Improving neonatal resuscitation: ethical aspects

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IMPROVING NEONATAL RESUSCITATION: ETHICAL ASPECTS

AN EMPIRICAL STUDY ON CONSENT FOR DELIVERY ROOM STUDIES AND RECORDING AND REVIEWING NEONATAL RESUSCITATION

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ISBN: 978-94-6416-514-2

Cover & Lay-out: Publiss | www.publiss.nl

Print: Ridderprint | www.ridderprint.nl

The research described in this thesis was supported by grants of the Leiden University Foundation and the NWO innovational research incentives scheme (recipient A.B. te Pas: VIDI 91716428).

The printing of this thesis was financially supported by Willem-Alexander Kinder-Ziekenhuis Leiden and Universiteitsbibliotheek Leiden.

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Proefschrift

ter verkrijging van

de graad van doctor aan de Universiteit Leiden,

op gezag van rector magnificus prof.dr.ir. H. Bijl,

volgens besluit van het college voor promoties

te verdedigen op donderdag 20 mei 2021

klokke 16:15 uur

door

Maria Christiane den Boer

geboren te Breda

in 1988

Promotores:	Prof. dr. A.B. te Pas
	Prof. dr. M.C. de Vries
Copromotor:	Dr. M. Houtlosser
Leden promotiecommissie:	Prof. dr. E.H.H.M. Rings
	Prof. dr. A.A.E. Verhagen (University of Groningen, the Netherlands)
	Prof. dr. M. van Dijk (Erasmus University Rotterdam, the Netherlands)
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As we tell stories about the lives of others, we learn how to imagine what another creature might feel in response to various events. At the same time, we identify with the other creature and learn something about ourselves.

Martha Nussbaum

(In: Take my advice: Letters to the next generation from people who know a thing or two. JL Harmon 2002, 177)

To my parents

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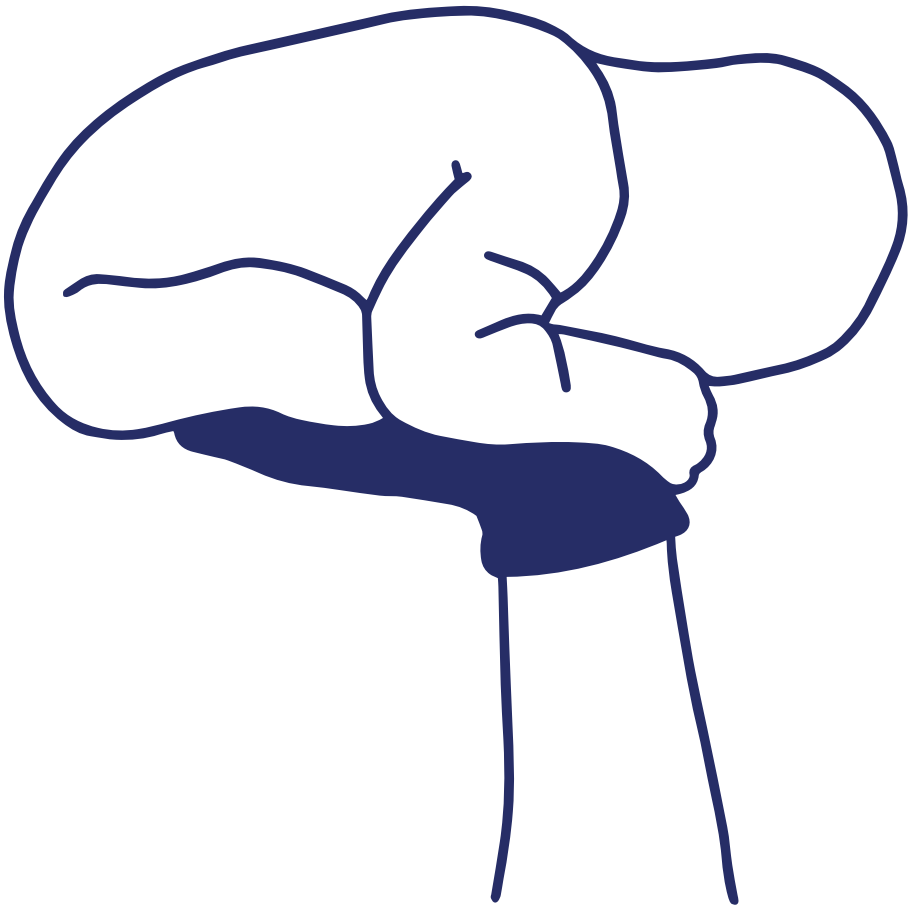
PART 1

PREFACE AND GENERAL INTRODUCTION



PREFACE

Virginia and Anthony[1] are expecting their first child. After 24 weeks of pregnancy, Virginias waters break. Virginias midwife refers Virginia to the hospital, where an obstetrician examines her and diagnoses preterm prelabour rupture of membranes (PPROM). Virginia is advised to stay in the hospital to closely monitor her and her baby for signs of infection. Subsequently, Virginia and Anthony are counselled by a neonatologist. Counselling includes detailed information about extreme prematurity, neonatal resuscitation, and the period that their baby might have to be in the hospital. Virginia and Anthony are then asked whether they want neonatal care providers to provide neonatal resuscitation or palliative comfort care in case Virginia will go into labour before 27 weeks of pregnancy.

During neonatal resuscitation, neonatal care providers evidently strive to provide the best possible care during neonatal resuscitation. The best possible care can be assured through conducting research and quality evaluation and improvement activities. However, as neonatal resuscitation oftentimes occurs in emergency situations and involves both very ill infants and physically and emotionally distressed parents, conducting these activities can be ethically challenging. This thesis discusses some of the ethical challenges that neonatal care providers of the neonatal intensive care unit (NICU) of the Leiden University Medical Center (LUMC) encounter in their endeavour to provide and study the best possible care during neonatal resuscitation[2].

Virginia and Anthony are very saddened and distressed about the imminent extremely premature birth of their baby. After deliberation among each other and with some family members, they request to provide neonatal resuscitation to their baby. In order to reduce the chance of complications in the infant from being born prematurely, Virginia is treated with magnesium sulfate and two courses of corticosteroids. A few days later, Virginia goes into labour. As the hospital where she is admitted has no NICU beds available, Virginia is transferred to the LUMC by ambulance. Soon after her arrival at the LUMC, Virginia gives birth to a boy: Peter. As time to approach Virginia and Anthony was lacking, the neonatal care providers decide to include Peter in the delivery room studies that are currently being performed at the NICU. For both studies, Peter is randomized into the experimental arm.

Conducting delivery room (DR) studies is much needed, but can be ethically challenging, as obtaining valid (proxy) informed consent for time critical studies from

[1] The presented case reflects a real case with fictive names.
[2] If people think about ethics and neonatal resuscitation, one of the first questions that might come to mind is 'should we provide neonatal resuscitation or palliative comfort care'? With the limits of viability decreasing, this question continues being relevant and actual. Although pressing, this thesis will not discuss the question whether or not to provide neonatal resuscitation, but discusses ethical challenges that are raised after the decision to provide neonatal resuscitation.

parents faced with an imminent premature birth can be arduous. In concordance with (inter)national guidelines, the ethics review committee of the LUMC allows participants to be included into specific studies without prior informed consent in emergency situations. Various DR studies have been conducted using this so-called deferred consent approach. When using a deferred consent approach, neonates can be included in a DR study without prior parental consent. As soon as possible, parents are then informed and asked for permission to continue their child's study participation and to use already obtained data.

Peter is born at a gestational age of 25 + 1 weeks with a birth weight of 800 gram. As Peter is not breathing, the neonatologist starts respiratory support. After sustained inflations and a few minutes of positive pressure ventilation, Peter starts breathing by himself. Peter is further stabilized on continuous positive airway pressure and subsequently transferred to the NICU. During the whole neonatal resuscitation, Anthony was standing nearby Peter, holding his little hand whenever possible.

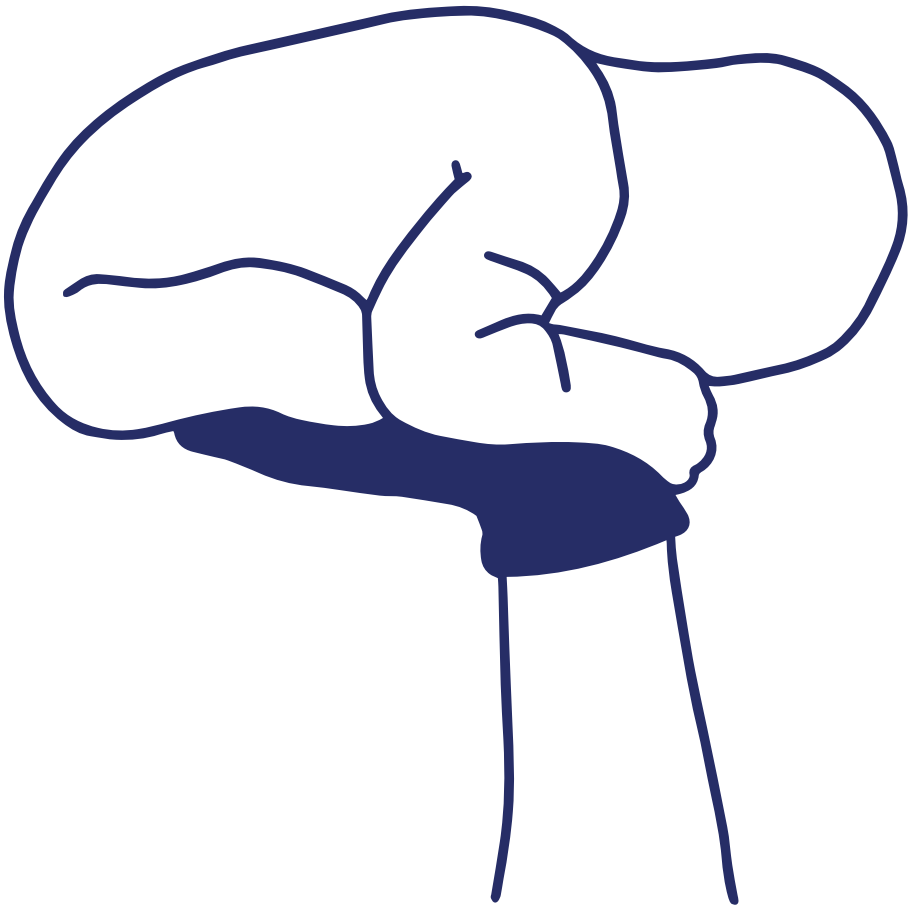
International guidelines on neonatal resuscitation recommend parental presence during neonatal resuscitation where possible. At the NICU of the LUMC parents are therefore encouraged to be present during neonatal resuscitation. However, mothers often cannot be present as resuscitation normally is not performed in the DR itself, but in an adjacent room.

When Peter has been admitted to the NICU for three weeks, Virginia and Anthony meet with their primary neonatal care provider, doctor Hoch, for their weekly appointment. During this appointment, Virginia mentions she has some questions about the resuscitation of Peter. Doctor Hoch therefore asks Virginia and Anthony whether they would like to review the recordings that were made during the neonatal resuscitation of Peter. One week later, doctor Hoch reviews the recordings with Virginia and Anthony and answers all their questions.

Virginia and Anthony are not the only ones reviewing the recordings of the resuscitation of Peter. Also, the neonatal care providers review the recordings during their weekly plenary audit of neonatal resuscitation. Doing so teaches them that in specific cases, pressures provided during respiratory support needs to be increased a lot in order to overcome obstruction.

For over ten years, both video and vital parameters of neonatal resuscitations performed at the NICU of the LUMC are recorded. Initially, these recordings were used for research purposes. Studies evaluating these recordings revealed that providers often diverge from the guideline for neonatal resuscitation and that documentation about the resuscitation in the infants medical record is often inaccurate or incomplete. In order to improve this, recordings are reviewed in weekly plenary audits since 2014. Furthermore, parents are offered the possibility to review the recording of their infant together with their primary neonatal care provider. Recording and reviewing neonatal resuscitation is now considered standard of care at the NICU of the LUMC, but implementation at other NICUs is impeded by various ethical concerns, including concerns about privacy, consent, medicolegal consequences and negative impact on providers.

The case presented above reveals some of the ethical challenges of improving neonatal resuscitation that will be addressed in this thesis. This thesis will discuss ethical challenges of consent for DR studies and recording and reviewing neonatal resuscitation in-depth. By combining empirical research with ethical reasoning, this thesis aims to provide guidance for the ethical conduct of activities that aim to improve neonatal resuscitation.



GENERAL INTRODUCTION

BACKGROUND AND AIMS OF THIS THESIS

Adapting from foetal to neonatal life is a complex physiological transition that probably requires the most substantial physiological changes that occur in life. Although most neonates adapt to these changes without assistance, about 10% of neonates require some form of support at birth(1), corresponding with yearly approximately 10 million babies requiring support worldwide(2). This support mostly consist of simple interventions, such as tactile stimulation or airway positioning or clearing, but 3% of all neonates require assisted ventilation, and 1% require endotracheal intubation or cardiac resuscitation.(3) In this thesis, the set of interventions to support the transitioning neonate will be referred to as neonatal resuscitation[3]. The key to successful neonatal resuscitation often is effective respiratory support. There is increasing evidence that providing inappropriate respiratory support can have severe consequences.(3, 4) Improving neonatal resuscitation performance can thus save lives and reduce morbidities.(5, 6)

Worldwide, approximately 15 million babies are born prematurely.(7) Of these, approximately 11,3% are born at a gestational age between 28 and 32 weeks (very preterm) and approximately 4,1% at a gestational age of less than 28 weeks (extremely preterm)(8), corresponding with approximately 2.3 million babies born at a gestational age of less than 32 weeks. A lower gestational age at birth is associated with an increased need of support, with up to 85% of extremely preterm infants requiring interventions at birth.(9) Furthermore, also the level of support that may be required is inversely related to the gestational age of the infant.(10) The increased need and intensity of support in very and extremely preterm neonates can be explained by the fact that transition from foetal to neonatal life is complicated by immaturity of many organ systems. Supporting these infants therefore requires (slightly) other strategies than supporting term neonates.(6) Just as many others, neonatal care providers working at the neonatal intensive care unit (NICU) of the Leiden University Medical Center (LUMC) participate in various activities to learn more about the best possible care for these very and extremely preterm neonates.

[3] As neonatal care providers at the LUMC strive to provide non-invasive care during neonatal transition, 'neonatal stabilization' may be more accurate to refer to the interventions performed to support most transitioning neonates. However, as 'neonatal resuscitation' is more commonly used in the international literature, this term will be used in this thesis.

IMPROVING NEONATAL RESUSCITATION

In 1880, obstetrician Robert Bruce reported how he introduced a specially made curved tube into the larynx of a term, non-vigorous neonate to perform artificial respiration for 35 minutes, after which natural respiration was established.(11) Since the 1940s, various papers reported methods to support breathing at birth, with Wilson and Roscoe reporting outcomes of one of the first controlled studies on neonatal resuscitation of preterm infants in 1958.(12) Theoretical knowledge about neonatal resuscitation is then rapidly advancing. However, improving neonatal resuscitation not solely requires improving theoretical knowledge, but also adapting clinical management. Establishment of guidelines for neonatal resuscitation was thus recommended, as well as the development of curriculums to teach these guidelines to neonatal care providers.(13) Efforts to do so resulted in international collaborations seeking consensus about neonatal resuscitation and evaluating evidence underpinning current practice. Doing so revealed that even after all this years, robust evidence for neonatal resuscitation interventions is still lacking.(14) Continued efforts to study and improve neonatal resuscitation are therefore needed.(13)

STUDY AIMS AND RESEARCH QUESTIONS

This thesis aims to explore some of the ethical challenges of studying and improving neonatal resuscitation by means of studying two cases: consent for delivery room (DR) studies and recording and reviewing neonatal resuscitation. The central research question of this thesis is: What are the ethical challenges of consent for DR studies and recording and reviewing neonatal resuscitation? In order to answer the central research question, various subquestions will be addressed, focused on stakeholders' perceptions on these issues. For example: how do neonatal care providers experience participating in recording and reviewing neonatal resuscitation? And how do parents experience being approached for consent for DR studies? By combining empirical research with ethical reasoning, this thesis aims to provide more insight in existing ethical challenges and guidance for the ethical conduct of initiatives aimed at studying and improving neonatal resuscitation. As such it aims to contribute to improving neonatal resuscitation.

METHODS

The importance of empirical research in bioethics is more and more recognized, as by combining ethical reasoning with empirical research, moral problems can be better addressed. Empirical data may enrich ethical reasoning as it may provide information about the moral principles that are most at stake in a given context. Furthermore, insight in the given context may generate new normative concerns. Moreover, empirical data may enable the development of concrete means to realize ethically justifiable behavior.(15) In this thesis ethical reasoning will be combined with empirical research by using empirical data in a so-called Reflective Equilibrium.

REFLECTIVE EQUILIBRIUM

The method of Reflective Equilibrium (RE) was developed by John Rawls in 1971(16) and consists of working back and forth among considered moral judgments about particular cases, the principles that govern these judgments, and the theoretical considerations behind the considered judgments and principles.(17) Various versions of the RE have been used to solve moral problems.(18) For the present study, the RE as described by de Vries and van Leeuwen(19) will be leading. This version of the RE is adjusted from the Network Model of van Willigenburg and Heeger(20) that added morally relevant facts to the RE, and additionally includes background theories and moral experiences of third persons, i.e. the individual people in the specific context, derived from empirical research (see figure 1). By adding empirical data in the RE, the risk of self-justification and bias can be reduced and the credibility of the reached RE can be increased.(19) It furthermore respects the moral wisdom of involved stakeholders.(21)

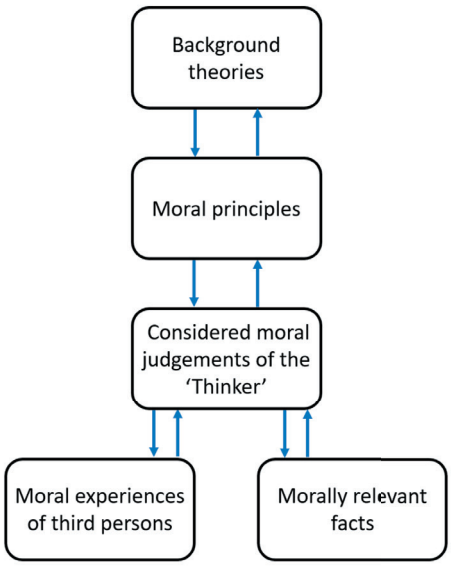


Figure 1. Model for Reflective Equilibrium used in the present study, based on De Vries and Van Leeuwen (2010).

THE CASES

CONSENT FOR DR STUDIES

For many years, neonatal care providers of the NICU of the LUMC have been involved in activities to improve neonatal resuscitation, with various DR studies being conducted since 2005. Conducting DR studies is important, as evidence regarding the best care for neonates that require interventions at birth is often lacking or of poor quality.(14) However, conducting DR studies can be ethically challenging. Approaching parents faced with an imminent premature birth for research participation can be burdensome(22) and the validity of consent obtained from emotionally and physically distressed parents can be challenged.(23, 24) Many parents will be approached unnecessarily, as their infants never become eligible for the specific DR studies, reflecting an unnecessary burden on both parents and research personnel.(25) In emergency situations, however, time to approach parents for research consent is often lacking, and neonates born in these situations are therefore often excluded from DR studies. As infants requiring resuscitation in an emergency situation are at the highest risk of a poor outcome, excluding these neonates is undesirable, as this

would result in selection bias.(26, 27) In order to manage challenges of this prospective consent approach, guidelines on conducting studies using a deferred consent approach were established. A deferred consent approach implies that neonates can be enrolled in a DR study without parental consent. As soon as reasonably possible, parents are informed and approached for their permission to continue their infant's study participation and to use already obtained data.(28)

In 2008, the NICU of the LUMC firstly used a deferred consent approach for a DR study.(29) Since then, various DR studies have been conducted using a deferred consent approach when time to approach parents for research consent was lacking, or approaching of parents for research consent was considered inappropriate.(30-33) The actual usage of a deferred consent approach raised various questions. For instance: when exactly is approaching parents inappropriate? How do providers experience approaching parents for deferred consent? How do parents consider being approached for deferred consent? These and other questions will be explored in this thesis.

RECORDING AND AUDITING[4] NEONATAL RESUSCITATION

In 2009, the NICU of the LUMC implemented recording neonatal resuscitation for research purposes. Recordings capture various vital parameters and imaging of the neonate and the providers' hands (see figure 2).

Recording neonatal resuscitation resulted in various insights in neonatal resuscitation, including what happens during manual inflations(34), the effects of sustained inflations(35), and physiological parameters during ventilation by mask or nasal tube(36). Evaluating recordings of neonatal stabilization revealed that providers frequently diverge from the prevailing guidelines and that mask technique is often inadequate.(37) Comparing recordings with the medical record furthermore revealed that documentation in the medical record is often incomplete or inaccurate.(38) In order to improve the quality of care provided during neonatal resuscitation and the documentation in the medical record, weekly plenary audits reviewing recordings of neonatal resuscitation were implemented in 2014. During audits, for which all NICU staff members are invited, provided care is reviewed, discussing, amongst others, mask technique, compliance to the prevailing local guideline, and clinical decision-making and alternative treatment options.

