire. We have no information about those who did not wish to participate and are therefore unable to examine possible differences between the response and non-response groups. Furthermore, their reasons for not participating in the survey are unclear and can therefore range from them being uninterested in the topic, to them not feeling like they had enough expertise to share, or even simply being absent during the time of data-collection, since it only spanned one month in time.

By basing our questionnaire on an existing Flemish attitude questionnaire, and further developing our questionnaire in a multidisciplinary team consisting of sociologists, psychologists, neonatologists and a gynaecologist, we ensured that the questions were both relevant to clinical practice and usable within a research context. Furthermore, the final questionnaire was cognitively tested within our target population, by interviewing five neonatologists from four separate hospitals, three neonatal nurses from two separate hospitals and one gynaecologist in order to ensure content validity of the items. This questionnaire can thus also be used to examine attitudes of healthcare providers, and their perceived psychosocial support in other countries or settings, making international comparisons and comparisons across settings possible. However, questionnaires only allow a limited potential to fully capture the complexity of experiences and attitudes regarding prenatal and neonatal end-of-life decisions. By structuring answers of healthcare providers on a four or five-point Likert scale, we were able to ensure strong options for comparability over healthcare providers, settings and even countries. Yet it fails to encompass the full scope of what it means to decide on an end-of-life decision prenatally or neonatally. Open-ended questions or even interviews with participants would provide us with more in-depth information, though it would increase workload on the healthcare providers, which would thus negatively impact the participation-rate.

7.3.4 The face-to-face semi-structured interview study

Our interview study was the first to examine barriers and facilitating factors regarding neonatal end-of-life decision-making in healthcare providers working in a neonatal intensive care unit. We included not only physicians who are most often responsible for making the end-of-life decision, but also the neonatal nurses who are often involved in the provision of the decided care to the child and the family[20]. Hereby, we included viewpoints of both healthcare providers so that every facet of the decision-making process could be considered. By including participants from four different hospital wards across Flanders, we included variability at the level of the hospital ward.

Hospitals and wards could vary on a number of factors ranging from their policy regarding end-of-life decision-making, to the diversity of the patient population who frequents those hospital wards, or even the availability of certain infrastructure at the ward. By broadening inclusion to four centres from different regions in Flanders and including both university hospitals and a general hospital, instead of performing a single-centre study, conclusions were more likely to be applicable broadly across settings. We believe that parents could have crucial additional insights, which is why they were included in a separate qualitative study on neonatal end-of-life decision-making that falls outside of the scope of this dissertation.

Some methodological considerations are linked to the chosen study design of using face-to-face semi-structured interviews. Firstly, the use of individual interviews allows participants to tell their story freely without interruption or fear of not being able to speak openly due to the presence of the other important actors in the care process of the infant, which would be the case during for example focus groups. Secondly, by using a qualitative approach, we were able to fully capture the complexity, subtlety and individuality of the experiences of healthcare providers in the neonatal end-of-life decision-making process. The quantitative approach of the other two data-collection methods used in this dissertation are hereby supplemented by covering the individual experiences and the ethical, moral or emotional load that is often associated with these experiences by means of face-to-face interviews. However, this form of open recall, where participants were invited to talk about memories freely, could result in only extremely positive or negative memories being recalled. While this is highly beneficial towards formulating barriers and facilitating factors in relation to end-of-life decision-making, it might result in a bias towards extremes while the majority of experiences are far less extreme, thus reducing generalizability in daily, regular practice. Additionally, a memory bias could occur, especially when the recalled memory was highly value-laden, as is the case when remembering the death of an infant. Healthcare providers could in this case remember something different than what actually happened.

Additionally, some considerations are related to the way the data was analysed. Thematic content analysis was used to extract codes by means of a bottom-up approach, meaning that no a priori framework was used as a basis for analysis and themes were identified as they emerged throughout the interviews. Hereby, the researchers remained close to the experiences of the participants and results are thus an accurate reflection of daily clinical practice. Recommendations that followed, based on conclusions drawn in the study, are therefore readily applicable in the daily care of extremely ill neonates. Furthermore, coding was done by two researchers independently, which improved reliability of the codes. Additionally, all codes and interpretations were discussed with experts in neonatal and end-of-life care during and after data-analysis occurred, ensuring that interpretations and recommendations are carried by clinicians who are confronted with these cases on a daily basis.

Lastly, within our interview study, a selection bias at the level of the participating neonatologists and nurses cannot be excluded. Healthcare providers who are less open to speaking about neonatal end-of-life decisions, or who have a conservative stance regarding these types of medical decisions at the end of a child's life, are less likely to be heard. This bias is not only unavoidable, it is also preferable as intrinsically motivated participants provide the richest source of information in qualitative studies.

7.4 Discussion of the findings

In this section, the main findings of this dissertation are discussed in-depth in relation to each other, and in relation to the current state of the art. First, we will give a summarized overview of what being part of a neonatal end-of-life decision-making process within the Flemish healthcare context is like for healthcare providers, including evidence from all studies used in this dissertation. Secondly, we will examine these findings in relation to internationally available evidence. Third, the impact of the specific Belgian legal framework on neonatal end-of-life decision-making will be considered. Fourth, we will discuss the importance of providing support for the healthcare providers during the stressful neonatal end-of-life decision-making process. Lastly, we will reflect on the role of palliative care in neonatal end-of-life decision making.

7.4.1 Flemish neonatal end-of-life decision-making: prevalence, attitudes, views and experiences of healthcare providers

Infant mortality during the first year of life in Belgium is rather low. To put our prevalence estimates on neonatal end-of-life decisions into perspective, in 2016 and 2017, the average birth rate per month in Flanders was 5386[23] while we registered a total number of 287 deaths across 16 months (an average of 18 per month). Within the small population of neonatal and infant decedents, prevalence of end-of-life decisions has remained fairly constant over the last few decades at about 60%. In the following paragraphs we will extensively discuss the evidence on non-treatment decisions and administration of medication with a potential or explicit life-shortening effect in Flanders, which was collected across all studies within this dissertation.

7.4.1.1 Non-treatment decisions are the most common and most accepted neonatal end-of-life decision

More than four in five healthcare providers working in a Flemish neonatal intensive care unit find non-treatment decisions such as withholding or withdrawing life-sustaining treatment acceptable in severely ill neonates and infants, regardless of whether or not the life-shortening intention of withholding or withdrawing was explicit rather than implicit[24]. These attitudes were reflected within daily practice, as non-treatment decisions are the most common neonatal end-of-life decision in Flanders with a prevalence of 37% of all deaths. Within our qualitative interview study, physicians and nurses also indicated that withholding or withdrawing treatment when deemed no longer beneficial to the child makes for a less difficult decision-making process than administering medication to end suffering[25]. The ethical difference between allowing a child to die by stopping or not starting futile treatment and in essence letting nature run its course, and actively intending for the child to die by means of medication[26] likely play a crucial role in why non-treatment decisions are more prevalent. This is especially the case when providing treatment could possibly even cause suffering for a child that is already dying[27], and choosing to forgo the treatment to spare the child becomes easier.

In research on end-of-life decisions, withholding and withdrawing treatment are often grouped together under the umbrella of non-treatment decisions. Withdrawal of treatment is essentially the removal of intensive therapy started in an attempt to sustain the life of the

infant. Withholding treatment on the other hand indicates a decision not to initiate any new therapeutic interventions. Ethicists have defined both practices as being ethically equivalent[28]. The British Medical Association also stated that, although it might psychologically be easier to withhold treatment than to withdraw treatment that had already been initiated, there are no legal or moral differences between the two practices[29]. Despite the difference in acceptance between the two being small and not statistically significant in our attitude survey, withholding treatment was in fact found acceptable by 90-100% of neonatal healthcare providers while withdrawing treatment showed slightly lower acceptance rates (between 80 and 89%). If acceptance of withholding treatment was found higher than withdrawing treatment, this might raise the question why the prevalence of withholding treatment preceding neonatal death in our study isn't higher than that of withdrawing treatment. Though results of the attitude survey did indicate that decisions in daily practice are influenced by attitudes of healthcare providers, each clinical case has its own clinical characteristics such as whether or not treatment was initially started and whether withholding or withdrawing treatment is considered a possibility. Additionally, it is important to keep in mind that, within our study, only the decision that was deemed most important was included in analysis and prevalence estimates. When both withholding and withdrawing treatment were present, withdrawing treatment prevailed and as such, total prevalence estimates might be higher. Furthermore, in neonates, the prognosis of the child is often uncertain[30] and therefore treatment is often initially started in order to give the child the benefit of the doubt. Our data corroborates these claims, as intensive treatment was started in about 60% of all cases, and in only about one in five neonates the decision to forgo all types of intensive treatment was made (data not given in chapter 3). Despite the possibility that withholding treatment might be psychologically easier for healthcare providers, in most cases treatment is initially started with the intention to sustain or save the life of an extremely ill neonate. Data in this dissertation showed that, when treatment was deemed futile, it can be, and is often, withdrawn to reduce suffering or because it has become futile, making withdrawal of life-sustaining treatment the most occurring neonatal end-of-life decision in Flanders.

7.4.1.2 Medication with and without explicit life-shortening intention is also an important part of neonatal end-of-life decision-making in Flanders

Aside from non-treatment decisions, this dissertation showed that in about one in four of deceased neonates and infants, the most important end-of-life decision preceding death was administering medication with an implicit or explicit life-shortening intention (chapter 3). Prevalence of these types of end-of-life decisions in Flanders is thus similar to those in minors between the age of one and 17 years old[6], yet slightly lower than the prevalence in the adult population (31%)[31].

Administration of medication, taking into account the possible life-shortening intention

Within the category of using medication, we distinguish medication where the life-shortening effect was taken into account or co-intended, and administering medication with an explicit life-shortening intention. Over the past 17 years the prevalence of administering medication without explicit life-shortening intention stayed relatively stable at about 15% of all neonatal deaths. Interestingly, in adults the prevalence of intensified alleviation of pain and other

symptoms without explicit life-shortening intention is far higher at 24%[31], with the prevalence in minors being somewhat in between (18%)[6]. In neonates, assessing pain and symptom burden remains challenging as they are unable to express it either verbally or non-verbally[32], which is very different from treating pain in minors and adults. Measures for assessing pain in neonates exist, but they are still more difficult to clearly interpret[32] than adults or minors indicating their suffering through verbal or non-verbal cues. Because of this, when hastening death is not the main goal of the administered medication, and providing pain and/or symptom management medication is thus used to relieve suffering during a curative rather than a palliative situation, it is infinitely more difficult to assess the right doses than is the case in minors or adults. Furthermore, as life-shortening is not the main goal, careful consideration towards the doses of for example opioids, benzodiazepines or other sedatives or medications to relieve pain and suffering needs to be given as high doses could lead to an unintended respiratory arrest or cardiovascular distress in neonates[33,34]. Physicians might in these cases be more hesitant to increase these types of medication when all hope of saving the infant is not yet lost, and they are adamant to avoid an unintended life-shortening effect. These difficulties in assessing pain and determining the correct dosages of pain and symptom medication are specific to the neonatal setting, and thus it is possible that they play a crucial role in why administration of medication without an explicit intention to hasten death is less prevalent than in older patient groups.

Administration of medication with an explicit life-shortening intention

In 2016-2017, administering medication with an explicit life-shortening effect occurred in one in ten neonatal deaths, which was similar to the prevalence estimate of 7% of all neonatal and infant deaths preceded by this type of end-of-life decision in 1999-2000 (chapter 3). Our attitude survey (chapter 4) revealed that 60% of Flemish neonatologists and 74% of neonatal nurses considered administering medication with an explicit life-shortening intention to be acceptable in certain cases of extremely ill infants[24]. Similarly, in the Walloon region of Belgium, a survey showed that 77% of neonatologists working in a neonatal intensive care setting would consider performing 'active' end-of-life practices in the context of a palliative care pathway[35]. Even though allowing for an infant to die by withholding or withdrawing treatment, and administering medication to explicitly hasten death might morally and ethically be considered equivalent as the end result is the same, our qualitative study revealed that the decision-making process in these cases is far more difficult than when a non-treatment decision would suffice to relieve suffering by allowing the neonate or infant to die[25]. The decision-making process is even more complex as whether or not actively ending life in neonates is legally possible within the Belgian legal framework can be debated (see introduction), yet our studies show that it is an important part of neonatal end-of-life practice.

When comparing the practice of administering medication with explicit life-shortening intention in neonates and infants with older patient groups, some differences can be noted. In adults, 5% of all deaths are preceded by euthanasia (where the physician actively carries out the patients request to die), and less than one percent is preceded by physician-assisted suicide (where the physician makes the lethal means available to the patient to be used at a time of the patient's own choosing)[31]. Euthanasia and physician-assisted suicide are also possible in minors with decisional capacity in Flanders, yet the only study reporting on prevalence rates predates the addition of capable minors to the euthanasia law in 2014, which

reported a prevalence estimate of 0%[6]. In neonates and infants, euthanasia and physician-assisted suicide are both impossible in our population of neonates, as newborns and infants do not have any decisional capacity and thus administering medication with an explicit life-shortening intention is by definition always without explicit request from the patient (but not necessarily without explicit request from parents). The prevalence of explicitly hastening death by administering medication without explicit patient request in adults is estimated at 2%[31], and in minors this was estimated at 8% of all deaths[6]. The prevalence of this type of end-of-life decision is thus higher in neonates and infants, which could possibly be due to the fact that in neonates and infants decisional capacity can never be achieved, making administration of medication without explicit patient request the only option to actively hasten death by medication. In minors with decisional capacity and adults, an explicit request by the patient to hasten death by means of a euthanasia or physician-assisted suicide is possible. Medical situations where actively hastening death by medication is needed to relieve suffering without explicit patient request is thus far more rare in minors and adults than in neonates and infants. Additionally, as the administration of adequate pain and symptom control in neonates is so difficult to assess[32], the line between providing comfort by continuously and deeply sedating a suffering child until death and actively hastening the end of their life might become blurred. It could thus be possible that physicians include cases of continuous deep sedation until death with a "welcomed" shortening of life in neonates and infants under this category. In adults, the existence of a grey zone between hastening death and adequate palliative sedation is well known[17,36]. Due to the inherent difficulties in assessing the correct dosage to ease suffering in neonates, and the fine line between adequate pain relief and hastening death, we can expect this grey zone and the accompanying difficulties in labelling medical decisions at the end of life is equally or even more inherently difficult in neonates.

7.4.2 Comparing Flemish neonatal end-of-life decision-making with internationally available evidence

Neonatal mortality varies widely across countries. While 3% of all neonates die within the first 28 days of life in low income countries, this number drops to 1% in upper-middle income countries and even to less than 0.5% in the highest income countries worldwide[37]. In 2016 in Flanders, neonatal mortality within the first 28 days of life occurred in 0.23% of all live-born infants[23]. Aside from these differences in neonatal mortality, differences in ethical perspective exist between countries in the acceptability and use of medical decisions at the end of an infant's life[37]. It is therefore necessary to compare the information gathered within this dissertation on neonatal end-of-life decisions in Flanders, Belgium with internationally available data in order to unveil country-specific factors influencing decision-making.

7.4.2.1 International comparison of the practice of non-treatment decisions

In most high-income countries, the differences in treatment policies of extremely ill neonates, especially those born at the limit of viability, are not huge[37] yet in the grey zone some differences between for example European countries can be noted. While in Flanders and the Netherlands infants born before 24 weeks of gestation are not treated[37,38], in Germany they are, indicating small international differences in when an initial decision to forgo treatment due to extreme prematurity is made. Generally though, in Europe, non-treatment decisions

such as withholding or withdrawing treatment are well accepted[39,40], and the majority of physicians working in neonatal intensive care report having been involved in at least one case in which limits to intensive care were set[41]. Internationally, the likelihood of limiting intensive treatment in neonates is known to be dependent on the positive or negative attitude of physicians towards these types of end-of-life decisions[18]. The positive attitude of Flemish neonatal healthcare providers towards non-treatment decisions and the corresponding high prevalence of these types of decisions in the entire population of neonatal deaths before the age of one year reported in this dissertation corroborate these findings. We could therefore hypothesize that our prevalence estimates concerning non-treatment decisions could possibly be comparable to those of European countries with a similarly positive stance on these end-of-life decisions such as the UK and the Netherlands[18]. Physicians working in neonatal healthcare in European countries such as the Baltic states, Italy, Spain and Germany have a stronger pro-life attitude[18]. While Flanders and countries such as the UK and the Netherlands could thus be considered to have an accepting attitude towards non-treatment decisions with a potentially life-shortening effect, other European countries might be more restrictive.

The prevalence of non-treatment decisions in Flanders in 2016-2017 was 37% of all neonatal deaths (chapter 3). This is slightly higher than that of the Netherlands, which was estimated at 31% in 2010[8]. Reports from neonatal intensive care centres in the United States, the United Kingdom, Australia and Europe show that between 40 and 93% of neonatal deaths occur after withholding or withdrawing artificial ventilation or other life-sustaining treatments[12,42–46]. The difference between these population-based estimates (37% in our study) and the prevalence estimates of the number of deaths in specialized neonatal intensive care units internationally being preceded by a non-treatment decision (between 40 and 93%) can be related to several factors. Firstly, some methodological differences in assessing the prevalence of end-of-life decisions could be noted. In the population-based studies, the type of end-of-life decision was considered mutually exclusive, indicating that when more than one end-of-life decision was noted for a death case, the decision with the most explicit life-shortening intention was used. Furthermore, when more than one end-of-life decision with the same life-shortening intention was noted, administration of medication, as an active form of treatment, prevailed over withholding or withdrawing treatment which was considered a more passive act of hastening death. Therefore, the prevalence of all non-treatment decisions, regardless of whether or not they were noted in combination with drugs that could possibly shorten life was higher at 56% of all neonatal and infant deaths (data not given in chapter 3). Secondly, the difference between the single centre studies estimates and the population-based estimates can be due to the specialized setting of neonatal intensive care units. Decision-making at the end of a neonate's life can be considerably variable in these specialized settings, where healthcare providers are confronted with extremely ill neonates on a daily level and highly specialized technical equipment is readily available[47]. As one of the main strengths of our mortality follow back survey-methodology is the inclusion of all deaths regardless of the type of hospital unit the infants were admitted to prior to death, the differences in prevalence might reflect an actual difference between end-of-life decision-making in specialized level three intensive care units compared to infants who were treated in hospitals located in the periphery, or even at home. To examine these differences, future studies should address the differences in neonatal end-of-life decision-making with regard to the care setting in which the neonates are admitted. Additionally, as population-level studies are scarce, actual international comparisons between

our population estimates and estimates from countries outside of the Netherlands were impossible, which should definitely be remedied in future studies in order to examine country-specific influences on clinical practice. The study design described in chapter 2 of this dissertation would be ideal for this purpose.

Estimates on the prevalence of non-treatment decisions using a myriad of study designs, as described above, are limited to practices in Europe, Australia and the United States, where clinical resources for neonates and infants with severe conditions are practically unlimited[48]. According to our knowledge there is no evidence on end-of-life practices in neonates and infants within less well-developed healthcare settings. One retrospective chart review study suggested that end-of-life decision-making in units within less developed healthcare settings was similar to that in developed countries[48], yet this study only considered one hospital in Curaçao, where all paediatricians and residents received training in the Netherlands. Therefore, no reliable conclusions can be drawn without comparing reliable prevalence estimates on a population-level. The considerable difference between the positive attitude of Flemish healthcare providers towards non-treatment decisions in extremely ill neonates and the conservative attitude towards limiting life-sustaining treatment of for example Argentinian neonatologists[49] suggests that in this country, a significantly different neonatal end-of-life culture exist than that of Flanders. Therefore, future international comparison studies should include regions with these potentially differing end-of-life cultures to further examine which country-specific factors, such as for example an accepting versus non-accepting attitude of healthcare providers towards different types of end-of-life decisions, or the existence of national laws or guidelines, have impact on actual prevalence rates.

7.4.2.2 International comparisons of the administration of medication with an implicit or explicit life-shortening intention

The findings within this dissertation indicate that healthcare providers in Flanders have a fairly accepting attitude towards more active types of end-of-life decisions such as administering medication with a potential or explicit life-shortening intention, even when these decisions currently fall outside of the Belgian legal framework. In the following paragraphs, we will go into detail on whether or not this accepting climate is comparable internationally, both in terms of attitudes of healthcare providers, and when looking at international prevalence estimates.

We see that the life-shortening intention of administering medication being either implicit or explicit makes a crucial difference in whether the Flemish accepting attitude could be corroborated internationally. In Switzerland, 95% of physicians and nurses working in a neonatal intensive care unit found administering sedatives or analgesics acceptable, even if this might cause respiratory depression and death[50]. However, when the life-shortening intention of administering medication becomes explicit, acceptance rates of Swiss neonatologists and nurses drop to 24%[50]. In Canada, a survey on the attitudes of Canadian paediatricians revealed a collective unease towards non-voluntary euthanasia in never-competent children[51,52], suggesting that Canadian paediatricians and neonatologists might be a lot less accepting than those in Flanders. In France, a multidisciplinary working group on ethical issues in perinatal medicine even stated that acts to deliberately hasten a patient's

death are both legally and morally forbidden[53], indicating an even more restrictive attitude. Flemish neonatal healthcare providers might thus be much more accepting towards administering medication with a potential or explicit life-shortening intention in extremely ill neonates and infants than healthcare providers in other countries. In this regard, the influence of the Belgian legal context and the accompanying medical culture on death and dying should be taken into account. A short reflection on these influences can be found in chapter 7.4.3.

Aside from a reflection on international attitudes towards the administration of medication with a potential or explicit life-shortening intention, international prevalence estimates should be considered. A multi-national study (EURONIC) in eight European countries (Belgium not included) revealed that between 32% and 89% of physicians working in a neonatal intensive care unit had previously administered pain and symptom relief, despite the risk of respiratory depression and even death[54]. These numbers varied greatly between countries, with France, the Netherlands and Sweden reporting the highest number of physicians with previous experience in administering sedatives and analgesics even at the risk of hastening death (86-89%), and Italy being the only reported country with rates under 50% (namely 32%)[54]. Furthermore, that study revealed that administering medication with the purpose of ending life in neonates occurs very rarely in the majority of reported European countries. Only 2-4% of physicians working in a neonatal intensive care unit in Italy, Spain, Sweden, Germany and the UK reported ever having taken these types of decisions[54]. Interestingly, the only outliers in this case were France, where 73% of physicians indicated that they previously administered medication with an explicit life-shortening intention, and the Netherlands, with reported rates of 47%[54]. This indicates that Belgium's neighbouring countries (France and the Netherlands) might have a similar underlying culture of medical practice regarding these more active forms of hastening death in neonates than that of Flanders. Data from the EURONIC study however, dates back to the early 2000s indicating that medical practice could possibly have changed since then. In the case of France for example, more recent data showed that acceptance of healthcare providers towards active termination of life in neonates dropped from 73% to 39%[55]. In a recent follow-up study of the EURONIC study in 2016 in Germany, Switzerland and Austria[56], 97% of physicians reported in an online survey that they have administered sedatives and analgesics even at the risk of potentially hastening death at least once. When considering the administration of drugs with an explicit life-shortening intention however, the proportion of physicians ever having made this decision in Germany, Switzerland and Austria drops to 4%[56]. We can conclude that internationally, some variability in prevalence estimates of administering medication with a potential or explicit life-shortening intention can be noted.

In the EURONIC studies, physicians were asked whether or not they had ever previously taken specific types of neonatal end-of-life decisions and therefore we have no indication of how frequent these decisions actually are. Providing a clear comparison between data from the EURONIC studies and our prevalence estimates of administering medication with a potential or explicit life-shortening intention within an entire population of deceased neonates and infants during a set period of time therefore proves to be difficult. The only available prevalence estimates regarding the use of medication to implicitly or explicitly hasten death in neonates is from the Netherlands[8], indicating that medical practice might not be as comparable to Flanders as previously suspected. Where our prevalence estimates indicate

that 14% of all neonatal deaths in 2016-2017 were preceded by the administration of medication with a potentially life-shortening effect, the Netherlands reported a prevalence of just 4% in 2010[8]. When looking at the prevalence of administering medication with an explicit life-shortening intention, the difference between the 10% prevalence estimates of Flanders in 2016-2017 with the Dutch estimate of 1% in 2010[8] is even more striking, particularly considering that the Netherlands have a legal framework which permits such decisions in rare cases of extremely ill infants where Flanders does not. Availability of a legal framework thus not necessarily leads to an increase in the prevalence of this practice. However, the lack of international population estimates makes it impossible to draw robust and valid conclusions on the impact of these different legislative choices regarding the permissibility and rules for good clinical practice of various neonatal end-of-life decisions on their actual prevalence.

7.4.3 The possible impact of the Belgian legal context on neonatal end-of-life decisions

The "permissive" climate towards neonatal end-of-life decisions amongst Belgian neonatal healthcare providers must be viewed within the broader context of the Belgian legal and medical culture. As Belgium has both a fairly liberal law on termination of pregnancy compared to some other countries and a law on euthanasia in adults and competent minors (see chapter 1), it could be debated that the Belgium medical and legal culture as a whole could be considered as more accepting of certain decisions at the end of a person's life regardless of their age than is internationally the case. Even though neonates themselves do not fall under the jurisdiction of the mentioned laws, we should consider if and how their presence and implementation could influence neonatal end-of-life decision-making.

One of the main arguments against the legalisation of euthanasia worldwide is the slippery slope argument, which states that legalising euthanasia will lead to error, abuse and the violation of rights of vulnerable people for which the law was not intended. As neonates are not competent to request, and receive, euthanasia, they could thus be classified as such a vulnerable group that falls outside the jurisdiction of the euthanasia law, but yet could experience an influence of its implementation. If this is the case, the implementation of the euthanasia law for adults and competent minors should lead to 1) an increase of deliberately ending the life of neonates with severe conditions, and 2) this increase should be attributed to physicians feeling more at ease with the practice explicitly due to the existence or extension of the euthanasia law. Prevalence estimates provided in this dissertation can only provide insight into the first claim, namely that the prevalence of administering medication with an explicit life-shortening intention stayed relatively constant at 7% two years before; and 10% of the total population of deceased neonates and infants 15 years after implementation of the euthanasia law in adults (three years after the addition of competent minors). Furthermore, a causal relation between the implementation of the euthanasia law for adults and competent minors, and the considerable prevalence of administration of medication to intentionally hasten death in neonates, as mentioned in point 2, cannot be proven by the data presented in this dissertation. The highly positive attitude of neonatologists and neonatal nurses towards these types of end-of-life decisions, which could possibly identify Flanders as a unique region with regard to neonatal end-of-life decision-making, was never linked to the existence of the euthanasia law by participants in the studies discussed in this dissertation. Contrary to the possibility that the Belgian euthanasia law has an unintended

facilitating effect on end-of-life decision-making in neonates, the existence of the law could have an impeding influence. Here we could argue that the existence of a clear law on when actively ending life in minors and adults is legally allowed, this also provides physicians with a clear demarcation on when using lethal drugs is considered illegal. As neonates are undoubtedly never competent, the prevalence of drug administration with an explicitly intended effect to shorten life in neonates should in this case decrease because they fall outside of the due care criteria mentioned in the law. Our data shows that this is not the case, and thus we can hypothesize that the existence of the euthanasia law has no impeding effect on neonatal end-of-life decision-making.

While a possible influence of the euthanasia law on neonatal end-of-life decision-making can be contested, the influence of another Belgian law on neonatal end-of-life decisions was explicitly mentioned in our qualitative study, namely the law on termination of pregnancy (see chapter 5). Late termination of pregnancy is legally possible in Belgium when completing the pregnancy presents a serious threat to the women's health or when it is established that, when born, the child will suffer from a particularly severe ailment, acknowledged to be incurable at the time of diagnosis[15,16,57,58]. During interviews with neonatologists and nurses, several participants mentioned that the lack of a legal framework to intentionally hasten death in neonates with a severe condition is identified as a barrier in neonatal end-of-life decision-making, especially compared to the existence of the law on termination of pregnancy which allows for intentionally hastening death in infants with a severe condition as long as the child is not yet born. Since the Belgian law on termination of pregnancy due to a severe or lethal foetal condition does not have a gestational age restriction[58], it can be considered more liberal than countries that do invoke a gestational age restriction[59], or even countries where late termination of pregnancy for foetal anomalies is illegal regardless of the gestational age[60]. As healthcare providers specifically mention the influence of this law on neonatal end-of-life decision-making, and more specifically the restrictions and uneasiness they sometimes feel when they are unable to intentionally hasten death in suffering neonates and infants when a pregnancy could be terminated for exactly the same diagnosis in an unborn foetus, it might be possible that the existence of a liberal termination of pregnancy law (compared to other countries internationally, see introduction for an overview) has an influence on decision-making after birth. However, as the Belgian law on termination of pregnancy was instated in 1990, prevalence estimates on neonatal end-of-life decisions from 1999-2000 and 2016-2017 discussed in this dissertation will thus not be able to point out any changes following the implementation of this law. Furthermore, whether the permissive attitude of healthcare providers in perinatal care follows rather than precedes the implementation of the termination of pregnancy law can be debated.

We found that a high number of neonatologists and nurses found administering medication with an explicit life-shortening intention acceptable in extremely ill neonates and infants, and that this practice occurs in about one in ten infants who died before the age of one year, despite the fact that the legality of these decisions can possibly be contested. Furthermore, international studies indicated that this practice occurs across Europe[41,61], while the Netherlands is currently the only country where this is legally condoned under strict substantive and procedural due care criteria (see chapter 1). Before debating on whether or not this data indicates that legislative changes in Belgium are warranted, we should thus consider why physicians in Flanders (and internationally) perform such acts in daily clinical practice. During interviews and consortium meetings with

Flemish neonatologists, some physicians emphasize that they interpret deliberate administration of lethal drugs as illegal, since neonates are not capable of determining their wishes regarding active termination of life. However, due to the legal haziness explained in the introduction of this dissertation, other physicians contest the fact that allowing a neonate to die in such manner would count as illegal. It would thus be short-sighted to start from the presumption that in 10% of deceased neonates, illegal medical acts (as interpreted by the physician) preceded death. Additionally, from a moral point of view, we can even contest that there is an inherent difference between a non-treatment decision with an explicit life-shortening intention and administering lethal doses of medication, as the intended end result is the same namely to end the suffering of the child by hastening death[62].