[4] In this thesis, the term 'audit' refers to the regular plenary meeting in which recordings of neonatal resuscitation are reviewed and discussed.

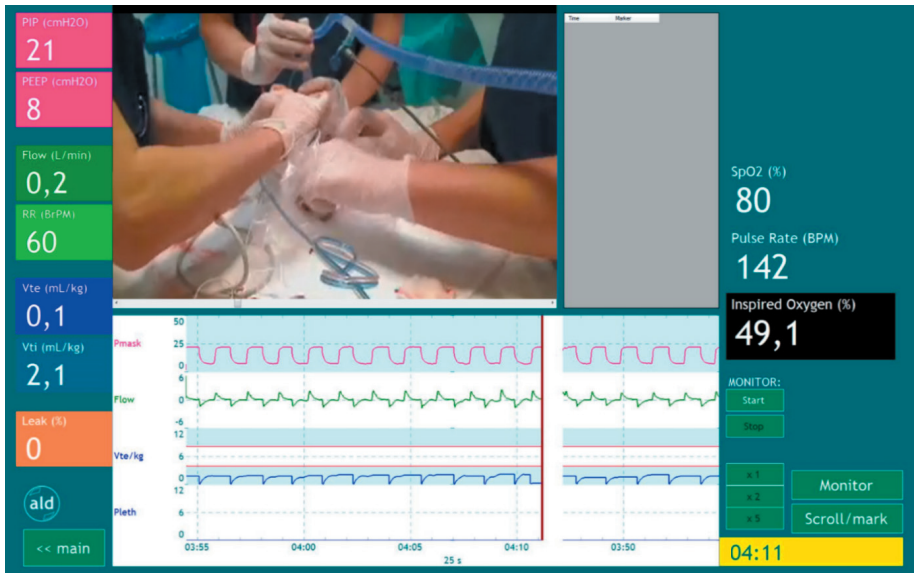


Figure 2. Recording neonatal resuscitation at the LUMC

Although the NICU of the LUMC successfully implemented recording and auditing neonatal resuscitation, implementation can be complicated due to various ethical dilemmas. For instance, should providers and parents consent to the recordings? How to deal with the privacy of the providers, the neonate and parents? Could recordings be stored to use them for further research, or should recordings be deleted after initial use? And what would be the legal status of recordings in court? These and other ethical challenges of recording and auditing neonatal resuscitation will be addressed in this thesis.

Using RE for the two cases, consent for DR studies and recording and auditing neonatal resuscitation, this thesis explores the moral landscape of improving neonatal resuscitation. These cases are exemplary for the complexity of the context of improving neonatal resuscitation. In the case of consent for DR studies, a fairly settled body of norms exists, however, appealing to these norms create new ethical challenges. Appealing to existing norms thus does not lead to a balanced moral practice. In contrast, guidelines for recording and auditing neonatal resuscitation fall short, resulting in questions about the moral justification for the practice. Thus, for both cases, coherence between theory and practice is lacking. In the present study, the moral experiences of third persons will be explored. By doing so, this thesis aims

to provide more insight into existing tensions between theory and practice and in how these tensions could be addressed in order to offer scope for the ethical conduct of a great variety of activities to study and improve neonatal resuscitation.

BACKGROUND THEORIES, MORAL PRINCIPLES AND MORALLY RELEVANT FACTS

Background theories provide the normative background of the principles used within a RE.(19) Theories that might be of importance in the context of improving neonatal resuscitation are theories of professionalism, theories of the child's best interest and theories of research with vulnerable populations. Moral principles that might be relevant are the four principles of biomedical ethics(39) - non-maleficence, beneficence, autonomy and justice-, as well as voluntariness, vulnerability and informed consent. Morally relevant facts are facts that can justifiably be called upon as a reason to support a particular moral judgement.(40) For improving neonatal resuscitation, morally relevant facts might be outcomes after providing neonatal resuscitation, the lack of robust evidence for DR interventions, and guidelines on providing active care to extremely preterm infants. By going back and forth between theory and practice, insight will be provided in whether these and/or other background theories, moral principles and morally relevant facts are relevant for furthering the practice of improving neonatal resuscitation.

MORAL EXPERIENCES OF THIRD PERSONS

Various stakeholders are affected by ethical challenges of improving neonatal resuscitation, including the neonate, parents and providers. Obviously, moral experiences of neonates cannot be studied. Therefore, this thesis solely explores the moral experiences of parents and neonatal care providers. In order to cover a range of potentially relevant perspectives, a qualitative bicentre project was performed at two NICUs: the NICU of the LUMC in Leiden, the Netherlands, and the NICU of the Hospital of the University of Pennsylvania (HUP), in Philadelphia, United States of America. These NICUs regularly participate in the same DR studies, but differ in their consent approaches. Furthermore, both NICUs conduct regular plenary audits of neonatal resuscitation, however, the way in which neonatal resuscitation is recorded diverges: the LUMC records video of providers' hands and various physiological parameters, whereas the HUP records only a limited number of physiological parameters, but both audio and video from two angles (see Chapter 5, figure 1). The research project was approved by the Ethics Review Committee of the LUMC.

Data was collected through two qualitative research methods: participant observations and semi-structured in-depth interviews. At both centres, participants observations were conducted, and neonatal care providers were invited to participate in semi-structured interviews exploring their experiences with and perceptions of recording and reviewing neonatal resuscitation and consent for DR studies. Additionally, parents of very and extremely premature infants admitted to the NICU of the LUMC were invited to participate in semi-structured interviews exploring their perceptions of and experiences with reviewing recordings of the neonatal resuscitation of their infant and consent for DR studies.

All observations and interviews were conducted by the author of this thesis. Consistent with standard qualitative research techniques, interviews were performed using topic lists that were adapted through an iterative process to ensure that the questions captured all relevant emerging themes.(41) Inclusion of participants continued until thematic saturation(42) was reached. In consistence with standards in qualitative research, participant observations were reported in field notes.(43)

Interviews with providers were conducted at the hospital and lasted between 24 and 93 minutes. Topics included demographics, perceptions of and experiences with recording and reviewing neonatal resuscitation, perceptions of the goal of recording and reviewing neonatal resuscitation, educational benefits of recording and reviewing neonatal resuscitation, impact of being recorded and reviewed, recording and reviewing neonatal resuscitation as a tool for transparency, parental involvement in recording and reviewing neonatal resuscitation and deferred consent for DR studies. An overview of participant characteristics can be found in table 1.

Interviews with parents lasted between 43 and 94 minutes and were conducted at the hospital or at the parents' home. Topics included demographics, experiences with and perceptions of reviewing recordings of the neonatal resuscitation of their infant, perceptions of improving the quality of neonatal resuscitation, and experiences with and perceptions of counselling and consent for DR studies. An overview of participant characteristics can be found in table 2.

With permission of participants, all interviews were audio-recorded and manually transcribed verbatim. Field notes and transcripts were deidentified. Data were firstly reviewed in a process of open coding, subsequently, data were thematically analysed. During consensus meetings, main themes emerged. Using an iterative approach, these

Table 1. Participant characteristics providers

Code	Profession	Sex	Age (years)	Years at NICU (years)	Center
HCP01	Consultant neonatologist	Male	49	14	LUMC
HCP02	Nurse/Researcher	Female	48	19	LUMC
HCP03	Consultant neonatologist	Female	37	3.5	LUMC
HCP04	Consultant neonatologist	Male	42	4.5	LUMC
HCP05	Resident	Female	27	0.5	LUMC
HCP06	Fellow	Female	35	1.5	LUMC
HCP07	Nurse/Researcher	Female	29	8	LUMC
HCP08	Physician Assistant	Female	33	11	LUMC
HCP09	Nurse	Female	54	30	LUMC
HCP10	Fellow	Female	31	1.5	LUMC
HCP11	Resident	Male	27	0.5	LUMC
HCP12	Nurse	Female	56	17	LUMC
HCP13	Physician Assistant	Female	56	31	LUMC
HCP14	Consultant neonatologist	Male	43	0.5	LUMC
HCP15	Intern	Female	27	0.5	LUMC
HCP16	Resident/Researcher	Male	30	3	LUMC
HCP17	Nurse	Female	30	5.5	LUMC
HCP18	Nurse	Female	26	2	LUMC
HCP19	Nurse trainee	Female	28	1	LUMC
HCP20	Fellow	Male	41	1	LUMC
HCP21	Consultant neonatologist	Male	43	12	LUMC
HCP22	Consultant neonatologist	Female	54	21	LUMC
HCP23	Consultant neonatologist	Male	49	17	LUMC
HCP24	Physician Assistant	Female	45	16	LUMC
HCP25	Researcher	Female	31	1.5	HUP
HCP26	Fellow	Female	32	1.5	HUP
HCP27	Consultant neonatologist	Female	38	6	HUP
HCP28	Consultant neonatologist	Female	35	4	HUP
HCP29	Physician Assistant	Female	34	9	HUP
HCP30	Nurse Practitioner	Female	33	11	HUP
HCP31	Consultant neonatologist	Female	35	4	HUP
HCP32	Consultant neonatologist	Male	34	4	HUP
HCP33	Respiratory Therapist	Male	44	14	HUP
HCP34	Consultant neonatologist	Male	73	46	HUP
HCP35	Respiratory Therapist	Female	44	16	HUP
HCP36	Fellow	Male	35	1.5	HUP
HCP37	Fellow	Male	32	1.5	HUP
HCP38	Fellow	Female	35	0.5	HUP
HCP39	Fellow	Female	33	0.5	HUP
HCP40	Resource Nurse/Nurse Practitioner	Female	34	12	HUP
HCP41	Resource Nurse	Female	28	5	HUP
HCP42	Registered Nurse	Female	58	15	HUP
HCP43	Registered Nurse/Respiratory Therapist	Female	36	23	HUP
HCP44	Registered Nurse	Female	63	41	HUP
HCP45	Resident	Female	31	0.5	HUP
HCP46	Consultant neonatologist	Male	44	15	HUP
HCP47	Fellow	Female	31	1.5	HUP
HCP48	Consultant neonatologist	Male	48	15	HUP

Table 2. Participant characteristics parents

Demographics interviews with parents ***(n = 13 interviews with 25 parents of 19 infants)***	
Fathers *n* (%)	12 (48)
Bereaved *n parents* (%)	2 (8)
Age median (range)	
Mothers	32 (23-41)
Fathers	34 (24-45)
Present during resuscitation *n* (%)	
Mothers	2 (15)*
Fathers	11 (92)
Mode of delivery *n infants* (%)	
Caesarean section	11 (58)
Vaginal	8 (42)
Parity *n mothers* (%)	
Nulliparous	9 (69)
Multiparous	4 (31)
Information provision about DR studies *n parental dyads (%)*	
Not informed about DR studies	1 (8)
Informed about one study	6 (46)
Informed about two DR studies	5 (38)
Informed using deferred consent approach	1 (8)
Consented *n parental dyads (%)*	
Consented to all DR studies	9 (70)
Consented to one, refused another	3 (23)
Refused all DR studies	0 (0)
Informed, but no time to respond	1 (8)
Resuscitation *n infants* (%)	
CPAP	19 (100)
PPV	15 (79)
Intubation	1 (5)
Cardiac resuscitation	1(5)

main themes were explored more in-depth in consecutive interviews. The qualitative data analysis software program Atlas ti (V7.0 and V.8.4), a software program that helps to sort, structure, describe and retrieve qualitative data(44), was used to analyse data.

THE 'THINKER' EMBEDDED

The present study was conducted while the author of this thesis, in the context of RE referred to as the 'Thinker', was embedded within the medical team of the NICU of the LUMC. During the study period, the position of the 'Thinker' changed a lot: while firstly studying the phenomenon of auditing neonatal resuscitation and consent for

DR studies as a relative outsider, the author became a 'third person' herself, as she approached parents for consent for DR studies and functioned as the coordinator of the audit. This fluid position of the researcher has various benefits, but also has pitfalls.(45) Being part of the medical team facilitated rapport, both with providers and parents, but may also have made participants reluctant to be critical. Furthermore, being a 'third person' enabled various valuable participant observations, but proximity and distance always needed to be balanced in order for observations to make sense. (46) Proximity and distance were for instance balanced by researcher triangulation: data were independently analysed and discussed by the author of this thesis and her supervisor working at the Department of Medical Ethics and Health Law of the LUMC.

RESEARCH AIMS

In the present study, moral experiences of stakeholders of improving neonatal resuscitation will be studied and added to the RE. By going back and forth between normative and empirical data, between information stemming from theory (moral principles and background theories) and from practice (morally relevant facts and moral experiences of third persons), the moral landscape of improving neonatal resuscitation will be explored.

OUTLINE OF THE THESIS

In this thesis, two cases will be addressed. Part One of this thesis focuses on consent for DR studies. **Chapter 1** describes the providers' perspective regarding deferred consent for DR studies. Insight in the providers' perspectives shows that deferred consent for DR studies is acceptable, but that the actual usage of the approach can be improved. **Chapter 2** describes the parental perspective regarding consent for DR studies. Interviews with parents showed that, despite being in an emotional and stressful situation, most parents considered being approached for DR studies as valuable. This was mostly due to appropriate timing and communication, compassion and the researcher not being obtrusive. Parents furthermore expressed the need for some sense of control of what happens to their infant, especially in the case of interventions that they perceive as risky. Using insights from the present study, a new approach to deferred consent is proposed in **Chapter 3**. By approaching deferred consent within a Learning Health System, uniform and evidence-based criteria for deferred consent for DR studies can be established.

Part Two of this thesis focuses on recording and auditing neonatal resuscitation. **Chapter 4** provides an overview of ethical challenges and moral principles of recording and auditing neonatal resuscitation. In this review, it is argued that ethical dilemmas arise as recordings of neonatal resuscitation are used in several domains of health care that all have their specific moral framework with requirements and conditions on issues such as privacy, consent and data storage. **Chapter 5** describes the providers' perspective regarding recording and auditing neonatal resuscitation. Providers consider recording and auditing neonatal resuscitation as highly beneficial for learning and improving resuscitation skills. The experiences of the NICU of the LUMC with auditing neonatal resuscitation are recapitulated in **Chapter 6**. In this perspective, it is argued that auditing neonatal resuscitation can be a valuable tool to identify and address various areas for improvement which also allows other NICUs to implement audits of neonatal resuscitation fitting to their improvement needs. In **Chapter 7** parental experiences with reviewing recordings of the neonatal resuscitation of their infant are reported. Parents consider reviewing these recordings valuable for coping with the trauma of neonatal resuscitation and highly value a copy of the video recording as a keepsake.

In the **General Discussion**, the main findings of the present study are assembled and discussed. Future perspectives are then considered. This thesis concludes with a summary of the present study in English and Dutch.

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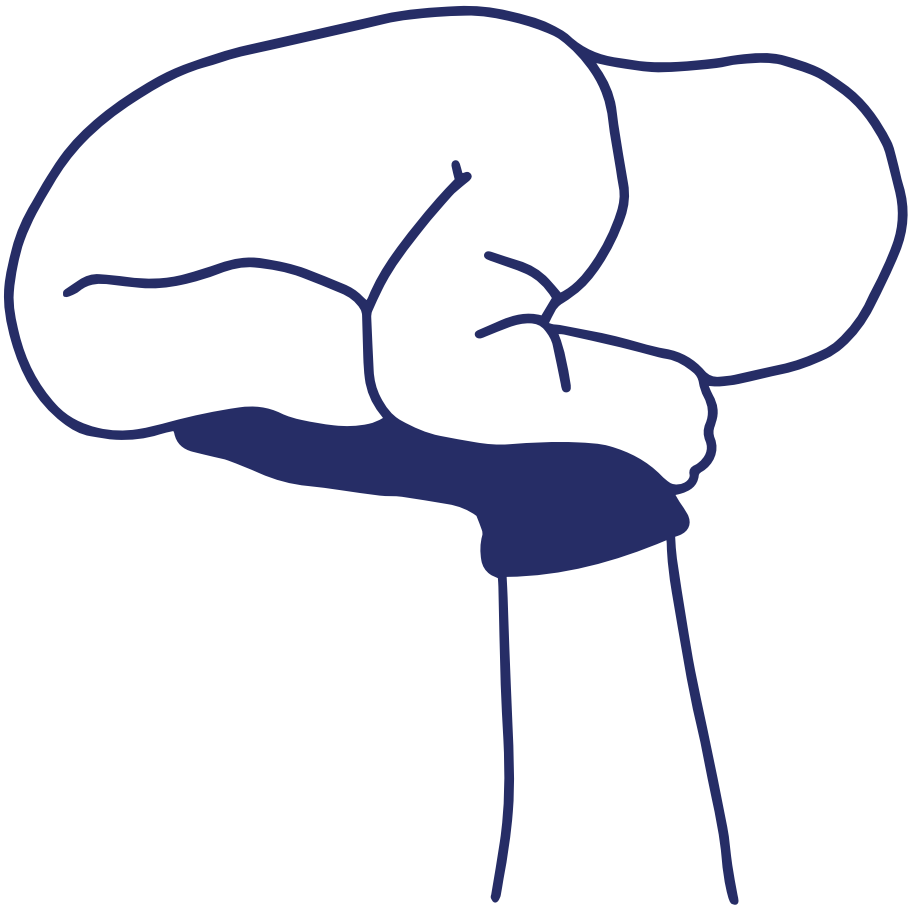
PART 2

CONSENT FOR DELIVERY ROOM STUDIES



CHAPTER 1

DEFERRED CONSENT FOR DELIVERY ROOM STUDIES:

THE PROVIDERS' PERSPECTIVE

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Archives of Disease in Childhood - Fetal and Neonatal Edition 2020;105:310-315

ABSTRACT

OBJECTIVE

To gain insight into neonatal care providers' perceptions of deferred consent for delivery room (DR) studies in actual scenarios.

METHODS

We conducted semistructured interviews with 46 neonatal intensive care unit (NICU) staff members of the Leiden University Medical Center (the Netherlands) and the Hospital of the University of Pennsylvania (USA). At the time interviews were conducted, both NICUs conducted the same DR studies, but differed in their consent approaches. Interviews were audio-recorded, transcribed and analysed using the qualitative data analysis software Atlas.ti V.7.0.

RESULTS

Although providers reported to regard the prospective consent approach as the most preferable consent approach, they acknowledged that a deferred consent approach is needed for high-quality DR management. However, providers reported concerns about parental autonomy, approaching parents for consent and ethical review of study protocols that include a deferred consent approach. Providers furthermore differed in perceived appropriateness of a deferred consent approach for the studies that were being conducted at their NICUs. Providers with first-hand experience with deferred consent reported positive experiences that they attributed to appropriate communication and timing of approaching parents for consent.

CONCLUSION

Insight into providers' perceptions of deferred consent for DR studies in actual scenarios suggests that a deferred consent approach is considered acceptable, but that actual usage of the approach for DR studies can be improved on.

INTRODUCTION

Conducting delivery room (DR) studies is much needed, but can be ethically problematic, as obtaining valid informed consent for time-critical studies from parents faced with an imminent premature birth can be challenging.(1–3) Neonates that require emergency resuscitation are often the most sick neonates, and excluding them from research would cause selection bias, resulting in decreased generalisability and less externally valid research.(4,5) Legislation and guidelines on conducting studies with an exception for informed consent in emergency situations were established, allowing investigators to enter neonates in study protocols that meet strict requirements without parental consent.(6–8) As soon as reasonably possible, parents are informed about their child's study participation (waiver of consent, as stipulated in American legislation) or informed and asked for permission to continue their child's study participation and to use already obtained data (retrospective, or deferred consent, as stipulated in European legislation).

Several studies reported usage of a deferred consent approach for DR studies.(9–17) Using a deferred consent approach can speed up patient accrual and reduce selection bias.(18,19) Concerns about using a deferred consent approach, such as concerns about the impact on the provider–parent relationship, were reported as well.(20,21) However, as jurisdiction and guidance for deferred consent vary, actual experience with deferred consent for DR studies is limited and indepth understanding of providers' views on deferred consent for DR studies is lacking.(22) As part of a larger project,(23,24) we conducted interviews with providers of neonatal intensive care units (NICUs) that participate in the same studies, but differ in their consent approaches. With this paper, we aim to gain insight into providers' perceptions of deferred consent for DR studies in actual scenarios.

METHODS

For a research project studying ethical aspects of improving DR management, semistructured interviews were conducted with NICU staff members working at the NICU of the Leiden University Medical Center (LUMC) in the Netherlands and the Hospital of the University of Pennsylvania (HUP) in the USA. The LUMC and the HUP are both tertiary perinatal centres with an average of 800 admissions a year.