When comparing prevalence estimates of administering medication with an explicit life-shortening intention in Flanders - a region where this practice is currently not regulated by means of a protocol or a law - with the Netherlands - who chose to provide guidelines and regulations for best practice –, we see that this practice occurs more often despite the lack of a clear regulation. Our prevalence estimates on a practice that is currently not clearly legally condoned, combined with the knowledge that attitudes of Flemish neonatal healthcare professionals towards administering medication with explicit life-shortening intention are permissible[24], raises the question of whether guidelines, protocols or laws are needed to monitor these decisions in such a vulnerable patient group. However, the existence of a permissive attitude of involved healthcare providers towards these decisions, and the existence of empirical evidence indicating that these decisions are actually made in daily clinical practice do not automatically warrant support towards these legislative changes. While our interview study showed that neonatologists and nurses find the lack of a law allowing for actively hastening death by means of medication in severe cases to be a barrier in decision-making, they also indicated to be wary of possible standardisation by means of a law. Additionally, a Walloon attitude survey revealed that only half of respondents were in favour of allowing and standardizing active end-of-life practices, with a preference for instating a protocol rather than a law[35]. Furthermore, a large proportion of their participants indicated feeling uncertain about whether or not they wish for a protocol or a law to be instated[35], which is consistent with the hesitation felt during conversations with Flemish neonatologists in context of this dissertation. The Walloon study indicates that neonatologists do not want decisions concerning life and death situations in an individual case of neonatal suffering to be regulated by a restrictive law[35]. On the other hand, the justification of placing the ultimate decision regarding life or death solely in the hands of the involved healthcare providers without the availability of clinical and ethical guidelines could also be questioned. While the existence of a protocol or a law to legally allow these decisions might aid decision-making, and could possibly provide guidelines towards what would be considered best practice in these cases, caution is warranted. This extremely sensitive issue needs further interdisciplinary debate, including physicians from both the Flanders and the Walloon region and possibly even ethicists and policy makers. The empirical evidence provided within this dissertation reveals that end-of-life decisions, even those that possibly fall outside of the Belgian legal framework, are prevalent in daily practice and therefore, these interdisciplinary debates on their permissibility and requirements for good clinical practice are warranted.

7.4.4 Support for healthcare providers during the neonatal end-of-life decision-making process

A key finding of this dissertation is that psychological and psychosocial support for healthcare providers working in neonatal end-of-life care is currently lacking (chapter 5 and 6)[25,63]. Both being part of an end-of-life decision-making process and experiencing the death of a neonate in their care causes a considerable amount of stress for involved physicians and nurses. Belgian neonatologists and nurses are no exception in this case. International evidence shows that healthcare providers working in a NICU setting are recognized as prone to the negative effects of experiencing stress within their occupation, as the prevalence of burnout is estimated to be about 30% in neonatologists[64] and between 7.5 and 54.4% in neonatal nurses[65]. This is unsurprising as healthcare providers working in an intensive care setting are confronted with a continuous high-stress work environment on a daily basis[66], where end-of-life issues[67], difficult ethical decisions[68], and observing continuous suffering of patients[69] can have a debilitating effect on their own quality of life. The negative effect of the experience of working in an intensive care setting on a daily basis on stress and wellbeing of the healthcare providers could be even larger in a NICU setting, as they care for extremely ill and dying infants who didn't even get the chance to start their lives properly. During interviews, neonatologists and neonatal nurses continuously stressed how dealing with severely ill newborns can weigh on their emotional wellbeing, especially when the infant looks like a healthy, full term baby, or when healthcare providers have young infants of their own which causes them to project the hardships they view and experience on the job on their own household situation. Additionally, they indicated that being part of a neonatal end-of-life decision-making process is never easy, and that diagnostic and prognostic insecurity can heavily weigh on their state of mind.

To cope with the elevated amounts of stress due to being confronted with end-of-life decisions and infant death on a regular basis, our studies showed that healthcare providers turn to their peer colleagues for support. The large majority of both neonatologists and nurses indicated that they were able to talk to their colleagues when something is bothering them regarding an end-of-life decision made for their patients[63]. Furthermore, neonatologists and nurses within our interview study indicated a considerably easier end-of-life decision-making process for extremely ill neonates when they felt like they could count on their colleagues for emotional support[25]. Additionally, not every healthcare provider is prepared to be part of an end-of-life decision-making process. While some nurses during interviews indicated that they would opt out of providing palliative or end-of-life care in favor of caring for infants with higher survival odds every single time to spare themselves the emotional burden, others indicated that their willingness to provide end-of-life care was related to the available emotional reserves they themselves had at that point in time. When both colleagues and the neonatal ward are open to allowing their staff to switch tasks and healthcare providers can indicate whether or not they are willing to be part of an end-of-life decision-making process at that time, this can have an influence on their overall wellbeing[70]. However, we found only one neonatal palliative care protocol which mentioned this in their recommendations section[70]. Promoting this type of emotional support amongst colleagues more broadly in neonatal palliative care guidelines, and installing a team-work culture in the NICU wards, could prove to be beneficial for the wellbeing of their staff.

Though the positive impact of collegial support from peers on wellbeing of the healthcare providers should not be overlooked, it is not sufficient to cope with the stressors associated with end-of-life decision-making and infant-death in the Flemish neonatal intensive care units. Counselling for bereaved parents after perinatal loss to help them cope is much more readily available[71] than it is for healthcare providers, as they are often not recognized as a bereaved person by society or their work environment[72]. As a result of this, most recommendations and guidelines on psychosocial support during death and end-of-life care in neonates focusses on providing physicians, nurses and other healthcare professionals with concrete tools to optimally attend to parents in their decision-making process and grief[73–75]. Caring for the healthcare providers in this case becomes secondary or even non-existent, even though the added emotional distress of dealing with these extremely difficult decisions regularly can prove to be more than they can cope with. Healthcare providers who suffer from emotional distress and even burn-out are furthermore known to have a diminished capacity to care for, and show empathy towards the ill neonates in their care and their parents[64,65]. Caring for the healthcare providers might thus not only benefit their wellbeing on a personal level, but it might also considerably improve their ability to care for the infants and support the families. The lack of professional support for healthcare providers working in a neonatal intensive care unit, as shown by several studies in this dissertation, should thus obviously be addressed and resolved. Suggested measures to increase this staff support are regular formal debriefings with the entire team to discuss difficult end-of-life cases, and counselling sessions for healthcare providers during regular work hours instead of on a voluntary basis or during unpaid time[70].

7.4.5 The role of palliative care in neonatal end-of-life decision making

In caring for extremely ill neonates and infants, deciding to either reorient care from cure-oriented and life-extending to comfort and palliative care, or to provide both cure-oriented and comfort care concurrently, is part of daily clinical practice[34]. Additionally, when a life-limiting condition is diagnosed before birth, decisions to start up palliative care at birth can be made prenatally[70]. In adults, when palliative care is provided – alongside standard care - during the final days of life, it has been shown to reduce symptom burden and increase quality of life for both people who are dying and those close to them[76]. An increasing amount of (cluster) RCTs show improvements in outcome measures such as dying at home, reducing symptom burden, and improving patient and caregiver satisfaction in people with advanced illnesses such as cancer, chronic obstructive pulmonary disease, congestive heart failure, etc[77,78]. In prenatal and neonatal practice on the other hand, palliative care is a relatively new field where the possible beneficial impact is hypothesized but has not yet been evaluated[79]. Furthermore, though several reports on perinatal and neonatal palliative care protocols, teams or educational interventions exist, they are not evidence based, raising the question of what exactly a perinatal or neonatal palliative care program should entail[80]. The role of end-of-life decisions, and the possible implications of data provided within this dissertation, within such a perinatal or neonatal palliative care approach is unclear.

When parents receive a life-limiting diagnosis for their child, it is extremely important that healthcare providers provide them with an empathetic, understandable and balanced overview of all treatment options, including active and cure-oriented interventions, end-of-life decisions, and palliative care[81,82]. As the practice of withholding or withdrawing unnecessarily invasive life-

supporting treatment in modern neonatal intensive care units globally is well supported[34,56,83], and results of this dissertation corroborated their central role in neonatal end-of-life care (chapter 3), we can expect these conversations between healthcare providers and parents to include discussing non-treatment decisions. Furthermore, we can expect decisions to withhold or withdraw unnecessarily invasive treatment to be an integral part of a shift from curative care to palliative care. A prime example of this is the practice of compassionate extubation, where assisted ventilation which is often vital for survival of the child is withdrawn to increase comfort[34]. Additionally, an integral part of perinatal and neonatal palliative care comprises allowing parents to be involved in normal baby care[22] and creating memories where there are none[74], which is unique to the palliative setting of losing a child at the very beginning of their life. Allowing parents to bathe, care for and dress their child if they so wish, and providing opportunities to take photographs as a family as a way to say goodbye to their child before he or she passes away is thus part of good practice in perinatal and neonatal palliative care[74]. Within our interview study (chapter 5), we learned that a necessary first step in order to provide these opportunities is to disconnect the dying child from life-support and mechanical ventilation. During advance care planning conversations, which is part of the provided palliative care service, the healthcare providers walk through the dying process of the child starting with withdrawal from life-supporting treatment, to making the most of their final moments[25]. Furthermore, results from our mortality follow back survey-method showed that, now more than 17 years ago, prevalence of end-of-life decisions rose after the first week of life (chapter 3), hereby indicating less need to rush the dying process of the infant than before, and allowing for time to adequately say goodbye.

Aside from other important components such as advance care planning and support for parents, providing adequate pain relief and comfort are a crucial component of perinatal and neonatal (palliative) care[84]. Withholding or withdrawing treatment is therefore usually followed by increasing analgesics and sedatives to treat the dying neonates' pain and suffering[85]. Pain management in newborns remains very challenging for healthcare providers, since infants are unable to express what they feel, and pain cues are difficult to interpret[86]. Furthermore, physicians worry that high doses of opioids, benzodiazepines and other sedatives which are needed to provide adequate pain relief during both curative care and palliative care, will lead to respiratory or cardiovascular distress[33,34]. In neonates more than in minors or adults, differentiating between actively and intentionally ending the life of the neonate with lethal doses of medication and providing adequate pain relief within a palliative care setting is thus very difficult[87]. As pain and symptom control are such crucial components of palliative care, they are inadvertently linked and a clear demarcation between an end-of-life decision to increase the administration of pain medication without explicit intent to hasten death and providing adequate palliative care is unnecessary. Yet the question becomes whether an end-of-life decision where medication is administered with an explicit life-shortening intention is compatible within a palliative care setting, or whether both practices should be seen as mutually exclusive. The high doses of pain medication needed to provide relief for suffering neonates within the context of providing good palliative care could, and are often (chapter 3) given even when a life-shortening effect was foreseen or even intended. In adults, we see that Belgium provides a unique context where the practice of euthanasia and palliative care are integrated[88–90], rather than being considered as incompatible practices as is the case abroad[91]. The fact that providing adequate pain relief during a palliative care approach, and administering medication with an explicit life-

shortening intent were not seen as separate practices by the healthcare providers involved in this dissertation seem to corroborate these findings.

Embedding the end-of-life decision-making process within a neonatal or perinatal palliative care approach could be useful to address the complex family needs in an emotionally turbulent time by providing a family-centered approach with a focus on parental (spiritual and cultural) values, memory making, and compassionate communication between parents and providers[92–94]. As family-centered psychosocial support and bereavement care is central within a neonatal or perinatal palliative care approach, ample attention is given to the values, goals and needs of parents, siblings and other significant relatives[82,84,94]. Additionally, such a palliative care approach could benefit healthcare providers, as existing perinatal palliative care protocols often include sections on psychosocial staff support, used to improve quality of care and counteract moral distress, burnout and compassion fatigue[80,95]. A neonatal or perinatal palliative care approach thus includes not only adequate pain relief and comfort for the child, but also has a strong emphasis on compassionate communication and psychosocial support for parents, family members and involved healthcare providers. Within a follow-up project of this dissertation, we will therefore aim to develop the first Belgian perinatal palliative care program to address this much needed support for fetuses and infants at the end of their life, as well as their families and involved healthcare providers. Within this project, ample attention will be given to end-of-life decision-making, and how to support parents and healthcare providers during the often difficult decision-making process.

7.5 Implications and recommendations

7.5.1 Implications and recommendations for practice

The data provided within the qualitative interview study (chapter 5) lead to some concrete recommendations with the aim of making the end-of-life decision-making process itself less difficult for healthcare providers. Firstly, attention should be given to creating a private room for bad-news conversations in the neonatal intensive care unit and in other hospital wards were such conversations are prevalent and necessary. By ensuring privacy, difficult end-of-life decisions can be discussed between healthcare providers and parents without outside interference or disturbance. During these conversations, compassionate communication between parents and healthcare providers is warranted. Secondly, installing a routine use of advance care planning with parents in neonates with a severe prognosis could aid difficult decisions. By planning possible courses of action depending on the possible clinical situations of the ill neonate beforehand with parents, healthcare providers will be more able to base their decisions on the parents' wishes and preferences. These advance care planning conversations can then be useful in times of acute deterioration of the child's condition, where decisions might otherwise be rushed or parents would previously be excluded from decision-making. Thirdly, prognostic uncertainty can be reduced by installing regular multidisciplinary team meetings and debriefings, and routinely asking for a second opinion from other physicians. By relying on the collective wisdom of multiple, experienced healthcare providers, as opposed to making medical decisions individually, uncertainty regarding the prognosis and the best possible course of action can be reduced. Lastly, difficulties in working with parents who have a different cultural background or speak a different language than that of the involved healthcare providers could possibly be

reduced by consulting a neonatal or perinatal palliative care team. As cultural and language differences can result in misunderstandings or even entail fundamentally different views on the acceptability of certain types of end-of-life decisions, conversations between parents and healthcare providers on this topic can be strenuous and stressful. In similar situations in adults, a palliative care team can be consulted to mediate these conversations, as they are supposed to have ample experience in dealing with these difficult issues[96]. Additionally, neonatal and perinatal palliative care teams put ample emphasis on conversational training and compassionate communication between parents and healthcare providers[92–94], making them ideally placed to mediate during difficult end-of-life decision-making processes. Internationally, a small but growing amount of perinatal and neonatal palliative care teams have been installed[97], yet the development of these teams is still in its infancy. In Belgium there are currently no official perinatal palliative care teams available, despite the fact that they could provide neonatologists and neonatal nurses with crucial and much needed support in end-of-life situations, including but not limited to providing assistance when families and healthcare providers disagree on the course of action for their dying child.

End-of-life decisions and a possible redirection of care from curative to palliative and comfort care is part of daily practice when working in a neonatal intensive care unit. Therefore, neonatologists, neonatal nurses and other healthcare professionals working in this setting should develop generalist palliative care skills. In Belgium, there is currently no formal training on neonatal palliative care available to aid healthcare providers in attaining these neonatal palliative care skills[98]. Including a module on neonatal death and end-of-life decision-making in standard curricula for neonatologists and neonatal nurses increases clinical experience and end-of-life communication skills early on in training, which leads to enhanced confidence and fewer negative experiences with end-of-life care in the neonatal intensive care units[99]. Furthermore, neonatal intensive care units could provide on-the-job training to newer/younger staff members by pairing them up with more experienced colleagues during their first encounters with dying neonates. By ensuring basic training on neonatal end-of-life care and palliative care for healthcare providers, individual experience is raised, which was indicated as a facilitating factor in neonatal end-of-life decision-making during our interview study. Additionally, when all available personnel working in neonatal intensive care units attained basic palliative care and end-of-life communication skills, dividing the workload of caring for neonates with a poor prognosis amongst competent and trained healthcare providers becomes easier.

As collegial support from peers in the neonatal intensive care unit was deemed crucial yet insufficient to support neonatologists and neonatal nurses during stressful end-of-life care and palliative care situations, the lack of professional psychosocial support at the ward is cause for concern. As discussed extensively in previous paragraphs, we suggest the implementation of regular formal debriefings with the entire team responsible for caring for a neonate who died within the unit. Hereby, opportunities are created to review and discuss what could have been improved, which could aid in future end-of-life cases. Furthermore, we recommend counselling sessions for healthcare providers who were involved in end-of-life cases during regular work hours, as opposed to them attending counselling sessions on a voluntary basis or during unpaid time[70]. By providing adequate professional psychosocial support at the neonatal intensive care unit, elevated levels of work-related stress and increased risk of burn-out can be avoided or remedied, which could improve job satisfaction and personal wellbeing of healthcare providers.

7.5.2 Implications and recommendations for policy

Some of the results from the 2016-2017 study described in chapter 3 were against expectations of Flemish neonatologists and available trend figures from the Netherlands. Relying on the reports and experiences of healthcare providers to provide estimates of which decisions are made could thus cause skewed results. Monitoring daily practice by means of population-level studies is thus crucial to have a reliable, continuous and up-to-date overview of which decisions are actually made in clinical practice across settings, and what the main reasons are for doing so. Actual prevalence estimates on a population level are invaluable as they enable an empirical analysis of the plausibility of certain decisions being made, and extent to which these decisions are practiced, especially in sensitive topics such as neonatal and prenatal end-of-life decision-making which are the topic of much ethical and legal debate. Without these prevalence estimates, ethical and legal discussions, and even legislative decision-making, are based on experiences and viewpoints of a select number of consulted experts, while population-data can provide an actual empirical basis on if and how often various end-of-life practices occur in the population. Within an ever-changing society where there is a continuous rise in medical possibilities to save the life of neonates with severe health concerns, systematic monitoring of end-of-life decisions on a population-level on a regular basis is paramount. Policymakers should support this recurrent periodic monitoring in order to be aware of any significant changes in daily practice which might warrant legislative or policy-changes.

The data presented within this dissertation showed that end-of-life decision making is common and we can thus assume that a large majority of neonatologists and neonatal nurses will be confronted with an end-of-life decision-making process numerous times over the course of their career. As current national and international guidelines on the acceptability and adequate performance of these neonatal end-of-life decisions are lacking, there might still be a lot of uncertainty among physicians and nurses regarding their permissibility and requirements for good clinical practice. Guidelines and protocols such as the Groningen protocol in the Netherlands, and even the institution of laws such as the euthanasia law for adults and competent minors can serve to eliminate some of the controversies that are inherent in neonatal end-of-life care. However, as discussed before, we should at the same time be wary of overregulating end-of-life practices as each individual neonatal end-of-life case is unique. Furthermore, overregulation can even have an adverse effect, causing doubt and leading to inaction amongst physicians even when it concerns acceptable end-of-life practices. Bearing in mind the study on attitudes of neonatologists in the Walloon region of Belgium on end-of-life decisions and practices for very preterm infants[35], issuing practice recommendations and guidelines in the form of a protocol might be a more adequate solution than striving towards an actual law to regulate neonatal end-of-life decision-making. Our prevalence estimates can provide experts with a starting point to discuss the possible formulation of these guidelines or legislative alternatives further. Additionally, the prevalence estimates and possible barriers and facilitators healthcare providers experience during a neonatal end-of-life decision-making process discussed within this dissertation might be an ideal starting point towards formulating aids and guidelines towards what is considered best practice in these cases.

7.5.3 Implications and recommendations for future research

Input from (bereaved) parents was missing from the narrative of this dissertation, yet parental views are crucial to provide a comprehensive picture of a neonatal end-of-life decision-making process because they serve as the surrogate decision-maker for their child. A forthcoming publication of the research group will focus on the barriers and facilitators for parents during the neonatal end-of-life decision-making process, yet future research should continue to focus on the views, attitudes and experiences of parents within neonatal end-of-life decision-making, and how they relate to that of healthcare providers.

End-of-life decision-making in neonates is irrevocably connected to prenatal end-of-life decision-making, as a lot of congenital disorders or anomalies can be diagnosed prenatally[100]. If a prenatal diagnosis is made, much of the advance care planning can be done before the child is born[101]. During this time a decision to terminate the pregnancy or a decision to forgo intensive treatment at birth can be made. When looking at shifts in the prevalence of end-of-life decisions over time, the decisions made before birth should thus not be overlooked. The study methodology described in chapter 2 of this dissertation proves to be ideal to examine such shifts. Within this dissertation, solely results in neonates and infants were discussed as the data collected during the course of the studies was too extensive to summarize within one comprehensive doctorate. We aimed to provide detailed and in-depth information regarding multiple aspects of the neonatal end-of-life decision-making process as opposed to a brief description of decision-making across a larger scope of the foetal-infantile period, yet results on this are forthcoming. Future research should continue to include both prenatal and neonatal decisions, using the framework provided in chapter 2. Additionally, as shown in chapter 4, when examining attitudes, opinions and experiences of involved healthcare providers, both prenatal and neonatal should be considered.

The mortality follow-back method described in chapter 2 can be used in many countries, as long as a declaration system of neonatal death and prenatal stillbirth is available. It is therefore ideal to compare the prevalence on foetal-infantile end-of-life decisions internationally. As the only other currently available population-based trend figures are from the Netherlands[8], future studies should focus on collecting population data internationally. International comparative research can identify country-specific or even region-specific factors that might influence the occurrence of end-of-life decisions and end-of-life practice. Furthermore, it could provide evidence of differing medical cultures concerning neonatal end-of-life care. Additionally, comparing international prevalence estimates in countries with differing guidelines and legal frameworks regarding neonatal end-of-life decision-making can give crucial insight in what the impact of deciding whether or not to regulate these practices can be on actual daily practice. This insight can in turn be used in future national and international debates on whether guidelines, protocols or laws are needed to monitor these decisions in such a vulnerable patient group.

As stated in the overview of the limitations of the mortality follow-back survey, questionnaires only provide a limited potential to fully capture the complexity of a prenatal and neonatal end-of-life decision-making process. Within this dissertation we added crucial data on experiences and attitudes of healthcare providers by means of attitude surveys and qualitative, in-depth interviews in order to frame prevalence estimates with insight into how these decisions are made in daily practice. However, future studies should continue to focus on gathering more detailed

information on for example how neonatal and prenatal end-of-life decisions are made in daily practice, and how parents are involved in decision-making. Additionally, the academic classification of foetal-infantile end-of-life decisions provided within this dissertation can differ from the interpretation of neonatologists and neonatal nurses in daily practice. These differences will not be noticeable within our large-scale studies, yet qualitative studies on a smaller scale within individual healthcare settings would be able to reveal this crucial information. Furthermore, the parental views and experiences on neonatal end-of-life decision-making were excluded from this dissertation, however they would provide essential additional insights in a complex decision-making process where multiple actors are involved. Future studies should therefore focus on embedding the parental views within the knowledge from healthcare providers available within this dissertation.

As previously stated, neonatal end-of-life decisions are embedded in neonatal and even perinatal palliative care (PPC). Although crucial elements of a palliative care approach are already implemented in regular perinatal practice, the existence of actual perinatal palliative teams internationally is rare[97]. Existing PPC programs mostly originated bottom-up from needs that arose within daily practice without evidence-based support[80]. Reports on these perinatal palliative care teams exist and indications of their positive effect on the vulnerable population of extremely ill infants before and after birth were found internationally[80,102,103], yet research on their implementation and effects on the provided care is lacking[80]. As this is a relatively new and emerging research field that addresses much needed support for extremely ill infants before and after birth as well as for their families and involved healthcare providers, future research should focus on evaluating the best model of care within this setting.

7.6 Conclusions

This dissertation has revealed that end-of-life decision-making is an important part of daily clinical practice when caring for neonates and infants with severe conditions. The majority of Flemish neonatologists and neonatal nurses working in a neonatal intensive care unit consider non-treatment decisions and the administration of medication acceptable to relieve suffering, even when this has a potential or explicit life-shortening effect. Consequently, the prevalence of both non-treatment decisions and the administration of medication with a potential or explicit life-shortening intent within the total population of deceased neonates and infants in Flanders is relatively high at about three in five. In one in ten deceased neonates and infants, medication was administered with an explicit intention to hasten death, which is currently not clearly legally condoned within the Belgian legal framework. Despite their commonality, healthcare providers are confronted with a significant number of barriers during the neonatal end-of-life decision-making process such as a lack of privacy for bad-news conversations, prognostic and diagnostic uncertainty, lack of training in palliative and end-of-life care, and difficult legal frameworks. Additionally, being confronted with both an end-of-life decision-making process and the resulting death of their patients causes neonatologists and neonatal nurses with a considerable amount of stress, which is not always adequately addressed by the neonatal ward. These findings can lead to a number of readily implementable recommendations for daily practice, such as creating privacy for bad-news conversations, installing regular multidisciplinary meetings and debriefings to reduce uncertainty, routinely setting up an advance care plan, and providing physicians and nurses with appropriate psychosocial support during regular work hours.

Additionally, we recommend adding a mandatory module on end-of-life care and palliative care training within standard curricula for neonatologists and neonatal nurses. Lastly, some recommendations for policy can be made such as attention for regular and detailed monitoring of the practice of end-of-life decisions in daily practice, which could be used to evaluate possible legislative changes.

Several other important questions regarding neonatal end-of-life decision-making remain, such as the need for internationally comparable prevalence estimates to reveal country-specific factors that influence decision-making, or how the parental narrative fits within the provided data of this dissertation. Furthermore, attention should be paid towards developing a supportive and encompassing perinatal palliative care approach that fits within the Belgian clinical and legal framework, wherein end-of-life decisions might play an important role. The recommendations based on the empirical evidence provided in this dissertation will hopefully aid future infants, parents and healthcare providers, so that a difficult end-of-life decision-making process can be made more bearable.

7.7 Reference list chapter 7

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Summaries

English summary

Introduction

Recent decades have seen an increase in possible medical and technical interventions for critically ill neonates and infants. However, in Flanders, Belgium about 8.7 per thousand children still die during the foetal-infantile period, i.e. from foetuses of more than 500 grams or 22 weeks of gestation up until one year after birth. Many of these deaths occur at neonatal intensive care units and are preceded by a possibly life-shortening end-of-life decision. In neonates, these include non-treatment decisions such as withholding or withdrawing life-sustaining treatment, intensification of alleviation of pain and/or other symptoms with a potential life-shortening effect and intentionally ending life with lethal drugs. Additionally, prenatal diagnostic techniques (genetic techniques, prenatal imaging techniques) have evolved considerably, leading to an increasing number of congenital malformations being diagnosed prenatally instead of after birth. Some decisions such as abstinence from treatment or termination of pregnancy can be made during gestation in cases of the detection of serious abnormalities.

The ethical dilemma in some of these cases between saving the life of the foetus or neonate, and not knowing what the burden of suffering will be later on needs thoughtful and professional deliberation of the parents and involved healthcare professionals. Even though these ethical dilemmas need to be evaluated on a case-by-case level, considering the specific characteristics and medical situation of the child, population data on what occurs in similar situations could be valuable for the involved healthcare providers in cases of uncertainty or disagreement between involved actors. Currently, available research both within the Belgian context and abroad is either incomplete or outdated, and thus not helpful as a guide to aid healthcare providers in current daily practice. Within the studies included in this doctoral thesis, we therefore focused on key characteristics of end-of-life decisions in a vulnerable population of children from a viable term of pregnancy up until they reach the age of one year. The aim of this dissertation was twofold: 1) to provide an account of what happens on a population level by means of providing prevalence rates on end-of-life decisions and their clinical and demographic characteristics; and 2) to go deeper into what it means to make these decisions in daily practice by mapping out attitudes, views and experiences on neonatal end-of-life decision-making of involved healthcare providers, namely neonatologists and neonatal nurses, in order to adequately frame these numbers in daily practice.

Current evidence on aspects of foetal-infantile end-of-life decisions discussed in this dissertation

The prevalence of foetal-infantile end-of-life decisions

Population-based studies (i.e. with *all* death cases as the focus) are ideal to study the incidence and characteristics of end-of-life decisions, but such studies are rare in neonates and infants and, to our knowledge, non-existent in stillborns. In neonates, results are mostly based on reviews of medical records of a neonatal intensive care unit at a particular hospital. In these studies 40% to 93% of deaths in a NICU follow withdrawal of life-sustaining treatments. The larger scale EURONIC study was based on physicians' self-reported practices within 143 European NICUs in the 1990s. The only population-based studies are from the Netherlands (in

2014) and Belgium (in 2000). These studies found an end-of-life decision being made in 60% of all deaths of neonates and infants. In stillborns, previous studies in 2003 and in 2000-2005 have only looked at the prevalence of late termination of pregnancy. Not much is known about the entirety of end-of-life practices (including decisions other than termination of pregnancy) and their decision-making process, or about patient characteristics besides gestational age and the presence of foetal anomalies.

Prior to the development of the studies in this dissertation, both prenatal and neonatal Flemish healthcare professionals stated the need for more recent, population-based data on the prevalence of end-of-life decisions. In light of ever changing societal, legal and clinical influences, we thus base important clinical decisions and recommendations in daily practice on outdated population-data. Important societal changes took place that could possibly impact end-of-life practice, including in the unborn and newborn population. There was the implementation of laws on patient rights, palliative care and euthanasia in adults in 2002, and the law on euthanasia for children with decisional capacity in 2014. Neonates do not fall under this euthanasia law, which is limited to adults and capable minors, yet a possible impact on prenatal and neonatal practice cannot be excluded. Internationally, the Groningen protocol in the neighboring Netherlands could possibly have an impact on Belgian prevalence rates. Aside from legal changes, the rise in medical treatment options for extremely ill neonates could possibly have changed medical practice. Therefore, a need for current and reliable incidence rates of Flemish end-of-life decisions is indicated, not only by researchers but also by Flemish representatives from all eight neonatal intensive care units. Within this dissertation, we will therefore aim to examine these incidences on a population level, in infants who died before the age of one year.

Attitudes of healthcare providers concerning foetal-infantile end-of-life decisions

Previous research showed that, even in newborns with the same pathology, variability between types of end-of-life decisions can be noted. This is because end-of-life decisions can be influenced by a number of contextual variables such as available hospital resources and the parents' and clinicians' social, cultural and religious beliefs. Aside from these contextual variables, attitudes of caregivers play a crucial role in end-of-life decision-making. And even within a care team, important differences between physicians' and nurses' attitudes towards end-of-life decisions have been found. Personal characteristics of healthcare providers may thus play a crucial role in end-of-life decision-making in neonates.

An attitude survey study in 10 European countries in 2000 found that the likelihood of limiting life-supporting treatments in neonates is dependent on the country of residence, reported religion of the physician, their gender, whether or not the physician has children, and the amount of very low-birth-weight infants that are admitted to their neonatal intensive care unit. Furthermore, a self-report questionnaire combined with retrospective medical chart review revealed that an unintentional life-shortening effect of administering opioids is considered acceptable for most neonatal intensive care and paediatric intensive care nurses. These studies are however limited, since they fail to include attitudes towards decisions that could have been made before the baby was born. Because attitudes and decisions before or after birth could possibly influence each other, and neonatologists are often consulted in

prenatal end-of-life decisions, attitudes towards prenatal and neonatal end-of-life decisions should thus be included into one overarching study to make valid comparisons possible. Because of their relevance for clinical practice, a separate part of this dissertation will be devoted to the examination of attitudes regarding foetal-infantile end-of-life decisions of the most involved healthcare providers in neonatal end-of-life decision-making, namely neonatologists and neonatal nurses.

Barriers to and facilitators of the neonatal end-of-life decision-making process for healthcare providers

Despite the severe impact of end-of-life decision-making on NICU staff members, few studies have focused on what the involved neonatologists and neonatal nurses find either helpful or difficult in making these end-of-life decisions. Qualitative studies with NICU staff members in Norway on deciding whether or not to continue life-sustaining treatment show that the lack of certainty in the prognosis of the child and what their suffering will be later on can be seen as an important barrier in decision-making. Furthermore, these Norwegian studies show that the ambivalence between wanting to include parents and wanting to spare them some of the pain, can cause indecision regarding whether, when and how certain information about the prognosis needs to be given by the healthcare providers to the parents.

Previous studies on these barriers and facilitators in neonatal end-of-life decision-making are limited in that they mainly focus on specific end-of-life practices such as withholding and withdrawing of treatment rather than focusing on the entire spectrum of end-of-life decisions, or that they mainly focus on the experiences of parents, hereby excluding healthcare providers as an important co-actor in the decision-making process. A separate chapter in this dissertation will therefore focus on examining which factors neonatologists and neonatal nurses experience as either helpful or difficult in neonatal end-of-life decision-making in a NICU. Knowledge on which factors could either benefit or hinder the neonatal end-of-life decision-making process from the viewpoint of the most involved healthcare providers could be a crucial starting point in formulating recommendations to aid future practice.

Psychological support in end-of-life decision-making for healthcare providers

Neonatologists and neonatal nurses who work in a neonatal intensive care unit often experience stressors and moral distress due to the high demands of their occupation. Especially in times when an infant in their care can no longer benefit from aggressive or even futile treatment and an end-of-life decision needs to be made. Similarly to paediatric intensive care unit staff, they experience sadness, helplessness and frustration when they are unable to do more when a child dies. Because of this distress, neonatologists and neonatal nurses are prone to developing compassion fatigue or burnout when the emotional price of caring becomes too high for them to cope. Psychosocial support for NICU staff members is currently included in recommendations for NICU practices, however most recommendations and guidelines concerning this psychosocial support focus on providing neonatologist and neonatal nurses with concrete tools to optimally attend to parents in their decision-making process and grief. Furthermore, research on how supported they actually feel is lacking.

To our knowledge, only one study included specific recommendations solely focusing on the benefit to NICU staff members in a neonatal end-of-life palliative care protocol. Catlin & Carter recommended formal meetings or counselling sessions as part of regular work hours, instead of on a voluntary basis or during unpaid time. Furthermore, they recommended that both neonatologists and nurses should be able to opt out of end-of-life care by taking on other assignments. A last part of this dissertation therefore focusses on the experienced psychological support of healthcare providers working in a neonatal intensive care unit as an important aspect of the foetal-infantile end-of-life decision-making context. Caring for the ones responsible for the care of critically ill infants could be a crucial step towards providing better support for both patients and grieving parents in a neonatal intensive care unit.

Study objectives

The main focus of this dissertation is end-of-life decision-making in stillbirths, neonates and infants on a population level, across centres, patients and physicians. The following two aims, each with specific research questions, guided this dissertation:

The ***first aim*** is to examine end-of-life practices and decisions in stillbirths, neonates and infants in Flanders, Belgium on a population level. The following research questions will be answered:

1. Which methodology can be used to reliably study the prevalence of various end-of-life decisions, taken before and after birth? Which population-level databases can be used to study both prenatal and neonatal end-of-life decisions, and how can we anonymously contact the physician involved in these stillbirth or death cases?
2. What is the prevalence of various end-of-life decisions made in the neonatal period? Did the prevalence change over time compared to the previous data-collection in 1999-2000? What are the clinical and demographic characteristics of infants whose death was preceded by various types of end-of-life decisions? Which circumstances are associated with various types of end-of-life decisions in neonates?

The ***second aim*** of this dissertation is to map the attitudes, views and experiences of involved healthcare providers, namely neonatologists and neonatal nurses, on neonatal end-of-life decision-making. The following research questions will be answered within this aim:

3. What are the attitudes of neonatologists and neonatal nurses concerning prenatal and neonatal end-of-life decision-making? What are the differences between physicians and nurses in attitudes towards these decisions? Which attitudes concerning prenatal and neonatal end-of-life decisions and which demographic characteristics are associated with possible treatment options that are considered acceptable in a hypothetical case?
4. Which factors involved in the decision-making process can, according to experiences from neonatologists and neonatal nurses, facilitate or impede the neonatal end-of-life decision-making process in a Flemish neonatal intensive care unit?
5. In what way are neonatologists and neonatal nurses supported by colleagues, psychologists and the hospital ward during the difficult process of end-of-life decisions in

a Flemish neonatal intensive care unit? How sufficient is the current psychological support for caregivers working in a Flemish neonatal intensive care unit?

Methods

To answer the research questions and study objectives of this dissertation, several data-collection methods and data sources were used, namely a mortality follow-back survey, an attitude and psychological support survey and a qualitative study with face-to-face semi-structured interviews.

The mortality follow-back survey

The mortality follow-back survey-method follows the design of a mortality follow-back survey on a population-level based on all death certificates of stillborns from 22 weeks of gestation or a birth weight of 500 gram onwards, and neonates or infants who died before the age of one year. All included stillbirths or deaths occurred in Flanders or Brussels and concerned foetuses or infants whose mother was a Flemish resident at the time of death. The design of this study was identical to a survey conducted from August 1999 to July 2000, with the exception of a longer inclusion period from September 2016 to December 2017 (12 months in 1999-2000 versus 16 months in 2016-2017).

Within four months after death, every certifying physician received a four-page questionnaire through the Flemish Agency for Care and Health who is responsible for processing the death certificates with an introductory letter containing patient identification characteristics. To guarantee anonymity, a lawyer served as an intermediary between the responding physicians, the Flemish Agency for Care and Health, and the researchers. The intermediary ensured that completed questionnaires could never be linked to specific patients, physicians or hospitals.

Two separate questionnaires were used during the survey namely one questionnaire to accompany death certificates that certified a stillbirth and one questionnaire to accompany death certificates that certified the death of an infant before the age of one year. The questionnaires used in the survey aimed to inquire about possible prenatal and neonatal end-of-life decisions that preceded the death or stillbirth reported on the death certificate. A validated questionnaire used to survey neonatal end-of-life decision making developed in the 1999-2000 study was used as the basis for the current 2016-2017 questionnaires to ensure comparability of data. Both questionnaires first asked whether the death of the neonate had been sudden and unexpected. If answered negatively, an end-of-life decision was considered possible and physicians were asked whether any end-of-life decisions preceded the death or stillbirth. The used questionnaires (in Dutch) can be found in Appendix 1 and 2.

When more than one end-of-life decision was denoted, the decision with the most explicit life-shortening intention was deemed most important. When more than one end-of-life decision with the same life-shortening intention was noted, administration of drugs (active) prevailed over withholding or withdrawing treatment (passive). In case of an end-of-life decision, follow-up questions were asked such as: by how much time was the life of the infant shortened, what was

the most important reason for deciding on the end-of-life decision, and who was included in the decision-making process. Demographic information from the death certificates was anonymously linked with their respective questionnaire data after data-collection was finished.

The attitude and psychological support survey

In order to examine the attitudes and perceived psychological support of involved healthcare providers in neonatal end-of-life decision-making, a full population mail survey was set up in all neonatologists and neonatal nurses working in a Flemish neonatal intensive care unit. All Flemish neonatal intensive care units participated in this study. These neonatal intensive care units were situated in the following hospitals: Ghent University Hospital, Brussels University Hospital, Leuven University Hospital, Antwerp University Hospital, AZ Sint-Jan Brugge-Oostende, Hospital Oost-Limburg Genk, Hospital GZA St Augustinus and ZNA Middelheim.

Data was collected between May 1st and May 31st of 2017. The gatekeeper method was used, where a representative physician working in each neonatal intensive care unit handed out the questionnaire to every neonatologist and every neonatal nurse in their respective ward. Physicians and nurses were invited to fill out the questionnaire and send it back by means of a prepaid envelope to the researchers within the period of one month.

The questionnaire used in this survey was developed based on an existing Flemish attitude questionnaire from the year 2000 on neonatal end-of-life decisions, and an American study on compassion fatigue, burnout and compassion satisfaction of neonatologists in a neonatal intensive care setting. A multidisciplinary team consisting of three sociologists, two psychologists, three neonatologists and one gynaecologist developed the final questionnaire. Afterwards, this questionnaire was cognitively tested on five neonatologists from four separate hospitals, three neonatal nurses from two separate hospitals and one gynaecologist in order to ensure validity of the items. The questionnaire consisted of seven socio-demographic questions and 12 items on perinatal end-of-life decisions. Six of these attitude items focussed on neonatal end-of-life decisions and six items focussed on prenatal end-of-life decisions (late termination of pregnancy). Attitudes were measured by indicating whether or not they agreed with the statements, scored on a five-point Likert scale. We also presented a hypothetical case of a foetus born at 27 weeks gestation with additional complications; participants were given seven possible treatment options and were asked to indicate whether they would consider each option on a four-point Likert scale. Lastly, the questionnaire included statements about perceived stress, professional psychological support provided by the neonatal intensive care unit, and psychological support provided by colleagues. We included a statement on the option of expressing protest concerning an end-of-life decision, which could be an additional source of distress when this is discouraged. The statements were scored on a 5-point Likert scale. The used questionnaires (in Dutch) can be found in Appendix 3 and 4.

Face-to-face semi-structured interviews

A qualitative study was conducted using semi-structured face-to-face interviews with neonatologists and neonatal nurses working in a Flemish neonatal intensive care unit. We chose

a qualitative research methodology to cover the complexity, subtlety and individual specificity of experiences in the end-of-life decision-making process regarding neonates that would be missed by a quantitative approach. Because of the sensitivity of the subject we opted for individual interviews.

We recruited neonatologists working as resident physicians at one of four Flemish neonatal intensive care units (University hospitals of Ghent, Brussels and Leuven, and general hospital Sint-Jan Bruges) between December 2017 and July 2018 who had been the attending/treating physician to at least one child who had died at the ward where an end-of-life decision was made in the past year, and nurses who had been the most involved. No exclusion criteria were used. A neonatologist of each participating hospital informed all neonatologists and nurses within their respective ward of the purpose of the study, and provided contact details of those willing to participate. Researchers contacted them and set up a date for the interview either at their neonatal intensive care unit or at their home residency. Purposeful sampling was used to select participants.

A topic guide (see Appendix 5 and 6) was developed by a multidisciplinary team of nine experienced researchers in the fields of end-of-life care and neonatology. Participants were asked what made it easier or more difficult to make end-of-life decisions. Before the interview, a short questionnaire was administered to collect socio-demographic data. Data were collected until no new barriers and facilitators emerged for both neonatologists and nurses separately, and data saturation was achieved.

Summary of the main findings

Examining end-of-life decisions in stillbirths, neonates and infants in Flanders, Belgium on a population level

Developing a methodology to study the prevalence of end-of-life decisions before and after birth

In chapter 2 we presented a study design aimed to evaluate and monitor the prevalence of prenatal and neonatal end-of-life decisions on a population level in Flanders, Belgium. This study design involved the development of a validated conceptual framework of end-of-life decisions across the entire foetal-infantile period and the development of a survey methodology to study these foetal-infantile end-of-life decisions independent of the setting within which the death or stillbirth took place.

We created a new, all-encompassing framework to conceptualize end-of-life decisions in the entire foetal-infantile period, including both deaths before birth from a viable age of the foetus onwards (from 22 weeks of gestation or a birth weight of 500 gram or more) and liveborn neonates who died before the age of one year. Two dimensions were deemed important, namely the medico-technical dimension that classified the medical act that was posed, and the medico-ethical classification that classified the life-shortening intention of the physician associated with that medical act. In terms of medical acts, a distinction was made between

non-treatment decisions such as withholding or withdrawing life-supporting treatment, and administering drugs or performing active medical interventions with a possible life-shortening effect. The life-shortening intention of the physician on the other hand could either be: 1) no intention to shorten life, yet a potentially life-shortening effect was taken into account, 2) a potentially life-shortening effect was partly intended, yet not the main aim of the medical act, and 3) the life-shortening intention was explicit. Based on this framework, we developed two separate but similar questionnaires in order to examine end-of-life decisions in stillborns and neonates respectively.

Our aim was to study end-of-life decisions in live-born infants and stillborns from 22 weeks of gestation onwards on a population level. Based on previous experience in neonates, children and adults, using death certificates as the basis for sending out questionnaires was deemed ideal. For stillbirths between 22 and 26 weeks of gestation, this procedure proved to be challenging as a death certificate is not mandatory under 26 weeks of gestation and thus our sampling framework by means of death certificates could potentially be incomplete. However, using the only other registry of all stillbirths, namely the birth registry (liveborn and stillborn) of the Study centre for Perinatal Epidemiology (SPE), would drastically decrease the reliability of our responses since delays in processing these documents could take up to one year. Therefore, we chose to rely on the robust mortality follow back survey-method for both deceased neonates and stillbirths, with some minor adjustments to improve coverage of stillbirths in the crucial period between 22 and 26 weeks of gestation. The Flemish Agency of Care and Health, which processes all death certificates, started encouraging registration of stillbirths from 22 weeks onwards for epidemiological purposes during the data-collection of our study. In addition to this method, we provided our questionnaires to the ten largest maternity wards in Flanders so that physicians were encouraged to fill them out for each stillbirth from 22 weeks of gestation onwards, in addition to filling out the accompanying death certificate.

Physicians filled out the main part of a death certificate for every neonatal death or stillbirth, which included demographic and medical information. Afterwards, the central administration authorities, in our case the Flemish Agency of Care and Health, received the filled-out certificates. The Agency was responsible for sending out questionnaires and accompanying letters with patient information to physicians for each death certificate denoting the death of a neonate or a stillbirth from 22 weeks of gestation onwards. The physician identified the infant, according to the information on the accompanying letter, and filled out the questionnaire. All filled-out questionnaires were sent to a lawyer, who was bound by confidentiality and thus safeguarded the anonymity of the physician, patient, parents and hospitals. After data collection was finished, the lawyer linked data from the questionnaires with information on the death certificates.

The developed research protocol is the first to study end-of-life decisions in stillborns and deceased neonates and infants under the age of one year on a population level within one study design. We are convinced that regular repetition of this study in the future is needed in order to monitor and evaluate changes in end-of-life practices under ever changing societal, legal and clinical influences in a vulnerable group of foetuses and infants who are unable to speak for themselves. By basing inclusion of all deaths and all stillbirths on the death

certificates, this research method can be used in other countries, irrespective of different legal frameworks regarding perinatal end-of-life decision-making, making international comparative studies possible. Providing these prevalence estimates, not only in Flanders, can eventually aid the development of obstetric, neonatal and paediatric guidelines to support a very difficult ethical end-of-life decision-making process in daily practice.

The prevalence of end-of-life decisions in the neonatal period

Chapter 3 of this dissertation focused on providing population estimates of the prevalence of end-of-life decisions in neonates and infants in Flanders over two study periods (1999-2000 and 2016-2017). These estimates were examined by means of the developed population-level mortality follow-back survey we described in the previous paragraphs.

A total number of 276 neonates and infants died between September 1st 2016 and December 31st 2017 (229 filled-out questionnaires received, 83% response rate); and 292 neonates and infants died between August 1st 1999 and July 31st 2000 (253 filled-out questionnaires received, 87% response rate). Study results showed that the prevalence of neonatal end-of-life decisions has stayed relatively stable across both time-points at about 60% of neonatal and infant deaths being preceded by an end-of-life decision. Non-treatment decisions are still the most prevalent at 34% of all neonatal and infant deaths in 1999-2000, compared to 37% in 2016-2017. Withholding treatment occurred in 13% of all neonatal and infant deaths in 1999-2000 and 12% in 2016-2017, while withdrawing treatment was prevalent in 21% of cases in 1999-2000 and 25% in 2016-2017. Administering medication with a potentially life-shortening effect stayed relatively stable at 16% in 1999-2000 compared to 14% in 2016-2017, while the prevalence of administering medication with an explicit life-shortening intention occurred in a similar group of 7% in 1999-2000 and 10% in 2016-2017. Despite stable prevalence rates overall, important shifts in the type of end-of-life decision being made in different age groups were noted. End-of-life decisions were now significantly more often taken after the first week of life (74% of deaths between 7 and 27 days old was preceded by an end-of-life decision in 2016-2017 compared to 50% in 1999-2000, p=0.03; 64% of deaths after 27 days of life in 2016-2017 compared to 38% in 1999-2000, p=0.003). In deaths occurring in the first week of life, prevalence of end-of-life decisions significantly dropped (55% of deaths in 2016-2017 compared to 72% in 1999-2000, p=0.01). After the first week of life, end-of-life practice in Flanders considerably changed compared to 17 years ago, as decisions to withdraw life-sustaining treatment or administer medication with an explicit life-shortening intention become noticeably more prevalent. In 1999-2000 9% of deaths between 7 and 27 days was preceded by a decision to withdraw treatment and there were no cases where medication with an explicit life-shortening intention was administered, while in 2016-2017 in the same age group, withdrawing treatment and administering medication with explicit life-shortening intention were each prevalent in 26% of cases. After the first 27 days of life, the prevalence of withdrawing treatment rose from 16% in 1999-2000 to 31% in 2016-2017, and the prevalence of administering medication with explicit life-shortening intention rose from 2% to 10%.

This chapter shows that end-of-life decisions continue to be an integral part of medical practice in extremely ill neonates and infants, with three in five deaths being preceded by such

decisions, which indicates the need to discuss their permissibility and requirements for good clinical practice amongst healthcare providers.

Attitudes, views and experiences of healthcare providers involved in neonatal end-of-life decision-making

Attitudes of neonatologists and neonatal nurses concerning perinatal end-of-life decisions

In chapter 4 we present the attitudes of neonatologists and neonatal nurses working in a neonatal intensive care unit towards perinatal end-of-life decisions, examined by means of a full-population mail survey.

We found that overall, considerable support for both prenatal and neonatal end-of-life decisions could be noted amongst Flemish neonatal healthcare providers. In terms of prenatal end-of-life decisions, between 80 and 98% of neonatologists and nurses considered termination of pregnancy at a viable term acceptable in case of severe or lethal foetal anomalies. When the foetus is healthy, yet the life of the mother is in danger, more than 60% of neonatologists and nurses found termination of pregnancy at a viable term acceptable. However, when the foetus is healthy but the mother has a severe psychological problem, acceptance rates drop to 15% in both physicians and nurses. In extremely ill liveborn neonates, between 80 and 100% of all participating healthcare providers found non-treatment decisions such as withholding or withdrawing treatment acceptable, regardless of whether the life-shortening effect was solely taken into account or explicitly intended. Aside from general consensus between neonatologists and neonatal nurses on the abovementioned types of prenatal and neonatal end-of-life decisions, some differences in attitudes between both healthcare providers could be noted. Administering medication with a potentially life-shortening effect was considered acceptable by the majority of both healthcare providers, yet neonatologists were significantly more likely to agree to this practice (96%) than nurses did (84%, $p=0.02$). Conversely, though more than half of both healthcare providers found actively administering medication with an explicit life-shortening intention acceptable, the practice was more often considered acceptable by nurses (74%) than by neonatologists (60%, $p=0.02$). This despite the fact that actively hastening death by means of medication is currently not legally tolerated within the Belgian legal framework.

Our study thus found a large acceptance of both prenatal and neonatal end-of-life decisions in neonatologists and neonatal nurses, even for decisions that currently fall outside the Belgian legal framework. However, physicians and nurses differed slightly in their acceptance of different types of end-of-life decisions, which could possibly be related to nurses not carrying the final legal responsibility of these medical decisions. These findings indicate the importance of including both perspectives in these difficult decisions at the end of an infant's life.

Barriers and facilitators for neonatologists and neonatal nurses regarding neonatal end-of-life decision-making

In chapter 5, we explored barriers and facilitating factors experienced by neonatologists and neonatal nurses during the end-of-life decision-making process in a neonatal intensive care unit. Hereby, we aimed to provide insight in the complexity of neonatal end-of-life decisions in daily practice, and the individual nature of personal experiences on this topic.

Some barriers and facilitators are linked with the characteristics of the specific case. These factors relate to either the ill neonate, the parents or the involved healthcare providers. Decisions seemed easier when the bad prognosis was evident fairly quickly as opposed to when there is a lot of prognostic insecurity, and exploring all curative treatment options first to ensure that the end-of-life decision is the only available option left to reduce suffering of the child helped make decisions easier. Healthcare providers indicate an easier decision-making process when parents have the same culture and language as the physicians and nurses involved. Previous experience of healthcare providers with end-of-life decisions is considered a crucial influencing factor, as they are better able to anticipate the child's future condition.

On a process level, we consider factors that are related to characteristics of the decision-making process itself. Intense communication between healthcare providers and parents is imperative for an easier end-of-life decision-making process. Furthermore, communication amongst healthcare providers is essential, for example by installing regular multidisciplinary consultations or debriefings. Additionally, deciding on an end-of-life decision can be made easier by considering all directions the child's condition can take in advance during one or more advance care planning conversations between parents and healthcare providers. Hereby, decisions regarding the medical responses in each situation can be made without being rushed by an acute deterioration of the child.

A final level includes factors relating to the overarching structure of the ward, the hospital and the broader society that could influence decision-making. Emotional and practical support from colleagues at the ward, or lack thereof, is crucial in end-of-life decision-making in neonates. Additionally, the lack of separate rooms to ensure privacy during bad-news conversations, and the shortage of available trained personnel in end-of-life care were clearly identified as barriers for end-of-life decision-making. Lastly, the current Belgian legislation was mentioned as an influencing factor. When mentioned, neonatologists and nurses stated that they experience the lack of a legal framework to allow for actively ending the life of a neonate in extreme cases to be an important barrier, especially in contrast to during the pregnancy, where the option to terminate as soon as a life-limiting foetal abnormality is diagnosed is available.

Our qualitative interview study revealed barriers and facilitators during neonatal end-of-life decision-making which could lead to recommendations for improving this process in daily practice. These recommendations include establishing regular multidisciplinary meetings to include all healthcare providers and reduce unnecessary uncertainty, routinely implementing advance care planning in severely ill neonates to make important decisions beforehand,

creating privacy for bad-news conversations with parents and reviewing the complex legal framework of perinatal end-of-life decision-making.

Psychological support in end-of-life decision-making for neonatologists and neonatal nurses

Chapter 6 of this dissertation focussed on the perceived stress that neonatologists and neonatal nurses experience during an end-of-life decision-making process in their neonatal intensive care unit, and their perceived psychological support both from colleagues and from professionals. This was examined by means of a full-population mail survey.

The majority of neonatologists and nurses agreed that making an end-of-life decision (neonatologists) or being confronted by one (nurses) caused more stress than usual (73% and 70% respectively). During the decision-making process for these end-of-life decisions, most physicians (86%) indicated that they felt supported by their colleagues. However, fewer than half of the neonatal nurses (45%) agreed that the physicians listened to their opinions when these decisions were being made. While most neonatologists (88%) agreed that their neonatal intensive care unit provides sufficient opportunity to express any reservations they might have about certain end-of-life decisions, only 32% of nurses agreed with this statement. Almost all of the participating neonatologists and neonatal nurses agreed that they can talk to their colleagues when something is bothering them regarding an end-of-life decision (94% and 92% respectively). Furthermore, when they did not agree with an end-of-life decision that had been made, half of neonatologists (53%) and 65% of nurses agreed that they could opt to no longer be involved in that particular case. Despite the fact that both groups of healthcare providers indicated that they could talk to their colleagues when something regarding end-of-life decision-making bothered them, 57% of neonatologists and 60% of neonatal nurses indicated that they would prefer their neonatal intensive care unit to provide more psychological support for staff members when they were being confronted with end-of-life decisions. Furthermore, only 41% of neonatologists and 50% of nurses agreed that they received sufficient psychological support from their neonatal intensive care unit after a patient of theirs died.

Our findings seem to suggest that neonatal intensive care units need professional ad hoc counselling or standard debriefings, as we believe they could substantially improve the perceived lack of support indicated by clinicians working at the neonatal intensive care unit. Furthermore, we believe that including nurses in interdisciplinary end-of-life discussions could not only increase the quality of these decisions, but could possibly also benefit the nurses themselves by reducing moral distress caused by being excluded from the decision-making.

Discussion of the main findings

Comparing Flemish neonatal end-of-life decision-making with internationally available evidence

Neonatal mortality varies widely across countries. Aside from differences in neonatal mortality, differences in ethical perspective exist between countries in the acceptability and use of medical decisions at the end of an infant's life. It is therefore necessary to compare the information gathered within this dissertation on neonatal end-of-life decisions in Flanders, Belgium with internationally available data in order to unveil country-specific factors influencing decision-making.

International comparison of the practice of non-treatment decisions

Generally, in Europe, non-treatment decisions such as withholding or withdrawing treatment are well accepted, and the majority of physicians working in neonatal intensive care report having been involved in at least one case in which limits to intensive care were set. Internationally, the likelihood of limiting intensive treatment in neonates is known to be dependent on the positive or negative attitude of physicians towards these types of end-of-life decisions. The positive attitude of Flemish neonatal healthcare providers towards non-treatment decisions and the corresponding high prevalence of these types of decisions in the entire population of neonatal deaths before the age of one year reported in this dissertation corroborate these findings. We could therefore hypothesize that our prevalence estimates concerning non-treatment decisions could possibly be comparable to those of European countries with a similarly positive stance on these end-of-life decisions such as the UK and the Netherlands. Physicians working in neonatal healthcare in European countries such as the Baltic states, Italy, Spain and Germany have a stronger pro-life attitude. While Flanders and countries such as the UK and the Netherlands could thus be considered to have a permissive attitude towards non-treatment decisions with a potentially life-shortening effect, other European countries might be more restrictive.

The prevalence of non-treatment decisions in Flanders in 2016-2017 was 37% of all neonatal deaths (chapter 3). This is slightly higher than that of the Netherlands, which was estimated at 31% in 2010. Reports from neonatal intensive care centres in the United States, the United Kingdom, Australia and Europe show that between 40 and 93% of neonatal deaths occur after withholding or withdrawing artificial ventilation or other life-sustaining treatments. The difference between these population-based estimates (37% in our study) and the prevalence estimates of the number of deaths in specialized neonatal intensive care units internationally being preceded by a non-treatment decision (between 40 and 93%) can be related to several factors including some methodological differences in assessing prevalence, and a difference between assessing prevalence estimates within highly specialized single centre studies compared with broad population data across settings. As population-level studies are scarce, actual international comparisons between our population estimates and estimates from countries outside of the Netherlands were impossible, which should definitely be remedied in

future studies in order to examine country-specific influences on clinical practice. The study design described in chapter 2 of this dissertation would be ideal for this purpose.

International comparisons of the administration of medication with an implicit or explicit life-shortening intention

The findings within this dissertation indicate that Flanders has a fairly permissive climate towards more active types of end-of-life decisions such as administering medication with a potential or explicit life-shortening intention, even when these decisions currently fall outside of the Belgian legal framework.

We see that the life-shortening intention of administering medication being either implicit or explicit makes a crucial difference in whether the Flemish permissive attitude could be corroborated internationally. In Switzerland, 95% of physicians and nurses working in a neonatal intensive care unit found administering sedatives or analgesics acceptable, even if this might cause respiratory depression and death. However, when the life-shortening intention of administering medication becomes explicit, acceptance rates of Swiss neonatologists and nurses drop to 24%. In Canada, a survey on the attitudes of Canadian paediatricians revealed a collective unease towards non-voluntary euthanasia in never-competent children, suggesting that Canadian paediatricians and neonatologists might be a lot less permissive than those in Flanders. In France, a multidisciplinary working group on ethical issues in perinatal medicine even stated that acts to deliberately hasten a patient's death are both legally and morally forbidden, indicating an even more restrictive attitude. Flemish neonatal healthcare providers might thus be much more permissive towards administering medication with a potential or explicit life-shortening intention in extremely ill neonates and infants than healthcare providers in other countries.

Aside from a reflection on international attitudes towards the administration of medication with a potential or explicit life-shortening intention, international prevalence estimates should be considered. A multi-national study (EURONIC) in eight European countries (Belgium not included) revealed that between 32% and 89% of physicians working in a neonatal intensive care unit had previously administered pain and symptom relief, despite the risk of respiratory depression and even death. These numbers varied greatly between countries, with France, the Netherlands and Sweden reporting the highest number of physicians with previous experience in administering sedatives and analgesics even at the risk of hastening death (86-89%), and Italy being the only reported country with rates under 50% (namely 32%). Furthermore, this study revealed that administering medication with the purpose of ending life in neonates occurs very rarely in the majority of reported European countries. Only 2-4% of physicians working in a neonatal intensive care unit in Italy, Spain, Sweden, Germany and the UK reported ever having taken these types of decisions. In a recent follow-up study of the EURONIC study in 2016 in Germany, Switzerland and Austria, 97% of physicians reported in an online survey that they have administered sedatives and analgesics even at the risk of potentially hastening death at least once. When considering the administration of drugs with an explicit life-shortening intention however, the proportion of physicians ever having made this decision in Germany, Switzerland and Austria drops to 4%. In the EURONIC studies, physicians were asked whether or not they had ever previously taken

specific types of neonatal end-of-life decisions and therefore we have no indication of how frequent these decisions actually are. Providing a clear comparison between data from the EURONIC studies and our prevalence estimates of administering medication with a potential or explicit life-shortening intention within an entire population of deceased neonates and infants during a set period of time therefore proves to be difficult.

The only available prevalence estimates regarding the use of medication to implicitly or explicitly hasten death in neonates is from the Netherlands, indicating that medical practice might not be as comparable to Flanders as previously suspected. Where our prevalence estimates indicate that 14% of all neonatal deaths in 2016-2017 were preceded by the administration of medication with a potentially life-shortening effect, the Netherlands reported a prevalence of just 4% in 2010. When looking at the prevalence of administering medication with an explicit life-shortening intention, the difference between the 10% prevalence estimates of Flanders in 2016-2017 with the Dutch estimate of 1% in 2010 is even more striking, particularly considering that the Netherlands have a legal framework which permits such decisions in rare cases of extremely ill infants where Flanders does not. Availability of a legal framework thus not necessarily leads to an increase in the prevalence of this practice. However, the lack of international population estimates makes it impossible to draw robust and valid conclusions on the impact of these different legislative choices regarding the permissibility and rules for good clinical practice of various neonatal end-of-life decisions on their actual prevalence.

The possible impact of the Belgian legal context on neonatal end-of-life decisions

The permissive climate towards neonatal end-of-life decisions amongst Belgian neonatal healthcare providers must be viewed within the broader context of the Belgian legal and medical culture. As Belgium has both a fairly liberal law on termination of pregnancy and a law on euthanasia in adults and competent minors (see chapter 1), it could be debated that the Belgium medical and legal culture as a whole could be considered as more accepting of certain decisions at the end of a person's life regardless of their age than is internationally the case.