RESEARCH AT THE LUMC AND THE HUP

Just as many NICUs, the LUMC and the HUP strive to improve the quality of their DR management. Both NICUs routinely record DR management. These recordings are used for plenary review meetings, as well as for education and for data collection for observational studies. When interviews were conducted, the LUMC and the HUP collaborated in two multicentre trials: a superiority trial comparing two initial sustained inflations combined with positive end-expiratory pressure (PEEP) with initial intermittent positive pressure ventilation combined with PEEP (Sustained Aeration of Infant Lungs (SAIL) trial)(25), and a study assessing the efficiency of a respiratory functioning monitor (MOnitoring Neonatal Resuscitation (MONitoR) trial; trial registration number: NCT03256578). At the HUP, neonates could only be entered into these study protocols after parental consent, obtained prior to randomisation, that is, prior to the delivery (prospective consent), whereas at the LUMC a deferred consent approach could also be used in case of an imminent delivery or when approaching parents for consent was considered inappropriate.

Experience with usage of a deferred consent approach differed strongly between NICUs: at the LUMC, a deferred consent approach was already used for various DR studies since 2014, whereas at the HUP a waiver of consent had been used for one observational DR study.

DATA COLLECTION

Interviews were conducted by MCdB. Using semistructured interview guides, participants were questioned about their experiences with and perceptions of a deferred consent approach for DR studies. To produce maximum variation in the study sample, participants were selected through purposive sampling, that is, a non-probability sampling method that is commonly used in qualitative research to cover a range of potentially relevant perspectives.(26) Inclusion of participants continued until thematic saturation was reached on providers' perspectives on recording and reviewing neonatal resuscitation.(23)

ANALYSIS

Data collection and analysis occurred simultaneously. Interviews were audio-recorded and transcribed. Data were first reviewed in a process of open coding, and subsequently data were thematically analysed. MCdB and MH independently

coded several transcripts. During consensus meetings, main themes connected to deferred consent emerged. Using an iterative approach, providers were specifically asked about these themes in further interviews. The qualitative data analysis software program Atlas.ti (V.7.0), a software program that helps to sort, structure, describe and retrieve qualitative data,(27) was used to analyse data.

RESULTS

From February to December 2017, 46 NICU staff members were interviewed, including attendings, physician assistants, respiratory therapists, registered nurses and investigators involved in DR studies. Interviews lasted 45min on average. Respondents differed in their experience with conducting DR studies and approaching parents for consent for study participation. Further participant characteristics are summarised in table 1.

Table 1. Participant characteristics

	LUMC (n = 24)	**HUP** (n = 22)	**Total** (n = 46)
Male (%)	33	29	31
Age median (range)	39 (26 – 54)	41 (28 – 77)	41 (26 – 77)
Years of experience at NICU median (range)	9.2 (0.5 – 31)	10.7 (0.5 – 46)	9.9 (0.5 – 46)
Staff members (%)			
Attending	29	32	30
Neonatal fellow	13	27	20
Physician assistant	13	5	9
Respiratory therapist	N/A	9	4
Nurse practitioner	N/A	9	4
Registered nurse	29	22	26
Paediatric resident	13	0	7
Medical student	4	0	2
Involved in DR studies	13	9	11

Although experience with usage of a deferred consent approach differed strongly between NICUs, similar perspectives were reported by providers of both centres. Four main themes were identified: acceptability of the deferred consent approach; the role of parents; intervention, standard of care and risk; and ethical oversight.

ACCEPTABILITY OF THE DEFERRED CONSENT APPROACH

Although providers reported to regard the prospective consent approach as the most preferable consent approach, they acknowledged that deferred consent is much needed to reduce selection bias, resulting in high-quality research that is generalisable to the whole population of neonates that require support at birth. Providers emphasised several benefits and concerns of both a deferred and a prospective consent approach (table 2).

Table 2. Illustrative quotes of reported benefits and concerns of prospective and deferred consent

	PROSPECTIVE CONSENT	DEFERRED CONSENT
BENEFITS	Golden standard "In my opinion, a good investigator holds the responsibility to ask for consent prospectively. That's just the best way." (LHCP21)	Less abstract "Well, some parents said: I am so happy we were not approached antenatally. We would not have had any idea of what we would have been consenting to." (LHCP02)
	Adds parental autonomy "So I think that while we do provide some parental autonomy, we actually limit a lot of what they are allowed to say yes or no to. So I think when it's new studies, when it's other things, I feel like that sort of has to be part of the parental autonomy." (HHCP15)	Improves generalizability "I think that if you want a representative study population, you just need to have the possibility. (…) And if you cannot include people that enter the hospital and directly give birth, you will draw conclusions that do not apply to these cases." (LHCP21)
	Relationship "You are not going to tell them all these things afterwards. I think that would be sneaky. So for the relationship of trust it's very important." (LHCP20)	Improves informed consent "And, you know, in the froze of preterm labour, an hour before she delivers, that might be not the best time to get consent from anybody. So, you actually make it a better consent if you do it afterwards." (HHCP24)

	PROSPECTIVE CONSENT	DEFERRED CONSENT
CONCERNS	Burden parents unnecessarily "And it happens frequently that parents did consent, but that parents pass the study term. And for me it is very unpleasant to burden parents with study protocols they end up not being eligible for." (LHCP02)	Parents cannot refuse anymore "But I also often notice that when parents are approached for deferred consent, they would easier consent as it has already been accomplished. And I do find that difficult, because it almost feels like that parents indicate they don't really have a choice." (LHCP07)
	Burden parents in a stressful situation "These parents are suddenly in such another mode and oftentimes it's just not sound to burden these people with that question, like, do you wanna participate in this study? That's just of a secondary importance to them." (LHCP03)	Mistrust "[I]f you are gonna say: we have already randomized, we have already done something different than we would otherwise do, that may stir up mistrust. (..) [T]hen they may think: well, what else are you gonna do to my child without me knowing about it?" (LHCP10)
	Too much information to process "And, you know, there is so much to tell when you counsel parents, you are not gonna elaborate on scientific research or approach them for consent in such a difficult time." (LHCP06)	Relationship "Because there only has to be one or two people who do have a problem with that. That would be very unpleasant. Especially when you are establishing a therapeutic relationship." (LHCP04)
	Potential benefit denied "I think if there's a potential for benefit, that's going to be, what's the word I'm looking for, denied to the families, then I feel more inclined to offer deferred consent for them." (HHCP11)	Right not to participate in research "Or there may be people that do not want to contribute to science at all, or that have other ideas about that. I do feel that we should respect that." (LHCP10)
	Selection bias "And if you can only get prospective consent and you know you're gonna end up with this selected and somewhat biased population, I don't know on a population level that that's the best thing for preterms either." (HHCP03)	Selection bias "I think if something went really well, they may be, you know, OK, I'll sign it. Whereas if you have a situation where something really didn't go well, I feel like if you just came to them and tell that mom that she lost her baby, like, you're not gonna get somebody who's gonna sign that paper." (HHCP16)
	Value of informed consent "Like, to play devil's side, the difference between getting consent from a mother who is in actively birth, and very stressed, like are you really getting a true informed consent, are you really explaining it in issue, understanding it?" (HHCP23)	Impact on the image of research "But you do risk that people would feel treated like guinea pigs. And if there's something you should not want to happen, it is that scientific research is gonna be labelled with 'guinea pigs'." (LHCP14)

LHCP: LUMC Health Care Professional; HHCP: HUP Health Care Professional

Having first-hand experience with deferred consent for DR studies improved acceptability of the deferred consent approach. However, first-hand experience did not evidently improve acceptability of a deferred consent approach for the specific studies that were being conducted at the NICUs. Perceived appropriateness of a deferred consent approach for the MONitoR and the SAIL trials varied widely among providers, both with and without experience with deferred consent. Providers stated to feel comfortable with a deferred consent approach for observational studies using recordings of DR management, assuming that parents can ask for the recordings to be deleted. For other studies, providers reported that the appropriateness of a deferred consent approach needs to be considered explicitly. Providers reported various preconditions for usage of a deferred consent approach (table 3), with special emphasis on communication to the parents, the need to delete data when parents refuse study participation of their child, and interventions that do not add risk, pain or discomfort, and are close to the standard of care.

Providers who were experienced in approaching parents for deferred consent reported they sometimes felt constrained to do so. However, providers reported that despite these feelings, it is always important to obtain parental consent for continued study participation and the usage of already obtained data, as this would provide parents with at least some autonomy. Providers thus preferred a deferred consent approach over a waiver of consent approach.

ROLE OF PARENTS

An important theme in considerations about the acceptability of deferred consent for DR studies was parental autonomy. Some providers stated that autonomy about study participation sometimes seems to be the only autonomy parents facing an imminent premature birth have, thus highlighting the importance of prospective consent. On the opposite, several providers considered prospective consent inappropriate, as this places too much burden on parents. Many providers emphasised the parental right not to participate in research. Some providers suggested that the deferred consent approach could be strengthened by adding an antenatal opt-out for research in general.

An important concern of providers was that deferred consent changes the question you ask parents when approaching them for consent. Providers felt that approaching parents for deferred consent could be considered by parents as fait accompli, pre-

Table 3. Illustrative quotes of reported requirements for usage of a deferred consent approach

REQUIREMENTS	
RISK	"I think it depends on the level of risk of the research. I think if you're comparing things that are fairly equable, or you're just trying to collect information, there's not a really significant intervention, then I think a postnatal consent is completely justified. I think where you need an antenatal consent is where you really have, where you really expect that there's a significant amount of risk depending on the arm that the baby gets allocated to, or randomized to." (HHCP24)
MINIMAL INVASIVE	"I can imagine that if you are gonna be invasive, or if you are gonna hurt the child, or if you need to do an intervention in order to be able to make some observations, or if you have to draw blood, well, that's another issue. In those cases you do want to have prospective consent." (LHCP11)
PROVIDERS PROFICIENT	"[W]e're really good at the protocol we know how to do, and sometimes when you introduce new protocols, even if it like has been shown to not be inferior in other studies, if we're not as good at doing it, like it may be inferior. So I think the providers also need to be proficient in that method, before, if there were gonna be a deferred consent there." (HHCP15)
CLOSE TO STANDARD OF CARE	"[I]f what you're doing isn't very far from the standard of care, you might be able to get away with a waiver of consent." (HHCP07)
NO DELAY	"If there was a step that would delay somehow the care of the infant, than I think that would be a different issue." (HHCP06)
CLINICAL EQUIPOISE	"So then I think it takes a little bit more careful thought and, you know, data maybe from animal models. You know, success rates in intubation in small animals, to make sure that the risk is not a huge difference." (HHCP22)
NO NEW DRUG	"[I]f I were a parent, I wouldn't what to be like, oh, we, we already, you know, gave your child an injection of this medication." (HHCP01)
GOOD COMMUNICATION	"So, I do think that parents, it just has to be asked properly, and deferred consent, fine! But that all depends on how you approach them and what you tell them. And whether you show some empathy towards them." (LHCP09)
NEED FOR OVERSIGHT	"It's not something some investigators just come up with, but something that has been reviewed by a committee of wise people. Independent people." (LHCP20)
DATA DELETED WHEN PARENTS REFUSE	"I think that would be fine. And, when parents refuse, I think you do have to delete the data." (LHCP12)

LHCP: LUMC Health Care Professional; HHCP: HUP Health Care Professional

venting parents to refuse continued study participation and the usage of already collected data. Some providers worried this could consequently result in parental mistrust or parents who feel their child was used as a 'guinea pig'. Experiences of Dutch providers, however, refute these concerns. Although interviewed providers reported to sometimes feel constrained by approaching parents for deferred consent, none of them had experienced a negative reaction from parents. According to providers, this was mostly due to appropriate communication and timing of approaching parents for deferred consent.

INTERVENTION, STANDARD OF CARE AND RISK

When asked for the acceptability of deferred consent for DR studies, providers related acceptability to study interventions and the incorporated risk of study procedures. Study protocols using a deferred consent approach should preferably not be interventional, but if interventional, study interventions should be close to the standard of care, or comparing two standards of care. Some providers highlighted that comparative effectiveness studies comparing two standards of care could still incorporate risk if providers are not proficient in both methods. Furthermore, some providers considered that participating in interventional studies adds a risk, whereas others pointed out that not participating in these studies adds the risk of not receiving the best treatment.

Most providers emphasised minimal risk as a precondition for deferred consent for DR studies. However, there was no consensus on how minimal risk should be defined or valued. Providers did not agree on how much risk was involved in the studies that were being conducted at both NICUs when interviews were conducted. How much risk was involved in studies was mostly approached intuitively and varied widely among providers. Consequently, acceptability of a deferred consent approach for specific study protocols also differed considerably among providers.

ETHICAL OVERSIGHT

Providers reported to feel backed up in using a deferred consent approach for DR studies by jurisdiction and ethical approval from the research ethics committee (REC). According to providers, reviewing study protocols that use a deferred consent approach for DR studies demands special expertise, but they were not sure whether the present REC actually has this expertise. Providers reported to be unsure about who could actually add this expertise to the REC. Some providers suggested that RECs

should involve parents in decision-making about the appropriateness of consent procedures for specific study procedures, while others suggested that RECs should consult independent neonatologists.

DISCUSSION

Interviewed providers regarded the prospective consent approach as the most preferable approach, but acknowledged that deferred consent is needed for specific DR studies. However, providers reported concerns about parental autonomy, the right not to participate in research, approaching parents for consent and ethical review of study protocols that include a deferred consent approach. Providers furthermore differed in perceived appropriateness of a deferred consent approach for the DR studies that were being conducted at their NICUs. Providers with first-hand experience with deferred consent reported positive experiences that they attributed to appropriate communication and timing of approaching parents for consent.

Acceptance of a deferred consent approach varies considerably around the world.(28) Providers' acceptability of a deferred consent approach for actual paediatric emergency studies has been reported before.(20,21) Our study suggests that having firsthand experience with deferred consent improves acceptability of the deferred consent approach, which was also reported by Woolfall et al.(20) In our study, however, first-hand experience did not evidently improve acceptability of a deferred consent approach for the specific studies that were being conducted at the NICUs. Interviewed providers reported several factors that influence their considered appropriateness of the usage of deferred consent for actual study protocols.

Interviewed providers reported risk as an important factor that influences the appropriateness of deferred consent for specific DR study protocols. This was also reported by Foglia et al.(29) Risk is an important ethical issue in research involving children. Risks incorporated with the standard treatment in the DR should not be considered as risks of participating in a DR study.(30) However, as the recent controversy about the Surfactant, Positive Pressure, and Oxygenation Randomized Trial(31) illustrates, differentiating between the two can be challenging.(32)

In our study, providers too reported that defining risk can be challenging, and that this is often done intuitively. Challenges of risk classifications have been reported earlier. Rossi and Nelson(33) stated that judgements about risk are both normative

and heavily intuitive in nature. Lantos et al(34) furthermore reported that risk classifications are marked by a high degree of variability and confusion. Local, regional or national differences in standards of care may furthermore complicate discussions about risk classifications of study protocols, which can be illustrated by the SAIL trial. In the Netherlands, the SAIL trial was considered as a comparative effectiveness study comparing two standards of care, as both interventions are commonly used in the Netherlands. Hence, this study was considered as a minimal risk study. In the USA, however, the study intervention of the SAIL trial was considered as an intervention that was not according to the prevailing national guideline, which according to interviewed providers may add medicolegal risks. Consequently, some American providers would consider a deferred consent approach for the SAIL trial appropriate in the Netherlands, but inappropriate in the USA. Thus, the risk involved in specific study procedures may also be perceived differently due to study classification and associated local legislation.

Perceived risk of DR study procedures may vary due to many factors. Variations in perceived risk may not only exist within a group of stakeholders, as in our study, but may as well exist between stakeholder groups. These variations may explain why providers doubt whether the present RECs have the required expertise to review DR protocols that include a deferred consent approach: when minimal risk is considered as an important requirement for usage of deferred consent, but risk is perceived differently within and between stakeholder groups, then how do you decide whether a study incorporates minimal risk? Some interviewed providers suggested that inviting parents to RECs may provide a solution. Involving parents in the ethical review of study protocols was also recommended by Janvier et al(35), but actual membership to an REC is considered complex. Janvier et al(35) therefore recommended to start with more easily achievable goals when planning to involve parents in research, such as the revision and improvement of consent forms, collaboration in the selection of research topics, or collaborating in patient recruitment. For DR studies, parents could be involved in discussions about perceived risk. Including also other stakeholders in this discussion, such as providers, RECs and the public, may allow to establish more comprehensive criteria for risk classifications for DR studies. These criteria may subsequently guide RECs in their decisions on the appropriateness of a deferred consent approach for a specific DR study. Furthermore, parent advisory boards could be involved in designing study protocols, or trial feasibility studies such as those

performed by O'Hara et al36 and Woolfall et al(3) can be conducted. Doing so may provide valuable insights into the perceived appropriateness of a deferred consent approach for specific DR studies.

Several interviewed providers reported that a prospective consent approach may burden parents and can thus be considered inappropriate. Ethical concerns about approaching parents faced with an imminent premature birth have been reported before.(1–3) According to American and European legislation, deferred consent can only be used when obtaining prospective consent is 'not feasible'(6) or 'not possible'.(7) Studying the impact of prospective consent on parents facing an imminent premature birth may help to decide whether possible impact on parents should be included in considerations about infeasibility or impossibility to obtain prospective consent for DR studies.

Concerns about the impact on parents were also reported for the deferred consent approach. Interviewed providers with firsthand experience with approaching parents for deferred consent suggested that these concerns can be overcome by appropriate communication with parents and timing of the consent procedure. Rich and Katheria(37) reported positive parental perceptions with deferred consent, as in the postnatal period there was more time in a non-stressful environment to inform parents about study procedures, allowing parents to truly recall and understand their child being in a DR study. Further studies on parental experiences with deferred consent, including experiences of parents of neonates that passed away or parents that refused deferred consent, may provide insight into the best way to approach parents for deferred consent. This may subsequently inform provider training on how to properly use a deferred consent approach for DR studies. As such, the deferred consent approach for DR studies can be improved and the actual usage of this approach can become more acceptable for both providers and parents.

Many providers reported the parental right not to participate in research, which complicated acceptability of deferred consent approach for DR studies. Providers therefore highlighted the importance of deferred consent in comparison with a waiver of consent, as this would provide parents with at least some autonomy. Interviewed providers furthermore suggested to adapt the deferred consent approach by adding an opt-out for research in general. This would respect the parental right not to participate in research. Other adaptations to the deferred consent approach could

be considered as well. Chhoa et al(38) and Molyneux et al(39) reported positive experiences of providers with an adapted deferred consent approach, which consisted of a prospective oral assent and a written deferred consent. Such a consent approach would respect both parental autonomy and the right not to participate in research.

Another approach that may respect both parental autonomy and the right not to participate in research, an opt-out approach, may as well be considered. When using an opt-out approach, parents are provided with information regarding the research and their child's involvement. Their child's participation is then presumed, unless parents take action to decline to their child's participation. Consequently, parents are postnatally approached for explicit consent to use the data of their child. An opt-out approach is already included in the Australian National Statement on Ethical Conduct in Human Research.(40) More insight into stakeholders' perceptions is needed in order to assess the acceptability of such adaptations to the deferred consent approach.

CONCLUSION

Insight into providers' perceptions of deferred consent for DR studies in actual scenarios suggests that deferred consent for DR studies is considered acceptable, but that the actual usage of the approach can be improved on. This demands further understanding of stakeholders' experiences with, and perceptions of, deferred consent for DR studies, appropriate communication and timing of a deferred consent approach, risk classification for DR studies, and adaptations to the deferred consent approach that respect parental autonomy and the right not to participate in research. Doing so may improve both the acceptability and the actual usage of deferred consent for DR studies, which may consequently improve the quality of DR studies and the provided care to neonates that require support at birth.