As neonates are not competent to request, and receive, euthanasia, they could thus be classified as a vulnerable group that falls outside the jurisdiction of the euthanasia law, but yet could experience an influence of its implementation. If this is the case, the implementation of the euthanasia law for adults and competent minors should lead to 1) an increase of deliberately ending the life of neonates with severe conditions, and 2) this increase should be attributed to physicians feeling more at ease with the practice explicitly due to the existence or extension of the euthanasia law. Prevalence estimates provided in this dissertation can only provide insight into the first claim, namely that the prevalence of administering medication with an explicit life-shortening intention stayed relatively constant at 7% two years before; and 10% of the total population of deceased neonates and infants 15 years after implementation of the euthanasia law in adults (three years after the addition of competent minors). Furthermore, a causal relation between the implementation of the euthanasia law for adults and competent minors, and the considerable prevalence of administration of medication to intentionally hasten death in neonates, as mentioned in point 2, cannot be proven by the data presented in this dissertation.

As healthcare providers specifically mention the influence of the existence of the law on termination of pregnancy on neonatal end-of-life decision-making, and more specifically the restrictions and uneasiness they sometimes feel when they are unable to intentionally hasten death in suffering neonates and infants when a pregnancy could be terminated for exactly the same diagnosis in an unborn foetus, it might be possible that the existence of a liberal termination of pregnancy law has an influence on decision-making after birth. However, as the Belgian law on termination of pregnancy was instated in 1990, prevalence estimates on neonatal end-of-life decisions from 1999-2000 and 2016-2017 discussed in this dissertation will thus not be able to point out any changes following the implementation of this law. Furthermore, whether the permissive attitude of healthcare providers in perinatal care follows rather than precedes the implementation of the termination of pregnancy law can be debated.

When comparing prevalence estimates of administering medication with an explicit life-shortening intention in Flanders - a region where this practice is currently not regulated by means of a protocol or a law - with the Netherlands - who chose to provide guidelines and regulations for best practice –, we see that this practice occurs more often despite the lack of regulation. Our prevalence estimates on a practice that is currently not legally tolerated, combined with the knowledge that attitudes of Flemish neonatal healthcare professionals towards administering medication with explicit life-shortening intention are permissible, raises the question of whether guidelines, protocols or laws are needed to monitor these decisions in such a vulnerable patient group. However, the existence of a permissive attitude of involved healthcare providers towards these decisions, and the existence of empirical evidence indicating that these decisions are actually made in daily clinical practice do not automatically warrant support towards these legislative changes. While our interview study showed that neonatologists and nurses find the lack of a law allowing for actively hastening death by means of medication in severe cases to be a barrier in decision-making, they also indicated to be wary of possible standardisation by means of a law. While the existence of a protocol or a law to legally allow these decisions might aid decision-making, and could possibly provide guidelines towards what would be considered best practice in these cases, caution is warranted. This extremely sensitive issue needs further interdisciplinary debate, including physicians, ethicists and policy makers.

Support for healthcare providers during the neonatal end-of-life decision-making process

A key finding of this dissertation is that psychological and psychosocial support for healthcare providers working in neonatal end-of-life care is currently lacking (chapter 5 and 6). Both being part of an end-of-life decision-making process and experiencing the death of a neonate in their care causes a considerable amount of stress for involved physicians and nurses. During interviews, neonatologists and neonatal nurses continuously stressed how dealing with severely ill newborns can weigh on their emotional wellbeing, especially when the infant looks like a healthy, full term baby, or when healthcare providers have young infants of their own which causes them to project the hardships they view and experience on the job on their own household situation. Additionally, they indicated that being part of a neonatal end-of-life decision-making process is never easy, and that diagnostic and prognostic insecurity can heavily weigh on their state of mind.

To cope with the elevated amounts of stress due to being confronted with end-of-life decisions and infant death on a regular basis, our studies showed that healthcare providers turn to their peer colleagues for support. Though the positive impact of collegial support from peers on wellbeing of the healthcare providers should not be overlooked, it is not sufficient to cope with the stressors associated with end-of-life decision-making and infant-death in the Flemish neonatal intensive care units. Counselling for bereaved parents after perinatal loss to help them cope is much more readily available than it is for healthcare providers, as they are often not recognized as a bereaved person by society or their work environment. As a result of this, most recommendations and guidelines on psychosocial support during death and end-of-life care in neonates focusses on providing physicians, nurses and other healthcare professionals with concrete tools to optimally attend to parents in their decision-making process and grief. Caring for the healthcare providers in this case becomes secondary or even non-existent, even though the added emotional distress of dealing with these extremely difficult decisions regularly can prove to be more than they can cope with. Healthcare providers who suffer from emotional distress and even burn-out are furthermore known to have a diminished capacity to care for, and show empathy towards the ill neonates in their care and their parents. Caring for the healthcare providers might thus not only benefit their wellbeing on a personal level, but it might also considerably improve their ability to care for the infants and support the families. The lack of professional support for healthcare providers working in a neonatal intensive care unit, as shown by several studies in this dissertation, should thus obviously be addressed and resolved.

The role of palliative care in neonatal end-of-life decision making

In caring for extremely ill neonates and infants, deciding to either reorient care from cure-oriented and life-extending to comfort and palliative care, or to provide both cure-oriented and comfort care concurrently, is part of daily clinical practice. In prenatal and neonatal practice, palliative care is a relatively new field. The role of end-of-life decisions, and the possible implications of data provided within this dissertation, within such a perinatal or neonatal palliative care approach is thus still unclear.

When parents receive a life-limiting diagnosis for their child, it is extremely important that healthcare providers provide them with an empathetic, understandable and balanced overview of all treatment options, including active and cure-oriented interventions, end-of-life decisions, and palliative care. As the practice of withholding or withdrawing unnecessarily invasive life-supporting treatment in modern neonatal intensive care units globally is well supported, and results of this dissertation corroborated their central role in neonatal end-of-life care (chapter 3), we can expect these conversations between healthcare providers and parents to include discussing non-treatment decisions. Furthermore, we can expect decisions to withhold or withdraw unnecessarily invasive treatment to be an integral part of a shift from curative care to palliative care. A prime example of this is the practice of compassionate extubation, where assisted ventilation which is often vital for survival of the child is withdrawn to increase comfort. Aside from other important components such as advance care planning and support for parents, providing adequate pain relief and comfort are a crucial component of perinatal and neonatal (palliative) care. Withholding or withdrawing treatment is therefore usually followed by increasing analgesics and sedatives to treat the dying neonates' pain and suffering. The high doses of pain medication needed to provide relief for suffering neonates within the context of providing

good palliative care could, and are often (chapter 3) given even when a life-shortening effect was foreseen or even intended.

Embedding the end-of-life decision-making process within a neonatal or perinatal palliative care approach could be useful to address the complex family needs in an emotionally turbulent time by providing a family-centred approach with a focus on parental (spiritual and cultural) values, memory making, and compassionate communication between parents and providers. Additionally, such a palliative care approach could benefit healthcare providers, as existing perinatal palliative care protocols often include sections on psychosocial staff support, used to improve quality of care and counteract moral distress, burnout and compassion fatigue. A neonatal or perinatal palliative care approach thus includes not only adequate pain relief and comfort for the child, but also has a strong emphasis on compassionate communication and psychosocial support for parents, family members and involved healthcare providers.

Implications and recommendations

Implications and recommendations for practice

- Attention should be given to creating a private room for bad-news conversations in the neonatal intensive care unit and in other hospital wards were such conversations are prevalent and necessary.
- Installing a routine use of advance care planning with parents in neonates with a severe prognosis could aid difficult decisions.
- Prognostic uncertainty can be reduced by installing regular multidisciplinary team meetings and debriefings, and routinely asking for a second opinion from other physicians.
- Difficulties in working with parents who have a different cultural background or speak a different language than that of the involved healthcare providers could possibly be reduced by consulting a neonatal or perinatal palliative care team. Neonatal and perinatal palliative care teams put ample emphasis on conversational training and compassionate communication between parents and healthcare providers, making them ideally placed to mediate during difficult end-of-life decision-making processes.
- Neonatologists, neonatal nurses and other healthcare professionals working in a neonatal intensive care unit should develop generalist palliative care skills. In Belgium, there is currently no formal training on neonatal palliative care available to aid healthcare providers in attaining these neonatal palliative care skills. Including a module on neonatal death and end-of-life decision-making in standard curricula for neonatologists and neonatal nurses increases clinical experience and end-of-life communication skills early on in training, which leads to enhanced confidence and fewer negative experiences with end-of-life care in the neonatal intensive care units.
- We suggest the implementation of regular formal debriefings with the entire team responsible for caring for a neonate who died within the unit. Hereby, opportunities are created to review and discuss what could have been improved, which could aid in future end-of-life cases.

- We recommend counselling sessions for healthcare providers who were involved in end-of-life cases during regular work hours, as opposed to them attending counselling sessions on a voluntary basis or during unpaid time.

Implications and recommendations for policy

- Without reliable population-level prevalence estimates, ethical and legal discussions, and even legislative decision-making, are based on experiences and viewpoints of a select number of consulted experts, while population-data can provide an actual empirical basis on if and how often various end-of-life practices occur in the population. Within an ever-changing society where there is a continuous rise in medical possibilities to save the life of neonates with severe health concerns, systematic monitoring of end-of-life decisions on a population-level on a regular basis is paramount. Policymakers should support this recurrent periodic monitoring in order to be aware of any significant changes in daily practice which might warrant legislative or policy-changes.
- As current national and international guidelines on the acceptability and adequate performance of these neonatal end-of-life decisions are lacking, there might still be a lot of uncertainty among physicians and nurses regarding their permissibility and requirements for good clinical practice. Our prevalence estimates can provide experts with a starting point to discuss the possible formulation of these guidelines or legislative alternatives further. Additionally, the prevalence estimates and possible barriers and facilitators healthcare providers experience during a neonatal end-of-life decision-making process discussed within this dissertation might be an ideal starting point towards formulating aids and guidelines towards what is considered best practice in these cases.

Implications and recommendations for future research

- Input from (bereaved) parents was missing from the narrative of this dissertation, yet parental views are crucial to provide a comprehensive picture of a neonatal end-of-life decision-making process.
- End-of-life decision-making in neonates is irrevocably connected to prenatal end-of-life decision-making, as a lot of congenital disorders or anomalies can be diagnosed prenatally. Future research should continue to include both prenatal and neonatal decisions, using the framework provided in chapter 2. Additionally, as shown in chapter 4, when examining attitudes, opinions and experiences of involved healthcare providers, both prenatal and neonatal should be considered.
- Future studies should focus on collecting population data internationally. International comparative research can identify country-specific or even region-specific factors that might influence the occurrence of end-of-life decisions and end-of-life practice. Furthermore, it could provide evidence of differing medical cultures concerning neonatal end-of-life care.
- Neonatal end-of-life decisions are embedded in neonatal and even perinatal palliative care. Although crucial elements of a palliative care approach are already implemented in regular perinatal practice, the existence of actual perinatal palliative teams internationally is rare. As this is a relatively new and emerging research field that

addresses much needed support for extremely ill infants before and after birth as well as for their families and involved healthcare providers, future research should focus on evaluating the best model of care within this setting.

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Nederlandstalige samenvatting

Inleiding

In de laatste decennia zijn het aantal medische en technische interventies voor het behandelen van extreem zieke pasgeborenen en neonaten sterk gestegen. Desondanks sterft in Vlaanderen ongeveer 8.7 per duizend kinderen gedurende de foeto-infantiele periode: vanaf de geboorte van een foetus met een geboortegewicht van >500 gram of een zwangerschapsduur van 22 weken tot en met de leeftijd van één jaar. Het grootste deel van deze overlijdens vindt plaats in een dienst neonatale intensieve zorgen en wordt voorafgegaan door een levenseindebeslissing met een mogelijks levensverkortend effect. Hieronder vallen zowel niet-behandelbeslissingen zoals het niet instellen of staken van een mogelijks levensverlengende behandeling, en het toedienen van medicatie, beide met een mogelijke of uitdrukkelijke levensverkortende intentie. Ook prenataal zien we de laatste jaren een belangrijke stijging in de kwaliteit van diagnostische technieken zoals genetische screening en prenatale beeldvorming, waardoor een steeds groter aantal congenitale afwijkingen prenataal in plaats van neonataal kunnen worden vastgesteld. Wanneer dit het geval is kunnen levenseindebeslissingen prenataal worden gemaakt, zoals het niet instellen van een actieve prenatale behandeling of het vroegtijdig afbreken van de zwangerschap.

Het ethisch dilemma in sommige van deze gevallen tussen het redden van het leven van de foetus of pasgeborene en onzekerheid over de prognose op latere leeftijd, vereist een doordachte en professionele afweging van zowel de ouders als de betrokken zorgverleners. Hoewel een individuele afweging van deze ethische dilemma's bij elke specifieke case noodzakelijk is, kunnen populatiegegevens over wat zich in vergelijkbare medische situaties voordoet waardevol zijn voor betrokken zorgverleners, zeker in geval van onzekerheid over de prognose of het bestaan van een meningsverschil tussen betrokken partijen. Beschikbaar onderzoek zowel binnen België als in het buitenland is onvolledig of verouderd, en daarom ongeschikt als leidraad voor de huidige praktijk. Binnen de studies van dit proefschrift hebben we ons daarom gericht op het onderzoeken van de huidige klinische praktijk rond het maken van levenseindebeslissingen in een kwetsbare populatie van kinderen vanaf een levensvatbare zwangerschapsduur tot en met de leeftijd van één jaar. Het doel van dit proefschrift was tweeledig: 1) inzicht geven in de prevalentie van levenseindebeslissingen bij doodgeborenen, pasgeborenen en zuigelingen, en 2) dieper ingaan op wat het betekent om als zorgverlener deel uit te maken van een levenseindebeslissingsproces in de dagelijkse praktijk.

Een overzicht van de beschikbare informatie inzake foeto-infantiele levenseindebeslissingen

De prevalentie van foeto-infantiele levenseindebeslissingen

Populatie-studies waarbij alle sterfgevallen binnen een bepaalde periode worden bekeken, zijn ideaal om accurate prevalentieschattingen te leveren aangezien ze een totaalbeeld geven van de praktijk onafhankelijk van de ziekenhuissetting of de diagnose. Dergelijke studies rond levenseindebeslissingen zijn zeldzaam bij pasgeborenen en zuigelingen, en zelfs onbestaand wanneer het gaat om levenseindebeslissingen bij doodgeborenen. Bij pasgeborenen worden prevalentieschattingen vaak gebaseerd op dossierstudies binnen één of enkele neonatale intensieve zorg afdelingen. Bij dit soort studies zien we dat 40% tot 93% van de sterfgevallen

binnen zulke dienst volgt na het stopzetten van een levensverlengende behandeling. De enige beschikbare populatie-studies zijn afkomstig uit Nederland in 2014 en België in 2000. Deze studies toonden aan dat levenseindebeslissingen gemaakt worden in ongeveer 60% van alle overlijdens onder de leeftijd van één jaar. Bij doodgeborenen bestudeerden bestaande studies in 2003 en 2000-2005 tot nu toe enkel de prevalentie van een laattijdige zwangerschapsafbreking in het tweede of derde trimester van de zwangerschap. Er is dus weinig beschikbare informatie over levenseindebeslissingen bij doodgeborenen anders dan het afbreken van de zwangerschap, over het voorafgaande beslissingsproces, en over patiëntkarakteristieken naast zwangerschapsduur en de aan- of afwezigheid van foetale afwijkingen.

Voorafgaand aan de ontwikkeling van de studies binnen dit proefschrift werd de nood voor recente, populatie-gebaseerde gegevens rond de prevalentie van levenseindebeslissingen aangegeven door Vlaamse zorgverleners uit zowel de prenatale als neonatale zorg. Aanbevelingen voor de klinische praktijk kunnen momenteel enkel gebaseerd worden op verouderde en mogelijks niet langer relevante populatiegegevens door de constante veranderingen op maatschappelijk, juridisch en klinisch vlak. Voorbeelden van deze maatschappelijke veranderingen zijn onder andere de implementatie van wetten rond patiëntenrechten, palliatieve zorg en euthanasie bij volwassenen in 2002; en de wet over euthanasie bij kinderen in 2014. Deze wetten zijn niet toepasbaar binnen onze populatie van pasgeborenen en zuigelingen, aangezien ze beperkt zijn tot volwassenen en wilsbekwame minderjarigen. Toch kunnen ze mogelijk een invloed hebben op de prenatale en neonatale praktijk. Internationaal werd in Nederland het Groningen-protocol geïmplementeerd, wat het toedienen van medicatie met een expliciete levensverkortende intentie bij pasgeborenen en zuigelingen wettelijk mogelijk maakt in extreme gevallen. Deze nationale en internationale maatschappelijke veranderingen hebben mogelijk een invloed gehad op de prevalentie van levenseindebeslissingen in België. Hiernaast zou ook de toename in medische en technische interventies pre- en postnataal een invloed kunnen hebben op de klinische praktijk. Actuele en betrouwbare prevalentieschattingen zijn dus broodnodig om zorgverleners, beleidsmakers en onderzoekers een beeld te geven van de huidige klinische praktijk van levenseindebeslissingen binnen een zeer kwetsbare populatie van kinderen onder de leeftijd van één jaar.

Attitudes van zorgverleners omtrent foeto-infantiele levenseindebeslissingen

Eerder onderzoek toonde een grote variabiliteit aan in welke types levenseindebeslissingen worden gemaakt, zelf bij pasgeborenen met dezelfde pathologie. Dit omdat beslissingen aan het levenseinde beïnvloed worden door een groot aantal contextuele factoren zoals de beschikbare middelen binnen de ziekenhuissetting; en de sociale, culturele en religieuze overtuigingen van ouders en de betrokken zorgverleners. Naast deze contextuele variabelen spelen attitudes van zorgverleners een cruciale rol in de besluitvorming. Zelfs binnen één zorgteam werden belangrijke verschillen gevonden tussen de houding van artsen en verpleegkundigen ten aanzien van levenseindebeslissingen. Persoonlijke kenmerken van de zorgverleners kunnen dus een cruciale rol spelen bij de besluitvorming rond levenseindebeslissingen bij pasgeborenen en zuigelingen.

Uit voorgaand onderzoek naar de attitudes van artsen in 10 Europese landen in 2000 bleek dat de waarschijnlijkheid van het beperken van levensondersteunende behandelingen bij pasgeborenen sterk afhankelijk is van het land; de religie, het geslacht en het al dan niet hebben van kinderen van de betrokken arts; en de prevalentie van kinderen met een extreem laag geboortegewicht op de desbetreffende dienst. Bovendien bleek uit een zelfrapportage vragenlijst en een retrospectieve review van ziekenhuisdossiers dat een onbedoeld levensverkortend effect van het toedienen van opioïden acceptabel wordt geacht voor een groot deel van artsen werkend op een neonatale of pediatrische dienst intensieve zorgen. Deze studies geven een beperkt beeld van de praktijk aangezien ze geen rekening hielden met attitudes ten opzichte van beslissingen die voor de geboorte mogelijk waren. We achten dit belangrijk omdat attitudes en beslissingen voor en na de geboorte zeer sterk gelinkt zijn. Neonatologen worden namelijk vaak geraadpleegd bij prenatale beslissingen rond het levenseinde, wat aantoont dat hun attitudes ten aanzien van prenatale en neonatale levenseindebeslissingen dus best onder één overkoepelend onderzoek worden bekeken, zodat een vergelijking tussen beide praktijken mogelijk wordt. Vanwege de relevantie van attitudes van zorgverleners binnen het debat rond levenseindebeslissingen pre- en postnataal, was een afzonderlijk deel van dit proefschrift gewijd aan het onderzoek naar attitudes met betrekking tot levenseindebeslissingen in de foeto-infantiele periode van neonatologen en neonatale verpleegkundigen.

Barrières en faciliterende factoren in het beslissingsproces van neonatale levenseindebeslissingen voor betrokken zorgverleners

Ondanks de grote impact van het maken van levenseindebeslissingen op betrokken zorgverleners hebben weinig studies tot nu toe gefocust op welke factoren door hen als behulpzaam of hinderend worden ervaren. Kwalitatieve studies bij zorgverleners werkend in een dienst neonatale intensieve zorgen in Noorwegen toonden aan dat beslissingen over het al dan niet voortzetten van levensondersteunende behandelingen bemoeilijkt worden door een gebrek aan zekerheid over de prognose en het toekomstig lijden van het kind. Verder toonden deze studies in Noorwegen aan dat de ambivalentie tussen het willen betrekken van ouders bij het beslissingsproces en hen besparen van onnodig lijden kan leiden tot besluiteloosheid over de hoeveelheid informatie die zorgverleners verstrekken aan de ouders.

Deze bestaande studies over barrières en faciliterende factoren in het beslissingsproces van neonatale levenseindebeslissingen voor betrokken zorgverleners hebben een aantal belangrijke tekortkomingen. Ze richten zich voornamelijk op specifieke types van levenseindebeslissingen, zoals het staken of niet instellen van een behandeling, in plaats van het volledige spectrum van mogelijke beslissingen in acht te nemen. Verder richten de meeste studies zich op de ervaring van ouders, waardoor het standpunt van de betrokken zorgverleners vaak wordt vergeten. Één van de hoofdstukken van dit proefschrift focuste zich daarom op de factoren die neonatologen en neonatale verpleegkundigen als behulpzaam of moeilijk ervaren bij het nemen van beslissingen aan het einde van het leven van pasgeborenen op een dienst neonatale intensieve zorgen. Kennis over de invloed van deze factoren op het besluitvormingsproces kan dienen als een startpunt voor het formuleren van concrete aanbevelingen om de toekomstige praktijk te verbeteren.

Psychologische ondersteuning van zorgverleners tijdens het maken van levenseindebeslissingen

Neonatologen en neonatale verpleegkundigen die op een dienst neonatale intensieve zorgen werken ervaren vaak stress en morele druk vanwege de hoge eisen van hun beroep. Vooral wanneer een kind binnen hun zorg niet langer voordelen ervaart van de agressieve of zelfs nutteloze behandelingen en een levenseindebeslissing moet/kan worden genomen, kan de stress hoog oplopen. Net zoals bij zorgverleners werkend op een dienst pediatrische intensieve zorgen ervaren ze verdriet, hulpeloosheid en frustratie wanneer ze niet in staat zijn om het leven van een kind te redden. Vanwege dit leed zijn neonatologen en neonatale verpleegkundigen erg vatbaar voor het ontwikkelen van een verminderde mogelijkheid om medeleven te tonen met hun patiënten en naasten, en hebben ze een verhoogd risico op het ontwikkelen van een burn-out. In deze instanties zijn zorgverleners niet langer capabel om de emotionele druk van hun job het hoofd te bieden. Psychosociale ondersteuning van zorgverleners werkend op een dienst neonatale intensieve zorgen werd momenteel reeds opgenomen in richtlijnen voor de dagelijkse praktijk, maar de meeste van deze aanbevelingen met betrekking tot psychosociale ondersteuning zijn eerder gericht op het voorzien van concrete tools voor neonatologen en neonatale verpleegkundigen om ouders optimaal te ondersteunen bij besluitvorming en rouw. Onderzoek naar de ervaren psychosociale ondersteuning bij zorgverleners is bijgevolg ook onbestaande.

Voor zover ons bekend is, bevatte slechts één onderzoek specifieke aanbevelingen uitsluitend gericht op het ondersteunen van zorgverleners binnen een neonatale palliatieve zorg setting. Catlin en Carter adviseerden verplichte, formele vergaderingen of adviessessies als onderdeel van reguliere werkuren van zorgverleners, in plaats van het zoeken naar professionele psychosociale ondersteuning buiten de werkuren of op vrijwillige basis. Verder raden ze ziekenhuisafdelingen aan om het mogelijk te maken voor zorgverleners om te weigeren deel uit te maken van een specifieke stervensbegeleiding wanneer ze deze last emotioneel niet kunnen dragen. Omwille van het belang van ondersteuning voor de zorgverleners binnen een levenseindebeslissingsproces, focuste een laatste studie binnen dit proefschrift op het onderzoeken van de ervaren psychologische ondersteuning van neonatologen en neonatale verpleegkundigen werkend op een dienst neonatale intensieve zorgen binnen de context van levenseindebeslissingen. Ondersteuning van de betrokken zorgverleners kan cruciaal zijn voor het optimaliseren van de aangeboden zorg en empathie voor zowel patiëntjes als ouders.

Doelstellingen van dit doctoraat

De focus van dit proefschrift is besluitvorming aan het levenseinde van doodgeborenen, pasgeborenen en zuigelingen op populatieniveau over verschillende ziekenhuissettings, patiënten en artsen. De volgende twee doelstellingen, met hun eigen specifieke onderzoeksvragen, leiden dit proefschrift:

De eerste doelstelling was het onderzoeken van levenseindebeslissingspraktijken en beslissingen bij doodgeborenen, pasgeborene en zuigelingen in Vlaanderen, België op populatieniveau. De volgende onderzoeksvragen werden beantwoord:

1. Welk studiedesign kan gebruikt worden om de prevalentie van verschillende beslissingen aan het levenseinde voor en na de geboorte betrouwbaar te bestuderen? Welke databanken op populatieniveau kunnen gebruikt worden om zowel prenatale als neonatale levenseindebeslissingen te bestuderen, en hoe kunnen we anoniem contact opnemen met de arts die betrokken is bij gevallen van doodgeboorte of overlijden?
2. Wat is de prevalentie van verschillende levenseindebeslissingen in de neonatale periode? Is de prevalentie in de loop van de tijd veranderd in vergelijking met de vorige gegevensverzameling in Vlaanderen in 1999-2000? Wat zijn de klinische en demografische kenmerken van pasgeborenen en zuigelingen wiens overlijden voorafgegaan werd door deze verschillende types van levenseindebeslissingen? Welke omstandigheden worden geassocieerd met verschillende soorten beslissingen aan het levenseinde van pasgeborenen en zuigelingen?

Het tweede doel van dit proefschrift was het in kaart brengen van attitudes, opvattingen en ervaringen van betrokken zorgverleners, namelijk neonatologen en neonatale verpleegkundigen, met betrekking tot prenatale en neonatale levenseindebeslissingen. Binnen dit doel werden de volgende onderzoeksvragen beantwoord:

3. Wat zijn de attitudes van neonatologen en neonatale verpleegkundigen ten aanzien van prenatale en neonatale levenseindebeslissingen? Wat zijn de verschillen in attitude tussen artsen en verpleegkundigen? Welke attitudes ten aanzien van prenatale en neonatale levenseindebeslissingen van zorgverleners, en welke van hun demografische kenmerken, worden geassocieerd met het al dan niet aanvaardbaar vinden van verschillende behandelopties in een hypothetische case?
4. Welke factoren van het levenseindebeslissingsproces kunnen, volgens de ervaring van neonatologen en neonatale verpleegkundigen, het besluitvormingsproces aan het levenseinde van pasgeborenen en zuigelingen belemmeren of vergemakkelijken?
5. Op welke manier worden neonatologen en neonatale verpleegkundigen ondersteund door collega's, psychologen en de ziekenhuisafdeling tijdens het beslissingsproces bij het maken van levenseindebeslissingen binnen een dienst neonatale intensieve zorgen? Wordt de ervaren psychologische ondersteuning door zorgverleners als voldoende geacht?

Methoden

Om de onderzoeksvragen en onderzoeksdoelstellingen van dit proefschrift te beantwoorden, werden verschillende methoden voor gegevensverzameling gebruikt, namelijk een vragenlijststudie bij artsen gebruik makend van overlijdensattesten, een attitude en psychologische ondersteuningssurvey bij artsen en verpleegkundigen, en een kwalitatief onderzoek met face-to-face semigestructureerde interviews bij artsen en verpleegkundigen.

De vragenlijststudie op basis van overlijdensattesten

Om onderzoeksvraag 2 en 3 te beantwoorden maakten we gebruik van een vragenlijststudie op basis van de overlijdensattesten van alle doodgeborenen met een zwangerschapsduur van meer

dan 22 weken of een geboortegewicht van meer dan 500 gram, en alle overlijdens voor de leeftijd van één jaar. Alle geïncludeerde doodgeboortes en overlijdens vonden plaats in Vlaanderen of Brussel, en bij elke foetus, pasgeborene of zuigeling was de moeder een inwoner van Vlaanderen op het moment van doodgeboorte of overlijden. Het design van deze studie was identiek aan een voorgaand onderzoek op basis van overlijdensattesten uitgevoerd tussen augustus 1999 en juli 2000, met uitzondering van een langere inclusieperiode van september 2016 tot december 2017 (12 maanden in 1999-2000 ten opzichte van 16 maanden in 2016-2017).

Binnen een periode van vier maanden na het overlijden ontving elke arts verantwoordelijk voor het ondertekenen van de overlijdensattesten een vragenlijst en een begeleidende brief met identificatiegegevens over het specifieke patiëntje via het Vlaams Agentschap voor Zorg en Gezondheid, die verantwoordelijk is voor de verwerking van overlijdensattesten. Om anonimiteit te garanderen, diende een advocaat als intermediair orgaan tussen de artsen, het Vlaams Agentschap voor Zorg en Gezondheid en de onderzoekers verantwoordelijk voor het verwerken van de gegevens. Deze tussenpersoon zorgde ervoor dat ingevulde vragenlijsten nooit gekoppeld konden worden aan een specifieke patiënt, arts of ziekenhuis.

Er werd gebruik gemaakt van twee afzonderlijke vragenlijsten tijdens dit onderzoek, namelijk een vragenlijst bij overlijdensattesten omtrent een doodgeboorte en een vragenlijst bij overlijdensattesten omtrent een overlijden van een levend geboren kind onder de leeftijd van één jaar. De vragenlijsten die tijdens dit onderzoek werden gebruikt hadden als doel om te informeren naar mogelijke prenatale en neonatale levenseindebeslissingen voorafgaand aan de doodgeboorte of het overlijden van het patiëntje. We maakten gebruik van een gevalideerde vragenlijst die vroeger reeds gebruikt werd om levenseindebeslissingen voorafgaand aan een overlijden van een pasgeborene of zuigeling onder de leeftijd van één jaar te bestuderen, zodat vergelijkbaarheid van gegevens over tijd gewaarborgd werd. Bij de start van beide vragenlijsten werd gevraagd of de doodgeboorte of het overlijden plotseling en volledig onverwacht plaatsvond. Bij een negatief antwoord werd een levenseindebeslissing voorafgaand aan de doodgeboorte of het overlijden mogelijk geacht, waarna de vragenlijst in detail het al dan niet voorkomen van deze levenseindebeslissingen naging. De gebruikte vragenlijsten kan je terugvinden in Appendix 1 en 2.

Wanneer er sprake was van meerdere levenseindebeslissingen bij een specifieke doodgeboorte of overlijden, werd de beslissing met de meest expliciete levensverkortende intentie als belangrijkste beslissing weerhouden. Wanneer meer dan één levenseindebeslissing met dezelfde levensverkortende intentie werd aangegeven, werd de toediening van medicatie (actief) verkozen boven het staken of niet instellen van een behandeling (passief). Wanneer een levenseindebeslissing werd aangegeven in de vragenlijst werden een reeks bijvragen gesteld, zoals bijvoorbeeld de tijdsduur waarmee het leven werd verkort, de belangrijkste reden voor het nemen van de beslissing, en wie betrokken was bij het besluitvormingsproces. Demografische informatie aangegeven op de overlijdensattesten werd anoniem gekoppeld aan de vragenlijstdata na voltooiing van de dataverzameling.

De attitude en psychologische ondersteuningssurvey

Om de attitudes en ervaren psychologische ondersteuning van betrokken zorgverleners bij neonatale beslissingen aan het levenseinde te onderzoeken, werd een vragenlijststudie opgesteld bij alle neonatologen en neonatale verpleegkundigen werkend in een dienst neonatale intensieve zorgen in Vlaanderen. Alle Vlaamse diensten neonatale intensieve zorgen namen deel aan dit onderzoek en waren gevestigd in de volgende ziekenhuizen: Universitair ziekenhuis Gent, Universitair ziekenhuis Brussel, Universitair ziekenhuis Leuven, Universitair ziekenhuis Antwerpen, AZ Sint-Jan Brugge-Oostende, ziekenhuis Oost-Limburg Genk, ziekenhuis GZA Sint-Augustinus en ziekenhuis ZNA Middelheim.

Gegevens werden verzameld tussen 1 en 31 mei 2017. De gatekeeper methode werd gebruikt, waarbij een arts werkend op elk van de acht deelnemende ziekenhuisdiensten verantwoordelijk was voor het uitdelen van de vragenlijsten aan alle artsen en verpleegkundigen werkend op hun dienst. Artsen en verpleegkundigen werden gevraagd om de vragenlijst in te vullen en terug te sturen naar de onderzoekers door middel van een prepaid envelop.

De vragenlijst die gebruikt werd tijdens deze survey werd ontwikkeld op basis van een bestaande Vlaamse attitude-vragenlijst uit het jaar 2000 over levenseindebeslissingen bij pasgeborenen en zuigelingen, en een Amerikaanse vragenlijst naar het onderzoeken van burn-out bij neonatologen binnen een intensieve zorgsetting. Een multidisciplinair team van drie sociologen, twee psychologen, drie neonatologen en een gynaecoloog ontwikkelde de finale vragenlijst. Nadien werd deze vragenlijst cognitief getest bij vijf neonatologen werkend op vier afzonderlijke ziekenhuisafdelingen, drie neonatale verpleegkundigen werkend op twee afzonderlijke ziekenhuisafdelingen, en één gynaecoloog om de validiteit van de items te garanderen. De vragenlijst bestond uit zeven socio-demografische vragen en 12 items over hun attitudes ten opzichte van perinatale levenseindebeslissingen. Zes van deze attitude items waren gericht op levenseindebeslissingen in de neonatale periode, de overige zes attitude items focusten op prenatale beslissingen (zwangerschapsafbreking bij een levensvatbare foetus). Attitudes werden gemeten door middel van een vijf-punt Likert-schaal, waarop de deelnemers konden aanduiden of ze het al dan niet eens waren met de aangeboden stellingen. We presenteerden ook een hypothetische casestudie van een foetus geboren na 27 weken zwangerschap, waarbij additionele complicaties optraden na de geboorte. Participanten konden hierbij op een vier-punt Likert-schaal aanduiden of ze zeven mogelijke behandelopties al dan niet zouden overwegen. Ten slotte bevatte de vragenlijst ook items rond ervaren stress, de aanwezigheid van professionele psychosociale ondersteuning voor zorgverleners, en de ervaren steun van collega's tijdens het maken van levenseindebeslissingen op hun dienst. Deelnemers konden op basis van een vijf-punt Likert-schaal aanduiden in welke mate ze akkoord gingen met deze stellingen. De gebruikte vragenlijsten kan je terugvinden in Appendix 3 en 4.

De face-to-face semigestructureerde interview-studie

Als laatste werd een kwalitatieve interview-studie uitgevoerd waarbij semigestructureerde interviews werden afgenomen bij neonatologen en neonatale verpleegkundigen werkend op een Vlaamse dienst neonatale intensieve zorgen. We kozen voor een kwalitatief design om

deelnemers de mogelijkheid te bieden om op een open manier hun mening te delen, waardoor er voldoende aandacht kon worden geschonken aan hun individuele ervaringen. Binnen deze interviews focusten we op de ervaren barrières en faciliterende factoren van zorgverleners tijdens het maken van levenseindebeslissingen.

We rekruteerden neonatologen die werkzaam waren op één van de volgende vier diensten neonatale intensieve zorgen: Universitair ziekenhuis Gent, Universitair ziekenhuis Brussel, Universitair ziekenhuis Leuven of AZ Sint-Jan Brugge-Oostende. De interviews vonden plaats tussen december 2017 en juli 2018. De neonatologen werden geacht betrokken te zijn bij ten minste één kind waarvan het overlijden voorafgegaan werd door een levenseindebeslissing binnen het afgelopen jaar. Verder rekruteerden we op dezelfde afdelingen ook neonatale verpleegkundigen die binnen het afgelopen jaar verantwoordelijk waren voor de zorg van ten minste één kind waarvan het overlijden voorafgegaan werd door een levenseindebeslissing. Een verantwoordelijke arts op elke afdeling informeerde alle neonatologen en verpleegkundigen op zijn/haar dienst over het doel van het onderzoek. Contactgegevens van geïnteresseerde artsen en verpleegkundigen werden daarna over gemaakt aan de onderzoekers. Alle interviews vonden plaats in een afgesloten ruimte op de ziekenhuisafdeling, of bij de deelnemers thuis.

De gebruikte topic guide (zie Appendix 5 en 6) werd ontwikkeld door een multidisciplinair team van negen onderzoekers met ervaring binnen het onderwerp van palliatieve zorg, levenseinde en neonatologie. Aan de deelnemers werd gevraagd wat het gemakkelijker of net moeilijker maakte voor hen om levenseindebeslissingen te nemen bij pasgeborenen en zuigelingen. Voorafgaand aan het interview werd een korte vragenlijst afgenomen om socio-demografische gegevens te verzamelen. Dataverzameling werd afgerond wanneer er geen nieuwe barrières of faciliterende factoren naar voor kwamen tijdens interviews.

Belangrijkste bevindingen

Het onderzoeken van levenseindebeslissingspraktijken en beslissingen bij doodgeborenen, pasgeborenen en zuigelingen in Vlaanderen, België op populatieniveau

Het ontwikkelen van een methode om de prevalentie van levenseindebeslissingen voor en na de geboorte te onderzoeken

In hoofdstuk 2 presenteerden we een studie design om de prevalentie van prenatale en neonatale beslissingen rond het levenseinde op populatieniveau in Vlaanderen, België, te evalueren en te monitoren. Dit design omvatte de ontwikkeling van een gevalideerd, conceptueel kader van levenseindebeslissingen gedurende de gehele foetaal-infantiele periode, en de ontwikkeling van een onderzoeksmethode om deze beslissingen te bestuderen, onafhankelijk van de setting waarin het overlijden of de doodgeboorte plaatsvond.

We creëerden een nieuw, allesomvattend kader om beslissingen over het levenseinde in de gehele foetale infantiele periode te classificeren. Binnen dit conceptuele kader includeren we beslissingen bij doodgeborenen met een zwangerschapsduur van meer dan 22 weken of een

geboortegewicht van meer dan 500 gram, en beslissingen voorafgaand aan een overlijden voor de leeftijd van één jaar. Twee dimensies werden belangrijk geacht, namelijk de medisch-technische dimensie die de medische handeling classificeerde die werd gesteld, en de medisch-ethische classificatie die de levensverkortende intentie van de arts in verband met die medische handeling omvatte. Wat medische handelingen betreft, werd een onderscheid gemaakt tussen niet-behandelbeslissingen, zoals het niet instellen of staken van een behandeling, en het toedienen van medicatie of het uitvoeren van een actieve medische interventie met een mogelijks levensverkortend effect. De medisch-ethische classificatie omvatte die mogelijke levensverkortende intenties namelijk: 1) geen intentie om het leven te verkorten, maar het mogelijks levensverkortend effect werd in rekening gebracht, 2) een mogelijks levensverkortend effect was aanwezig, maar het was niet het hoofddoel van de medische handeling, en 3) de intentie om het leven te verkorten was expliciet. Op basis van dit conceptuele kader werden twee afzonderlijke, vergelijkbare vragenlijsten ontwikkeld om levenseindebeslissingen bij respectievelijk doodgeborenen en overleden kinderen onder de leeftijd van één jaar te onderzoeken.

Het hoofddoel van de studie was het onderzoeken van levenseindebeslissingen bij doodgeborenen vanaf 22 weken zwangerschap en bij overleden kinderen onder de leeftijd van één jaar op populatieniveau. Gebaseerd op eerdere ervaringen bij pasgeborenen, minderjarigen en volwassenen werd geopteerd voor het gebruik van overlijdensattesten als basis voor het verzenden van onze vragenlijsten. Voor doodgeborenen tussen 22 en 26 weken zwangerschap bleek deze methode niet ideaal, aangezien het aangeven van een doodgeboorte binnen deze periode door middel van een overlijdensattest niet verplicht is. Ons steekproefkader bleek dus mogelijks onvolledig. Desondanks verkozen we deze methode boven het versturen van vragenlijsten gebaseerd op het geboorteregister van het Studiecentrum voor Perinatale Epidemiologie (SPE), aangezien een vertraging bij verwerking van deze gegevens tot één jaar in beslag kon nemen, wat de betrouwbaarheid van de antwoorden op onze vragenlijst drastisch zou verlagen. We kozen daarom voor een mortality follow-back survey methode voor zowel overleden pasgeborenen en zuigelingen als voor doodgeborenen, mits kleine aanpassingen aan de methodologie voor doodgeborenen in de cruciale periode tussen 22 en 26 weken zwangerschap. Het Vlaams Agentschap voor Zorg en Gezondheid, dat alle overlijdenscertificaten verwerkt, moedigde de registratie van doodgeboortes vanaf 22 weken zwangerschap actief aan tijdens de periode van data-collectie. Verder werden vragenlijsten verstrekt aan de tien grootste materniteiten in Vlaanderen, zodat artsen de mogelijkheid hadden om deze in te vullen na elke doodgeboorte, naast het invullen van de bijhorende overlijdenattesten.

Artsen vulden bij elk overlijden of elke doodgeboorte een overlijdensattest in, inclusief demografische en medische gegevens van het kind. Nadien ontvingen de centrale overheidsinstanties, in ons geval het Vlaams Agentschap voor Zorg en Gezondheid, de ingevulde overlijdensattesten. Het Agentschap was verantwoordelijk voor het verzenden van de vragenlijsten voor elk ontvangen overlijdensattest naar de attesterende arts vermeld op het attest, inclusief een begeleidende brief met patiëntkenmerken nodig voor de identificatie van het kind. De arts identificeerde het kind op basis van de voorziene gegevens, en vulde de vragenlijst in. Alle vragenlijsten werden verzonden naar een advocaat die verantwoordelijk was voor het anonimiseren van de ontvangen gegevens, waardoor anonimiteit van de

betrokken arts, het patiëntje en het ziekenhuis gewaarborgd werd. Na afsluiting van de dataverzameling werden alle gegevens van de vragenlijsten gekoppeld aan de demografische en klinische gegevens van het overlijdensattest.

Dit ontwikkelende onderzoeksprotocol is het eerste studie design waar beslissingen rond het levenseinde bij doodgeborenen, pasgeborenen en zuigelingen onderzocht kunnen worden op populatieniveau binnen één onderzoeksopzet. We zijn ervan overtuigd dat dit soort onderzoek regelmatig moet worden herhaald om eventuele veranderingen in de praktijk van levenseindebeslissingen in kaart te brengen, onder een voortdurend veranderende maatschappelijke, juridische en klinische invloed. Omwille van het gebruik van overlijdenscertificaten voor de verzending van onze vragenlijsten kan deze methode ook in andere landen gebruikt worden, ongeacht mogelijke verschillen in het wettelijk kader met betrekking tot levenseindebeslissingen. Hierdoor zijn internationale vergelijkingen tussen landen mogelijk. Het verstrekken van prevalentieschattingen, niet enkel in Vlaanderen maar ook internationaal, kan uiteindelijk helpen bij de ontwikkeling van richtlijnen ter ondersteuning van zorgverleners tijdens het maken van deze ethische beslissingen in de dagelijkse praktijk.

De prevalentie van levenseindebeslissingen bij pasgeborenen en zuigelingen

Hoofdstuk 3 van dit proefschrift was gericht op het leveren van prevalentieschattingen van verschillende types levenseindebeslissingen bij pasgeborenen en zuigelingen in Vlaanderen over twee verschillende studieperiodes (1999-2000 en 2016-2017). Deze prevalentieschattingen werden onderzocht door middel van de ontwikkelde onderzoeksmethode beschreven binnen de vorige paragrafen.

Een totaal aantal van 276 neonaten en zuigelingen stierf tussen 1 september 2016 en 31 december 2017 (229 ingevulde vragenlijsten ontvangen, 83% respons rate); en 292 pasgeborenen en zuigelingen stierven tussen 1 augustus 1999 en 31 juli 2000 (253 ingevulde vragenlijsten ontvangen, 87% respons rate). Onderzoeksresultaten toonden aan dat de prevalentie van levenseindebeslissingen bij pasgeborenen relatief stabiel is gebleven over beide studieperiodes. Ongeveer 60% van alle neonatale en kindersterfte onder de leeftijd van één jaar in Vlaanderen werd voorafgegaan door zulke beslissingen. Niet behandelbeslissingen komen nog steeds het meest voor, namelijk bij 34% van alle overlijdens in 1999-2000 en 37% in 2016-2017. Het niet instellen van een behandeling kwam voor bij 13% van alle neonatale en zuigelingensterfte in 1999-2000 en 12% in 2016-2017, terwijl het staken van een behandeling voor kwam bij 21% van de gevallen in 1999-2000 en 25% van de gevallen in 2016-2017. Het toedienen van medicatie met een potentieel levensverkortend effect bleef stabiel op 16% in 1999-2000 vergeleken met 14% in 2016-2017. De prevalentie van het toedienen van medicatie met een expliciet levensverkortend effect bleef relatief constant met 7% in 1999-2000 en 10% in 2016-2017. Ondanks het feit dat de prevalentie van levenseindebeslissingen over beide studieperiodes relatief stabiel is gebleven, merken we toch grote veranderingen binnen leeftijdsgroepen. Levenseindebeslissingen werden nu significant vaker genomen na de eerste levensweek dan in 1999-2000 (74% van de sterfgevallen tussen 7 en 27 dagen oud werd voorafgegaan door een levenseindebeslissing in 2016-2017 vergeleken met 50% in 1999-2000, p=0.03; en 64% van de sterfgevallen na 27

dagen oud in 2016-2017 vergeleken met 38% in 1999-2000, p=0.003). Bij sterfgevallen die plaats vonden binnen de eerste levensweek daalde de prevalentie van levenseindebeslissingen aanzienlijk (55% van de sterfgevallen in 2016-2017 vergeleken met 72% in 1999-2000, p=0.01). Na de eerste levensweek veranderde de praktijk van levenseindebeslissingen in Vlaanderen in vergelijking met 17 jaar geleden, aangezien beslissingen om levensverlengende behandelingen te staken of medicatie met een expliciete levensverkortende intentie toe te dienen aanzienlijk stegen. In 1999-2000 werd 9% van de sterfgevallen tussen 7 en 27 dagen oud voorafgegaan door een beslissing om een reeds ingestelde behandeling te staken, en werden er geen gevallen aangegeven waar medicatie met een expliciete levensverkortende intentie werd toegediend. In 2016-2017 daarentegen werd binnen dezelfde leeftijdsgroep in 26% van de gevallen een behandeling gestaakt en in 26% van de gevallen medicatie toegediend met een expliciete levensverkortende intentie. Na de eerste 27 dagen steeg de prevalentie van het staken van een behandeling van 16% in 1999-2000 naar 31% in 2016-2017, en de prevalentie van het toedienen van medicatie met een expliciete levensverkortende intentie steeg van 2% naar 10%.

Binnen hoofdstuk 3 toonden we aan dat levenseindebeslissingen een integraal onderdeel blijven van de medische praktijk bij het behandelen van extreem zieke kinderen onder de leeftijd van één jaar, aangezien drie op de vijf sterfgevallen binnen deze groep voorafgegaan werd door dergelijke beslissingen. Dit geeft aan dat de toelaatbaarheid en vereisten voor een goede klinische praktijk besproken moeten worden onder betrokken zorgverleners.

Attitudes, opvattingen en ervaringen van betrokken zorgverleners met betrekking tot prenatale en neonatale levenseindebeslissingen

Attitudes van neonatologen en neonatale verpleegkundigen ten opzichte van perinatale levenseindebeslissingen

In hoofdstuk 4 besproken we de attitudes van neonatologen en neonatale verpleegkundigen werkend op een dienst neonatale intensieve zorgen ten opzichte van perinatale levenseindebeslissingen. Deze werden onderzocht door middel van een post survey op populatieniveau.

We vonden dat er algemeen aanzienlijke steun kon worden gevonden voor zowel prenatale en neonatale levenseindebeslissingen bij neonatale zorgverleners. In geval van prenatale levenseindebeslissingen achtte 80 tot 98% van alle neonatologen en verpleegkundigen dat een laattijdige zwangerschapsafbreking na een levensvatbare termijn aanvaardbaar was bij diagnose van ernstige of lethale foetale afwijkingen. Wanneer de foetus gezond is maar het leven van de moeder door de zwangerschap in gevaar wordt gebracht, vond meer dan 60% van de neonatologen en verpleegkundigen een zwangerschapsafbreking op levensvatbare termijn aanvaardbaar. Wanneer de foetus echter gezond is maar de zwangerschap een gevaar vormt voor de psychologische gezondheid, daalt de aanvaardbaarheidsgraad tot 15% bij zowel artsen als verpleegkundigen. Bij extreem zieke pasgeborenen of zuigelingen vond 80 tot 100% van alle deelnemende zorgverleners niet-behandelbeslissingen zoals het staken of niet instellen van een behandeling aanvaardbaar, ongeacht of deze beslissing genomen werd

rekening houdend met een mogelijk levensverkortend effect of met een expliciete levensverkortende intentie. Naast de algemene consensus tussen artsen en verpleegkundigen op de bovenvermelde levenseindebeslissingen konden ook een aantal verschillen tussen zorgverleners worden waargenomen. Het toedienen van medicatie met een potentieel levensverkortend effect werd door de meerderheid van beide zorgverleners aanvaardbaar geacht, maar neonatologen waren significant meer geneigd om in te stemmen met deze praktijk (96%) dan verpleegkundigen (84%, p=0.02). Anderzijds vonden verpleegkundigen het toedienen van medicatie met een expliciete levensverkortende intentie vaker aanvaardbaar (74%) dan neonatologen (60%, p=0.02). Ondanks het feit dat deze praktijk momenteel niet wettelijk toegestaan is in België, lag de aanvaardbaarheidsgraad bij beide zorgverleners boven de 50%.

Onze studie stelde een grote aanvaardbaarheid vast van zowel prenatale als neonatale levenseindebeslissingen bij neonatologen en neonatale verpleegkundigen, zelfs voor beslissingen die momenteel buiten het Belgische wettelijke kader vallen. Artsen en verpleegkundigen verschilden echter enigszins in hun aanvaardbaarheid ten opzichte van specifieke types levenseindebeslissingen. Deze verschillen tussen zorgverleners houden mogelijk verband met het feit dat verpleegkundigen vaak niet de eindverantwoordelijkheid voor de medische beslissingen dragen. Deze bevindingen wijzen op het belang van het includeren van het perspectief van zowel artsen als verpleegkundigen tijdens het maken van levenseindebeslissingen in de perinatale periode.

Barrières en faciliterende factoren bij het maken van levenseindebeslissingen bij pasgeborenen en zuigelingen

In hoofdstuk 5 onderzochten we de barrières en faciliterende factoren die zorgverleners ervaren tijdens het maken van levenseindebeslissingen bij pasgeborenen en zuigelingen op een dienst neonatale intensieve zorgen. Hiermee wilden we inzicht verschaffen in de complexiteit van het levenseindebeslissingsproces binnen de dagelijkse praktijk door inzicht te geven in de individuele en persoonlijke ervaringen van zorgverleners.

Sommige van deze barrières en faciliterende factoren zijn gelinkt aan de specifieke kenmerken van de case in kwestie. Deze factoren hebben betrekking op het zieke kind, de ouders of de betrokken zorgverleners. Het beslissingsproces werd gemakkelijker geacht wanneer een slechte prognose vrij snel duidelijk was in het ziektetraject dan wanneer prognostische onzekerheid aanhield, of wanneer alle curatieve mogelijkheden eerst verkend werden om iedereen ervan te verzekeren dat de levenseindebeslissing de enige mogelijke optie was om het lijden van het kind te verzachten. Zorgverleners gaven aan dat een levenseindebeslissingsproces gemakkelijker verliep wanneer de ouders dezelfde culturele- en taalachtergrond hadden als de betrokken artsen en verpleegkundigen. Ervaring in het maken van levenseindebeslissingen werd ook beschouwd als een cruciale factor, dit omdat ervaren zorgverleners beter kunnen anticiperen op de toekomstige medische toestand van het kind.

Op procesniveau beschouwen we factoren die verband houden met kenmerken van het specifieke besluitvormingsproces zelf. Intensieve communicatie tussen zorgverleners en ouders is cruciaal om het besluitvormingsproces makkelijker te laten verlopen. Ook

communicatie tussen alle betrokken zorgverleners zelf is van groot belang, bijvoorbeeld door regelmatig multidisciplinair overleg of debriefings. Bovendien kan het nemen van levenseindebeslissingen gemakkelijker worden gemaakt door het routinematig opstellen van voorafgaande zorgplanning gesprekken tussen alle betrokkenen. Tijdens deze gesprekken kan geanticipeerd worden op alle mogelijke medische uitkomsten van het kind, waardoor beslissingen gemaakt kunnen worden in alle rust in plaats van tijdens periodes van acute achteruitgang.

Een laatste niveau omvat factoren met betrekking tot de overkoepelende structuur van de afdeling, het ziekenhuis en de bredere samenleving die mogelijk een invloed kunnen hebben op besluitvorming aan het levenseinde van pasgeborenen en zuigelingen. Emotionele en praktische steun van collega's op de afdeling, of het gebrek hiervan, is cruciaal voor zorgverleners tijdens het maken van levenseindebeslissingen. Bovendien werd het gebrek aan een afzonderlijke ruimte voor slecht-nieuws gesprekken op de dienst en het tekort aan ervaren personeel getraind in levenseinde- en palliatieve zorg geïdentificeerd als een belangrijke barrière in het levenseindebeslissingsproces. Als laatste werd ook de huidige Belgische wetgeving genoemd als een beïnvloedende factor. Neonatologen en verpleegkundigen gaven aan dat het ontbreken van een wettelijk kader om in uitzonderlijke gevallen actief in te grijpen en het lijden van het kind te beëindigen door middel van medicatie met een expliciet levensverkortende intentie een belangrijke barrière vormt in het beslissingsproces. Vooral omdat deze beslissingen tijdens de zwangerschap wel kunnen worden gemaakt onder de wet rond zwangerschapsafbrekingen.

Onze kwalitatieve interviewstudie bracht verschillende barrières en faciliterende factoren aan het licht rond het levenseindebeslissingsproces bij pasgeborenen en zuigelingen. De geïdentificeerde factoren kunnen leiden tot een aantal specifieke aanbevelingen om het beslissingsproces in de dagelijkse praktijk te verbeteren, zoals het opzetten van regelmatige multidisciplinaire overlegmomenten en debriefings met alle betrokken zorgverleners om prognostische onzekerheid te reduceren, het routinematig implementeren van voorafgaande zorgplanning gesprekken met ouders en zorgverleners bij extreem zieke kinderen zodat belangrijke beslissingen vooraf gemaakt kunnen worden, het creëren van privacy voor slecht-nieuws gesprekken, en een mogelijke herziening van het complexe juridische kader rond perinatale levenseindebeslissingen.

Psychologische ondersteuning voor zorgverleners bij het maken van levenseindebeslissingen bij pasgeborenen en zuigelingen

Hoofdstuk 6 van dit proefschrift richtte zich op de stress die zorgverleners ervaren tijdens het maken van levenseindebeslissingen op een dienst neonatale intensieve zorgen, en de ervaren psychosociale ondersteuning van zowel collega's als professionele instanties. Dit werd onderzocht door middel van een post survey op populatieniveau.

De meerderheid van de ondervraagde neonatologen en neonatale verpleegkundigen gaf aan dat het nemen van levenseindebeslissingen (artsen), of het geconfronteerd worden met levenseindebeslissingen (verpleegkundigen) meer stress veroorzaakt dan normaal (respectievelijk 73% en 70%). Tijdens het besluitvormingsproces voor deze beslissingen gaf

een meerderheid van de artsen aan dat ze zich ondersteund voelden door hun collega artsen (86%). Minder dan de helft van de verpleegkundigen daarentegen gaf aan dat artsen naar hun mening luisterden toen levenseindebeslissingen genomen werden (45%). Hoewel de meeste neonatologen (88%) het eens waren dat hun neonatale intensieve zorg afdeling voldoende opportuniteiten aanbood om eventuele bedenkingen of bezwaren te uiten omtrent gemaakte beslissingen, werd dit bij verpleegkundigen slechts bevestigd door 32% van de deelnemers. Bijna alle deelnemende artsen en verpleegkundigen waren het eens dat ze bij hun rechtstreekse collega's terecht konden voor een gesprek wanneer hen iets dwars zat omtrent genomen levenseindebeslissingen (respectievelijk 94% en 92%). Bovendien gaf de helft van de neonatologen (53%) en 65% van de verpleegkundigen aan dat ze ervoor konden kiezen om niet langer betrokken te worden bij een kindje waarbij ze het niet eens waren met de genomen beslissingen. Ondanks het feit dat beide zorgverleners aangaven dat ze bij collega's terecht konden voor een gesprek, gaf 57% van de neonatologen en 60% van de verpleegkundigen aan dat ze wilden dat hun afdeling meer psychologische steun aanbood wanneer zorgverleners geconfronteerd werden met het maken van levenseindebeslissingen. Bovendien was slechts 41% van de neonatologen en 50% van de verpleegkundigen het ermee eens dat de afdeling voldoende psychologische ondersteuning bood na het overlijden van patiënten.

Deze bevindingen wijzen erop dat een dienst neonatale intensieve zorgen meer ad hoc professionele psychologische ondersteuning moet bieden aan zorgverleners die geconfronteerd worden met het overlijden van patiëntjes of het maken van levenseindebeslissingen. Daarnaast raden we standaard debriefings aan om zorgverleners extra te ondersteunen bij het maken van deze beslissingen. Verder zijn we van mening dat verpleegkundigen meer betrokken moeten worden bij interdisciplinaire overlegmomenten tijdens het levenseindebeslissingsproces. Dit zou niet enkel de kwaliteit van deze beslissingen kunnen verbeteren, maar zou mogelijk ook een invloed kunnen hebben op de ervaren stress van verpleegkundigen veroorzaakt door het feit dat ze nog te vaak niet betrokken worden bij het maken van beslissingen voor hun patiëntjes.

Bespreking van de belangrijkste bevindingen

Een internationale vergelijking van neonatale levenseindebeslissingen

Neonatale sterfte varieert sterk tussen verschillende landen. Naast deze variatie in neonatale sterftecijfers bestaan er internationale verschillen in ethisch perspectief wat de aanvaardbaarheid en de prevalentie van verschillende levenseindebeslissingen betreft. Het is daarom noodzakelijk om de verzamelde informatie binnen dit proefschrift te vergelijken met internationaal beschikbare gegevens om zo landsfactoren te identificeren die mogelijk een invloed hebben op het maken van levenseindebeslissingen bij pasgeborenen en zuigelingen.

Een internationale vergelijking van het maken van niet-behandelbeslissingen

Over het algemeen worden niet-behandelbeslissingen zoals het staken of niet instellen van een behandeling in Europa goed geaccepteerd, en geeft een meerderheid van de artsen werkzaam op een dienst neonatale intensieve zorgen aan reeds betrokken geweest te zijn bij

ten minste één geval waar intensieve zorgen gelimiteerd werden. Internationaal zien we dat de kans op het limiteren van intensieve zorgen bij pasgeborenen sterk afhankelijk is van de positieve of negatieve houding van de betrokken artsen ten opzichte van dit soort levenseindebeslissingen. De positieve houding van Vlaamse zorgverleners ten aanzien van niet-behandelbeslissingen bij pasgeborenen en de overeenkomstige hoge prevalentie van dit soort beslissingen binnen de gehele populatie sterfgevallen voor de leeftijd van één jaar, zoals gerapporteerd in dit proefschrift, bevestigen deze bevindingen. We zouden daarom kunnen veronderstellen dat onze prevalentieschattingen met betrekking tot het voorkomen van niet-behandelbeslissingen mogelijk vergelijkbaar zijn met andere landen waar zorgverleners een dergelijke positieve houding ten opzichte van deze niet-behandelbeslissingen rapporteren zoals het Verenigd Koninkrijk en Nederland. Artsen werkzaam op een dienst neonatale intensieve zorgen in Europese landen zoals de Baltische staten, Italië, Spanje en Duitsland hebben daarentegen een sterkere pro-life attitude. Hoewel Vlaanderen, het Verenigd Koninkrijk en Nederland beschouwd kunnen worden als landen met een tolerante houding ten opzichte van niet-behandelbeslissingen met een potentieel levensverkortend effect, kunnen andere Europese landen dus mogelijk restrictiever zijn.

De prevalentie van niet-behandelbeslissingen in Vlaanderen in 2016-2017 bedroeg 37% van alle sterfgevallen onder de leeftijd van één jaar (hoofdstuk 3). Deze schattingen zijn iets hoger dan cijfers uit Nederland, waar de prevalentie in 2010 op 31% werd geschat. Uit rapporten van neonatale intensieve zorg afdelingen in de Verenigde Staten, het Verenigd Koninkrijk, Australië en Europa bleek dat 40% tot 93% van de neonatale sterftes op deze diensten voorafgegaan werd door het staken of niet instellen van een mogelijks levensreddende behandeling. Het verschil tussen de prevalentieschattingen van onze populatie studie (37%) en de prevalentieschattingen van het aantal sterfgevallen binnen gespecialiseerde diensten neonatale intensieve zorgen voorafgegaan door een niet-behandelbeslissing (40-93%) kan verschillende oorzaken hebben. Eerst en vooral bestaan er methodologische verschillen in de beoordeling van de prevalentie van levenseindebeslissingen, maar verder bestaat er ook een groot verschil tussen het voorkomen van deze beslissingen binnen een gespecialiseerde unit en het voorkomen van niet-behandelbeslissingen binnen de totale populatie van sterfgevallen onder de leeftijd van één jaar over verschillende settings. Omdat studies op populatieniveau schaars zijn, waren valide internationale vergelijkingen tussen onze prevalentieschattingen en internationaal beschikbare cijfers, met uitzondering van deze uit Nederland, onmogelijk. In de toekomst zijn deze internationale vergelijkingen op populatieniveau broodnodig om de specifieke invloed van verschillende landsfactoren op de klinische praktijk te onderzoeken. Het onderzoeksdesign beschreven in hoofdstuk 2 van dit proefschrift is ideaal om dit doel te bereiken.