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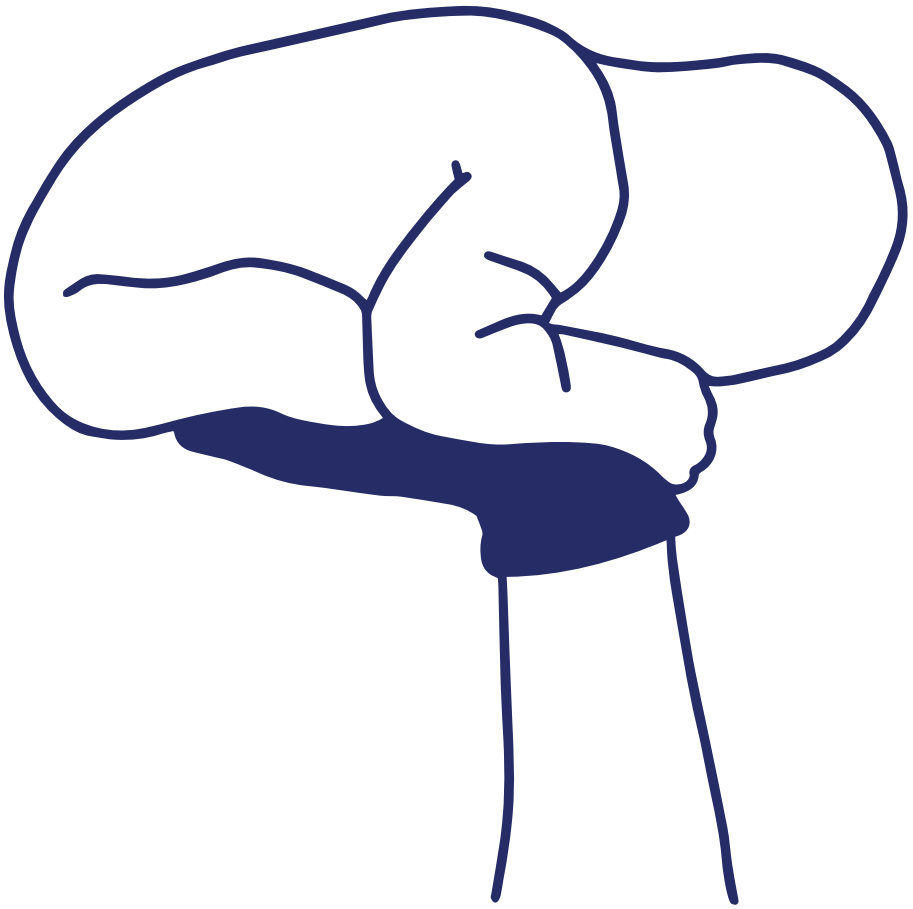

CHAPTER 2

CONSENT FOR DELIVERY ROOM STUDIES:

WHAT CAN BE LEARNED FROM PERCEPTIONS OF PARENTS

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ABSTRACT

BACKGROUND

Obtaining ethically valid consent for participation in delivery room (DR) studies from parents facing an imminent premature birth can be challenging. This study aims to provide insight into parental experiences with and perceptions of consent for DR studies.

METHODS

Semi-structured interviews were conducted with parents of very and extreme preterm infants. Interviews were audio-recorded, transcribed and analysed using the qualitative data analysis software Atlas. ti V.8.4.

RESULTS

Twenty-five parents were interviewed. Despite being in an emotional and stressful situation, most parents considered being approached for DR studies as valuable. According to parents, this was mostly due to appropriate timing and communication, compassion and investigators not being obtrusive. Interviewed parents generally decided to accept or decline study participation based on perceived risk. Parents differed strongly in how risk of specific study interventions was perceived, but agreed on the fact that parental consent is needed for DR studies that involve risk. There was no consensus among parents on deferred consent for DR studies running at our NICU, however, parents considered deferred consent appropriate for observational studies. Furthermore, during interviews it became clear that parental incomprehension of various aspects of DR studies, including aims, the concept of randomization and risk associated with specific interventions, was common.

CONCLUSION

Insight into parental perceptions of consent for DR studies allowed to distill areas where the validity of parental consent can be improved. Further research on parental perspectives for consent for DR studies will allow to establish consent procedures that are considered both valid and valuable.

INTRODUCTION

Informed consent for research involving human participants is considered a cornerstone in research ethics. The principle of informed consent protects the autonomy of human subjects and is embedded in various ethical codes and regulations, such as the Declaration of Helsinki(1) and the Good Clinical Practice guidelines(2). In order to be valid, consent should be provided voluntarily by a participant, or in well-defined situations by a proxy, that is deemed to be mentally competent, has received appropriate information and is able to understand this information.(1-3)

As robust evidence on neonatal resuscitation interventions is still lacking(4), conducting delivery room (DR) studies is much needed. As neonates clearly cannot provide a valid consent for these studies, consent for DR studies should be obtained from a proxy with parental responsibility. However, obtaining ethically valid proxy consent for DR studies can be particularly challenging. Investigators need to approach parents that are facing an imminent premature birth to inform them about possible research participation of their very fragile infant that is not even born yet. If consent is obtained, the validity of this consent can be called into question as it is often provided by emotionally distressed parents within a tight timescale for decision-making.(5-7)

As part of a research project studying ethical aspects of recording and reviewing neonatal resuscitation(8-11), we conducted interviews with parents of very and extremely premature infants. One of the objectives for the study was to provide insight into parental perceptions of consent for using recordings for neonatal resuscitation for various purposes, including DR studies. With this paper, we aim to provide insight into parental perceptions of consent for DR studies.

METHODS

At the Neonatal Intensive Care Unit (NICU) of the Leiden University Medical Center (LUMC), a tertiary perinatal centre with an average of 800 admissions a year, recording neonatal resuscitation is considered standard care. Recordings of neonatal resuscitation are used for plenary audits and parents are offered the possibility to review the recordings of their infant. Furthermore, recordings are used for the majority of DR studies conducted at our NICU.

DR STUDIES AT THE LUMC

In accordance with a ruling of the Ethics Review Committee (ERC) of the LUMC, parents are counselled for a maximum of two DR studies simultaneously. DR studies that were running during the study period included a minimal risk study assessing the efficiency of a respiratory functioning monitor (RFM) (MONitoR trial; Dutch Trial Register NTR4104, clinicaltrials.gov NCT03256578), a minimal risk study assessing the effect of initial high versus low oxygen on breathing effort (IMPROvE study; trial registration number: NTR6878), and two subsequent studies assessing the feasibility and effectiveness of physiology-based cord-clamping (ABC project; trial registration numbers: NTR7194 & NCT03808051). These DR studies all used recordings of neonatal resuscitation. In addition to these DR studies, various other neonatal trials were running at the NICU.

For the minimal risk MONitoR trial and IMPROvE study, apart from a prospective consent approach, a deferred consent approach could also be used. This approach allows investigators to enter neonates in DR study protocols without parental consent. As soon as reasonably possible, parents are informed about their infant's study participation and asked for permission to continue their infant's study participation and to use already obtained data.

DATA COLLECTION

All parents invited to watch the recordings of their very or extremely preterm infant in the period from February 2018 – October 2019 were approached to participate in this study.(11) Interviews were conducted between February 2018 and October 2019. Interviews were conducted by MCdB. Using semistructured interviews, parents were questioned about their perceptions of consent for the usage of recordings of neonatal resuscitation for DR studies. Inclusion of participants continued until thematic saturation was reached on parental perspectives on recording and reviewing neonatal resuscitation.

DATA ANALYSIS

Interviews were audio-recorded and manually transcribed. MCdB and MH independently coded various transcripts. Data was firstly analysed in a process of open coding. During consensus meetings, main themes connected to consent for DR studies emerged. Using an iterative approach, parents were questioned more

in-depth about their perceptions of consent for DR studies in further interviews. The qualitative data analysis software program Atlas ti (V.8.4) was used for analysis.

ETHICS

This study was reviewed by the ERC of the LUMC. In concordance with laws and guidelines, a statement of no objection against execution of the study was issued (P16.316).

RESULTS

In thirteen interviews, a total of twenty-five parents were interviewed. All parents had been approached for neonatal research. One parental dyad was not approached for consent for DR studies, another parental dyad was approached for deferred consent for DR studies. Further participant characteristics are listed in table 1. Five main themes were identified: participating in neonatal research, being approached for consent for DR studies, deferred consent, incomprehension, and risk.

PARTICIPATING IN NEONATAL RESEARCH

Interviewed parents reported various perceptions on participating in neonatal research. Parents oftentimes acknowledged that their infant(s) could only have received good care during neonatal resuscitation due to previous DR studies that have been conducted and reported altruistic motivations to consent to DR studies:

> Father: "Of course, so many studies have been conducted in the past, and that's why they could have cared for her so well."
>
> (...)
>
> Mother: "Yes, it's like contributing to the next generation, to the children that will be born in the future."
>
> LP14

Many interviewed parents related conducting research to improving care and reported to consider research as inherent to being admitted to a university hospital:

> "Well, we've been confronted quite a lot with research and things like that. But, this is a university hospital, and eventually all you want to do is to improve and provide the best possible care."
>
> LP04 - father

Several parents furthermore reported to put their trust in scientific integrity:

> "For me, it was quite easy to sign the papers. Although I did not read it all, I felt like, I can trust it is ok. Because I know, it is research, and research needs to meet certain requirements, and well, these requirements were all covered, so yes, ok, I can sign with confidence."
>
> LP07 – mother

Although all interviewed parents were positive about participating in neonatal research, they also acknowledged that some parents would not be positive about it:

> "I could imagine that certain people would not participate in research due to ethical beliefs."
>
> LP02 – mother

BEING APPROACHED FOR CONSENT FOR DR STUDIES

For most parents, being approached for DR studies was a positive experience. Parents considered information provision about DR studies as a positive distraction in a stressful period, as an opportunity to receive extra information about prematurity, or even as an opportunity to prevent boredom when being admitted for various days (see illustrative quotes in box 1). Parents furthermore reported that being approached for more than one DR study was not problematic, but they also emphasized that one could also demand too much from parents:

> "If they would have asked for ten more, we would probably feel like: well, this is kind of enough now!"
>
> LP01 – mother

Parents reported various factors that contributed to positive experiences with being counselled for DR studies (see Box 1). Important factors were appropriate communication and compassion. Interviewed parents furthermore highly valued the fact that investigators were not obtrusive and that they told parents that refusing participation was also fine:

> Mother: "And how it was asked, it was asked in a peacefully manner, very compassionate. We were allowed to think about it. No pressure at all."

> Father: "Especially with this oxygen trial, I found it very pleasant, I think it was the physician who said, if you don't know what to do, just say no, it doesn't matter."
>
> LP22

Other factors were that the physician introducing the research emphasized that research was always of secondary importance, and the addition of oral information to the written information. Furthermore, timing of obtaining consent was considered important. Various parents reported that it is important that investigators check with the obstetric staff whether it is a good moment to approach parents:

> "And maybe the investigator could contact either the physician or the nurse, like, hey, would this be the right moment?"
>
> LP07 – mother

Another possibility to improve the timing of obtaining consent for DR studies reported by several parents was to expedite information provision to earlier in the pregnancy:

> "Maybe at the intake with the midwife. That she's the one who addresses it. Like, in case you will deliver prematurely, what do you want in terms of research? Would you like to participate or not?"
>
> LP27 – father

A minority of parents reported that being approached for DR studies was too much, because there is already so much going on. Having to think about study participation in such circumstances was considered stressful:

> "Of course, you are thinking about what decision to make. Subconsciously it is on your mind. But you already have so much on your mind in such situation. You're constantly thinking about what to do to do well. With everything! Then [research] is just another thing that adds on to the stress."
>
> LP16 - father

PERCEPTIONS OF BEING COUNSELLED FOR DR STUDIES

"Yes, it is a perfect way to distract the mother. Really! They gave us these leaflets, we read them all. It is the perfect way to distract parents from what really happens. Because as a new parent, as future parent, you really need to gain an understanding of prematurity. You don't know what to expect. So these studies, they add extra information." LP12 – mother

"So there were a few days that I was like, well, starting to get bored. What am I doing here? Wll, you know, that's the moment you can explain the study." LP01 – mother

"Of course, it was a torrent of information, but it actually helped me to keep on going. Because I have been admitted for three weeks. And I really enjoyed it, it was, somehow you needed to think in a different way. To deal with something else. Something different than my own story. No, it actually really helped me to think about different things and to think about my stay here from another perspective." LP19 – mother

ASPECTS THAT CONTRIBUTED TO A POSITIVE EXPERIENCE

"In such situations, I think the compassionate skills from the one asking you the question, yeah, I think she had that skills. She really sat down, what is going on, how are these people doing? Is this the right moment to pose this question?" LP14 – father

"Well, the way you are approached. Even if the timing is inappropriate, the way you are approached really makes a difference." LP22 – mother

"Well, I think the doctor, the pediatrician is the right person to announce it. At least, to introduce it, to tell that there are [studies]. And that there is the possibility that somebody approaches you, or that you can indicate yourself that you are ready to be informed about it." LP14 - father

"And they explained that it really depends on the situation, and if the situation is different than expected, or if anything goes wrong, they will deviate from the protocol. So we knew that on beforehand. (...) That research is not conducted at the expense of everything. They explained that very clearly." LP16 – father

"It was really good that your colleague came and explained everything, instead of solely receiving those leaflets. So, yeah, I based on that." LP07

Box 1: illustrative quotes perceptions of being counselled for delivery room studies

DEFERRED CONSENT

Although many parents, including the parents approached for deferred consent, agreed that usage of a deferred consent approach could be appropriate, various parents also feared it could undermine confidence in providers or that it could be tricky in case something would have gone wrong during neonatal resuscitation:

> "Imagine something would have gone differently than planned. And then afterwards you hear the monitor was blinded, and even though the monitor did not influence anything, I think that's tricky. I would not have been happy in that case."
>
> LP07 - mother

According to parents, these risks could be reduced by adding a general consent for conducting studies using a deferred consent approach:

> "So, maybe you should obtain informed consent that it is ok not to obtain an informed consent. Do you know what I mean? Explain that this is a university hospital. Would it be ok if we include her in some studies, in case everything goes very fast, and we estimate it will not have any consequences for her? As a parent, it gives you at least some sense of control of what happens."
>
> LP11 – mother

Among parents, consensus about the appropriateness of deferred consent for ongoing DR studies was lacking. However, several parents reported that a deferred or waived consent approach would be appropriate for observational research:

> "It really depends on how intensive the study is. You know, just adding an extra pulse oximeter because that one might be more accurate than the one you normally use, well, you know, you don't have to tell me. It's fine to me to just use that data."
>
> LP22 – father

INCOMPREHENSION

When parents recalled the information provided to them during the consent process, parental incomprehension of DR studies was frequently identified. For example, several parents misperceived the concept of randomization, the aim of a study or specific study interventions. InterAviewed parents oftentimes were not aware of

these misperceptions, however, various parents reported that they did not properly remember all details about DR studies:

> "And the other one, what was the other [study]? The placenta, there was also something with the placenta, there was something with the placenta, wasn't it?"
>
> LP03 – mother

RISK

Most parents based their decision on study participation on the perceived risk of the DR study instead of on the prospect of direct benefit:

> Father: "In my opinion, benefits do not outweigh possible risks. Maybe that's sounds a bit strange, but, yeah."
>
> Interviewer: "Preferably a study.."
>
> Father: ".. without any risks, but also without any benefits, than a study with possible risks and some benefits."
>
> LP07

Oftentimes, parents perceived risk differently than how it was categorized by the ERC:

> "They probably have thought about it carefully, but for parents it may sound, maybe that's the whole point, it might be scientifically sound, but 100% oxygen, that sounds quite scary for us parents."
>
> LP11 – father

How risk associated to specific study procedures was perceived also differed among parents: procedures that some parents considered minimal risk, were considered risky by others. However, parents agreed that if there was risk associated with a specific study, parental consent is required:

> "If there is any risk for the child, parents need to consent."
>
> LP12 – mother

Parents reported various factors that contributed to perceived risk (see box 2). In general, parents considered their infant participating in research oftentimes riskier than themselves participating in research. Furthermore, some parents perceived

a new study riskier than a study that was already running for several months. Also anticipated regret added perceived risk. Having an 'escape' for the study intervention, e.g. the possibility of unblinding the RFM if needed, reduced perceived risk.

PERCEIVED RISK

M: It was more difficult to make a decision, to say yes on her behalf.
(...)

F: Because you want to protect her. From things that can go wrong. (...) She cannot make the decision. And every decision that I make for her, I really have to support this decision. I need to have the feeling that this is the right thing to do.
LP04

What we found a very important aspect is for how long the study has been running already. Because somehow that matters. Whether the study is running for just one month, or already for a year. Because we know, if something is wrong with the study, the study will be stopped. So if the study is already running for a while, you know it already passed that stage. LP16 – mother

But instinctively, for instance with the monitor trial, you swith off the monitor, you take something away. LP07 – mother

And maybe you will lose your child, because you made the decision to participate in that study. I would never forgive myself. I would think by myself, why did I participate at all? LP03 - father

So, and if you see that she is on a ventilator, well, you could say, you made the decision for 100% [oxygen]. Maybe she has problems with her longs because they gave her too much at once. LP09 - father

The monitor trial, well, that is easier to reverse. If they say, please turn on the monitor again, or whatever. I guess. I don't know how that happens, monitor on or off. LP11 – mother

Box 2. illustrative quotes perceived risk

DISCUSSION

Obtaining ethically valid proxy consent for participation in DR studies from parents facing an imminent premature birth can be challenging. Despite being in an emotional and stressful situation, most interviewed parents in our study considered being approached for DR studies as valuable. According to parents, this was mostly due to appropriate timing and communication, compassion and investigators not being obtrusive. Parents generally based decisions about study participation on perceived risk. Parents differed strongly in how risks of specific study interventions was perceived, but agreed on the fact that consent is needed for DR studies that involve risk. There was no consensus on deferred consent for DR studies running at our NICU, however, most parents considered deferred consent appropriate for observational studies. Furthermore, when parents recalled the information provided to them during the consent process, parental incomprehension of various aspects of DR studies was frequently identified. Although this was a qualitative study and experiences of interviewed parents thus cannot directly be generalized, parents highlighted some important themes that may help to improve the validity of consent for DR studies.

Already for decades, the validity of consent for neonatal research is questioned due to the fact that parents are approached in a particularly difficult time with oftentimes a tight timescale for decision-making.(12) Obtaining valid consent for DR studies may even be more complicated due the medical condition of the mother. In our experience, investigators can therefore be reluctant to approach parents for DR studies. However, most interviewed parents considered approaching parents for DR studies appropriate, but reported that timing, communication, compassion and not being obtrusive are keys for a positive experience. These factors may all improve the validity of consent for DR studies. Approaching parents on an appropriate moment may improve the validity of consent, as parents may be more emotionally competent for decision-making about their infant's research participation. Collaborating with the obstetric staff can help investigators to find the right moment to approach parents for study participation. Also the degree of investigators' compassion may influence the validity of parental consent, as compassion supports a better exchange of information, improves a trustful relationship, and may reduce emotional distress of parents.(13) Emphasizing the importance of compassion when training investigators in obtaining consent from parents may therefore help to improve the validity of parental consent.

Furthermore, appropriate communication is important for information provision. By making sure that language used is understood and by re-wording information according to parental needs, consent can be more understood and incomprehension about research can be prevented. In our study, parents reported to appreciate how information on research was communicated to them, however, when interviewing parents, it was also noticed that oftentimes elements of research were forgotten, misunderstood or misperceived. Parental difficulties to understand, comprehend and recall elements of research were reported extensively.(14) Continued efforts should therefore be on improving the information provision about DR studies. This may include more public education about research methodology, including concepts of randomization, and communication training for research personnel. Another important topic for training is how to communicate that it is also appropriate to decline study participation. In our study, parents reported not to feel pressurised in study participation, but these feelings were reported by Richards et al.(15) By preventing obtrusiveness of investigators, consent can become more voluntarily, thus more valid.

Although parents considered being approached for consent for DR studies valuable, alternative approaches to consent were also suggested. Some parents stated it might be valuable to be informed on DR studies earlier in pregnancy, for instance at a midwife's appointment. Parents furthermore described a process similar to the "blanket prenatal opt-out consent" as described by Janvier and Farlow. This approach implies that parents are approached by a midwife/obstetrician for a blanket opt-out consent for DR studies that went through rigorous scientific and ethics review.(16) Like neonatal care providers that were interviewed in our earlier study(10), parents suggested the prenatal opt-out as a possible addition to improve the deferred consent approach, which most parents considered as potentially tricky or undermining the confidence in providers. According to parents, using a blanket prenatal opt-out could reduce these risks, but doing so would not absolve investigators of informing parents of eventual study participation of their infant, nor of obtaining consent for the usage of already obtained data. In contrast, various parents reported that consent could fully be waived in the case of observational DR studies. Interestingly, according to prevailing legislation(17), observational studies do not qualify for the usage of a deferred consent approach, as observational studies lack the prospect of direct benefit. Although parental perceptions provide insight into possible improvements

of the deferred consent approach, it must be acknowledged that most interviewed parents were not actually approached for deferred consent. More insight into perceptions of parents that were approached for deferred consent is therefore needed.

Interviewed parents also addressed actual decision-making for DR studies. Zupancic et al reported that in making consent decisions on behalf of their infant, parents are influenced by risk and benefit assessments, attitudes toward research, and the integrity of the consent process.(18) These factors were all reported in our study, with perceived risks as the most important factor. Interestingly, risks were perceived differently by parents and the ERC, as well as among parents. Providing more insight into how parents perceive risks of study interventions may help to understand why parents accept or decline study participation, which may inform training of research personnel involved in obtaining consent. Considerations about perceived risk may furthermore inform risk classifications for DR studies, which may be used by investigators, providers and ERCs, for instance when deciding whether it is appropriate to use a deferred consent approach.

It has been advocated to give parents a voice in the discussion about consent for neonatal trials.(16, 19, 20) Earlier, McCarthy et al reported parental perspectives on consent for hypothetical neonatal trials.(21) Furthermore, Sloss et al reported parental perspectives on deferred consent.(22) With our study, we add to their findings by providing in-depth understanding of parental perspectives. Our study allowed to distil areas to improve the validity of consent for DR studies. It furthermore revealed that obtained consent did not always meet all requirements for an ethically valid consent, yet, parents did consider the consent procedure valid and valuable. Parents expressed the need for some sense of control of what happens to their infant especially in the case of interventions that they perceive as risky. These insights into parental perspectives may help to improve consent procedures for DR studies.