Een internationale vergelijking van het toedienen van medicatie met een impliciete of expliciete levensverkortende intentie

De resultaten beschreven binnen dit proefschrift geven aan dat Vlaanderen een vrij tolerant klimaat heeft voor meer actieve vormen van levenseindebeslissingen zoals het toedienen van medicatie met een potentiële of expliciete levensverkortende intentie, zelfs wanneer deze beslissingen momenteel buiten het huidige Belgische wettelijke kader vallen.

We zien dat de levensverkortende intentie om medicatie toe te dienen, hetzij impliciet of expliciet, een cruciaal verschil maakt in de vraag of de Vlaamse accepterende houding van zorgverleners internationaal kan worden bevestigd. In Zwitserland gaf 95% van de artsen en verpleegkundigen werkend op een dienst neonatale intensieve zorgen aan het toedienen van sedatieva of analgetica acceptabel te vinden, zelfs als dit kon leiden tot ademhalingsnood en vroegtijdig overlijden. Wanneer het toedienen van deze medicatie daarentegen een expliciete levensverkortende intentie had daalde de aanvaardbaarheidsgraad naar 24% van de ondervraagde zorgverleners. In Canada toonde een onderzoek bij pediaters aan dat ze zich collectief weerhoudend opstelden ten opzichte van niet-vrijwillige euthanasie bij niet-competente kinderen, wat suggereert dat Canadese kinderartsen en neonatologen mogelijks een stuk minder tolerant zijn ten opzichte van deze levenseindebeslissingen dan hun Vlaamse collega's. In Frankrijk verklaarde een multidisciplinaire werkgroep rond ethische kwesties in perinatale geneeskunde dat handelingen om opzettelijk de dood van een patiënt te bespoedigen zowel wettelijk als moreel verboden zijn, wat duidelijk een restrictieve houding aangeeft van Franse zorgverleners. Vlaamse zorgverleners werkend in neonatale intensieve zorgen hebben dus mogelijk een veel tolerantere houding ten opzichte van het toedienen van medicatie met een potentieel of expliciet levensverkortend effect bij pasgeborenen en zuigelingen dan hun internationale collega's.

Naast een vergelijking van de internationale verschillen in attitudes van zorgverleners omtrent het toedienen van medicatie met een potentieel of expliciete levensverkortende intentie, is een internationale vergelijking van effectieve prevalentieschattingen nodig. Uit een multinationale studie (EURONIC) in acht Europese landen (België niet inbegrepen) bleek dat 32-89% van de artsen werkend op een dienst neonatale intensieve zorgen aangaf dat ze ooit pijn- en symptoommedicatie hadden toegediend, ondanks het risico op ademhalingsnood en vroegtijdig overlijden. Deze cijfers varieerden sterk tussen landen: in Frankrijk, Nederland en Zweden gaf 86-89% van de artsen aan ervaring te hebben met het toedienen van sedatieva of analgetica, zelfs wanneer een risico op ademhalingsnood of vroegtijdige dood van het kind mogelijk was; terwijl de prevalentie van artsen met eerdere ervaring in deze levenseindebeslissingen in Italië slechts 32% bedroeg. Bovendien bleek uit onderzoek dat het toedienen van medicatie met een expliciet doel om het levenseinde te bespoedigen zeer zelden voorkwam in de meeste onderzochte Europese landen. Slechts 2-4% van de artsen in Italië, Spanje, Zweden, Duitsland en het Verenigd Koninkrijk gaf aan dat ze ooit eerder zulke beslissingen hadden gemaakt. In een recent vervolgonderzoek van EURONIC in 2016 in Duitsland, Zwitserland en Oostenrijk meldde 97% van de artsen door middel van een online enquête dat ze ten minste éénmalig medicatie hadden toegediend met het risico op een vroegtijdig overlijden. Wanneer de toediening van deze medicatie een expliciet levensverkortende intentie had, daalde het percentage van artsen met ervaring in deze beslissingen tot 4%. Binnen deze EURONIC-studies werd artsen gevraagd of ze ooit eerder een bepaalde levenseindebeslissing hadden gemaakt in de volledige loop van hun carrière. Dit geeft ons geen indicatie over hoe prevalent deze beslissingen effectief zijn binnen de dagelijkse praktijk. Het is dan ook moeilijk om een duidelijke vergelijking te maken tussen de gegevens van de EURONIC-studies en onze prevalentieschattingen omtrent het toedienen van medicatie met een potentieel of expliciete levensverkortende intentie binnen de totale populatie van overleden kinderen onder de leeftijd van één jaar binnen een bepaalde periode.

De enige beschikbare prevalentieschattingen omtrent het toedienen van medicatie met een potentieel of expliciete levensverkortende intentie bij pasgeborenen en zuigelingen zijn afkomstig uit Nederland. Wanneer we deze prevalentieschattingen vergelijken met Vlaamse cijfers, zien we dat de medische praktijk misschien toch niet zo vergelijkbaar is als eerder werd vermoed. Waar onze cijfers aangeven dat 14% van alle sterfgevallen onder de leeftijd van één jaar in 2016-2017 werd voorafgegaan aan het toedienen van medicatie met een mogelijks levensverkortend effect, rapporteerde Nederland een prevalentie van slechts 4% in 2010. Wanneer we kijken naar de prevalentie van het toedienen van medicatie met een expliciete levensverkortende intentie is het verschil tussen de prevalentieschatting van 10% in Vlaanderen in 2016-2017 met een prevalentie van 1% in Nederland in 2010 nog opvallender. Wat het laatste verschil zo opvallend maakt is het feit dan Nederland een wettelijk kader voorziet dat het maken van dit soort beslissingen in extreme gevallen mogelijk maakt, terwijl deze beslissingen in Vlaanderen momenteel niet wettelijk zijn toegestaan. De beschikbaarheid van een ondersteunend wettelijk kader leidt dus niet noodzakelijk tot een toename in prevalentie van het toedienen van medicatie met een expliciete levensverkortende intentie. Het ontbreken van internationale populatieschattingen maakt het echter onmogelijk om robuuste en geldige conclusies te trekken over de impact van verschillende keuzes omtrent het wettelijk omkaderen van deze beslissingen op de klinische praktijk.

Een reflectie over incidentie, attitudes en ervaringen van zorgverleners in relatie met het huidig wettelijk kader

Het tolerante klimaat voor het maken van levenseindebeslissingen bij Vlaamse neonatale zorgverleners moet worden gekaderd binnen de bredere Belgische juridische en medische cultuur. België heeft zowel een vrij liberale wetgeving rond laattijdige zwangerschapsafbrekingen als een euthanasiewetgeving bij volwassenen en competente minderjarigen (zie hoofdstuk 1). Daarom zouden we kunnen argumenteren dat de Belgische juridische en medische cultuur in zijn geheel beschouwd kan worden als toleranter ten opzichte van levenseindebeslissingen ongeacht de leeftijd dan internationaal het geval is.

Omdat pasgeborenen zelf niet in staat zijn om euthanasie aan te vragen en dus te ontvangen, kunnen we ze definiëren als een kwetsbare groep die momenteel buiten de bestaande euthanasiewetgeving valt, maar waar een mogelijke invloed van de implementatie van deze wetgeving mogelijk is. Om een invloed van de wetgeving aan te tonen, zou de implementatie van de euthanasiewetgeving voor volwassenen en competente minderjarigen leiden tot 1) een toename in de prevalentie van het opzettelijk beëindigen van het leven van pasgeborenen met ernstige aandoeningen, en 2) moet deze toename toegeschreven worden aan het feit dat artsen sneller geneigd zijn om dit soort beslissingen te maken omwille van het bestaan van deze wetgeving ondanks dat deze niet op hun patiënten van toepassing is. De prevalentieschattingen gegeven binnen dit proefschrift kunnen enkel inzicht geven in punt 1 van deze voorwaarden: namelijk dat de prevalentie van het toedienen van medicatie met een expliciete levensverkortende intentie relatief constant blijft op 7% van de gehele populatie van overlijdens onder de leeftijd van één jaar voorafgegaan door dergelijke beslissing twee jaar voor de implementatie, en 10% van de populatie overlijdens 15 jaar na de implementatie van de euthanasiewetgeving (drie jaar na de toevoeging van competente minderjarigen). Een oorzakelijk verband tussen de implementatie van de euthanasiewetgeving en het feit dat een aanzienlijk

aantal overlijdens onder de leeftijd van één jaar voorafgegaan wordt door het toedienen van medicatie met een expliciete levensverkortende intentie in de praktijk, zoals vermeld in punt 2, kan als dusdanig niet bewezen worden met gegevens binnen dit proefschrift.

Zorgverleners gaven desondanks wel de invloed van een andere wetgeving aan binnen het kader van onze interviewstudie, namelijk de bestaande wetgeving rond zwangerschapsafbrekingen. Zo vermelden ze het contrast tussen de onmogelijkheid om wettelijk het leven van een pasgeborene te verkorten door middel van medicatie met een expliciete levensverkortende intentie terwijl een zwangerschap kan worden beëindigd voor exact dezelfde diagnose bij een ongeboren foetus als een belangrijke barrière. Het bestaan van een liberale wetgeving rond laattijdige zwangerschapsafbreking voor ernstige en lethale foetale afwijkingen kan dus mogelijk een invloed hebben op besluitvorming aan het levenseinde van pasgeborenen en zuigelingen. Omdat de Belgische wetgeving omtrent zwangerschapsafbreking in 1990 geïmplementeerd werd, kunnen de prevalentieschattingen rond neonatale levenseindebeslissingen tussen 1999-2000 en 2016-2017 binnen dit proefschrift geen informatie verschaffen over de mogelijke invloed van deze wetgeving. Bovendien kan gedebatteerd worden over de vraag of een tolerante houding van betrokken zorgverleners in perinatale zorg de implementatie van dergelijke wetgeving voorafgaat, eerder dan dat het volgt op de implementatie van deze wetgeving.

Wanneer we de prevalentieschattingen voor het toedienen van medicatie met een expliciete levensverkortende intentie in Vlaanderen – een regio waar deze praktijk momenteel niet wordt gereguleerd door middel van een protocol of wetgeving – vergelijken met deze in Nederland – waar richtlijnen en voorschriften voor deze praktijk verstrekt werden binnen het Groningen protocol -, zien we dat deze praktijk vaker voorkomt ondanks het gebrek aan regelgeving. Onze prevalentieschattingen omtrent een praktijk die momenteel niet wettelijk wordt getolereerd, in combinatie met de tolerante houding van Vlaamse zorgverleners ten opzichte van het toedienen van medicatie met een expliciet levensverkortend effect, roept de vraag op of richtlijnen, protocollen of wetgevingen nodig zijn om deze beslissingen in de dagelijkse praktijk binnen zo een kwetsbare groep op te volgen. Desondanks leidt het bestaan van zo een tolerante houding van betrokken zorgverleners en het bestaan van empirisch bewijs van het effectief voorkomen van deze praktijk binnen de Vlaamse zorgverlening niet automatisch tot brede steun binnen perinatale geneeskunde voor het ontwikkelen van dergelijke wetswijzigingen. Hoewel onze interviewstudie aantoonde dat neonatologen en verpleegkundigen het ontbreken van een wettelijk kader om medicatietoediening met expliciete levensverkortende intentie mogelijk te maken in specifieke gevallen als een belangrijke barrière zien, gaven ze ook aan erg op hun hoede te zijn voor de mogelijke gevolgen van pogingen om zulke individuele beslissingen te standaardiseren en reguleren binnen een restrictieve wetgeving. Het ontwikkelen van een protocol of wetgeving om deze beslissingen wettelijk te reguleren en toe te staan kan dus mogelijk helpen bij besluitvorming in de klinische praktijk. Toch willen we hierin voorzichtig zijn. Deze uiterst gevoelige ethische kwestie behoeft zeker verder interdisciplinair debat, waarbij betrokken zorgverleners, ethici en beleidmakers betrokken moeten worden.

Psychosociale ondersteuning voor zorgverleners tijdens het nemen van neonatale levenseindebeslissingen

Een belangrijke bevinding van dit proefschrift is de vaststelling van het ontbreken van psychologische en psychosociale ondersteuning voor zorgverleners werkzaam op een dienst neonatale intensieve zorgen bij het maken van levenseindebeslissingen (zie hoofdstuk 5 en 6). Zowel deel uitmaken van een levenseindebeslissingsproces als betrokkenheid bij het overlijden van een pasgeborene veroorzaakt een aanzienlijke hoeveelheid stress bij betrokken artsen en verpleegkundigen. Tijdens de interviews benadrukten neonatologen en neonatale verpleegkundigen voortdurend hoe het omgaan met ernstig zieke kinderen kan doorwegen op hun emotionele welzijn, vooral wanneer de baby er gezond en voldragen uitziet, of wanneer zorgverleners zelf kinderen hebben waardoor de moeilijke situaties die ze ervaren binnen hun job al snel geprojecteerd worden op hun eigen gezinssituatie. Bovendien is het belangrijk om te vermelden dat deel uitmaken van een levenseindebeslissingsproces bij pasgeborenen nooit gemakkelijk is, en dat de diagnostische en prognostische onzekerheid zwaar kan doorwegen op de gemoedstoestand.

Om deze verhoogde hoeveelheid stress het hoofd te bieden wanneer zorgverleners geconfronteerd worden met levenseindebeslissingen wenden artsen en verpleegkundigen zich vaak tot hun collega's ter ondersteuning. Hoewel het positieve effect van collegiale steun op het welzijn van zorgverleners zeker niet vergeten mag worden, is het niet voldoende om de stressoren gelinkt met levenseindebeslissingen en kindersterfte het hoofd te bieden. Psychosociale ondersteuning voor ouders na het verlies van hun kind is veel frequenter beschikbaar dan ondersteuning voor betrokken zorgverleners. De meeste aanbevelingen en richtlijnen omtrent psychosociale ondersteuning bij zorg aan het levenseinde van pasgeborenen richt zich daarom ook op het ondersteunen van artsen en verpleegkundigen bij rouwbegeleiding van ouders. Psychosociale ondersteuning van de zorgverleners zelf wordt in dit geval als secundair of zelfs onbelangrijk geacht. Desondanks kan het ervaren emotionele leed van deze zorgverleners leiden tot burn-out, depressie en een verminderd vermogen om empathie te tonen naar patiënten en ouders toe. Het voorzien van zorg voor zorgverleners kan dus niet alleen hun persoonlijk welzijn bevorderen, het kan ook de zorg die ze verstrekken aan patiënten en ouders verbeteren. Het gebrek aan professionele ondersteuning voor artsen en verpleegkundigen werkend op een dienst neonatale intensieve zorgen, zoals aangegeven binnen dit proefschrift, moet dus duidelijk geadresseerd en opgevolgd worden.

De rol van palliatieve zorg bij het maken van neonatale levenseindebeslissingen

Het heroriënteren van zorg van curatief naar palliatief, of het gelijktijdig aanbieden van beide, is onderdeel van de dagelijkse klinische praktijk bij het behandelen van extreem zieke pasgeborenen en zuigelingen. In de prenatale en neonatale praktijk is palliatieve zorg tot nu toe een relatief nieuw en onontgonnen veld. De rol van het maken van levenseindebeslissingen, en de mogelijke implicaties van de cijfers die besproken worden in dit proefschrift, binnen een dergelijke perinatale of neonatale palliatieve zorgbenadering is momenteel nog erg onduidelijk.

Wanneer ouders geconfronteerd worden met een ernstige of lethale diagnose voor hun kind is het uiterst belangrijk dat zorgverleners hen een empathisch, begrijpelijk en evenwichtig overzicht geven van alle behandelingsopties, inclusief actieve en op genezing gerichte interventies, beslissingen rond het levenseinde en palliatieve zorg. Het staken of niet instellen van een mogelijk levensreddende behandeling is een internationaal ondersteunde praktijk bij deze extreem zieke kinderen, en de data binnen dit proefschrift onderschrijven hun centrale rol binnen de levenseindezorg bij pasgeborenen en zuigelingen (zie hoofdstuk 3). Daarom kunnen we verwachten dat zorgverleners bij dergelijke slecht-nieuws gesprekken met ouders ook de mogelijkheid tot het beperken van de zorg door middel van een niet-behandelbeslissing zullen aanhalen. Verder kunnen we ook veronderstellen dat niet-behandelbeslissingen een cruciale stap zijn in het overschakelen van curatieve en levensreddende behandelingen naar palliatieve en levenseindezorg. Een ideaal voorbeeld is het extuberen van het kind om comfort te verhogen, ook al is de kunstmatige beademing cruciaal voor overleving. Naast componenten zoals voorafgaande zorgplanning en psychosociale ondersteuning van ouders bestaat een neonatale of perinatale palliatieve zorgbenadering bij deze kinderen uit het aanbieden van adequate pijn- en symptoombestrijding. Het staken of niet instellen van behandelingen wordt daarom vaak gevolgd door het toedienen van pijnstillers en sedativa om het lijden van het kind te verzachten. De hoge dosissen pijn- en symptoombestrijding die nodig zijn om adequate palliatieve zorg te bieden kunnen, en worden (zie hoofdstuk 3), vaak toegediend zelfs wanneer dit een potentieel of expliciet levensverkortend effect teweegbrengt.

Wanneer het levenseindebeslissingsproces ingebed wordt binnen een perinatale of neonatale palliatieve zorgbenadering kan er tijdens een emotioneel turbulente periode voldoende aandacht gegeven worden aan de complexe behoeften van het gezin. Dit omdat zulke palliatieve zorgbenaderingen een gezinsgerichte zorg aanbieden met een grote focus op de (spirituele en culturele) waarden van de ouders, het maken van blijvende herinneringen met hun kind, en empathische en duidelijke communicatie tussen ouders en zorgverleners. Dit soort ondersteuning is cruciaal bij beslissingen aan het einde van het leven van pasgeborenen en zuigelingen. Verder biedt een palliatieve zorgbenadering ook voldoende ondersteuning voor de betrokken zorgverleners. Bestaande perinatale palliatieve zorg protocollen geven namelijk meer aandacht aan psychosociale ondersteuning van het personeel, om zo de kwaliteit van zorg te verbeteren en stress, burn-out en compassionele vermoeidheid tegen te gaan. Een neonatale of perinatale palliatieve zorgbenadering omvat dus niet alleen voldoende pijn- en symptoombestrijding gericht op comfort voor het kind, maar het legt ook een sterke nadruk op empathische communicatie en psychosociale ondersteuning voor ouders, familieleden en betrokken zorgverleners.

Implicaties en aanbevelingen

Implicaties en aanbevelingen voor de praktijk

- Er moet voldoende aandacht worden besteed aan het creëren van een privéruimte waar slecht-nieuws gesprekken in alle rust kunnen plaatsvinden. Dit zowel op diensten neonatale intensieve zorgen als op alle andere ziekenhuisafdelingen waar dergelijke gesprekken regelmatig plaatsvinden.

- Het routinematig implementeren van voorafgaande zorgplanningsgesprekken met ouders in geval van een slechte prognose van het kind kan een faciliterende factor zijn bij moeilijke levenseindebeslissingen.
- Prognostische onzekerheid kan worden verminderd door het installeren van regelmatige multidisciplinaire overlegmomenten en debriefings, en het stelselmatig betrekken van (externe) experts om een second opinion te bekomen.
- Moeilijke gesprekken met ouders omwille van een cultuur- of taalbarrière kunnen worden verholpen of verminderd door het raadplegen van gespecialiseerde neonatale of perinatale palliatieve zorgteams. Deze teams worden verondersteld om voldoende ervaring en training genoten te hebben omtrent het hebben van slecht-nieuwsgesprekken en empathische communicatie tussen ouders en zorgverleners. Daarom zijn ze in staat om te bemiddelen tijdens extreem moeilijke levenseindebeslissingsprocessen tussen ouders en zorgverleners.
- Neonatologen, neonatale verpleegkundigen en andere betrokken zorgverleners werkend op een dienst neonatale intensieve zorgen zouden moeten worden verondersteld om generalistische palliatieve zorgvaardigheden te ontwikkelen. In België is er momenteel geen formele training beschikbaar rond het aanbieden van adequate neonatale palliatieve zorg met het doel om zorgverleners deze vaardigheden aan te leren. Het opnemen van een module over neonatale sterfte en besluitvorming rond het levenseinde in standaardcurricula voor neonatologen en neonatale verpleegkundigen verhoogt de individuele klinische ervaring van zorgverleners. Verder verwerven ze tijdens deze modules cruciale communicatievaardigheden. Deze opleidingen zouden het vertrouwen van zorgverleners in hun eigen vaardigheden omtrent het bieden van adequate palliatieve en levenseindezorg kunnen verhogen, en hun negatieve kijk op levenseindezorg kunnen verminderen.
- We stellen voor om regelmatig formele debriefings te houden met het betrokken zorgteam na het overlijden van een kind op de afdeling. Hierdoor creëer je mogelijkheden om te bespreken wat fout ging, wat vlot verlopen is en wat zou helpen bij toekomstige levenseindebeslissingen.
- We raden diensten neonatale intensieve zorgen aan om standaard psychosociale ondersteuning te voorzien tijdens de werkuren voor zorgverleners die betrokken waren bij een levenseinde- of palliatieve zorg proces.

Implicaties en aanbevelingen voor het beleid

- Zonder betrouwbare prevalentieschattingen op populatieniveau zijn ethische en juridische discussies en zelfs wettelijke besluitvorming gebaseerd op ervaringen en standpunten van een select aantal geraadpleegde experts. Populatiegegevens vormen een feitelijke, empirische basis voor deze discussies, aangezien ze kunnen aangeven of en hoe vaak verschillende levenseindebeslissingen voorkomen binnen een bepaalde groep patiënten. Onze samenleving ondergaat continue veranderingen en evoluties, en de medische behandelopties voor extreem zieke kinderen neemt steeds toe. Daarom is systematische monitoring van levenseindebeslissingen op populatieniveau van het grootste belang. Beleidsmakers moeten deze systematische periodieke monitoring ondersteunen. Zo kunnen beslissingen en wijzigingen op wettelijk of beleidsvlak steeds

gebaseerd worden op de meest recente cijfers en mogelijke wijzigingen van de dagelijkse praktijk.

- Aangezien er momenteel een gebrek is aan nationale en internationale richtlijnen over de aanvaardbaarheid en adequate uitvoering van levenseindebeslissingen bij pasgeborenen en zuigelingen, is er nog steeds veel onzekerheid over hun toelaatbaarheid en vereisten voor een goede klinische praktijk. Onze prevalentieschattingen kunnen experts een startpunt bieden om de ontwikkeling van deze richtlijnen of mogelijke wettelijke kaders verder te bespreken. Bovendien kunnen de prevalentieschattingen en de besproken barrières en faciliterende factoren tijdens het besluitvormingsproces, zoals aangegeven binnen dit proefschrift, een ideaal uitgangspunt zijn voor het formuleren van aanbevelingen en richtlijnen over wat in moeilijke gevallen als beste praktijk kan worden beschouwd.

Implicaties en aanbevelingen voor verder onderzoek

- Input van ouders ontbrak binnen het narratief van dit proefschrift. Toch zijn de ervaringen en opvattingen van ouders cruciaal om een volledig beeld te geven van het besluitvormingsproces bij levenseindebeslissingen onder de leeftijd van één jaar. Toekomstig onderzoek zou zich daarom moeten focussen op het onderzoeken van hun ervaringen en belevingen.
- Neonatale levenseindebeslissingen zijn onherroepelijk verbonden met mogelijke beslissingen tijdens de prenatale periode. Dit omdat een groot deel van de aangeboren aandoeningen of afwijkingen prenataal kunnen worden vastgesteld. Toekomstig onderzoek moet zowel prenatale als neonatale levenseindebeslissingen blijven omvatten binnen eenzelfde onderzoekssetting, eventueel gebruikmakend van het conceptueel kader beschreven in hoofdstuk 2. Bovendien moet, zoals in hoofdstuk 4 werd getoond, bij het onderzoeken van attitudes, meningen en ervaringen van betrokken zorgverleners zowel de mening van prenatale als neonatale experten overwogen worden.
- Toekomstige studies moeten gericht zijn op het verzamelen van internationale populatiedata omtrent de prevalentie van prenatale en neonatale levenseindebeslissingen. Internationaal vergelijkend onderzoek kan landspecifieke of zelfs regiospecifieke factoren identificeren die de prevalentie van deze levenseindebeslissingen en de bijhorende klinische praktijk kunnen beïnvloeden. Bovendien zou internationale data inzicht kunnen bieden in verschillende medische culturen met betrekking tot neonatale zorg aan het levenseinde.
- Levenseindebeslissingen bij pasgeborenen en zuigelingen zijn duidelijk sterk ingebed in neonatale en zelfs perinatale palliatieve zorg. Hoewel cruciale elementen van een palliatieve zorgbenadering reeds worden geïmplementeerd in de reguliere perinatale praktijk, is het bestaan van gespecialiseerde perinatale palliatieve zorgteams internationaal zeldzaam. Aangezien dit een relatief nieuw en opkomend onderzoeksveld is dat instaat voor de cruciale ondersteuning voor extreem zieke baby's voor en na de geboorte, evenals voor hun families en betrokken zorgverleners, zou toekomstig onderzoek zich moeten richten op het evalueren van het beste zorgmodel binnen deze setting.

Curriculum Vitae and list of publications of Laure Dombrecht

Curriculum vitae

Laure Dombrecht, born May 11th 1992 (Tielt, Belgium), graduated with honours from Ghent University in 2015 as a master of science in experimental psychology. In October 2015 she joined the End-of-Life Care Research group of Ghent University and Vrije Universiteit Brussel (VUB) as a doctoral researcher. Her doctoral research project focussed on end-of-life decisions in stillbirths, neonates and infants in Flanders. She was supervised by Prof. dr. Luc Deliens, Prof. dr. Joachim Cohen, Prof. dr. Kenneth Chambaere, and dr. Kim Beernaert. Recently, in collaboration with Prof. dr. Kenneth Chambaere, dr. Kim Beernaert, Prof. dr. Filip Cools and Prof. dr. Kristien Roelens, she obtained a four-year grant from Research Foundation Flanders (FWO) to develop and pilot test the first Belgian perinatal palliative care program within standard perinatal healthcare (a phase 0-2 study).

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Appendix

Appendix 1

Vragenlijst Medische beslissingen aan het levenseinde, nul tot éénjarigen (in Dutch)

VUB - UGent onderzoeksgroep zorg rond het levenseinde

Medische beslissingen aan het levenseinde, nul tot éénjarigen	2016 - 2017	

Algemeen

1. Dit sterfgeval vond plaats…

- ☐ in een afdeling voor neonatale intensieve zorgen, type NIC
- ☐ in een afdeling voor niet-intensieve neonatale zorgen, type N*
- ☐ in de verloskamer
- ☐ in een andere ziekenhuisdienst
- ☐ thuis
- ☐ elders, namelijk:

2. Van wanneer dateerde uw eerste contact met de patiënt?

- ☐ vóór of tijdens het overlijden
- ☐ na het overlijden ➔ **door naar vraag 29**

3. Ging het om een plotseling en geheel onverwacht overlijden?

- ☐ ja ➔ **door naar vraag 29**
- ☐ neen

4. Werd bij deze patiënt een (of meerdere) congenitale aandoening(en) vastgesteld?
(meerdere antwoorden mogelijk)

- ☐ ja, vastgesteld voor de geboorte
- ☐ ja, vastgesteld bij de geboorte
- ☐ ja, vastgesteld na de geboorte, maar voor het overlijden
- ☐ ja, vastgesteld na het overlijden
- ☐ neen ➔ **door naar vraag 5**

Hoe kan de ernst van de afwijking(en) beschreven worden?

- ☐ zeer ernstig
  (Niet compatibel met het leven of met zekerheid resulterend in een zeer ernstige uitkomst zonder mogelijkheid tot behandeling)
- ☐ ernstig
  (Behandeling was mogelijk maar zelfs indien succesvol, zou het kind met zekerheid lijden aan een ernstige neurologische of lichamelijke beperking)
- ☐ matig
  (Behandeling was mogelijk met een realistische kans op een goede uitkomst, maar nog steeds met een belangrijk risico op mortaliteit of lange termijn morbiditeit)
- ☐ mild
  (Behandeling was mogelijk met redelijk goede kans op een goede uitkomst)

Medische handelwijzen

5. Werd bij deze patiënt ooit gestart met intensieve (maximale) zorg?

- ☐ ja
- ☐ neen, voor de geboorte werd reeds beslist niet te starten
- ☐ neen, na de geboorte werd beslist niet te starten

6. Heeft u of een collega één of meer van de volgende handelwijzen uitgevoerd (of doen uitvoeren), rekening houdend met de mogelijkheid dat deze handelwijze het levenseinde van deze patiënt zou kunnen bespoedigen?
(zowel 6a, 6b als 6c beantwoorden)

a. *niet instellen* van een (nieuwe) behandeling (bv sondevoeding of beademingsapparaat)?

- ☐ ja
- ☐ neen

b. *staken* van een behandeling?

- ☐ ja
- ☐ neen

c. *intensiveren van pijn- en/of symptoombestrijding* d.m.v. één of meerdere middelen?