CONCLUSION

Despite being in an emotional and stressful situation, parents in our study generally considered being approached for DR studies valuable. According to parents, this was mostly due to appropriate timing and communication, compassion and investigators not being obtrusive, factors that can all be addressed in training of research

personnel. Consensus on perceived risk associated to study interventions and the appropriateness of deferred consent for DR studies running at our NICU was lacking. Interviewed parents expressed the need for consent for DR studies that they perceive as risky. Insight into parental perspectives may help to establish consent procedures that parents, research personnel, providers and ethicists consider both valid and valuable.

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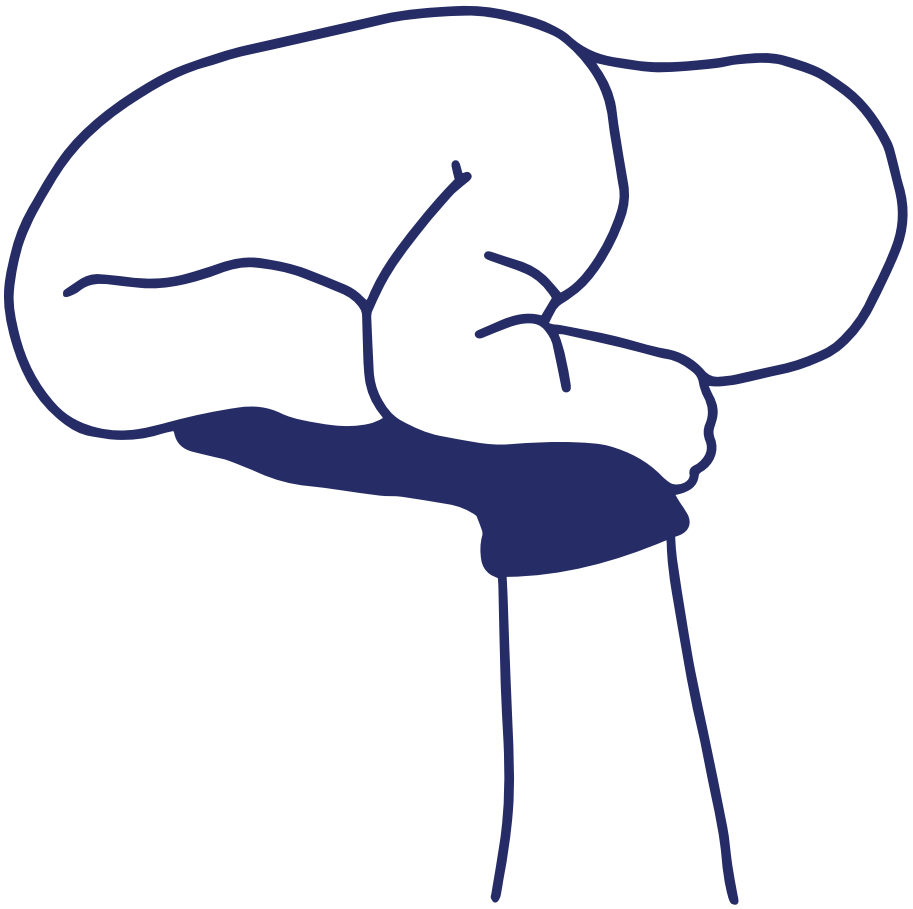

CHAPTER 3

DEFERRED CONSENT FOR THE ENROLMENT OF NEONATES IN DELIVERY ROOM STUDIES

– STRENGTHENING THE APPROACH

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INTRODUCTION

The transition from fetal to newborn life involves major cardiopulmonary changes. Most neonates adapt to these changes without assistance, but approximately 10% of neonates require support and less than 1% require cardiac resuscitation.(1–3) Improving the provision of care to neonates during transition can save lives and reduce morbidities, but can be arduous.(4) Evidence regarding the best care for neonates requiring interventions in the delivery room (DR) is often lacking or of poor quality.(5) There is a lack of uniformity in DR management, indicated by the existence of differing local, national and international resuscitation guidelines. Improving the evidence base for DR interventions is recommended, as this improves uniformity, thus safety and efficacy of DR interventions, and thereby neonatal outcomes.(1,6,7) However, conducting research in the DR can be ethically challenging.

Conducting clinical research requires informed consent from participants or their proxies. This implies that parents need to consent to their child's participation before the start of study procedures. Hence, parents need to consent for DR studies before the birth of their child. We will refer to this traditional approach as prospective consent. Obtaining ethically appropriate prospective consent from parents, faced with an imminent premature birth or their newborn needing emergency resuscitation, is complicated for various reasons. First, emotional and physical distress of the parents complicates the consent process,(8–11) and approaching parents in such a stressful situation is burdensome.(12) Second, many of these infants never become eligible for specific DR studies, reflecting an unnecessary burden on both parents and investigators.(13) Above all, time to approach parents for prospective consent is often lacking in situations of imminent premature birth or emergency resuscitation. Neonates requiring resuscitation in these situations are therefore often excluded from DR studies, and these infants may be at the highest risk of a poor outcome. Excluding these neonates therefore results in selection bias, and as such in decreased generalisability and less externally valid research.(8,14,15)

In order to manage challenges of prospective consent in DR research, guidelines on a waiver or deferred consent were established.(16–19) A waiver of informed consent, as stipulated in American legislation, allows neonates to be enrolled without prospective parental consent. Whenever appropriate, parents will be provided with additional pertinent information after participation. A deferred (or retrospective)

consent approach, as stipulated in European legislation, also implies that neonates can be enrolled without prospective parental consent. As soon as reasonably possible, parents are approached for permission to continue their child's study participation and to use already obtained data. Legitimate usage of a waived or deferred consent approach for DR studies requires study protocols that meet strict criteria. American, Canadian, Australian and European legislation includes slightly different, but similar criteria (see table 1). However, acceptance of, and guidance for such consent approaches vary considerably around the world.(20)

Table 1. Criteria for conducting studies without prior informed consent

	USA	**CANADA**	**AUSTRALIA**	**EU***
TERMINOLOGY	Exception from informed consent	Exception to consent	Research without prior consent	Informed consent to participate in a clinical trial after the decision to include the subject in the clinical trial
SITUATION	A life-threatening situation necessitating urgent intervention	A serious threat requiring immediate intervention	High dependency on medical care	A sudden life-threatening or other sudden serious medical condition
JUSTIFICATION	Study cannot be practicably carried out without waiver Available treatments unproven or unsatisfactory Prospect of direct benefit, derived from animal or preclinical studies	No efficacious standard treatment; or prospect of direct benefit in comparison with standard care	Study leads to increased understanding or improvement in care Reasonable prospect of direct benefit in comparison standard care	Prospect of direct clinically relevant benefit, derived from scientific grounds Study can only be conducted in emergency situations
RISK	Reasonable in relation to medical condition and standard care	Not greater than standard care; or clearly justified by benefit	Justified by benefit	Minimal risk or burden compared to standard care

	USA	CANADA	AUSTRALIA	EU*
PROSPECTIVE CONSENT	No reasonable way to identify eligible participants prospectively Informed consent infeasible within therapeutic window due to medical condition Efforts to approach legally authorized representative are summarized	Third party authorization cannot be secured in sufficient time, despite diligent and documented efforts to do so	Neither the potential participant nor another on his or her behalf can consider the proposal and give consent	Impossible within therapeutic window
PROCESS	The legally authorized representative is informed that participation may be discontinued at any time without penalty or loss of benefits	Third party is afforded the opportunity to consent to continued participation	As soon as reasonably possible, information about the inclusion and the option to withdraw without any reduction in quality of care is given	As soon as possible informed consent is sought for continued participation, and information on the clinical trial and the right to object to the use of obtained data is given
MISCELLANEOUS REQUIREMENTS	Community consultation and public disclosure	Additional safeguards, where feasible and appropriate		

Criteria according to (inter)national legislation. Local guidelines may differ. USA: Code of Federal Regulations. Title 21. Part 50. Protection of Human Subjects. Section 24. Exception from informed consent requirements for emergency research. (1996); Canada: Tri-Council Policy Statement. Ethical Conduct for Research Involving Humans, (2014); Australia: National Statement on Ethical Conduct in Human Research (2007) - Updated 2018; Europe: Regulation (EU) No 536/2014 of the European Parliament and of the Council of 16 April 2014 on clinical trials on medicinal products for human use, and repealing Directive 2001/20/EC, (2014)
* The European Directive is on clinical trials on medicinal products for human use. However, this European directive serves as the base for all emergency trials in Dutch legislation.

At the moment, a deferred consent approach is used for specific multicentre DR studies at some of our neonatal intensive care units (NICU) in the USA, Canada, Australia and the Netherlands. Using experiences from our research practice, we will elaborate how a deferred consent approach creates new challenges when conducting

multicentre DR studies. We will then argue how deferred consent for DR studies will be strengthened by approaching it within the context of a learning health system (LHS).

CHALLENGES OF DEFERRED CONSENT FOR MULTICENTRE STUDIES

The challenges imposed by a deferred consent approach for multicentre studies can be illustrated by the recent study of Songstad et al(21), who conducted a secondary analysis of the High Flow Nasal Cannulae as Primary Support in the Treatment of Early Respiratory Distress (HIPSTER) trial. This comparative effectiveness study compared two modes of primary non-invasive respiratory support for preterm infants following stabilisation in the DR.(22) After an initial period of enrolment using prospective consent, the authors conducted an audit of eligibility and recruitment.(21) The research ethics committee (REC) then reassessed the study protocol of the HIPSTER trial and approved a deferred consent approach for this study. This resulted in recruitment of neonates in two cohorts, which Songstad et al referred to as Era 1 and Era 2. In Era 1, neonates were entered into the study protocol only after prospective parental consent. In Era 2, a deferred consent approach could also be used for entering neonates into the study protocol. In order to study the effect of a deferred consent approach, a secondary analysis was conducted, assessing inclusion rates of eligible infants, demographic data and primary trial outcome in both Eras. Songstad et al reported that using a deferred consent approach improved recruitment of eligible newborns and resulted in a sample that was more representative of the entire population of neonates requiring support during transition. In particular, deferred consent allowed recruitment of a greater proportion of severely ill neonates. However, it also led to significant differences in the demographics of mothers and neonates: in Era 2, more mothers received intrapartum antibiotics, fewer mothers received a complete course of antenatal corticosteroids and fewer infants received prerandomisation continuous positive airway pressure.(21) These factors influence the outcomes for neonates that require support during transition. Using different consent approaches within one study thus created a systematic difference between infants enrolled during the two recruitment Eras of the HIPSTER trial.

As differences in legislation and guidance exist, NICUs that collaborate in multicentre trials vary in the practice of enrolling neonates in study protocols using a deferred consent approach. Due to this variation, a similar systematic difference in participant

groups as in the HIPSTER trial can occur. Therefore, study outcomes of multicentre DR studies can be less generalisable and externally valid. We argue that more uniformity in the usage of a deferred consent approach for multicentre DR studies is needed.

CLARITY OF DEFERRED CONSENT APPROACHES

According to the Declaration of Helsinki, studies can only commence when study protocols are reviewed and approved by an REC.(23) For international multicentre studies, studies are currently reviewed by different RECs, using national legislation and local guidelines. Consequently, deferred consent procedures can be approved by some RECs, and rejected by others. We propose that considerations of the usage of deferred consent should be an integral component of the study design of a multicentre study, taking into account local interpretations of legislation and guidelines for deferred consent. This can be achieved through extensive consultation between investigators, clinicians and RECs from participating centres. As such, deferred consent approaches can be unambiguous and acceptable for all participating centres.

DEFERRED CONSENT IN AN LHS

Usage of a deferred consent approach for DR studies can be promoted by considering this approach within the context of an LHS. An LHS sets a moral priority on continuously evaluating and improving healthcare.(24) Knowledge development and translation are integrated into the core of the healthcare delivery process.(25) By advancing high-quality studies, clinical care is continuously studied, innovated and improved.(26) Furthermore, the evidence of the effectiveness and value of provided care is constantly updated, resulting in better care for current and future patients.(27)

In an LHS, the quality of healthcare is improved through ongoing learning activities, including comparative effectiveness studies, quality improvement projects, quality assurance and clinical practice. In such a system, best practices are seamlessly embedded into healthcare delivery, which in turn generates new knowledge.(28) Thus, overlap may exist between the interventions employed and knowledge gained from clinical practice, quality improvement and comparative effectiveness studies comparing standard of care interventions. Each of these activities may contribute generalisable knowledge and ultimately improve clinical outcomes for individual patients. However, traditionally these activities have been subject to distinct regulatory requirements and ethical oversight. An LHS advocates a new ethical framework

for oversight for learning activities(24), which we will illustrate for comparative effectiveness studies. Comparative effectiveness studies assess currently available interventions, creating an evidence base for the most effective intervention. Many DR interventions could be studied in comparative effectiveness studies.(29) Some of these studies involve no more than minimal risk, yet, their potential benefit on clinical outcomes for neonates may be considerable. Challenges of conducting these studies, such as informed consent procedures and their burden on parents and researchers, can make comparative effectiveness studies hard to conduct.(30) An LHS strives to enable vital research while also protecting the rights, interests and well-being of research participants. The system therefore questions when informed consent for comparative effectiveness studies is necessary, what is required and how it should be obtained. When making such decisions within this paradigm it is important to consider burden, risks and benefits of the specific study.(30)

DR studies are needed as they protect future neonates requiring support during transition from receiving ineffective care. Individual neonates can benefit from participating in a study, but study interventions can also expose them to risk. Obtaining prospective consent from parents in this situation is burdensome for parents.(12) As many of these infants never become eligible for specific DR studies, an unnecessary burden on both parents and investigators is imposed.(13) In an LHS, these and other benefits, risks and burden for individual neonates, the population of neonates requiring interventions at birth, parents, investigators, resources and the quality of DR studies are taken into account when deciding which consent approach is appropriate for a specific DR study. RECs may then approve certain DR studies, having no or only minimal risk, to proceed using a deferred consent approach, or even without informed consent.(30) However, an LHS demands extensive consultation with stakeholders of healthcare delivery about the appropriateness of deferred consent.(30) For DR studies, this implies extensive consultation with clinicians, investigators, RECs and parents. This consultation with stakeholders should result into an ongoing dialogue, and the establishment of empirical evidence that can nourish this dialogue, allowing various questions to be answered. For instance, for which study types do stakeholders regard a deferred consent approach acceptable? When can a DR study not be carried out without usage of a deferred consent approach? When do stakeholders deem approaching parents for prospective informed consent impossible or inappropriate? Which DR studies involve no more than minimal risk? And when do stakeholders consider that the benefit of a DR study justifies a deferred consent

approach? Answers to these questions may enable consensus on if, when and how a deferred consent approach is acceptable for DR studies. This may ultimately result in uniform and comprehensive criteria for the usage of deferred consent for DR studies, providing evidence-based guidance to investigators designing DR study protocols that use a deferred consent approach and to reviewing these study protocols. This could subsequently improve the quality of DR studies, and thereby the standard of care.

PARENTAL PERCEPTIONS

An LHS demands insight into stakeholders' perception of the appropriateness of deferred consent for DR studies. This includes insight from parents and their perceptions. Not much is known about parental perceptions of the usage of deferred consent for DR studies. Recently, McCarthy et al examined parental attitudes towards the appropriateness of different consent approaches for hypothetical studies with neonates. In this study, most parents preferred a prospective consent approach.(31) Rich and Katheria, however, suggested that deferring consent for DR studies is acceptable for parents.(32) They reported a lack of negative parental reaction on the usage of a deferred consent approach for a specific DR study, although bias may have occurred as all questioned parents agreed for the study participation of their child. More research on parental experiences with and perceptions of a deferred consent approach is needed.(1)

Parental experiences with and perceptions of a deferred consent approach have been described for paediatric emergency care studies. Molyneux et al(33) interviewed parents who were approached for deferred consent after a prior assent for their child's study participation. Most parents reported they did not remember receiving information about their child's participation in the study, or recall the assent process. Parents furthermore reported they would prefer deferral of the consent process until after treatment.

Support for a deferred consent approach for paediatric emergency care studies was also reported by Menon et al(20), Furyk et al(34) and Woolfall et al(12). These studies suggest that a deferred consent is acceptable for parents, but that information about the deferred consent process and safety of study interventions should be carefully provided. Similar experiences were reported by O'Hara et al(35), who gained insight in parental perceptions of a deferred consent approach for a paediatric emergency study by conducting a qualitative trial feasibility study. Such feasibility studies may as

well provide valuable insight in parental perceptions of deferred consent for specific DR studies.

ENGAGING PARENTS IN AN LHS

Patient engagement is at the core of an LHS.(24) In an LHS, parents, as proxies, should be involved in the ongoing dialogue about the acceptability and the use of a deferred consent approach. Preference studies can provide an understanding of how parents regard the use of prospective or deferred consent in DR studies and when parents consider being approached for consent appropriate. Studying parental preferences may also help understand other issues that are important for parents.

Insight into how parents estimate and value risk involved with study protocols can be provided by consulting parents when designing a DR study protocol or through submitting study protocols for DR studies to parents, parent support groups or parent support organisations. RECs may be strengthened by the inclusion of parent representatives.(1)

Parental engagement can be achieved in various ways. Parents can be engaged when their child is admitted to the NICU, or through parent support groups, parent support organisations or internet support groups. However, parental engagement in an LHS does not only imply that parents need to be involved in discussions about the appropriateness of deferred consent. It also ensures that parents are committed to improving the healthcare delivery process.(24) Hence, future parents need to be informed that conducting DR studies is a crucial component of improving care for neonates that require support at birth, and that some studies, meeting strict conditions, may be conducted without their prospective consent. Future parents can be informed at admission to the hospital, or even earlier, during an antenatal care appointment with a midwife or an obstetrician.

REMAINING ISSUES

Although it may be obvious for certain studies that a deferred consent approach is appropriate, the issue may be more complex for other studies. Minimal risk may be valued differently by various stakeholders. For instance, clinicians may assess the comparison of two common modes of non-invasive respiratory support as a minimal risk study, whereas parents may assess this as more controversial. Furthermore, although all studies can have unexpected outcomes, unforeseen risks or harms may

put a strain on usage of deferred consent, as the recent Surfactant, Positive Pressure, and Oxygenation Randomized Trial (SUPPORT)(36) illustrates. For this factorial design comparative effectiveness study, extremely preterm neonates were randomised to different respiratory support strategies in the DR and two different oxygen saturation targets, either 85%–89% (lower oxygen saturation group) or 91%–95% (higher oxygen saturation group) in the NICU. The study showed a statistically significant higher rate of death in the lower oxygen saturation group. Although at the time the study was planned there was no evidence to suggest an increased risk of death before discharge, the investigators were charged with failure to describe the foreseeable risks of the SUPPORT. However, others considered the higher rate of death as an unforeseen harm of the standard of care.(37) Years of public debate about ethical conduct of such studies followed, including a lawsuit filed by parents of some of the enrolled children. This illustrates that considering which DR study protocols involve minimal risk can be difficult, as defining reasonably foreseeable risks associated with a specific study can be ambiguous when the risks of standard practice are already quite significant.

The SUPPORT was conducted using a prospective consent approach, but some investigators suggested that being able to use a deferred consent approach for the SUPPORT would have improved the validity of the study.(13) It is uncertain what medicolegal consequences would then have followed the study's findings of increased mortality in one randomised group. Within the context of an LHS, controversy about studies could be counteracted, as an LHS implies informed patients who invest in their own healthcare, as well as in the broader health system.(38) This implies that the public needs to be educated about both the risks of conducting research and the risks of not conducting research, as well as the risks of using a deferred consent approach for specific studies and the risks of not using it. A similar approach of community outreach is already required within American legislation concerning the exception for prospective consent requirements for emergency research, but efficient methods of community consultation for DR studies are still lacking. We therefore propose that communication strategies for informing the public about these risks should be developed. The public can then be involved in the ongoing dialogue and voice when they assess deferred consent for DR studies acceptable. As such, the public becomes a partner in improving the care for neonates that require support at birth.

Insight into how investigators, clinicians, RECs, parents and the public estimate and value the risk of study interventions and the appropriateness of deferred consent can result in uniform criteria for the usage of deferred consent for DR studies. These criteria may help RECs review study protocols for DR studies that include a deferred consent approach. The aim of these efforts should be to develop a clear approach to the issue of deferred consent for both multicentre and single-centre DR studies.