- ☐ ja
- ☐ neen ➔ **door naar vraag 7**

Indien ja, welk(e) middel(en) betrof dit?
(meerdere antwoorden mogelijk)

- ☐ barbituraat
- ☐ benzodiazepine
- ☐ morfine of morfine-achtig middel
- ☐ spierverslapper (curare-achtig middel)
- ☐ andere, namelijk:

7. Was het bespoedigen van het levenseinde mede het doel van één of meer van de volgende handelwijzen?
(zowel 7a, 7b als 7c beantwoorden)

a. *niet instellen* van een (nieuwe) behandeling (bv sondevoeding of beademingsapparaat)?
- ☐ ja
- ☐ neen

b. *staken* van een behandeling?
- ☐ ja
- ☐ neen

c. *intensiveren van pijn- en/of symptoombestrijding* d.m.v. één of meerdere middelen?
- ☐ ja
- ☐ neen ➔ **door naar vraag 8**

Indien ja, welk(e) middel(en) betrof dit? (meerdere antwoorden mogelijk)
- ☐ barbituraat
- ☐ benzodiazepine
- ☐ morfine of morfine-achtig middel
- ☐ spierverslapper (curare-achtig middel)
- ☐ andere, namelijk: _____

8. Was het overlijden het gevolg van één of meer van de volgende handelwijzen, waartoe door u of een collega is besloten met het uitdrukkelijke doel het levenseinde van de patiënt te bespoedigen?
(zowel 8a als 8b beantwoorden)

a. *niet instellen* van een (nieuwe) behandeling (bv sondevoeding of beademingsapparaat)?
- ☐ ja
- ☐ neen

b. *staken* van een behandeling?
- ☐ ja
- ☐ neen

9. Was het overlijden het gevolg van het gebruik van een middel (*) dat door u of een collega werd **voorgeschreven, verstrekt of toegediend** met het uitdrukkelijke doel het levenseinde te bespoedigen?
(*) het kan gaan om één of meer middelen
- ☐ ja
- ☐ neen ➔ **ga door naar oranje instructiekader**

a. Indien ja, welk(e) middel(en) betrof dit? (meerdere antwoorden mogelijk)
- ☐ barbituraat
- ☐ benzodiazepine
- ☐ morfine of morfine-achtig middel
- ☐ spierverslapper (curare-achtig middel)
- ☐ kaliumchloride
- ☐ andere, namelijk: _____

b. Indien ja, door wie is het middel toegediend (=in het lichaam gebracht)? (meerdere antwoorden mogelijk)
- ☐ uzelf of een collega-arts
- ☐ verpleegkundige
- ☐ anders, namelijk: _____

Indien 'ja' is geantwoord op één van de onderdelen van de vragen 6 tot en met 9 ➔ door naar vraag 10
Indien op geen enkel onderdeel van de vragen 6 tot en met 9 'ja' is geantwoord ➔ door naar vraag 21

De laatstgenoemde handelswijze
Let op: de vragen 10 tot en met 20 hebben betrekking op de laatstgenoemde handelwijze, dit wil zeggen op het laatst gegeven 'ja' antwoord bij de vragen 6 tot en met 9

10. Met hoeveel tijd is het leven van de patiënt naar uw schatting verkort door de laatstgenoemde handelwijze?
- ☐ meer dan vier weken
- ☐ één tot vier weken
- ☐ één tot zeven dagen
- ☐ minder dan 24 uur
- ☐ heeft waarschijnlijk geen verkorting van de levensduur gegeven

11. Heeft één van de volgende overwegingen bij die laatstgenoemde handelwijze een rol gespeeld? (meerdere antwoorden mogelijk)
- ☐ geen reële overlevingskansen
- ☐ geen kans op een leefbaar leven
- ☐ andere, namelijk: _____

12. Betrof de laatstgenoemde handelwijze het **niet instellen of staken van een behandeling?**
- ☐ ja
- ☐ neen ➔ **door naar vraag 13**

Indien ja, welke behandeling werd niet ingesteld of gestaakt? (meerdere antwoorden mogelijk)
- ☐ toediening van antibiotica
- ☐ toediening van medicatie, uitgezonderd antibiotica
- ☐ toediening van vocht
- ☐ toediening van voeding
- ☐ kunstmatige beademing
- ☐ reanimatie
- ☐ chirurgische ingreep
- ☐ andere, namelijk: _____

13. Is over de (mogelijke) bespoediging van het levenseinde door de laatstgenoemde handelwijze door u of een collega met de *ouder(s) van de patiënt overlegd*?

- ☐ ja
- ☐ neen ➔ **door naar vraag 17**

14. Is de beslissing over de laatstgenoemde handelwijze op grond van een *uitdrukkelijk verzoek* van de ouder(s) van de patiënt genomen?

- ☐ ja
- ☐ neen

15. Was er *overeenstemming* over de beslissing over laatstgenoemde handelwijze tussen u of een collega en de ouder(s)?

- ☐ ja, met beide ouders (incl. enige ouder)
- ☐ ja, enkel met de moeder
- ☐ ja, enkel met de vader
- ☐ neen

16. Achtte u de ouder(s) ten tijde van dit overleg of verzoek *in staat* de situatie van de patiënt te overzien en daarover op adequate wijze een besluit te nemen?

- ☐ ja ➔ **door naar vraag 18**
- ☐ neen, niet volledig in staat ➔ **door naar vraag 18**
- ☐ neen, helemaal niet in staat ➔ **door naar vraag 18**

17. Om welke reden is door u of een collega niet met de ouder(s) van de patiënt overlegd over de mogelijke bespoediging van het levenseinde door die laatstgenoemde handelwijze?
(meerdere antwoorden mogelijk)

- ☐ daar was geen behoefte aan omdat de situatie duidelijk was
- ☐ de ouder(s) waren niet voldoende in staat de situatie adequaat te beoordelen
- ☐ de situatie was zodanig dat er geen tijd was om te overleggen
- ☐ er waren geen ouders aanwezig
- ☐ andere, namelijk: _____

18. Hebben de ouder(s), voor zover u bekend, *ooit op enige wijze een wens tot bespoedigen van het levenseinde* van de patiënt kenbaar gemaakt?

- ☐ ja
- ☐ neen

19. Is door u of een collega *met anderen overlegd* over de (mogelijke) bespoediging van het levenseinde voordat werd besloten tot de laatstgenoemde handelwijze?
(meerdere antwoorden mogelijk)

- ☐ ja, met individuele collega('s)
- ☐ ja, in open team vergadering
- ☐ neen ➔ **door naar vraag 20**

Indien ja, met wie?
(meerdere antwoorden mogelijk)

- ☐ gynaecoloog
- ☐ neonatoloog
- ☐ pediater
- ☐ andere arts
- ☐ verpleegkundige/verzorgende
- ☐ familie of naasten (ander dan de ouders)
- ☐ andere, namelijk: _____

20. Is de beslissing over de laatstgenoemde handelwijze voorgelegd aan een ethische commissie?

- ☐ ja, voor de uitvoering van de laatstgenoemde handelwijze
- ☐ ja, na de uitvoering van de laatstgenoemde handelwijze
- ☐ neen

Zorg en behandeling

21. Werd bij deze patiënt, na de diagnose die gerelateerd was aan het overlijden, ooit een levensverlengende behandeling ingesteld (of voortgezet) (excl. de normale voeding)?

- ☐ ja
- ☐ neen ➔ **door naar vraag 25**

22. Is deze levensverlengende behandeling op *uitdrukkelijk verzoek* van de ouder(s) ingesteld (of voortgezet)?

- ☐ ja
- ☐ neen

23. Hebben bij dit sterfgeval de ouder(s) ooit verzocht een levensverlengende behandeling niet in te stellen of te staken?

- ☐ ja
- ☐ neen

24. Heeft u of een collega de ouder(s) ooit voorgesteld om een levensverlengende behandeling te staken of niet in te stellen?

- ☐ ja
- ☐ neen

25. Heeft u of een collega vooraf duidelijk afgesproken dat bij een eventuele (functionele) hartstilstand en/of ademhalingsstilstand *geen poging tot reanimatie* van deze patiënt zou worden ondernomen?

- ☐ ja
- ☐ neen ➔ **door naar vraag 26**

Zo ja, met wie werd deze afspraak gemaakt?
(meerdere antwoorden mogelijk)

- ☐ andere arts(en)
- ☐ verpleegkundige(n)
- ☐ ouder(s)
- ☐ familie of naasten

26. Is er bij dit overlijden een uitdrukkelijk verzoek om levensbeëindiging geweest dat NIET is uitgevoerd?

- ☐ ja
- ☐ neen ➔ **door naar vraag 27**

a. Door wie is dit verzoek geuit?
(meerdere antwoorden mogelijk)

- ☐ ouder(s)
- ☐ arts(en)
- ☐ verpleegkundige(n)
- ☐ andere familie of naasten
- ☐ andere, namelijk: _____

b. Welke overwegingen hebben een rol gespeeld bij de beslissing om dit verzoek niet uit te voeren? (meerdere antwoorden mogelijk)

- ☐ één ouder was niet akkoord
- ☐ beide ouders waren niet akkoord
- ☐ neonatoloog was niet akkoord
- ☐ arts, anders dan neonatoloog, was niet akkoord
- ☐ ethische commissie gaf geen goedkeuring
- ☐ ziekenhuisbeleid liet het inwilligen van het verzoek niet toe

27. Is er bij dit overlijden een verzoek tot afbreking van de zwangerschap geweest dat NIET is uitgevoerd?

- ☐ ja
- ☐ neen ➔ **door naar vraag 28**

a. Door wie is dit verzoek geuit? (meerdere antwoorden mogelijk)

- ☐ gynaecoloog
- ☐ neonatoloog
- ☐ andere arts
- ☐ verpleegkundige
- ☐ ouder(s)
- ☐ anders, namelijk: _____

b. Welke overwegingen hebben een rol gespeeld bij de beslissing om dit verzoek niet uit te voeren? (meerdere antwoorden mogelijk)

- ☐ één ouder was niet akkoord
- ☐ beide ouders waren niet akkoord
- ☐ gynaecoloog was niet akkoord
- ☐ neonatoloog was niet akkoord
- ☐ andere arts was niet akkoord
- ☐ ethische commissie gaf geen goedkeuring
- ☐ ziekenhuisbeleid liet het inwilligen van het verzoek niet toe
- ☐ anders, namelijk: _____

c. Was er een onderliggende medische reden voor het niet uitvoeren van dit verzoek?

- ☐ de aandoening was niet levensbedreigend
- ☐ er was kans op een leefbaar leven
- ☐ anders, namelijk: _____

28. Werd de patiënt tot aan het overlijden continu in diepe sedatie of coma gehouden d.m.v. één of meer middelen?

- ☐ ja
- ☐ neen ➔ **door naar vraag 29**

a. Welk(e) middel(en) werd(en) daartoe gebruikt? (meerdere antwoorden mogelijk)

- ☐ midazolam
- ☐ andere benzodiazepine
- ☐ morfine of een morfine-achtig middel
- ☐ andere, namelijk: _____

b. Hoe lang voor het overlijden werd gestart met het continu sederen van de patiënt?

- ☐ minder dan 12 uur voor het overlijden
- ☐ 12 tot 24 uur voor het overlijden
- ☐ één tot zeven dagen voor het overlijden
- ☐ één tot twee weken voor het overlijden
- ☐ meer dan twee weken voor het overlijden

c. Kreeg de patiënt daarbij kunstmatig vocht en/of voeding toegediend?

- ☐ ja, tot aan het overlijden
- ☐ ja, maar niet tot aan het overlijden
- ☐ neen

d. Deze wijze van sederen, al dan niet in combinatie met vocht of voeding, werd uitgevoerd…

- ☐ ervan uitgaande dat daarmee het levenseinde niet zou worden bespoedigd
- ☐ rekening houdend met de mogelijke bespoediging van het levenseinde
- ☐ mede met het doel het levenseinde te bespoedigen
- ☐ met het uitdrukkelijke doel het levenseinde te bespoedigen

e. Is de beslissing over het continu sederen genomen op grond van een *uitdrukkelijk verzoek* van de ouder(s) van de patiënt?

- ☐ ja
- ☐ neen

Toelichting

29. Als bepaalde van uw antwoorden volgens u nog verdere verduidelijking behoeven, kunt u dit hier neerschrijven.

_____
_____
_____
_____
_____
_____
_____

HARTELIJK DANK VOOR UW GEWAARDEERDE DEELNAME !

Appendix 2

Vragenlijst Medische beslissingen bij een doodgeboorte (in Dutch)

Vrije Universiteit Brussel & Ghent University
end-of-life care research group

Medische beslissingen bij een doodgeboorte | **2017**

Algemeen

1. Vond deze doodgeboorte plaats in een ziekenhuis met een derdelijnsfunctie voor prenatale diagnostiek?
- ☐ ja
- ☐ neen

2. Was u betrokken bij de opvolging en/of besluitvorming van deze zwangerschap?
- ☐ ja
- ☐ neen ➔ **door naar vraag 28**

3. Ging het om een plotseling en geheel onverwachte doodgeboorte?
- ☐ ja ➔ **door naar vraag 28**
- ☐ neen

4. Werd(en) bij deze foetus één (of meerdere) congenitale aandoening(en) vastgesteld voor de doodgeboorte?
- ☐ ja
- ☐ neen ➔ **door naar vraag 6**

5. Hoe kan de ernst van de afwijking(en) beschreven worden?
- ☐ zeer ernstig
  (niet compatibel met het leven of met zekerheid resulterend in een zeer ernstige uitkomst zonder mogelijkheid tot behandeling)
- ☐ ernstig
  (behandeling was mogelijk geweest maar zelfs indien succesvol, zou het kind met zekerheid lijden aan een ernstige neurologische of lichamelijke beperking)
- ☐ matig
  (behandeling was mogelijk met een realistische kans op een goede uitkomst, maar nog steeds met een belangrijk risico op mortaliteit of lange termijn morbiditeit)
- ☐ mild
  (behandeling was mogelijk met redelijk goede kans op een goede uitkomst)

6. Het ontstaan van de zwangerschap was…
- ☐ spontaan
- ☐ hormonaal
- ☐ IVF
- ☐ ICSI
- ☐ anders, namelijk: _____

Medische handelwijzen

7. Werd er bij deze foetus een behandeling gestart om de prognose te verbeteren?
(bv. longrijping, foetale ingreep)
- ☐ ja
- ☐ neen ➔ **door naar vraag 9**

8. Is de foetus overleden door een complicatie van deze behandeling (en)?
- ☐ ja ➔ **sla vraag 9, 10 en 11 over en ga door naar de het blauwe instructiekader**
- ☐ neen

9. Heeft u of een collega één of meer van volgende handelwijzen uitgevoerd, rekening houdend met de mogelijkheid dat deze handelwijze het levenseinde van de foetus zou kunnen bespoedigen of het leven van de foetus niet zou kunnen verlengen?

a. *niet instellen* van een (nieuwe) behandeling (bv. foetale ingreep, intra-uteriene bloedtransfusie)?
- ☐ ja
- ☐ neen

b. *staken* van een behandeling? (bv. tocolyse)
- ☐ ja
- ☐ neen

10. Was de doodgeboorte het gevolg van één of meer van de volgende handelwijzen, waartoe door u of een collega is besloten met het uitdrukkelijke doel het levenseinde van de foetus te bespoedigen of het leven van de foetus niet te verlengen?

a. *niet instellen* van een (nieuwe) behandeling (bv. foetale ingreep, intra-uteriene bloedtransfusie)?
- ☐ ja
- ☐ neen

b. *staken* van een behandeling? (bv. tocolyse)
- ☐ ja
- ☐ neen

11. Werd door u of een collega de zwangerschap vroegtijdig afgebroken?

- ☐ ja
- ☐ neen ➔ **sla vraag 11a, b, c en d over en ga door naar het blauwe instructiekader**

a. Werd door u of een collega een middel toegediend of een technische handeling gesteld om de foetus prenataal (antepartum) te laten overlijden?

- ☐ ja
- ☐ neen ➔ **door naar vraag 11c**

b. Indien ja, welk middel en/of technische handeling betrof dit?

- ☐ kaliumchloride
- ☐ lidocaine/xylocaine
- ☐ navelstrengcoagulatie
- ☐ andere, namelijk: _____

c. Vertoonde de foetus teken van leven bij de geboorte?

- ☐ ja
- ☐ neen ➔ **sla vraag 11d over en ga door naar het blauwe instructiekader**

d. Zijn er na de geboorte nog medische interventies uitgevoerd?

- ☐ neen
- ☐ ja, algemene comfortzorg
- ☐ ja, lethaal middel
- ☐ anders, namelijk: _____

Indien 'ja' is geantwoord op één van de onderdelen van de vragen 9 tot en met 11a ➔ door naar vraag 12
Indien op geen enkel onderdeel van de vragen 9 tot en met 11a 'ja' is geantwoord ➔ door naar vraag 24

De laatstgenoemde handelswijze:
Let op: de vragen 12 tot en met 19 hebben betrekking op de laatstgenoemde handelwijze, dit wil zeggen op het laatst gegeven 'ja' antwoord bij de **vragen 9 tot en met 11a**

12. Is over de (mogelijke) bespoediging van het levenseinde door de handelwijze door u of een collega met de *ouder(s) overlegd*?

- ☐ ja
- ☐ neen ➔ **door naar vraag 14**

13. Was er overeenstemming over de beslissing tussen u of een collega en de ouder(s)?

- ☐ ja, met beide ouders of met de enige ouder
- ☐ ja, met één van beide ouders
- ☐ neen

14. De beslissing tot de handelwijze werd genomen op basis van…

- ☐ een expliciet verzoek van de ouder(s)
- ☐ instemming van de ouder(s) na voorstel van de arts
- ☐ anders, namelijk: _____

15. Achtte u de ouder(s) ten tijde van dit overleg in staat de medische situatie van de foetus te overzien en daarover op adequate wijze een besluit te nemen?

- ☐ ja
- ☐ neen, niet volledig in staat
- ☐ neen, helemaal niet in staat

16. Is door u of een collega met andere zorgverleners overlegd over de bespoediging van het levenseinde voordat werd besloten tot de handelwijze?
(meerdere antwoorden mogelijk)

- ☐ ja, met individuele collega('s)
- ☐ ja, in open team vergadering
- ☐ neen ➔ **door naar vraag 17**

Indien ja, met wie?
(meerdere antwoorden mogelijk)

- ☐ een collega-gynaecoloog
- ☐ een neonatoloog
- ☐ een pediater
- ☐ een orgaanspecialist
- ☐ een psycholoog
- ☐ een sociaal verpleegkundige
- ☐ een vroedvrouw
- ☐ een geneticus
- ☐ andere, namelijk: _____

17. Met wie hebben de ouder(s) behalve met uzelf over deze handelwijze overlegd?
(meerdere antwoorden mogelijk)

- ☐ niemand
- ☐ een collega-gynaecoloog
- ☐ een neonatoloog
- ☐ een pediater
- ☐ een orgaanspecialist
- ☐ een geneticus
- ☐ een psycholoog
- ☐ een sociaal verpleegkundige
- ☐ een vroedvrouw
- ☐ andere, namelijk: _____

18. Heeft één van de volgende overwegingen bij deze handelwijze een rol gespeeld?
(meerdere antwoorden mogelijk)

- ☐ geen reële overlevingskansen voor de foetus/kind ten gevolge van congenitale malformaties
- ☐ geringe verwachte levenskwaliteit voor de foetus/kind ten gevolge van congenitale malformaties
- ☐ zwangerschap was een gevaar voor de fysieke gezondheid van de moeder
- ☐ zwangerschap was een gevaar voor de psychische gezondheid van de moeder
- ☐ andere, namelijk: _____

19. Werd(en) de ouder(s) door een andere gynaecoloog naar u doorverwezen in het kader van deze handelwijze?

- ☐ neen
- ☐ ja, door een collega vanuit een ander ziekenhuis
- ☐ ja, door een collega binnen ons ziekenhuis
- ☐ ja, door een onafhankelijke gynaecoloog

Indien 'ja' is geantwoord op **vraag 11** (indien het gaat om een zwangerschapsafbreking) ➔ door naar vraag 20
Indien 'neen' is geantwoord op **vraag 11** (indien het niet gaat om een zwangerschapsafbreking) ➔ door naar vraag 24

20. Hoeveel tijd is verstreken tussen de beslissing en de uitvoering van de zwangerschapsafbreking?

- ☐ minder dan 6 dagen
- ☐ 6 dagen of meer

21. Is de beslissing over de afbreking van de zwangerschap voorgelegd aan een ethische commissie?

- ☐ ja
- ☐ neen

22. Werd deze zwangerschapsafbreking aangegeven bij de Nationale Commissie voor de Evaluatie van de Wet betreffende de Zwangerschapsafbreking (abortuscommissie)?

- ☐ ja ➔ **door naar vraag 24**
- ☐ neen

23. Om welke reden werd deze zwangerschapsafbreking niet gemeld bij de voornoemde abortuscommissie?
(meerdere antwoorden mogelijk)

- ☐ zwangerschapsafbreking is een zaak tussen arts en ouder(s)
- ☐ vanwege mogelijke juridische consequenties
- ☐ het betrof geen abortus provocatus
- ☐ melden geeft te veel rompslomp
- ☐ er was mogelijk niet voldaan aan de voorwaarden voor zwangerschapsafbreking na 12 weken zwangerschapsduur
- ☐ aangiftepapieren waren niet voorhanden
- ☐ aangifte is geen onderdeel van het beleid van de dienst en/of het ziekenhuis
- ☐ anders, namelijk: _____

Zorg en behandeling

24. Hebben de ouder(s) een van volgende opties afgewezen?
(meerdere antwoorden mogelijk)

- ☐ het staken of niet instellen van een behandeling
- ☐ het vroegtijdig afbreken van de zwangerschap
- ☐ geen van bovenstaande opties afgewezen

25. Heeft de geloofsovertuiging van de ouder(s) een rol gespeeld bij de bepaling van de medische beslissingen?

- ☐ ja
- ☐ neen

26. Kregen de ouder(s) een of andere vorm van nazorg/begeleiding <u>aangeboden</u> door u of uw dienst na de doodgeboorte?
(meerdere antwoorden mogelijk)

- ☐ neen
- ☐ ja, fysieke nazorg
- ☐ ja, emotionele/psychologische nazorg
- ☐ ja, sociale/materiële nazorg
- ☐ andere, namelijk: _____

27. Welke vorm van nazorg/begeleiding hebben de ouder(s) van u of uw dienst <u>effectief gekregen</u> na de doodgeboorte?
(meerdere antwoorden mogelijk)

- ☐ geen
- ☐ ja, fysieke nazorg
- ☐ ja, emotionele/psychologische nazorg
- ☐ ja, sociale/materiële nazorg
- ☐ weet het niet
- ☐ andere, namelijk: _____

Toelichting

28. Als bepaalde van uw antwoorden volgens u nog verdere verduidelijking behoeven, kunt u dit hier neerschrijven.
Indien u niet de behandelende arts was, gelieve deze vragenlijst door te zenden naar de behandelende arts of de vragenlijst leeg terug te zenden.

HARTELIJK DANK VOOR UW GEWAARDEERDE DEELNAME !

Appendix 3

Vragenlijst Attitudes van artsen over levenseindebeslissingen (in Dutch)

Vrije Universiteit Brussel & Ghent University
end-of-life care research group

Attitudes van artsen over levenseindebeslissingen -2017-

Terugsturen voor 17 mei a.u.b.
Postzegel hoeft niet

Algemeen

1. Wat is uw geslacht?	☐ man ☐ vrouw
2. Wat is uw leeftijd?	☐ < 30 jaar ☐ 30-39 jaar ☐ 40-49 jaar ☐ ≥ 50 jaar
3. Wat is uw functie?	☐ ASO (kandidaat specialist) ☐ arts-specialist
4. Hoe lang bent u reeds aan het werk in de setting van een NICU?	☐ < 5 jaar ☐ 5-10 jaar ☐ 11-20 jaar ☐ > 20 jaar
5. Is er in uw naaste omgeving iemand overleden? (meerdere antwoorden mogelijk)	☐ ja, kind(eren) ☐ ja, partner ☐ ja, andere naaste familie en/of vriend(in) ☐ nee, geen van bovenstaande
6. Wat beschouwt u als uw religie of levensovertuiging?	☐ rooms-katholiek geloof ☐ protestants geloof ☐ islamitisch geloof ☐ gelovig, doch geen specifieke religie ☐ niet religieus ☐ andere:
7. Is uw levensbeschouwing belangrijk bij het nemen van medische beslissingen rond het levenseinde van uw patiënten?	☐ ja ☐ nee

Attitudes over levensbeëindiging bij pasgeborenen met een ernstige aandoening

Geef aan in hoeverre u het eens of oneens bent met de volgende stellingen. Gelieve één antwoord per vraag aan te kruisen. Daarbij gaat het over **uw mening of attitude** ten aanzien van de gegeven stelling en niet over wat wettelijk bepaald is.

	Helemaal oneens - 2	- 1	0	+ 1	Helemaal eens + 2
8. De arts moet rekening houden met de verwachte levenskwaliteit van een pasgeborene met een ernstige aandoening om een behandelingsbeslissing te nemen	☐	☐	☐	☐	☐
9. De taak van de arts houdt in dat hij/zij overbodig lijden van pasgeborenen met een ernstige aandoening moeten verhinderen door het levenseinde te versnellen	☐	☐	☐	☐	☐
10. De arts dient met de ouders te overleggen vooraleer de behandeling van een pasgeborene met een ernstige aandoening te staken	☐	☐	☐	☐	☐
11. Er is een ethisch verschil tussen het staken van een behandeling en het toedienen van een middel, ook al hebben ze beide de dood van de pasgeborene tot gevolg	☐	☐	☐	☐	☐
12. Bij pasgeborenen met een ernstige aandoening is het in bepaalde gevallen aanvaardbaar om **geen behandeling in te stellen** rekening houdend met de mogelijkheid dat dit het levenseinde zou kunnen bespoedigen	☐	☐	☐	☐	☐

	Helemaal oneens - 2	- 1	0	+ 1	Helemaal eens + 2
13. Bij pasgeborenen met een ernstige aandoening is het in bepaalde gevallen aanvaardbaar om **geen behandeling in te stellen** met het uitdrukkelijke doel om het levenseinde te bespoedigen	☐	☐	☐	☐	☐
14. Bij pasgeborenen met een ernstige aandoening is het in bepaalde gevallen aanvaardbaar om **een behandeling te staken** rekening houdend met de mogelijkheid dat dit het levenseinde zou kunnen bespoedigen	☐	☐	☐	☐	☐
15. Bij pasgeborenen met een ernstige aandoening is het in bepaalde gevallen aanvaardbaar om **een behandeling te staken** met het uitdrukkelijke doel om het levenseinde te bespoedigen	☐	☐	☐	☐	☐
16. Bij pasgeborenen met een ernstige aandoening is het in bepaalde gevallen aanvaardbaar om **middelen toe te dienen** rekening houdend met de mogelijkheid dat dit het levenseinde zou kunnen bespoedigen	☐	☐	☐	☐	☐
17. Bij pasgeborenen met een ernstige aandoening is het in bepaalde gevallen aanvaardbaar om **middelen toe te dienen** met het uitdrukkelijke doel om het levenseinde te bespoedigen	☐	☐	☐	☐	☐
18. Artsen die helpen bij het uitvoeren van levensbeëindiging bij pasgeborenen moeten aangeklaagd worden bij bevoegde professionele instanties	☐	☐	☐	☐	☐
19. Levenseindebeslissingen nemen bij wilsonbekwame patiënten is moeilijker dan die bij wilsbekwame patiënten	☐	☐	☐	☐	☐
20. Verder behandelen is altijd in het belang van het kind	☐	☐	☐	☐	☐
21. De wetgeving zou moeten aangepast worden om in sommige gevallen het beëindigen van het leven van een pasgeborene met een ernstige aandoening mogelijk te maken	☐	☐	☐	☐	☐

Attitudes over zwangerschapsafbreking bij levensvatbare termijn

Gelieve **één antwoord** per vraag aan te kruisen. Daarbij gaat het over **uw mening of attitude** ten aanzien van de gegeven stelling en niet over wat wettelijk bepaald is.
Let op, elke vraag gaat over een zwangerschapsafbreking waarbij het de bedoeling is dat het foetus/kind overlijdt na levensvatbare termijn (dwz vanaf wanneer neonatale reanimatie mogelijk zou zijn)

	Helemaal oneens - 2	- 1	0	+ 1	Helemaal eens + 2
22. Een zwangerschapsafbreking bij levensvatbare termijn moet multidisciplinair overlegd worden	☐	☐	☐	☐	☐
23. Een zwangerschapsafbreking bij levensvatbare termijn op vraag van de moeder is aanvaardbaar	☐	☐	☐	☐	☐
24. Een zwangerschapsafbreking bij levensvatbare termijn moet volledig verboden worden	☐	☐	☐	☐	☐
25. Een zwangerschapsafbreking bij levensvatbare termijn moet in overleg gebeuren met minstens één andere arts	☐	☐	☐	☐	☐
26. Een zwangerschapsafbreking bij levensvatbare termijn moet steeds binnen een ethisch comité besproken worden	☐	☐	☐	☐	☐
27. Het is de taak van artsen om de moeder te overtuigen om de zwangerschap bij levensvatbare termijn af te breken als het kind amper overlevingskansen heeft	☐	☐	☐	☐	☐
28. Neonatologen en gynaecologen moeten overleggen over het al dan niet uitvoeren van een zwangerschapsafbreking bij levensvatbare termijn	☐	☐	☐	☐	☐

	Helemaal oneens - 2	- 1	0	+ 1	Helemaal eens + 2
29. In geval van een ernstig foetaal probleem moeten steeds alle mogelijkheden van palliatieve zorg worden benut	☐	☐	☐	☐	☐
30. Als de foetus gezond is, is een zwangerschapsafbreking bij levensvatbare termijn aanvaardbaar wanneer het leven van de moeder in gevaar is	☐	☐	☐	☐	☐
31. Als de foetus gezond is, is een zwangerschapsafbreking bij levensvatbare termijn aanvaardbaar in geval van een ernstig materneel psychologisch probleem	☐	☐	☐	☐	☐
32. Als de moeder gezond is, is een zwangerschapsafbreking bij levensvatbare termijn aanvaardbaar in geval van <u>een lethaal foetaal</u> medisch probleem	☐	☐	☐	☐	☐
33. Als de moeder gezond is, is een zwangerschapsafbreking bij levensvatbare termijn aanvaardbaar in geval van <u>een ernstig foetaal</u> probleem	☐	☐	☐	☐	☐

Beleid

34. Is er een beleid omtrent levenseindebeslissingen op uw afdeling? (meerdere antwoorden mogelijk)	☐ ja, een schriftelijk beleid ☐ ja, een mondeling beleid ☐ nee ➔ **door naar vraag 36** ☐ weet ik niet ➔ **door naar vraag 36**
35. Ik sta achter het beleid van de afdeling omtrent het nemen van levenseindebeslissingen op de NICU	☐ ja ☐ nee
36. Ik vind dat er voldoende richtlijnen of beleid voorzien zijn op mijn afdeling om levenseindebeslissingen te nemen	☐ ja ☐ nee ☐ geen mening
37. Is er een beleid omtrent levensvatbaarheid en verder behandelen op uw afdeling? (meerdere antwoorden mogelijk)	☐ ja, een schriftelijk beleid ☐ ja, een mondeling beleid ☐ nee ➔ **door naar vraag 39** ☐ weet ik niet ➔ **door naar vraag 39**
38. Ik sta achter het beleid van de afdeling omtrent levensvatbaarheid en verder behandelen	☐ ja ☐ nee ☐ geen mening
39. Is er een beleid in uw ziekenhuis omtrent zwangerschapsafbreking na 14 weken? (meerdere antwoorden mogelijk)	☐ ja, een schriftelijk beleid ☐ ja, een mondeling beleid ☐ nee ➔ **door naar vraag 41** ☐ weet ik niet ➔ **door naar vraag 41**
40. Ik sta achter het beleid in het ziekenhuis omtrent zwangerschapsafbreking na 14 weken	☐ ja ☐ nee ☐ geen mening

Psychologische ondersteuning

	Helemaal oneens - 2	- 1	0	+ 1	Helemaal eens + 2
41. Ik heb het gevoel dat ik door mijn collega's gesteund word in de beslissingen die ik neem omtrent het levenseinde van mijn patiënten	☐	☐	☐	☐	☐
42. Het nemen van levenseindebeslissingen bezorgt mij meer stress dan normaal	☐	☐	☐	☐	☐
43. Ik word voldoende psychologisch ondersteund door mijn afdeling na het sterven van een patiënt op onze afdeling	☐	☐	☐	☐	☐

	Helemaal oneens - 2	- 1	0	+ 1	Helemaal eens + 2
44. Er worden door de afdeling voldoende mogelijkheden aangeboden om mijn eventuele bezwaren tegen levenseindebeslissingen te uiten	☐	☐	☐	☐	☐
45. Als ik niet akkoord ga met de uitkomst van een bepaalde beslissing omtrent het levenseinde van een patiënt dan kan ik ervoor opteren om niet langer bij dit geval betrokken te worden	☐	☐	☐	☐	☐
46. Als er mij iets dwars zit omtrent het nemen van een levenseindebeslissing, kan ik bij mijn collega's terecht voor een gesprek	☐	☐	☐	☐	☐
47. Ik zou graag willen dat mijn afdeling meer psychologische hulp aanbiedt voor het personeel wanneer zij met levenseindebeslissingen geconfronteerd worden	☐	☐	☐	☐	☐

Casussen

In het laatste deel van onze vragenlijst willen we u 2 casussen voorleggen. Ondanks het feit dat de casussen duidelijke reducties van de werkelijkheid zijn en u het gevoel kan hebben meer informatie over de patiënt nodig te hebben, willen we u toch vragen om bij elke casus de vragen zo volledig mogelijk te beantwoorden. Daarbij telt enkel uw persoonlijke mening. Het is dus van groot belang de vragen te beantwoorden alsof u zelf met deze casus geconfronteerd zou worden.

Casus 1

Bij een zwanger koppel wordt bij een prenataal echo-onderzoek op 25 weken zwangerschap vastgesteld dat de foetus een ernstige open spina bifida heeft. De MRI-scan die enkele dagen later wordt uitgevoerd bevestigt de aanwezigheid van een grote lumbosacrale meningomyelocoele en toont daarenboven ook een Arnold-Chiari malformatie ter hoogte van de hersenen aan, met reeds belangrijke ventrikeldilatatie. Een gesprek met het perinataal, neurologisch en neurochirurgisch team leert het koppel dat, ook na een geslaagde sluitingsoperatie, hun kindje een verlamming van zijn onderste ledematen zal hebben, evenals incontinentie en blaasledigingsproblemen. De Arnold-Chiari malformatie is verder een verzwarende factor voor de cognitieve ontwikkeling.

Los van wat de ouders wensen, welk van volgende opties zijn voor u persoonlijk mogelijke opties voor dit betreffende geval?

	Vind ik geen goede optie	Vind ik een minder goede optie	Vind ik een goede optie	Vind ik een heel goede optie
Levensverlengende behandelingen starten of verderzetten bij de foetus/het kind	☐	☐	☐	☐
De zwangerschap **afbreken** door een middel toe te dienen of een technische handeling te stellen met het uitdrukkelijke doel om het levenseinde van de foetus te bespoedigen	☐	☐	☐	☐
Na de geboorte **geen behandeling** instellen rekening houdend met de mogelijkheid dat dit het levenseinde van de patiënt zou kunnen bespoedigen	☐	☐	☐	☐
Na de geboorte **geen behandeling** instellen met het uitdrukkelijke doel om het levenseinde van de patiënt te bespoedigen	☐	☐	☐	☐
Na de geboorte **middelen toedienen** rekening houdend met de mogelijkheid dat dit het levenseinde van de patiënt zou kunnen bespoedigen	☐	☐	☐	☐
Na de geboorte de **middelen toedienen** met het uitdrukkelijke doel het levenseinde van de patiënt te bespoedigen	☐	☐	☐	☐

Casus 2

Liza is een deel van een tweeling, geboren op 27 weken met een extreme intra-uteriene groeivertraging. Zij woog slechts 500 g bij geboorte. De eerste levensdagen verlopen wonderwel rustig: ze ademt zelfstandig met behulp van non-invasieve ademhalingsondersteuning en de enterale voeding kan voorzichtig geïntroduceerd en verhoogd worden. De echo van de hersenen is volstrekt normaal. Op dag 8 vertoont ze echter een maagperforatie waarna ze een beeld van ernstige septische shock met multi-orgaan falen ontwikkelt. Na enkele dagen stabiliseert de situatie zich en hernemen de orgaanfuncties. Een herstelfase lijkt ingezet. Dit herstelproces wordt helaas gecompliceerd door een ernstige dehiscentie van de buikwonde, waarbij de darmen zichtbaar bloot komen te liggen. Dit zal ongetwijfeld nog een (of meerdere) heelkundige interventies vragen, maar in het huidige stadium is dit nog niet mogelijk. Wanneer enkele dagen later de echo van de hersenen wordt herhaald, blijkt zij daarenboven een snel progressieve, ernstige multicystische leukomalacie te ontwikkelen waarbij de cerebrale witte stof diffuus is aangetast. Tijdens een multidisciplinair overleg is men het er over eens dat dit met zekerheid zal leiden tot een ernstige spastische quadriparese. Zij is op dat moment 3 weken oud, kan zelfstandig ademen, maar is wel afhankelijk van non-invasieve ademhalingsondersteuning, is hemodynamisch stabiel, maar wordt uiteraard volledig parenteraal gevoed.

Los van wat de ouders wensen, welk van volgende opties zijn voor u persoonlijk mogelijke opties voor dit betreffende geval?

	Vind ik geen goede optie	Vind ik een minder goede optie	Vind ik een goede optie	Vind ik een heel goede optie
Levensverlengende behandelingen starten of verderzetten bij de foetus/het kind	☐	☐	☐	☐
Geen behandeling instellen rekening houdend met de mogelijkheid dat dit het levenseinde van de patiënt zou kunnen bespoedigen	☐	☐	☐	☐
Geen behandeling instellen met het uitdrukkelijke doel om het levenseinde van de patiënt te bespoedigen	☐	☐	☐	☐
De behandeling staken rekening houdend met de mogelijkheid dat dit het levenseinde van de patiënt zou kunnen bespoedigen	☐	☐	☐	☐
De behandeling staken met het uitdrukkelijk doel om het levenseinde van de patiënt te bespoedigen	☐	☐	☐	☐
Middelen toedienen rekening houdend met de mogelijkheid dat dit het levenseinde van de patiënt zou kunnen bespoedigen	☐	☐	☐	☐
Middelen toedienen met het uitdrukkelijke doel het levenseinde van de patiënt te bespoedigen	☐	☐	☐	☐

Toelichting

Wanneer uw antwoorden enige verduidelijking vragen, kunt u die hier geven:

Wilt u zo vriendelijk zijn deze vragenlijst terug te sturen in de bijgevoegde envelop gericht aan de **advocaat** die alle **anonieme** vragenlijsten voor ons verzamelt. Deze opent de enveloppe en controleert de volledige anonimiteit, en bezorgt de vragenlijst daarna aan de onderzoeksgroep.
Een postzegel hoeft **NIET**.

Wij danken u van harte voor de medewerking aan dit onderzoek.

Appendix 4

Vragenlijst Attitudes van verpleegkundigen over levenseindebeslissingen (in Dutch)

Vrije Universiteit Brussel & Ghent University
end-of-life care research group

Attitudes van verpleegkundigen over levenseindebeslissingen -2017-

Terugsturen voor 17 mei a.u.b.
Postzegel hoeft niet

Algemeen

1. Wat is uw geslacht?	☐ man ☐ vrouw
2. Wat is uw leeftijd?	☐ < 30 jaar ☐ 30-39 jaar ☐ 40-49 jaar ☐ ≥ 50 jaar
3. Wat is uw hoogst behaalde diploma?	☐ Graduaat (A2) ☐ Bachelor (A1) ☐ Master ☐ Eventuele specialisatie:
4. Hoe lang bent u reeds aan het werk in de setting van een NICU?	☐ < 5 jaar ☐ 5-10 jaar ☐ 11-20 jaar ☐ > 20 jaar
5. Is er in uw naaste omgeving iemand overleden? (meerdere antwoorden mogelijk)	☐ ja, kind(eren) ☐ ja, partner ☐ ja, andere naaste familie en/of vriend(in) ☐ nee, geen van bovenstaande
6. Wat beschouwt u als uw religie of levensovertuiging?	☐ rooms-katholiek geloof ☐ protestants geloof ☐ islamitisch geloof ☐ gelovig, doch geen specifieke religie ☐ niet religieus ☐ andere:
7. Heeft uw levensbeschouwing een belangrijke invloed op uw attitudes tegenover levenseindebeslissingen bij patiënten op uw afdeling?	☐ ja ☐ nee

Attitudes over levensbeëindiging bij pasgeborenen met een ernstige aandoening

Geef aan in hoeverre u het eens of oneens bent met de volgende stellingen. Gelieve één antwoord per vraag aan te kruisen. Daarbij gaat het over uw mening of attitude ten aanzien van de gegeven stelling en niet over wat wettelijk bepaald is.

	Helemaal oneens - 2	- 1	0	+ 1	Helemaal eens + 2
8. De arts moet rekening houden met de verwachte levenskwaliteit van een pasgeborene met een ernstige aandoening om een behandelingsbeslissing te nemen	☐	☐	☐	☐	☐
9. De taak van de arts houdt in dat hij/zij overbodig lijden van pasgeborenen met een ernstige aandoening moeten verhinderen door het levenseinde te versnellen	☐	☐	☐	☐	☐
10. De arts dient met de ouders te overleggen vooraleer de behandeling van een pasgeborene met een ernstige aandoening te staken	☐	☐	☐	☐	☐
11. Er is een ethisch verschil tussen het staken van een behandeling en het toedienen van een middel, ook al hebben ze beide de dood van de pasgeborene tot gevolg	☐	☐	☐	☐	☐
12. Bij pasgeborenen met een ernstige aandoening is het in bepaalde gevallen aanvaardbaar om **geen behandeling in te stellen** rekening houdend met de mogelijkheid dat dit het levenseinde zou kunnen bespoedigen	☐	☐	☐	☐	☐

	Helemaal oneens - 2	- 1	0	+ 1	Helemaal eens + 2
13. Bij pasgeborenen met een ernstige aandoening is het in bepaalde gevallen aanvaardbaar om **geen behandeling in te stellen** met het uitdrukkelijke doel om het levenseinde te bespoedigen	☐	☐	☐	☐	☐
14. Bij pasgeborenen met een ernstige aandoening is het in bepaalde gevallen aanvaardbaar om **een behandeling te staken** rekening houdend met de mogelijkheid dat dit het levenseinde zou kunnen bespoedigen	☐	☐	☐	☐	☐
15. Bij pasgeborenen met een ernstige aandoening is het in bepaalde gevallen aanvaardbaar om **een behandeling te staken** met het uitdrukkelijke doel om het levenseinde te bespoedigen	☐	☐	☐	☐	☐
16. Bij pasgeborenen met een ernstige aandoening is het in bepaalde gevallen aanvaardbaar om **middelen toe te dienen** rekening houdend met de mogelijkheid dat dit het levenseinde zou kunnen bespoedigen	☐	☐	☐	☐	☐
17. Bij pasgeborenen met een ernstige aandoening is het in bepaalde gevallen aanvaardbaar om **middelen toe te dienen** met het uitdrukkelijke doel om het levenseinde te bespoedigen	☐	☐	☐	☐	☐
18. Artsen die helpen bij het uitvoeren van levensbeëindiging bij pasgeborenen moeten aangeklaagd worden bij bevoegde professionele instanties	☐	☐	☐	☐	☐
19. Levenseindebeslissingen bij wilsonbekwame patiënten zijn moeilijker dan die bij wilsbekwame patiënten	☐	☐	☐	☐	☐
20. Verder behandelen is altijd in het belang van het kind	☐	☐	☐	☐	☐
21. De wetgeving zou moeten aangepast worden om in sommige gevallen het beëindigen van het leven van een pasgeborene met een ernstige aandoening mogelijk te maken	☐	☐	☐	☐	☐

Attitudes over zwangerschapsafbreking bij levensvatbare termijn

Gelieve **één antwoord** per vraag aan te kruisen. Daarbij gaat het over **uw mening of attitude** ten aanzien van de gegeven stelling en niet over wat wettelijk bepaald is.
Let op, elke vraag gaat over een zwangerschapsafbreking waarbij het de bedoeling is dat het foetus/kind overlijdt na levensvatbare termijn (dwz vanaf wanneer neonatale reanimatie mogelijk zou zijn)

	Helemaal oneens - 2	- 1	0	+ 1	Helemaal eens + 2
22. Een zwangerschapsafbreking bij levensvatbare termijn moet multidisciplinair overlegd worden	☐	☐	☐	☐	☐
23. Een zwangerschapsafbreking bij levensvatbare termijn op vraag van de moeder is aanvaardbaar	☐	☐	☐	☐	☐
24. Een zwangerschapsafbreking bij levensvatbare termijn moet volledig verboden worden	☐	☐	☐	☐	☐
25. Een zwangerschapsafbreking bij levensvatbare termijn moet in overleg gebeuren met minstens één andere arts	☐	☐	☐	☐	☐
26. Een zwangerschapsafbreking bij levensvatbare termijn moet steeds binnen een ethisch comité besproken worden	☐	☐	☐	☐	☐
27. Het is de taak van artsen om de moeder te overtuigen om de zwangerschap bij levensvatbare termijn af te breken als het kind amper overlevingskansen heeft	☐	☐	☐	☐	☐
28. Neonatologen en gynaecologen moeten overleggen over het al dan niet uitvoeren van een zwangerschapsafbreking bij levensvatbare termijn	☐	☐	☐	☐	☐

	Helemaal oneens - 2	- 1	0	+ 1	Helemaal eens + 2
29. In geval van een ernstig foetaal probleem moeten steeds alle mogelijkheden van palliatieve zorg worden benut	☐	☐	☐	☐	☐
30. Als de foetus gezond is, is een zwangerschapsafbreking bij levensvatbare termijn aanvaardbaar wanneer het leven van de moeder in gevaar is	☐	☐	☐	☐	☐
31. Als de foetus gezond is, is een zwangerschapsafbreking bij levensvatbare termijn aanvaardbaar in geval van een ernstig materneel psychologisch probleem	☐	☐	☐	☐	☐
32. Als de moeder gezond is, is een zwangerschapsafbreking bij levensvatbare termijn aanvaardbaar in geval van <u>een lethaal (dodelijk) foetaal</u> medisch probleem	☐	☐	☐	☐	☐
33. Als de moeder gezond is, is een zwangerschapsafbreking bij levensvatbare termijn aanvaardbaar in geval van <u>een ernstig foetaal</u> probleem	☐	☐	☐	☐	☐

Beleid

34. Is er een beleid omtrent levenseindebeslissingen op uw afdeling? (meerdere antwoorden mogelijk)	☐ ja, een schriftelijk beleid ☐ ja, een mondeling beleid ☐ nee ➔ **door naar vraag 36** ☐ weet ik niet ➔ **door naar vraag 36**
35. Ik sta achter het beleid van de afdeling omtrent het nemen van levenseindebeslissingen op de NICU	☐ ja ☐ nee
36. Ik vind dat er voldoende richtlijnen of beleid voorzien zijn op mijn afdeling om levenseindebeslissingen te nemen	☐ ja ☐ nee ☐ geen mening
37. Is er een beleid omtrent levensvatbaarheid en verder behandelen op uw afdeling? (meerdere antwoorden mogelijk)	☐ ja, een schriftelijk beleid ☐ ja, een mondeling beleid ☐ nee ➔ **door naar vraag 39** ☐ weet ik niet ➔ **door naar vraag 39**
38. Ik sta achter het beleid van de afdeling omtrent levensvatbaarheid en verder behandelen	☐ ja ☐ nee ☐ geen mening
39. Is er een beleid in uw ziekenhuis omtrent zwangerschapsafbreking na 14 weken? (meerdere antwoorden mogelijk)	☐ ja, een schriftelijk beleid ☐ ja, een mondeling beleid ☐ nee ➔ **door naar vraag 41** ☐ weet ik niet ➔ **door naar vraag 41**
40. Ik sta achter het beleid in het ziekenhuis omtrent zwangerschapsafbreking na 14 weken	☐ ja ☐ nee ☐ geen mening

Psychologische ondersteuning

	Helemaal oneens - 2	- 1	0	+ 1	Helemaal eens + 2
41. Ik heb het gevoel dat de behandelende arts(en) naar mijn mening luisteren als er een levenseindebeslissing wordt genomen bij pasgeborenen met een ernstige aandoening	☐	☐	☐	☐	☐
42. Als ik geconfronteerd word met een levenseindebeslissing bij een pasgeborene op mijn de afdeling, dan ervaar ik daardoor meer stress dan normaal	☐	☐	☐	☐	☐

	Helemaal oneens - 2	- 1	0	+ 1	Helemaal eens + 2
43. Ik word voldoende psychologisch ondersteund door mijn afdeling na het sterven van een patiënt op onze afdeling	☐	☐	☐	☐	☐
44. Er worden door de afdeling voldoende mogelijkheden aangeboden om mijn eventuele bezwaren tegen levenseindebeslissingen te uiten	☐	☐	☐	☐	☐
45. Als ik niet akkoord ga met de uitkomst van een bepaalde beslissing omtrent het levenseinde van een patiënt dan kan ik ervoor opteren om niet langer bij dit geval betrokken te worden	☐	☐	☐	☐	☐
46. Als er mij iets dwars zit omtrent genomen levenseindebeslissingen van een patiënt, kan ik bij mijn collega's terecht voor een gesprek	☐	☐	☐	☐	☐
47. Ik zou graag willen dat mijn afdeling meer psychologische hulp aanbiedt voor het personeel wanneer zij met levenseindebeslissingen geconfronteerd worden	☐	☐	☐	☐	☐

Casussen

In het laatste deel van onze vragenlijst willen we u 2 casussen voorleggen. Ondanks het feit dat de casussen duidelijke reducties van de werkelijkheid zijn en u het gevoel kan hebben meer informatie over de patiënt nodig te hebben, willen we u toch vragen om bij elke casus de vragen zo volledig mogelijk te beantwoorden. Daarbij telt enkel uw persoonlijke mening. Het is dus van groot belang de vragen te beantwoorden alsof u zelf met deze casus geconfronteerd zou worden.

Casus 1

Bij een zwanger koppel wordt bij een prenataal echo-onderzoek op 25 weken zwangerschap vastgesteld dat de foetus een ernstige open spina bifida heeft. De MRI-scan die enkele dagen later wordt uitgevoerd bevestigt de aanwezigheid van een grote lumbosacrale meningomyelocoele en toont daarenboven ook een Arnold-Chiari malformatie ter hoogte van de hersenen aan, met reeds belangrijke ventrikeldilatatie. Een gesprek met het perinataal, neurologisch en neurochirurgisch team leert het koppel dat, ook na een geslaagde sluitingsoperatie, hun kindje een verlamming van zijn onderste ledematen zal hebben, evenals incontinentie en blaasledigingsproblemen. De Arnold-Chiari malformatie is verder een verzwarende factor voor de cognitieve ontwikkeling.

Los van wat de ouders of artsen wensen, welk van volgende opties zijn voor u persoonlijk mogelijke opties voor dit betreffende geval?

	Vind ik geen goede optie	Vind ik een minder goede optie	Vind ik een goede optie	Vind ik een heel goede optie
Levensverlengende behandelingen starten of verderzetten bij de foetus/het kind	☐	☐	☐	☐
De zwangerschap **afbreken** door een middel toe te dienen of een technische handeling te stellen met het uitdrukkelijke doel om het levenseinde van de foetus te bespoedigen	☐	☐	☐	☐
Na de geboorte **geen behandeling** instellen rekening houdend met de mogelijkheid dat dit het levenseinde van de patiënt zou kunnen bespoedigen	☐	☐	☐	☐
Na de geboorte **geen behandeling** instellen met het uitdrukkelijke doel om het levenseinde van de patiënt te bespoedigen	☐	☐	☐	☐
Na de geboorte **middelen toedienen** rekening houdend met de mogelijkheid dat dit het levenseinde van de patiënt zou kunnen bespoedigen	☐	☐	☐	☐
Na de geboorte de **middelen toedienen** met het uitdrukkelijke doel het levenseinde van de patiënt te bespoedigen	☐	☐	☐	☐

Casus 2

Liza is een deel van een tweeling, geboren op 27 weken met een extreme intra-uteriene groeivertraging. Zij woog slechts 500 g bij geboorte. De eerste levensdagen verlopen wonderwel rustig: ze ademt zelfstandig met behulp van non-invasieve ademhalingsondersteuning en de enterale voeding kan voorzichtig geïntroduceerd en verhoogd worden. De echo van de hersenen is volstrekt normaal. Op dag 8 vertoont ze echter een maagperforatie waarna ze een beeld van ernstige septische shock met multi-orgaan falen ontwikkelt. Na enkele dagen stabiliseert de situatie zich en hernemen de orgaanfuncties. Een herstelfase lijkt ingezet. Dit herstelproces wordt helaas gecompliceerd door een ernstige dehiscentie van de buikwonde, waarbij de darmen zichtbaar bloot komen te liggen. Dit zal ongetwijfeld nog een (of meerdere) heelkundige interventies vragen, maar in het huidige stadium is dit nog niet mogelijk. Wanneer enkele dagen later de echo van de hersenen wordt herhaald, blijkt zij daarenboven een snel progressieve, ernstige multicystische leukomalacie te ontwikkelen waarbij de cerebrale witte stof diffuus is aangetast. Tijdens een multidisciplinair overleg is men het er over eens dat dit met zekerheid zal leiden tot een ernstige spastische quadriparese. Zij is op dat moment 3 weken oud, kan zelfstandig ademen, maar is wel afhankelijk van non-invasieve ademhalingsondersteuning, is hemodynamisch stabiel, maar wordt uiteraard volledig parenteraal gevoed.

Los van wat de ouders of artsen wensen, welk van volgende opties zijn voor u persoonlijk mogelijke opties voor dit betreffende geval?

	Vind ik geen goede optie	Vind ik een minder goede optie	Vind ik een goede optie	Vind ik een heel goede optie
Levensverlengende behandelingen starten of verderzetten bij de foetus/het kind	☐	☐	☐	☐
Geen behandeling instellen rekening houdend met de mogelijkheid dat dit het levenseinde van de patiënt zou kunnen bespoedigen	☐	☐	☐	☐
Geen behandeling instellen met het uitdrukkelijke doel om het levenseinde van de patiënt te bespoedigen	☐	☐	☐	☐
De behandeling staken rekening houdend met de mogelijkheid dat dit het levenseinde van de patiënt zou kunnen bespoedigen	☐	☐	☐	☐
De behandeling staken met het uitdrukkelijk doel om het levenseinde van de patiënt te bespoedigen	☐	☐	☐	☐
Middelen toedienen rekening houdend met de mogelijkheid dat dit het levenseinde van de patiënt zou kunnen bespoedigen	☐	☐	☐	☐
Middelen toedienen met het uitdrukkelijke doel het levenseinde van de patiënt te bespoedigen	☐	☐	☐	☐

Toelichting

Wanneer uw antwoorden enige verduidelijking vragen, kunt u die hier geven:

Wilt u zo vriendelijk zijn deze vragenlijst terug te sturen in de bijgevoegde envelop gericht aan de advocaat die alle anonieme vragenlijsten voor ons verzamelt. Deze opent de enveloppe en controleert de volledige anonimiteit, en bezorgt de vragenlijst daarna aan de onderzoeksgroep.
Een postzegel hoeft **NIET**.

Wij danken u van harte voor de medewerking aan dit onderzoek.

Appendix 5

Topic Guide interviewstudie artsen (in Dutch)

Vragen (interviewer)	Prompts (Manier om verder in te gaan op wat de arts of verpleegkundige vertelt)
Introductie	
- Naam vragen - Bedanken voor hun aanwezigheid - Jezelf (interviewer) voorstellen - Doel van het onderzoek en het gesprek toelichten - Wijzen op vertrouwelijkheid - Wijzen op het feit dat ze het gesprek te allen tijde kunnen stopzetten indien gewenst - Uitleg van de informed consent - Vragen om hun GSM uit te zetten	Nagaan of de informed consent ondertekend werd
Introductievraag	
- Ik wil het in dit interview graag hebben over de problematiek van levenseindebeslissingen. Welke levenseindebeslissingen worden hier op de dienst soms gemaakt?	- Wijzen op andere vormen van levenseindebeslissingen indien nodig
Kernvragen	
- Wat maakt het voor jou moeilijker wanneer er zo'n levenseindebeslissingen worden gemaakt?	- Voor jezelf als arts/verpleegkundige (eigen rol benadrukken) - Bijvragen stellen: ⇒ Wat bedoel je hier precies mee? ⇒ Kan je hier wat meer op ingaan? ⇒ Kan je hier een concreet voorbeeld bij geven ⇒ En wat maakte het hier dan moeilijker? - Duidelijk weten welke ELD het is. Indien algemeen: vragen of het bij andere ELDs ook zo gaat - Voorbeelden van momenten die het moeilijker maken
- Wat maakt het voor jou makkelijker wanneer er zo'n levenseindebeslissingen worden gemaakt? - Wat zou het voor jou gemakkelijker kunnen maken?	- Voor jezelf als arts/verpleegkundige (eigen rol benadrukken) - Bijvragen stellen: ⇒ Wat bedoel je hier precies mee? ⇒ Kan je hier wat meer op ingaan? ⇒ Kan je hier een concreet voorbeeld bij geven ⇒ En wat maakte het hier dan gemakkelijker? - Duidelijk weten welke ELD het is. Indien algemeen: vragen of het bij andere ELDs

	ook zo gaat - Voorbeelden van momenten die het gemakkelijker maken
- Voelt u zich ondersteund door collega's bij het nemen van levenseindebeslissingen? - Voelt u zich ondersteund door ouders bij het nemen van levenseindebeslissingen?	- Eventueel verschil tussen: ⇒ Ondersteund tijdens het beslissingsproces ⇒ Ondersteund achteraf (psychologische ondersteuning bv)
- Welk gevoel hebt u dan na het nemen en uitvoeren van zo'n levenseindebeslissingen?	- En hebt u dan het gevoel dat de juiste beslissing gemaakt werd?
Indien niet vermeld: - Ethische commissie betrokken bij ELDs? - Zijn er soms momenten in de communicatie met ouders/collega's die het beslissingsproces makkelijker of moeilijker maken?	
Eindvragen	
- De interviewer maakt een korte samenvatting van het gesprek. - Vindt u dit een goede samenvatting van het gesprek? - Zijn er nog zaken die niet aan bod gekomen zijn waar u het graag nog over willen hebben?	
Slotvraag	
Er is vandaag heel wat besproken geweest. Voor we afronden, hebt u nog vragen? Heel erg bedankt voor uw tijd en bijdrage aan onze studie. Indien u nog bijkomende vragen of opmerkingen hebt over dit interview, de data, of het onderzoek in het algemeen, aarzel dan niet om contact op te nemen met de uitvoerende onderzoeker (geef gegevens mee).	

Appendix 6

Topic Guide interviewstudie verpleegkundigen (in Dutch)

Vragen (interviewer)	Prompts (Manier om verder in te gaan op wat de arts of verpleegkundige vertelt)
Introductie	
- Naam vragen - Bedanken voor hun aanwezigheid - Jezelf (interviewer) voorstellen - Doel van het onderzoek en het gesprek toelichten - Wijzen op vertrouwelijkheid - Wijzen op het feit dat ze het gesprek te allen tijde kunnen stopzetten indien gewenst - Uitleg van de informed consent - Vragen om hun GSM uit te zetten	Nagaan of de informed consent ondertekend werd
Introductievraag	
- Ik wil het in dit interview graag hebben over de problematiek van levenseindebeslissingen. Welke levenseindebeslissingen worden hier op de dienst soms gemaakt?	- Wijzen op andere vormen van levenseindebeslissingen indien nodig
Transitievragen	
- In welke mate word jij/u betrokken bij het nemen van zo'n levenseindebeslissingen?	- Niet te lang blijven stilstaan bij deze vraag - Doel = worden ze betrokken ja of nee: ⇒ Ja = kernvragen behouden ⇒ Nee = doorvragen waar ze dan wel bij betrokken worden (bv uitvoering van de beslissing, ondersteuning van ouders…) + de kernvragen anders formuleren: als er zo'n levenseindebeslissingen gemaakt worden, wat maakt die situatie dan makkelijker/moeilijker voor jou?
Kernvragen	
- Wat maakt het voor jou moeilijker wanneer er zo'n levenseindebeslissingen worden gemaakt?	- Voor jezelf als arts/verpleegkundige (eigen rol benadrukken) - Bijvragen stellen: ⇒ Wat bedoel je hier precies mee? ⇒ Kan je hier wat meer op ingaan? ⇒ Kan je hier een concreet voorbeeld bij geven ⇒ En wat maakte het hier dan moeilijker? - Duidelijk weten welke ELD het is. Indien algemeen: vragen of het bij andere ELDs

	ook zo gaat - Voorbeelden van momenten die het moeilijker maken
- Wat maakt het voor jou makkelijker wanneer er zo'n levenseindebeslissingen worden gemaakt? - Wat zou het voor jou gemakkelijker kunnen maken?	- Voor jezelf als arts/verpleegkundige (eigen rol benadrukken) - Bijvragen stellen: ⇒ Wat bedoel je hier precies mee? ⇒ Kan je hier wat meer op ingaan? ⇒ Kan je hier een concreet voorbeeld bij geven ⇒ En wat maakte het hier dan gemakkelijker? - Duidelijk weten welke ELD het is. Indien algemeen: vragen of het bij andere ELDs ook zo gaat - Voorbeelden van momenten die het gemakkelijker maken
- Voelt u zich ondersteund door collega's bij het nemen van levenseindebeslissingen? - Voelt u zich ondersteund door ouders bij het nemen van levenseindebeslissingen?	- Eventueel verschil tussen: ⇒ Ondersteund tijdens het beslissingsproces ⇒ Ondersteund achteraf (psychologische ondersteuning bv)
- Welk gevoel hebt u dan na het nemen en uitvoeren van zo'n levenseindebeslissingen?	- En hebt u dan het gevoel dat de juiste beslissing gemaakt werd?
Indien niet vermeld: - Ethische commissie betrokken bij ELDs? - Zijn er soms momenten in de communicatie met ouders/collega's die het beslissingsproces makkelijker of moeilijker maken?	
Eindvragen	
- De interviewer maakt een korte samenvatting van het gesprek. - Vindt u dit een goede samenvatting van het gesprek? - Zijn er nog zaken die niet aan bod gekomen zijn waar u het graag nog over willen hebben?	
Slotvraag	
Er is vandaag heel wat besproken geweest. Voor we afronden, hebt u nog vragen? Heel erg bedankt voor uw tijd en bijdrage aan onze studie. Indien u nog bijkomende vragen of opmerkingen hebt over dit interview, de data, of het onderzoek in het algemeen, aarzel dan niet om contact op te nemen met de uitvoerende onderzoeker (geef gegevens mee).	