CONCLUSION

A deferred consent approach solves various challenges to the conduct of high-quality DR studies. However, acceptance of, and guidance for, a deferred consent approach vary widely. By approaching deferred consent for DR studies within the context of an LHS, we aim to encourage an on-going dialogue between investigators, clinicians, RECs, parents, and the public, and the establishment of empirical evidence on the acceptability and implementation of a deferred consent approach. This may ultimately result in uniform and evidence-based criteria for deferred consent for DR studies. By using these criteria, the quality of DR studies can improve, and most importantly, the best treatments for our patients can be identified

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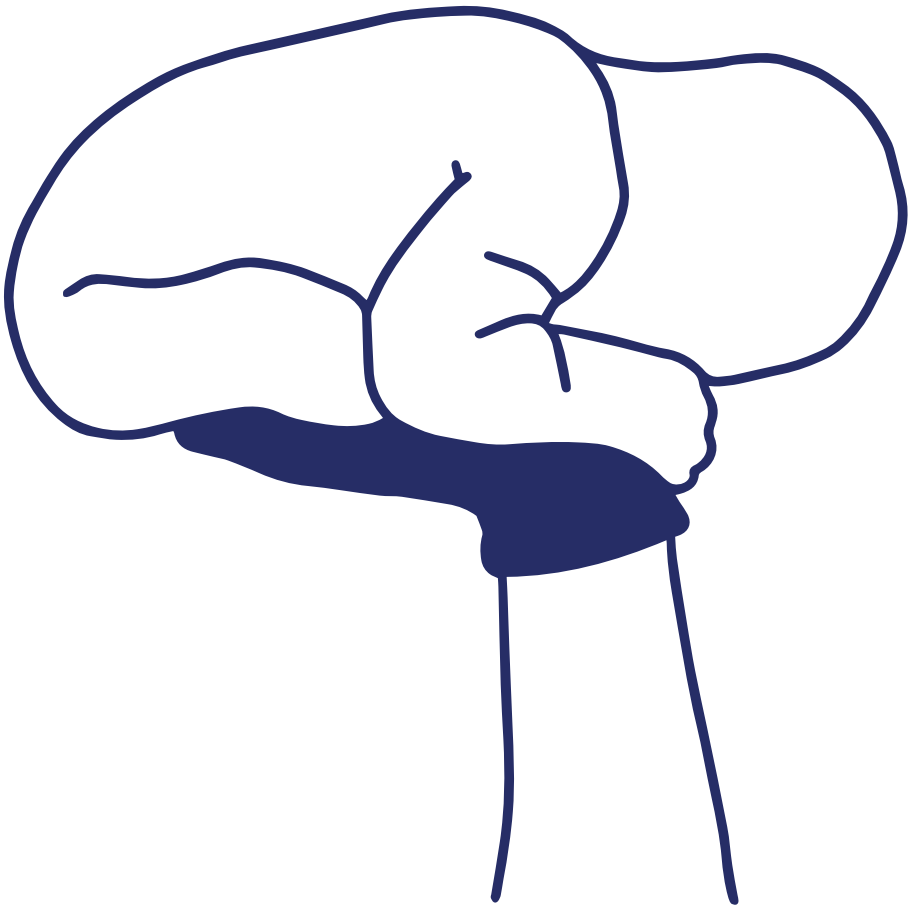
PART 3

RECORDING AND REVIEWING NEONATAL RESUSCITATION



CHAPTER 4

ETHICAL DILEMMAS OF RECORDING AND REVIEWING NEONATAL RESUSCITATION

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Archives of Disease in Childhood - Fetal and Neonatal Edition 2018;103:F280-F284

ABSTRACT

Neonatal resuscitation is provided to approximately 3% of neonates. Adequate ventilation is often the key to successful resuscitation, but this can be difficult to provide. There is increasing evidence that inappropriate respiratory support can have severe consequences. Several Neonatal Intensive Care Units have recorded and reviewed neonatal resuscitation procedures for quality assessment, education and research, however, ethical dilemmas sometimes make it difficult to implement this review process. We reviewed the literature on the development of recording and reviewing neonatal resuscitation and have summarized the ethical concerns involved. Recording and reviewing vital physiological parameters and video imaging of neonatal resuscitation in the delivery room is a valuable tool for quality assurance, education and research. Furthermore, it can improve the quality of neonatal resuscitation provided. We observed that ethical dilemmas arise as the review process is operating in several domains of health care that all have their specific moral framework with requirements and conditions on issues such as consent, privacy and data storage. These moral requirements and conditions vary due to local circumstances. Further research on the ethical aspects of recording and reviewing is desirable before wider implementation of this technique can be recommended.

INTRODUCTION

Approximately 10% of neonates require some form of neonatal stabilization, with neonatal resuscitation provided to approximately 3 % of neonates.(1) Neonatal resuscitation is thus the most common frequently occurring form of acute resuscitation in hospitals.(1, 2) Applying respiratory support to neonates during transition at birth can be problematic. Establishing effective ventilation is often the key to successful resuscitation, but can be hampered by inadequate resuscitation techniques or subjectivity in monitoring.(3) There is increasing evidence that inappropriate respiratory support can have severe consequences.(4-6) The therapeutic margin between ineffective and injurious ventilation may be very narrow, and health care providers are often unable to identify inappropriate or injurious inflations in real time. Several Neonatal Intensive Care Units (NICUs) implemented a system of recording and reviewing neonatal resuscitation in order to improve the quality of care.

New techniques create new ethical questions. NICUs that have implemented the technique of recording and reviewing neonatal resuscitation reported concerns about parental and provider consent(3, 7-12), data storage(9-13), impact on providers and parents(2, 3, 12), privacy(3, 8, 10, 11, 13, 14), and medicolegal consequences.(3, 8, 10-12) The concerns reported by each NICU seem to be related to the context, as this technique is used for more than one purpose and is used within various domains of health care. As such, various interests and values of the stakeholders of recording and reviewing neonatal resuscitation are at stake.

In this review we aim to provide insight in the ethical dilemmas that impede the implementation of recording and reviewing neonatal resuscitation. We reviewed the literature about the development of this technique, as well as the ethical aspects that need to be taken into consideration.

DEVELOPMENT OF THE TECHNIQUE OF RECORDING AND REVIEWING

VIDEO RECORDING NEONATAL RESUSCITATION

Video recording in the medical setting was first described by Peltier et al in 1969(15) and in the neonatal setting specifically by Hoyt et al in 1988.(2) Finer et al pioneered video recording neonatal resuscitation as part of a quality assurance procedure in

1999.(12) In more recent years, a limited number of hospitals in Australia, the United States, France, Germany and in the Netherlands have reported to record neonatal resuscitation on a regular basis.(3, 9, 11-13, 16, 17)

According to Finer et al, video recording is a good method to evaluate the competencies of health care providers objectively during actual neonatal resuscitation.(18) Reviewing video recordings allows providers to compare their performance during resuscitation with the guidelines.(2) Systematic and procedural errors can be measured(1, 9, 18, 19) and further training can be implemented to re-educate providers and improve performance(2, 9). Furthermore, video recordings potentially have a valuable role in assessing new approaches to neonatal resuscitation(2), although significant measurable improvements of the clinical performance of neonatal resuscitation have not yet been reported(9, 20). Video recording is not only reported to be valuable for quality assurance and improvement, but also to function as an educational tool(2, 9, 12, 18, 21, 22), as a basis for future neonatal resuscitation research(9), and for auditing purposes(12).

RECORDING OF PHYSIOLOGICAL PARAMETERS

Although video recording neonatal resuscitation is valuable for quality assurance and improvement, education, research, and audits, it does not provide information about the quality and the effect of the intervention. This information can be gathered by adding vital physiological parameters to the recordings.

Real-time information on vital physiological parameters could improve neonatal resuscitation; with monitoring, these parameters can be kept within the safe range and severe injuries can be prevented.(3) Measuring oxygen saturation and heart rate using pulse oximetry is now recommended in the international guidelines. These measurements, including a continuous measurement of how much oxygen was being administered, may provide more accurate and objective information regarding the quality and effect of the performed intervention.

The effect of the respiratory support provided during neonatal resuscitation can also be monitored by, among other devices, a Respiratory Functioning Monitor (RFM). The monitored parameters can be used to evaluate ventilation and mask technique(3, 23, 24) and RFM readings can confirm endotracheal intubation, leak around the endotracheal tube, or airway obstruction within seconds(24). Furthermore, a RFM enables the health care provider to observe the infant's breathing pattern.(24)

Although the RFM could remove subjectivity in evaluating neonatal resuscitation(3), it does not provide any interpretation of the signals or a diagnosis. Due to caregivers' possible inexperience and lack of knowledge, misinterpretation of vital physiological parameters may sometimes occur.(24) Inexperience also results in difficulties incorporating the information of the RFM. Providers stated that they do not use the monitor for evaluating mask technique or ventilation pressures for these reasons.(8) Although neonatal health care providers are familiar with the RFM when using mechanical ventilators in the unit, training in interpreting the RFM during resuscitation is necessary.(3) Evaluating RFM recordings can be a tool for training providers, thus improving patient care.

SIMULTANEOUSLY RECORDING VIDEO IMAGING AND PHYSIOLOGICAL PARAMETERS

Recording video and physiological parameters simultaneously results in an accurate and transparent documentation of neonatal resuscitation. In several studies, reviewing this documentation revealed deviation from the guidelines for neonatal resuscitation.(7, 9, 21) As a result, guidelines were changed and providers were taught to follow them more closely. Simultaneously recording video and vital parameters therefore contributes to improving the quality of care. However, the simultaneous recordings also reveal that medical record documentation often differs from the actual procedure.(1, 7, 21) As such the recordings can also be used to supplement or even correct the documentation of delivery room management.(8)

Adding audio to the recordings can be valuable for evaluating collaboration and teamwork. Several studies reported that recordings with audio revealed problems in the conduct by the team, the team leader or both.(9, 21, 25, 26)

THE ETHICAL PERSPECTIVE

REPORTED CONCERNS

There is a general consensus regarding the importance of quality improvement of health care.(27) Although providers in the field agree that recording and reviewing neonatal resuscitation is advisable as it may improve the quality of the procedure(2, 7, 9, 11, 16, 18, 21), the implementation of this technique can create controversy. Centers that record and review neonatal resuscitation reported concerns about privacy(3, 8,

10, 11, 13, 14), medicolegal consequences(3, 8, 10-12), data storage(9-13), the impact on providers and parents(2, 3, 12) and provider and parental consent(3, 7-12).

PRIVACY

In general, video recording in hospitals is subject to strict privacy regulations, although more flexible requirements apply when recordings are being used solely for auditing purposes.(3) Video recording can infringe the privacy of families and providers and therefore it is important to take this into account.(12)

Several studies reporting video recordings in the delivery room stated that only the hands and arms of the health care providers are shown.(2, 8, 10, 12, 14) However, in practice it may be difficult to guarantee privacy when recording or during plenary review of the recordings. Some health care providers felt uncomfortable when they could be identified in the recordings(10), but their experiences have not been fully explored.

Making identifiable recordings part of the infant's medical record can be seen as a part of family-centered care, as videos can be shown to the parents.(8) However, there is a risk that family privacy may be infringed; providers, depending on the local requirements, may have a legal obligation to keep the recordings for several years. This risk increases when several users have immediate access to electronic medical records. Concerns about inappropriate use of photographs in medical records were reported(28, 29) and could also apply to video recordings.

Concerns about privacy can be complicated by adding audio to the recordings. Providers could be identified by their voice during plenary review. Furthermore, recording audio can capture the voices of people that are not visible, such as the father that may be present during the resuscitation. Finally, statements about other persons, such as the mother or other patients on the ward, can be captured unintended.

MEDICOLEGAL CONSEQUENCES

Privacy may also be a concern because of possible medicolegal consequences. Since Peltier et al started video recording in hospitals, health care providers have expressed their concerns about the potential of medical malpractice litigation.(15) For this reason many trauma centers choose not to implement video recording in

resuscitation cases.(12) Furthermore, providers are concerned that showing parents the recordings could increase the risk of medicolegal consequences.

Although recordings used for auditing may be protected by law(3, 12), the medicolegal consequences of recording neonatal resuscitation need to be considered carefully within the context of local regulations. No related legal cases have been reported by NICUs(8, 10, 11), and it is not yet clear whether the baby and providers are identifiable in the recordings in order to be used in court(12). The question whether recordings are identifiable can be even more complicated when audio is added to the recordings, as it is not clear what would be the status of unintended captured information, such as information about the management of the mother.

DATA STORAGE

When recordings are used for auditing, several centers reported deleting them directly after review.(2, 10) If recordings are stored, however, the storage method affects future use and access. For instance, data can be separated from identity markers and may therefore be used for retrospective studies without patient consent. One benefit of de-identification is that it could prevent the recordings being used in legal cases(3), although this may differ according to local legal regulations. Data storage should be considered carefully as it may have consequences for consent and privacy.

IMPACT ON HEALTH CARE PROVIDERS

The presence of the video recorder may alter the conduct of health care providers in the delivery room. The reported negative effects of being recorded include negative emotions, the development of a climate of mistrust, a decrease in job satisfaction, and an increase in stress and health problems.(30, 31) Video recording neonatal resuscitation could cause providers anxiety during the resuscitation itself(12), creating a higher level of risk for the patient. The awareness of being observed may also enhance distraction and therefore add a risk to video recording.(10)

Although such negative effects may occur, health care providers stated that they adapt to the presence of the video recorder very quickly.(2) According to the experiences of Finer et al changes in the providers' behavior are normally for the better, resulting in improved clinical performances.(2) Several studies show this improvement could be due to the awareness of being observed, an effect known as the Hawthorne effect. (31)(32)

Plenary video review could also affect health care providers; they may feel exposed, embarrassed or vulnerable when they become the object of a group video review.(33) (33). However, sO'Donnell et al reported other experiences, however. Providers accepted plenary review as little different from being observed by senior colleagues and found it useful as a means to improve their own clinical performances.(12)

Using video recording during audits has several benefits. Firstly, an audit can be a second opportunity for a post-brief, and more providers can participate in and learn from a specific resuscitation.(21) Secondly, it is not subjected to recall bias.(18) As the recording can be watched by many observers, individual observer bias can be avoided or reduced(21). Reviewing video recording is therefore a powerful tool to help reduce the amount of errors during neonatal resuscitation.(18) Finally, one study showed improvement in teamwork after several months of plenary video review, although measurable improvements in the clinical performance after auditing have not yet been reported.(16) Further research is needed to investigate how auditing affects the performance of individual health care providers.

IMPACT ON PARENTS

Makary et al reported that patients like the idea of having their procedure recorded, and offering patients a copy of the recording can increase patient satisfaction through increased transparency.(32, 34) Recording neonatal resuscitation could also specifically benefit parents. Several studies show the benefits of parental presence during the resuscitation of their child(35-39), and there may be an analogy with showing parents the video of the resuscitation of their newborn. In the experience of several hospitals, parents find recording neonatal resuscitation acceptable.(3, 9, 12) Parents' experiences of viewing recordings have not yet been studied, however.

PROVIDER CONSENT

As stated above, recording and reviewing neonatal resuscitation may add risks for the health care provider. Therefore, their consent was explicitly sought in several hospitals.(9-11) When the technique is considered standard practice or is used for auditing, however, explicit provider consent is deemed unnecessary.(10) Moreover, as individual providers may be unable to refuse to be recorded, they may feel vulnerable and affected in their privacy. Provider autonomy may therefore be limited in these cases.

PARENTAL CONSENT

Parental consent for recording for audit purposes is often considered unnecessary(3, 11, 12) and in hospitals where recording neonatal resuscitation is part of standard care parental consent may not be sought. Nevertheless, as video recording their child could potentially cause anxiety for parents(12) and adds a privacy risk(10), parental consent is an issue that should be considered.

Parental consent is required when recordings are used for research. However, it may be impossible or inappropriate to approach parents for antenatal consent in an emergency situation(10, 11), while deferring consent, i.e. approaching parents for consent postnatally, is still considered controversial. Furthermore, when the recording is part of the medical record it may be used for retrospective studies that do not always require parental consent. Finally, parental consent should be taken into account when the recording is used for educational purposes in the interests of protecting the family's privacy.(10)

CONFLICTING HEALTH CARE DOMAINS

In 1999, recording and reviewing neonatal resuscitation was implemented as a quality assurance tool.(2) Over time and as several NICUs started to implement this technique, it developed into a valuable tool for education, training, research, patient care and quality improvement. As such, recording and reviewing neonatal resuscitation is operating in several domains of health care: patient care, quality assurance, research, and education. We argue this complicates implementation of the technique even more, as these domains each have their own moral frameworks with requirements and conditions for issues such as consent, privacy and data storage, that may vary as well by institutional, local, federal, and national rules and laws. The moral and legal issues sometimes conflict with each other; for example, the moral framework for patient care may be inconsistent with the moral framework for the domain of research. The record retention period, for example, can be up to 30 years for patient care, whereas for research this period is often 15 years. This results in additional ethical dilemmas. When the technique of recording and reviewing neonatal resuscitation operates in various domains of health care, various stakeholders are affected. In Table 1 we show what ethical dilemmas arise for these stakeholders and what ethical values and principles are at stake. We will illustrate this using the experiences of a Dutch NICU.

Table 1. Ethical dilemmas of recording and reviewing neonatal resuscitation

	QUALITY ASSURANCE	**PATIENT CARE**	**RESEARCH**	**EDUCATION**	***ETHICAL VALUES/ PRINCIPLES***
NEONATE	Can the impact of the technique deteriorate received care?	Can the impact of the technique deteriorate received care?			*Non-maleficence*
			Is neonate research subject?		*Vulnerability* *Research ethics*
	Should identifiability be precluded?	Is the newborn identifiable when recordings are part of the medical record?	Is de-identification of the recordings mandatory?	Should identifiability be precluded?	*Privacy* *Vulnerability*
PARENTS	Can (information about) parents be captured on recordings?	Can (information about) parents be captured on recordings?	Can (information about) parents be captured on recordings?	Can (information about) parents be captured on recordings?	*Privacy* *Vulnerability*
	Should identifiability be precluded?	Are parents identifiable when recordings are part of the medical record?	Is de-identification of the recordings mandatory?	Should identifiability be precluded?	*Privacy*
	Are parents informed?	Are parents informed about the use of the technique during resuscitation of their child?	How and when should parents be informed?	Is parental consent needed for de-identified recordings?	*Voluntariness* *Autonomy*
	Can parents refuse?	Can parents refuse the use of the technique?	Should parents consent?		*Voluntariness* *Autonomy*
		Can parents view recordings?			*Transparency* *Vulnerability*

	QUALITY ASSURANCE	PATIENT CARE	RESEARCH	EDUCATION	*ETHICAL VALUES/ PRINCIPLES*
PROVIDER			Is provider research subject?		*Vulnerability Research ethics*
	Should identifiability be precluded?	Should identifiability be precluded?	Is de-identification of the recordings mandatory?	Should identifiability be precluded?	*Privacy Vulnerability*
	Can individual providers refuse to be recorded?	Can individual providers refuse to be recorded?	Should provider consent?	Is provider consent needed for de-identified recordings?	*Voluntariness Vulnerability Autonomy*
	How are providers informed?	How are providers informed?	Are providers informed?	Are providers informed?	*Vulnerability Voluntariness*
	Can recordings be claimed for medicolegal purposes?	Can recordings be claimed for medicolegal purposes?			*Vulnerability Transparency*
	Which providers have access to the recordings?	What is the impact on provider if parents can watch recording?	Who has access to the recordings?	Who has access to recordings?	*Privacy Vulnerability Voluntariness*
	Should be acted upon observations of substandard care (i.e. malpractice)?		Should be acted upon observations of substandard care (i.e. malpractice)?	Should be acted upon observations of substandard care (i.e. malpractice)?	*Professional ethics Research ethics*
	Will recordings be deleted after review?	Should recordings be part of medical record?	Should recordings be stored de-identified?	Should recordings be stored de-identified?	*Privacy Vulnerability*
	For which period is data stored?	For which period is data stored?	For which period is data stored?	For which period is data stored?	*Privacy*

THE DUTCH CASE

In 2009 the NICU in the Leiden University Medical Center (LUMC), the Netherlands, started recording both vital physiological parameters and video during neonatal resuscitation in the delivery room for research and auditing. Audits are performed on a weekly basis in the presence of neonatologists, fellows and residents. The goal of the audit is to discuss interventions and guidelines in order to improve neonatal resuscitation. Interventions are reviewed and then presented by the coordinator of the audit, who is part of the medical team. All health care providers present are invited to give feedback. Open discussion of the recordings is generally considered acceptable. The medical record is checked for any discrepancies between the chart, the recordings and the guidelines.

From 2010 onwards, parents have been given the opportunity to see the recordings of their baby's resuscitation. The coordinator of the audit watches the recordings with them and then explains the process of neonatal resuscitation. Generally speaking, parents who choose to watch these video recordings report a positive response. However, their experiences need to be explored further.

Since 2016 this technique has been considered standard care and the recordings have become part of the medical record. Recordings are also used for education. The goal of the technique is to improve the quality of neonatal resuscitation and to provide transparency.

CONFLICTING ETHICAL VALUES AND PRINCIPLES

In the domains of quality assurance, patient care, research and education have different aims. The aim of quality assurance is to attain a high quality of care, of patient care to provide the best possible care to the patient. Research is oriented towards new knowledge and the aim of education is competent providers. Benefiting one aim or its stakeholders adds risk of losing out on other aims or stakeholders. For instance, when recordings are openly discussed, as is done during the audits at the LUMC, provider autonomy, voluntariness and vulnerability risk losing out. Or, although providers working at the NICU of the LUMC consider making recordings part of the medical record as family-centered care, it also adds a privacy risk to providers, parents and neonate. And, when considering the technique standard of care, parental and provider voluntariness may lose out. In order to implement the technique of

recording and reviewing neonatal resuscitation, possible benefits and disadvantages should be balanced.

FURTHER RESEARCH

Table 1 is not conclusive; further research into the ethical dilemmas for the various stakeholders is needed. Other parties, such as the authorities may be involved too. They are important stakeholders in the pursuit of quality improvement in health care and might encourage audits using video recordings in order to enhance quality improvement. By doing so, they would also respond to the public's call for the use of video recordings to increase hospital transparency.(34) However, research is needed to define whether governmental involvement as such is desirable and what additional ethical dilemmas could then arise.

In the following years, we will further explore the conflicting ethical values of all stakeholders of recording and reviewing neonatal resuscitation. Furthermore, we will study how stakeholders outweigh benefits and risks. As such we expect to provide insight and guidance to advance the implementation of the technique of recording and reviewing neonatal resuscitation.

CONCLUSION

Recording and reviewing neonatal resuscitation can be a valuable tool for quality assurance, patient care, research and education. However, the ethical dilemmas that create a barrier for further implementation of the technique have not been studied thoroughly. Further research is needed to define whether other ethical conflicts exist that need to be covered. The experiences and perceptions of stakeholders using this technique need to be mapped in order to determine the impact of ethical concerns and to find a solution for existing ethical dilemmas.

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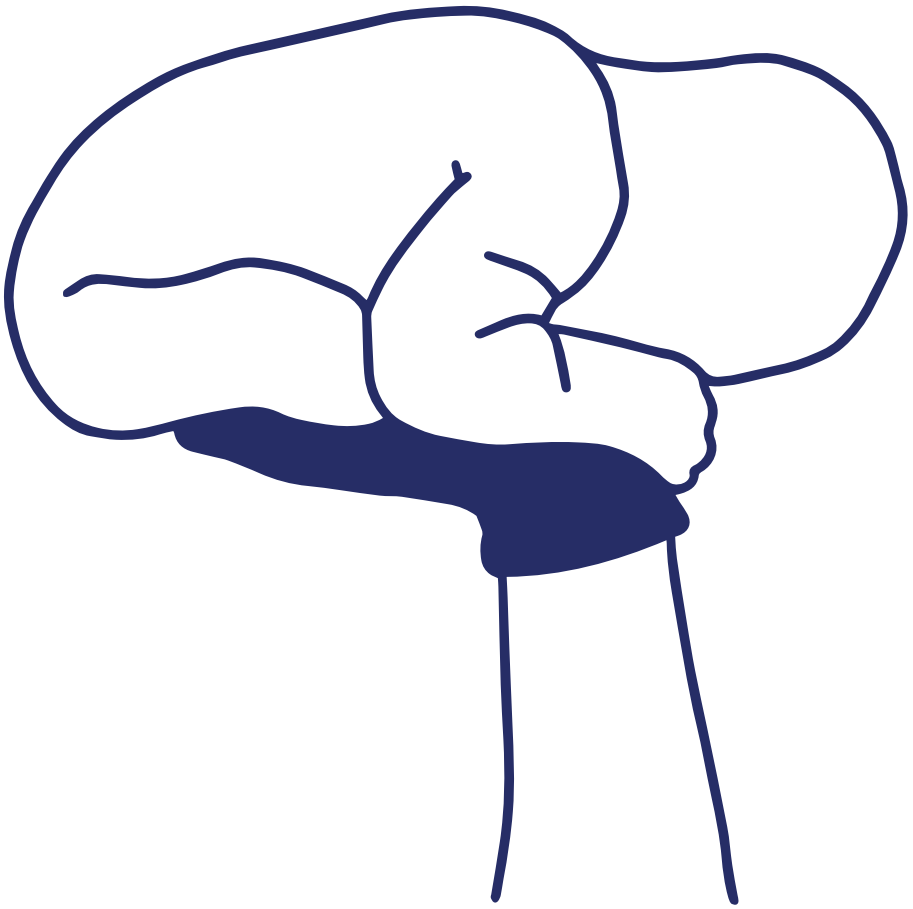

CHAPTER 5

BENEFITS OF RECORDING AND REVIEWING NEONATAL RESUSCITATION:

THE PROVIDERS' PERSPECTIVE

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Archives of Disease in Childhood - Fetal and Neonatal Edition 2019;104:F528-F534

ABSTRACT

OBJECTIVE

To assess benefits of recording and reviewing neonatal resuscitation as experienced by neonatal care providers.

DESIGN

A qualitative study using semi-structured interviews questioning neonatal care providers about their experiences with recording and reviewing neonatal resuscitation. Data were analysed using the qualitative data analysis software Atlas.ti 7.0.

SETTING

Neonatal care providers working at Neonatal Intensive Care Units (NICUs) of the Leiden University Medical Center, the Netherlands, and the University of PennAsylvania School of Medicine, the United States of America participated in this study.

RESULTS

In total 48 NICU staff members were interviewed. Reported experiences and attitudes are broadly similar for both NICUs. All interviewed providers reported positive experiences and benefits, with special emphasis on educational benefits. Recording and reviewing neonatal resuscitation is used for various learning activities, such as plenary review meetings and as tool for objective feedback. Providers reported to learn from reviewing their own performance during resuscitation, as well as from reviewing performances of others. Improved time perception, reflection on guideline coAmpliance, and acting less invasively during resuscitations were often mentioned as learning outcomes. All providers would recommend other NICUs to implement recording and reviewing neonatal resuscitation, as it is a powerful tool for learning and improving. However, they emphasized preconditions for successful implementation, such as providing information, not being punitive and focusing on the benefits for learning and improving.

CONCLUSION

Recording and reviewing neonatal resuscitation is considered highly beneficial for learning and improving resuscitation skills and is recommeAnded by providers participating in it.

INTRODUCTION

Neonatal resuscitation is the most provided form of acute resuscitation performed in hospitals, with 10% of all neonates needing support in stabilization and 3% needing resuscitation.(1, 2) Effective neonatal resuscitation has the potential to save lives and reduce disabilities.(3) However, resuscitation is complex and may not always be maximally effective. Further improvement of the quality of neonatal resuscitation is therefore pursued.

Various Neonatal Intensive Care Units (NICUs) around the world implemented the technique of recording and reviewing neonatal resuscitation in order to improve the quality of provided support during transition at birth. Although NICU staff members agree that recording and reviewing neonatal resuscitation can improve the quality of the procedure, concerns about implementation of the technique and the impact of the technique on providers are raised as well.(4) These concerns create a barrier to further implementation of the technique at other NICUs.

For a wider study, we interviewed neonatal staff members who participate in recording and reviewing neonatal resuscitation in order to gain an understanding of factors that could impede or assist implementation of the technique. In this paper we report the experienced benefits for learning and improving neonatal resuscitation and the necessity of preconditions for a safe learning environment.

METHODS

For this study, which is a sub-study of a project where we review factors that impede or assist wider implementation of recording and reviewing neonatal resuscitation, we conducted semi-structured interviews with NICU staff members working at the NICU of the Leiden University Medical Center (LUMC), the Netherlands, and the Hospital of the University of Pennsylvania (HUP), the United States of America. To produce maximum variation in the study sample, participants were selected through purposive sampling. Using an interview guide, participants were questioned about their experiences with recording and reviewing neonatal resuscitation.

LUMC

The LUMC is a tertiary level perinatal centre with an average of 850 admissions a year. In 2009, recording and reviewing video and vital parameters of neonatal resuscitation

was implemented. Since 2013 audits are conducted, discussing, among others, the technical performance and the documentation of the resuscitation. All NICU staff members are invited to participate in the meetings. Audits are prepared and chaired by the coordinator of the audit. As recording and reviewing neonatal resuscitation is considered standard care since 2016, recordings are stored as part of the medical record and parents are invited to watch the recording of their child accompanied by a provider.

HUP

The HUP is a tertiary level perinatal centre with an average of 800 admissions a year. Since 2015, video, audio and vital parameters of neonatal resuscitation are recorded and reviewed. Providers meet for review conferences, discussing recordings of neonatal resuscitation and relevant literature. All NICU staff members are invited to participate in these meetings. Review conferences are prepared by the coordinator of the program, together with a fellow. The video recordings are part of the hospital's quality improvement and peer review program and are therefore protected under the Pennsylvania Peer Review Protection Act.

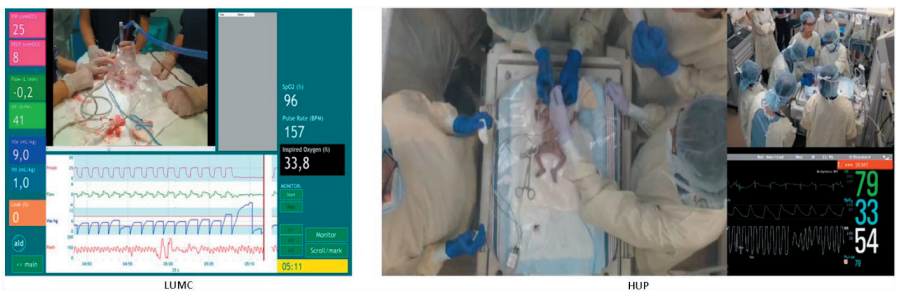

Figure 1. Recording at the LUMC and the HUP

The LUMC and the HUP differ both in their method of recording (figure 1) and their process of reviewing: the LUMC conducts weekly audits of 15 minutes, whereas the HUP conducts an hour lasting review conferences six times a year; the HUP records audio, whereas the LUMC is still considering to record audio; the position of the camera and the amount of cameras differs between NICUs; providers of the LUMC use a respiratory functioning monitor, both during resuscitation and audits; and the HUP has a live stream that allows providers to watch resuscitations at the ward.

ANALYSIS

Data collection and analysis occurred simultaneously. Interviews were audio recorded and transcribed. Transcripts were analysed in two stages. Data were manually reviewed in a process of open coding. Subsequently, data were reviewed using the qualitative data analysis software program Atlas.ti (version 7.0). Themes emerged after initial review of data, which resulted in adaption of the interview guide. In later interviews, participants were therefore directly questioned about their educational experiences.

ETHICS

This study was reviewed by the Ethics Review Committee of the LUMC. In concordance with laws and guidelines, a statement of no objection against execution of the study at the LUMC and the HUP was issued by the Ethics Review Committee.

RESULTS

Interviews were conducted from February 17th through December 27th 2017. A total of 49 interviews were conducted with 48 NICU staff members, of various ages and levels of experience at the NICU. Table 1 shows participant characteristics. One participant was interviewed twice, as initial analysis of the interview showed that more information on specific themes was required. Interviews lasted between 24:19 – 93:05 (mean 45:43) minutes. Duration of interviews varied widely, as providers differed in their exposure to being recorded and reviewed.

Although both NICUs differ in the design of their review process, reported experiences and attitudes are broadly similar. Interviewed providers highly value recording and reviewing neonatal resuscitation and benefits were reported by all providers, with special emphasis on educational benefits. Negative feelings and experiences were reported by many providers, but these were mostly overcome by being exposed to the procedure in a safe learning environment that allowed learning and improving. Three overarching themes were identified: recording and reviewing neonatal resuscitation as a learning activity; reported learning outcomes; and preconditions for successful implementation. These themes and illustrative quotes are presented in table 2-4.

Table 1. Participant characteristics

	LUMC (n = 24)	**HUP (n = 24)**	**TOTAL (n = 48)**
Male (%)	33	29	31
Age mean (range)	39 (26 – 54)	40 (28 – 77)	39 (26 – 77)
Years of experience at NICU mean (range)	9.2 (0.5 – 31)	10.4 (0.5 – 46)	9.8 (0.5 – 46)
Staff members (%)			
Attending	29	29	29
Neonatal fellow	13	25	19
Physician assistant	13	4	8
Respiratory therapist	N/A	13	6
Nurse practitioner	N/A	8	4
Registered nurse	29	21	25
Paediatric resident	13	4	8
Medical student	4	0	2
Involved in neonatal resuscitation studies	13	8	10

RECORDING AND REVIEWING NEONATAL RESUSCITATION AS A LEARNING ACTIVITY (TABLE 2)

Both NICUs implemented recording neonatal resuscitation as a research tool. Over time, the technique developed into a tool for various learning activities. To date, the technique is mostly used for the review conference (HUP) and the audit (LUMC). Recording and reviewing neonatal resuscitation is furthermore valued as a feedback tool, both for asking feedback on performance, and for providing feedback on the performance of others. This was reported not only by junior providers, but also by senior providers, who emphasized how reviewing resuscitations with their peers allows them to keep on learning and improving.

Providers reported to appreciate reviewing recordings of neonatal resuscitation as it allows objective feedback. Recordings are used for feedback in various settings. Feedback can be provided during plenary review meetings, or on an individual base: trainees sit down with their trainers to review their resuscitations. Moreover, recordings are discussed by the team performing a resuscitation. As such, reviewing recordings also functions as a debrief tool. Recordings are furthermore used for teaching and orientation.

Table 2. Recording and reviewing neonatal resuscitation as a tool for various learning activities

	CITATION
RESEARCH	"And I think it's like an unique opportunity for research, because it's so unusual. Like all the things that men might want to study in the NICU, like, we don't usually have video, like primary source. We could actually look and know like what was done and what the vital signs were at that moment. Like that's I think a pretty unusual opportunity, so to have that and to be able to use that for research is, is a pretty powerful tool." (PHCP14)
AUDIT	"And, well, eventually we thought we should actually implement it as an audit, in order to improve ourselves by reviewing the video." (LHCP1)
REVIEW CONFERENCE	"[Y]ou know we have our video review conferences that are also barely new, and those are very helpful. I think we always learn a lot from those, because we all, I think, have similar behaviours and fall into similar patterns or have similar challenges in resuscitations. So they're often widely implementable." (PHCP23)
FEEDBACK ONE-ON-ONE	"I think you get different perspectives, so, if I just watch the video by myself I may not pick up exactly what I could have done differently. But when you watch it with people who are more senior, more expert, they can give you tips about, you know, this went OK, but you could have thought about this, or you could have done this differently." (PHCP13)
TEAM	"But I do think that it's just an invaluable tool to sit down watch yourself in a resuscitation. Watch how the team communicated, how technical skills where done, how people adapted the things. And I think that if you could sit down with the team right after and watch it, well, it's really uncomfortable, I think it would be a really good tool for kind of self-improvement, team improvement." (PHCP15)
DISCIPLINARY	"[A]s paediatricians we are sometimes working solo [...] we do work as a team, but when working with your patient, when you are on service, or whenever, your colleagues almost never see what you are actually doing. So, you do not get a lot of feedback on that. This is especially true when being the supervisor. A resident will not easily tell you: he, you should have done this or that. So reviewing a video is an ideal way of actually look at that objectively." (LHCP21
INTERDISCIPLINARY	"Like, I didn't know that, when you, when you, push morphine, you can get rigidity in your chest wall. I never knew that. Also, sometimes your pattern of resuscitation and compresses, can be a little off. Sometimes it takes a clinician to say: you're going to fast, or you're going to slow." (PHCP18)

	CITATION
TRAINING	"[B]ecause we have so many people we're teaching there, but every one of us can also learn. So we're, we're constantly learning and looking at the sequences around. And so I think there's room for every single person to look at that and, even if you do it perfectly, you still wanna teach the people that you're with what you're doing and why you're doing and what the sequence is." (PHCP10)
ORIENTATION	"Before she even got to see or go to a delivery, I did pull up one of our deliveries and showed her a typical OR delivery. Which is nice for an educational purpose in that sense too. They can see kind of what to do before they even do it." (PHCP17)
DEBRIEF	"We also encourage people to use the tool as an immediate debrief. So the baby is stable, OK guys, let's just watch it really quickly. What went well, what didn't go well. Very real time feedback and debrief." (PHCP3)
CLINICAL CARE	"But, whenever things did not go well from the first start, or when the patient needed more support, sometimes you can see that later on these children also do worse, or you may feel that they weren't breathing well from the very beginning. It may then help to get a better picture of what actually happened during the resuscitation." (LHCP10)

LHCP: LUMC Health Care Professional; HHCP: HUP Health Care Professional

REPORTED LEARNING OUTCOMES OF RECORDING AND REVIEWING NEONATAL RESUSCITATION (TABLE 3)

Interviewed providers regarded recording and reviewing neonatal resuscitation as a unique way to learn and improve. It allows a different perspective than when actually being in a resuscitation, resulting in, for instance, a better perception of time. Furthermore, appropriateness of interventions and guideline adherence can be evaluated. This offers opportunities for fully assimilating guidelines of neonatal resuscitation. Providers reported that they regard recording and reviewing neonatal resuscitation as actually improving patient safety and the quality of provided care, although they realize this may be difficult to prove.

Providers reported learning from reviewing their own performance during resuscitation, as well as from reviewing performances of others. Reviewing one's own performance is considered valuable for reassurance and self-improvement. Providers often compared reviewing actual resuscitations with debrief after simulations, but considered the first more valuable, as this includes actual emotions and interventions.

Extra exposure was the most frequent reported benefit of reviewing others performing resuscitation. Being exposed to more resuscitations, especially more difficult ones or those including intubation, is considered very instructive. Furthermore, providers considered that plenary review of resuscitations allows them to keep their knowledge up-to-date and also provides a forum to discuss approaches. This results in more uniformity in procedures.

Providers reported various benefits of adding extra features to the review process, such as the possibility to train communication skills or crew resource management when recording audio. Although these additional features are considered valuable, implementing them should be considered carefully, as they may affect providers negatively as well.

Providers reported that recording and reviewing also affected their professional standard. Recording and reviewing taught providers to act less invasively during neonatal resuscitation. At the HUP, this led to fewer hands on the baby, at the LUMC to providers spending more time evaluating the baby's condition before being interventional. Reviewing neonatal resuscitation furthermore contributes to a culture of openness, allowing providers to openly discuss procedures of any kind. Finally, providers stated that recording and reviewing neonatal resuscitation benefits the relationship with parents, as it instils trust and shows that the NICU is striving for quality improvement.

All interviewed providers reported at least one learning outcome. The educational value, however, differed between disciplines. Various providers emphasized the importance of a more interdisciplinary approach during review meetings, although they realize interdisciplinary reviews are challenging to implement in the daily routine at a NICU.

Table 3. Educational benefits

	CITATION
TIME PERCEPTION	"It's easy to go back, it's harder to go back and think about what you think, because time is so skewed and like when you're doing a resuscitation. So it's nice to be able to go back and see how long each thing took." (PHCP17)
DISCUSSING APPROACHES	"Yes, and discussing, I mean, there is so much uncertainly in neonatology that I think, you know, just discussing different ways to approach the same situation inevitable is part of our field. Cause there are a lot of things where it's grey and you don't know what the right way to do would have been." (PHCP14)
CREW RESOURCE MANAGEMENT	"I mean if you think about it, and again, it's not exact the same thing, but like, in airplanes, like the black box, like things like that, it's a recording of everything that happens on the plane and it's reviewed. And I think that that is again invaluable for figuring out when things go wrong, how things go wrong. And so I think that it could also be from, like when things do go wrong, like are there system things that we can change? Are there personnel things that need to be changed?" (PHCP15)
INTERNALIZE PROTOCOL	"From an educational standpoint how it helps me is in the sense of just sort of following the steps of resuscitation, dry, stem, stimulation. How to give PPV. Sort of how to think about what the next steps are." (PHCP12)
EXPOSURE	"Well, residents for instance, they can see how other people perform during resuscitation, and they can take things away from that. Because your exposure as a resident is relatively low, as you are not on service all the time. And oftentimes you do not even get the chance to perform an intubation at all, as we are trying to be non invasive, and as such you can see how a intubation is performed. Your exposure increases, as you can see more. Normally, you would only see like twenty resuscitations a year, of which one or maybe five include intubation. But by reviewing you can actually see it five times more." (LHCP16)
DATA COLLECTION	"And I think it's like an unique opportunity for research, because it's so unusual. Like all the things that men might want to study in the NICU, like, we don't usually have video, like primary source. We could actually look and know like what was done and what the vital signs were at that moment. Like that's I think a pretty unusual opportunity, so to have that and to be able to use that for research is, is a pretty powerful tool." (PHCP14)

	CITATION
COMMUNICATION SKILLS	"But even how you communicate, the words you use, the tone you have, the way you instruct people, the way you give feedback or ask people to do things, are all things that, that you know, it's a lot of that communication and personal, you know personal style or communication skills that watching the video allows you to understand that better than you would just trying to recall that." (PHCP24)
DOCUMENATION	"But in my opinion this has more to do with being trained in reviewing those moments, so you can actually be more aware of how to document and how to reflect on those decisions that in retrospect turn out to be important for the whole process." (LHCP10)
REASSURANCE	"So, afterwards, I, the whole team sat down and we looked at it again. [...] I think we were all kind of feeling, like afterwards, is there more that we could have done differently, you know, would the outcome have been different. And so I think it was helpful for us to sit down and look at it and, you know, talk about little things we might have done differently, but, you know, in the end it was like, I don't know if there was anything we really could have done that would have ultimately have made so that baby survived. But it was helpful to have the video as a tool to go back and not just rely on our memories of what happened." (PHCP14)
RESPIRATORY FUNCTIONING MONITOR	"It needs a few resuscitations and a few audits to understand how to interpret those numbers and graphs. A lot of it is pattern recognition, so it's helpful if you are telling us, well, this is what we can see now. This is the pattern. And if you see that pattern recur, so yesterday night I saw this pattern and I thought, oh, these are good tidal volumes, I can see air getting in the airways, I do not see obstruction, I do not see leakage. Those patterns you learn to recognize and this helps you to read the monitor." (LHCP20)
SELF-AWARENESS	"Or, watched yourself on a video, it's, you see a lot of your own manners and some of them make you cringe, but you also notice things, like either during a resuscitation a kid was fine, but I kept on turning my head and getting distracted by other things and not focusing on the kid in front of me. Even though he was fine, but it just, it just, it reminded me how distracted I get by everything else in the room. And so with things like I think it can be a really good tool." (PHCP15)
SELF-IMPROVEMENT	"If you do not do the audit, you don't know. You do not get that feedback. Maybe you would feel better, but, well, somehow you are unconsciously incompetent. And of course, it's easier to be unconsciously incompetent than consciously competent. But, in the end it's better for everybody, for your patient, but as well for yourself, to have been made aware about things you did suboptimal. [...] And there are definitely things I learned and that I would do differently later on or still do differently than I did at that moment." (LHCP21)

	CITATION
ROLE DIFFERENTATION	"I think the, just like less people touching, just being a bit more specific about the roles themselves. Before this, we've been very, it was very vague. It was just, I'm the leader and I'm the airway and I'm the this and I'm the that. But we weren't very clear about what is it I want you to do in that role. And so, you know, that's, that's been helpful." (PHCP25)
PHYSIOLOGY	"And you need to know a lot about physiology, that you do know as a neonatologist, but to put this knowledge into practice may not be this obvious for everyone. [...] But you do learn how to do that by reviewing these videos. [...] And as this is taught during review, you learn a lot about the physiology of transition at birth." (LHCP21)
PROTOCOL COMPLIANCE	"And that's one of the biggest things I've seen in the program, is, and we know it all along, but every one of these resuscitations, the steps take a lot longer, or are instituted a lot later than what you think. And so this, this says, let's get these steps in order and do them in a quick fashion." (PHCP10)
KEEPING KNOWLEDGE UP-TO-DATE	"I think everybody has room for improvement. No matter how much experience people have and, with the way like in health care things constantly are changing, I think like, you know, just staying up-to-date with the current procedures and policies. So I think it's helpful." (PHCP6)
PROTOCOL ESTABLISHMENT	"I think, I think just the, it really, one is, like it facilitates an open discussion on how we perform our resuscitation and how we can do things better [...] But then we also say like how, like we identify this, how is the division gonna adjust this?" (PHCP7)

PRECONDITIONS FOR SUCCESSFUL IMPLEMENTATION (TABLE 4)

Providers reported negative feelings and experiences with recording and reviewing neonatal resuscitation and therefore emphasized preconditions for using the technique. Providing information, such as information about data storage and the legal status of recordings, is considered very important for providers in order to feel safe when using the technique.

Many providers reported feeling nervous when their performance was reviewed by colleagues. These feelings were reported more frequent by junior providers and providers who stated that they felt less confident about their clinical performance. Feelings of anxiety normally reduced after exposure. Providers tended to give little weight to negative feelings, as they experienced the benefits of recording and

Table 4. Preconditions for successful implementation

	CITATION
MIND SET	"So making sure that everybody has like the shared mentality, like: yes, like there will be things we find that we do wrong, and we're gonna acknowledge that. And that's how we're gonna improve." (PHCP23)
BLAME FREE, SHAME FREE	"So, yeah, I think you should introduce it well and that you need to pay attention to a safe environment during review, especially in the beginning. It should not be blaming and shaming, but it should be constructive. And we should keep in mind that there may be more ways to reach the best outcome for our patients." (LHCP11)
CREATE INVOLVEMENT	"And also have all of the sort of stakeholders in that, have the nurses, have the RT's, have everyone kind of sit down at a table and be like: how can we use it together so everyone feels like they're part of it." (PHCP15)
PROVIDE INFORMATION	"I think just transparency about the process and just like, like, you know, when it's been recorded, when they're being deleted, how you can review it, both informally, and then that the formal reviews are done in a kind of like, you know, non-accusatory way they're done from the point of like: let's learn, let's improve, let's look at our practice." (PHCP7)
FOCUS ON BENEFITS	"Before you start plenary meetings, you have to make sure you explain everyone very well what's the goal of these meetings, so they know it's not about judging people, or grading them, but because you want to discuss together what you are doing. So they know the goal is to learn together. In order to improve care." (LHCP21)
EXPOSURE	"So I think having more exposure, then you're less afraid of it, you're less afraid because oh yeah, this is not about getting in trouble, it's all about dynamics and how we can improve our logistics and also improve the outcome for this baby." (PHCP11)
DATA PROTECTION	"I think if it wasn't as secured, if it wasn't, you know, if it hasn't be a secured server on a password protected storage, like I think all of this things need to be in place for in order to all of the physicians to feel safe and stuff." (PHCP7)
PREPARE PROVIDER FOR REVIEW	"I think it's important to watch the video on beforehand. The best would be not to do that, but that would be very harsh. (...) I think it's decent to discuss it on beforehand. It would make it easier, so somebody will know a bit what is gonna happen during the plenary review and he can prepare himself a little for that." (LHCP21)

reviewing neonatal resuscitation for learning and improving the quality of the procedure. All providers stated that the benefits of the technique outweigh the concerns.

In order to prevent or reduce negative feelings and enable learning and improving, providers highlighted preconditions for a safe learning environment. Providers considered involvement, a shared group culture or mind set, focus on the educational benefits, and a blame free, shame free environment as essential conditions for an effective review process. Creating a safe learning environment is considered an ongoing process and a shared responsibility for all providers who benefit from the technique.

When preconditions are met, recording and reviewing neonatal resuscitation is acceptable for providers, and definitely recommended to implement at other NICUs. Furthermore, providers assume that recording and reviewing actual care could be valuable for other procedures, such as laryngoscopy, or at other wards, such as the ER or other ORs. Moreover, providers proposed recording consultation with patients in order to improve communication between providers and patients.

DISCUSSION

Our study explored benefits of recording and reviewing neonatal resuscitation as experienced by neonatal care providers. Recording and reviewing neonatal resuscitation is considered highly beneficial for learning and improving resuscitation skills. All interviewed providers would definitely recommend other NICUs to implement recording and reviewing neonatal resuscitation, but stated that preconditions should be met for successful implementation.

Knowledge and skills often diminish shortly after Neonatal Resuscitation Program (NRP) and equivalent trainings.(5, 6) Matterson et al. showed that resuscitation skills diminish between two and four months after completion of neonatal resuscitation training.(5) Therefore, activities that boost knowledge and skills are recommended. (7) Sawyer et al. and Cordero et al. furthermore showed that multiple sessions are needed in order to actually improve resuscitation skills.(8, 9) Many NICUs therefore conduct regular simulation training of neonatal resuscitation. Various studies reported improvement of neonatal resuscitation skills after simulation trainings.(5, 10, 11) In our study, providers considered reviewing actual neonatal resuscitation

even more valuable for learning and improving clinical performance than reviewing performances after simulations.

Enhanced learning after reviewing actual resuscitation was reported by Shivananda et al. and Skåre et al.(12, 13) Many studies highlight the clear educational benefits of recording and reviewing actual care.(14) Yet, an improvement in clinical performance after reviewing recordings of actual resuscitation could not be proved.(2, 15-17) In these studies, clinical performance was mostly scored as correct performance of hands-on technical skills. Successful delivery room management, however, demands a combination of technical, cognitive and behavioural skills.(18) Interviewed providers in our study reported learning outcomes in all these domains. For instance, when reviewing recordings, providers are trained on physiology and clinical indications (cognitive skills) and they receive objective feedback on mask technique (technical skills) and communication (behavioural skills). The improved clinical performance that interviewed providers reported experiencing may be due to the learning effect on this combination of skills. Increased self-assurance about clinical skills, which has been reported to improve resuscitation skills(10), may also contribute to the learning effect.

Based on the reported learning outcomes of recording and reviewing actual neonatal resuscitation, we propose that the technique supports maintaining resuscitation skills. Moreover, we suggest that review processes as performed by the LUMC and the HUP can be even more successful than debrief after simulation trainings, as these review processes are more concise and more frequent than most simulation training programs. Frequently recurring short-lasting booster sessions may allow better integration in the daily routine of NICUs and extra exposure for providers. This extra exposure will especially benefit residents: in the short time of rotating at a NICU, residents will be exposed to various booster sessions. Furthermore, they are more likely to be exposed to a booster session before being hands-on again after a period of rotations at other wards. This will improve patient safety.

Although recording and reviewing neonatal resuscitation is considered valuable for improving resuscitation skills, providers of both NICUs reported that the educational value of recording and reviewing neonatal resuscitation differs strongly between NICU staff members, as it is often logistically impossible for all neonatal disciplines to join review meetings. More research is needed in order to develop a format for review meetings, fitting to the daily routine of a NICU, in which all NICUS staff members can participate, allowing all providers to improve resuscitation skills.

In our study, providers reported that recording and reviewing neonatal resuscitation is acceptable for providers. This is in accordance with previous reported experiences. For example, in 2008, O'Donnell et al. reported that providers accepted recording and reviewing neonatal resuscitation as little different from being observed and instructed by senior colleagues.(19) Gelbart et al. reported that most staff members were willing to participate.(20) Shivananda et al. recently reported that 90% of questioned providers considered recording and reviewing acceptable.(12) This suggests a growing base of evidence that recording and reviewing neonatal resuscitation is acceptable for neonatal care providers, supporting the recommendation for implementation made by the providers participating in our study. However, although participant selection was conducted carefully and anonymously, researcher bias may have occurred. Furthermore, providers may have been biased by positive experiences or providers may have felt constrained to report negative experiences, as the general consensus at both NICUs is very positive. Based on reported concerns about recording and reviewing neonatal resuscitation, both by providers in our study and providers in other studies, we therefore recommend cautiousness upon implementation. As providers who experienced the educational benefits of recording and reviewing neonatal resuscitation generally highly appreciate the technique, we advise NICUs that plan to implement recording and reviewing neonatal resuscitation, to expose providers to the educational benefits as early as possible and to involve them in designing a review process fitting to their educational needs.

To the best of our knowledge, this is the first study to report learning outcomes of recording and reviewing neonatal resuscitation in depth. In order to provide guidance to other NICUs that are planning to implement this technique, we provide an overview of learning outcomes of various forms of review meetings for providers (table 5). This overview may be used to provide neonatal care providers insight in educational benefits and to create involvement in designing a review process fitting to educational needs of providers.

CONCLUSION

Recording and reviewing neonatal resuscitation is considered highly beneficial for maintaining and improving resuscitation skills. Providers using the technique would recommend other NICUs to implement it, assuming that preconditions for a

safe learning environment are met. Insight in educational benefits may be used for successful implementation of a review process, fitting to educational needs of those participating in it.

Table 5. Educational benefits of various review processes

	UNDERGRADUATES (i.e. interns)	**POSTGRADUATES (i.e. residents, fellows, neonatal nurse trainees)**	**SENIORS (i.e. attendings, resource nurses, physician assistants)**
ONE-ON-ONE REVIEW	N/A	Self-reflection Reassurance Self-improvement Feedback Time perception Internalizing protocol	Self-reflection Reassurance Self-improvement Peer coaching Time perception
DISCIPLINARY REVIEW	Orientation Exposure (Patho)physiology	Orientation Feedback Exposure Internalizing protocol (Patho)physiology Acting less invasively Documentation	Peer coaching Internalizing protocol (Patho)physiology Acting less invasively Documentation Keep knowledge up-to-date Discussing approaches Protocol establishment
TEAM REVIEW	Exposure	Debrief Internalizing protocol Role differentiation Documentation	Debrief Role differentiation Documentation
INTERDISCIPLINARY REVIEW	Orientation Exposure (Patho)physiology	Orientation Feedback Exposure Internalizing protocol Role differentiation (Patho)physiology Documentation Acting less invasively	Peer coaching Internalizing protocol Role differentiation (Patho)physiology Documentation Acting less invasively Keep knowledge up-to-date Discussing approaches Protocol establishment

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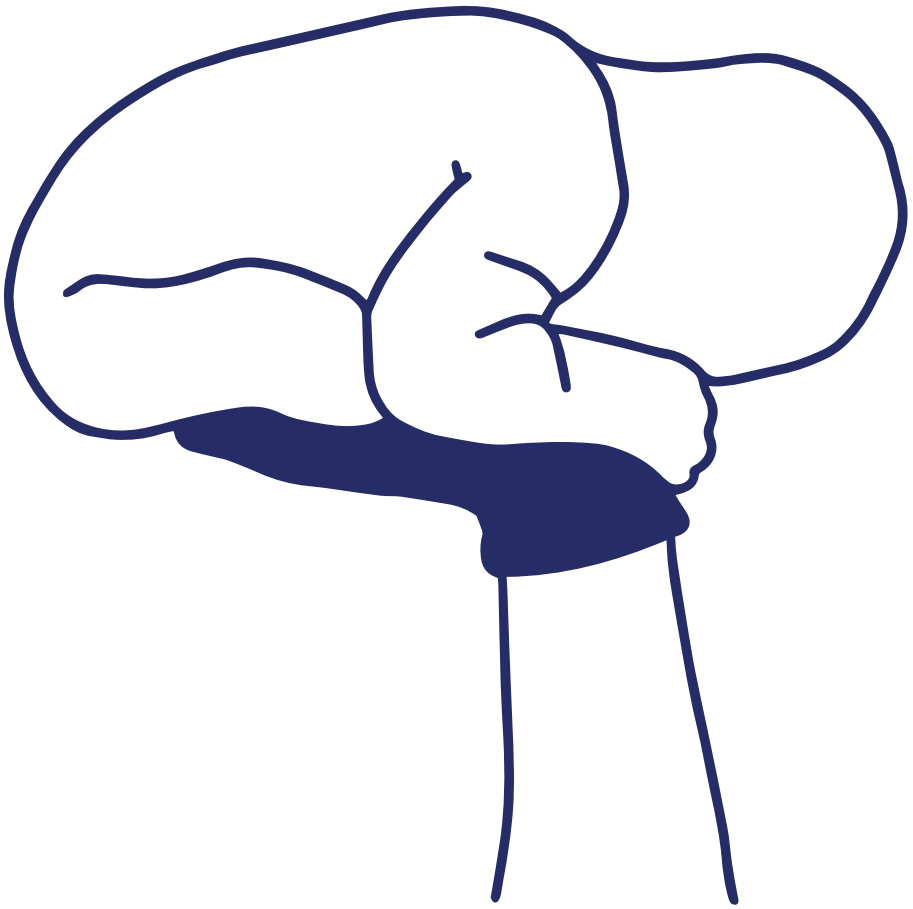

CHAPTER 6

IMPROVING THE QUALITY OF PROVIDED CARE:

LESSONS LEARNED FROM AUDITING NEONATAL STABILIZATION

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Frontiers in Pediatrics 2020;8;560

ABSTRACT

Video and physiological parameter recording of neonatal stabilization was implemented at the Neonatal Intensive Care Unit (NICU) of the Leiden University Medical Center. In order to improve documentation and the quality of care provided during neonatal transition, we implemented weekly plenary audits reviewing recordings of neonatal stabilization in 2014. In audits, provided care is reviewed, discussing, among others, mask technique, compliance to the prevailing local guideline, and clinical decision

making and alternative treatment options. In this perspective, we argue that auditing neonatal stabilization is a valuable tool to improve patient safety and the quality of care provided during neonatal stabilization. We, therefore, report lessons learned and areas for improvement that could be identified and addressed during audits conducted at our NICU. Important areas for improvement were guideline compliance, documentation, the usage of medical devices, the conduct of delivery room studies, and clinical decision-making. By reporting our experiences, we hope to encourage other NICUs to also implement regular audit meetings, fitting to their improvement needs.

INTRODUCTION

Providing support to neonates during neonatal transition is challenging. In order to study care provided during neonatal transition, we implemented recording of video and physiological parameters of neonatal stabilization at the Neonatal Intensive Care Unit (NICU) of the Leiden University Medical Center (LUMC), a tertiary level perinatal centre with an average of 850 admissions a year, in 2009. In order to protect the privacy of providers, recordings capture only imaging of the neonate and providers' hands (Figure 1). Evaluation of recordings of neonatal stabilization showed that providers frequently diverge from the prevailing guidelines and that mask technique is often inadequate.(1) Comparing recordings with the medical record furthermore showed that documentation in the medical record is often incomplete or inaccurate. (2) In order to improve documentation and the quality of care provided during neonatal transition, we implemented weekly plenary audits reviewing recordings of neonatal stabilization in 2014.

Figure 1. Recording equipment. Video is recorded by a webcam, capturing the neonate and providers' hands. Vital parameters include positive end-expiratory pressure and peak inspiratory pressure (pink), flow and respiratory rate (green), expired tidal volume (blue) and mask leak (orange), oxygenation, heart rate, and fraction of inspired oxygen. All measurements are digitized and recorded at 200 Hz using the Bicore II (Cardinal Healthcare, Yorba Linda, CA, USA) physiological recording system with Polybench software (Advanced Life Diagnostics, Weener, Germany).

Our weekly audits are prepared and chaired by the coordinator of the audit. Providers can request a specific stabilization to be discussed, or the coordinator selects a stabilization based on gestational age (<26 weeks), intensity of provided care (e.g. intubation, cardiac resuscitation), medical history (e.g. congenital malformation, twin-twin transfusion syndrome), or inclusion in a delivery room study. Audits take place after morning handover and last approximately 20 minutes. All NICU staff members

are invited to participate in these meetings. In audits, provided care is reviewed, discussing, amongst others, mask technique, compliance to the prevailing local guideline, and clinical decision-making and alternative treatment options. Concluding the audit, providers capture lessons learned. Since 2018, minutes are sent out after every audit, as this allows providers that could not have been present during the specific audit to also learn from the discussed stabilization.

Various studies highlight the clear benefits of recording and auditing actual care(3, 4), yet several studies failed to prove improvements in clinical performance after auditing recordings of actual neonatal stabilization.(5-7) Recently, we reported that weekly plenary audits at our NICU improved guideline compliance and documentation in the medical record.(8) Furthermore, we reported that providers report various educational benefits of auditing recordings of neonatal stabilization and that providers consider audits beneficial for improving the quality of care provided during neonatal transition. Providers therefore recommend the implementation of plenary audits, but also acknowledge that successful implementation requires that audits should complement the needs of a NICU(9). Based on experiences at our centre, we argue that auditing neonatal stabilization is a valuable tool for improving patient safety and the quality of care provided during neonatal stabilization, as it can be used to identify and address various areas for improvement. By providing insight in these areas for improvement, we hope to encourage other NICUs to implement regular plenary audits using recordings of neonatal stabilization, fitting to their specific needs.

LESSONS LEARNED DURING PLENARY AUDITS

In order to provide more insight in the potential of plenary audits for improving the quality of provided care during neonatal stabilization, we analysed all notes made during audits and minutes sent out after audits in the period between February 2018 and February 2019. In this period, 39 stabilizations were discussed during plenary audit meetings. Infants that received support during these stabilizations were born after a median (range) gestational age of 27+4 (24+3 - 41+5) weeks. In total 131 lessons learned were captured, with median (IQR), 3 (2-4) lessons learned per audit. These lessons learned were connected to 15 areas for improvement.

Audits were attended by a mean±SD of 23±4 staff members. This group averagely composed of 5±2 consultants, 3±1 fellows, 4±1 residents, 2±1 physician assistants,

1 ±1 nurse, and 7±1 staff members not involved in hands-on care (e.g. coordinator of the audit, investigators, medical students). During 12 (31%) audits, members of the obstetrical team attended the audit after the joint handover of the NICU and obstetrics department.

Table 1. Lessons learned during plenary audits

LESSONS LEARNED DURING PLENARY AUDITS (N = 131)			
		n (%)*	**Examples**
Discipline	Medical staff	50 (38)	Standard operating procedures of delivery room studies, oxygen titration.
	Nursing staff	4 (3)	Documentation, stimulation.
	Both	53 (40)	Order of starting up devices, interpretation of monitor signals, dedicated persons.
	Obstetrics staff	11 (8)	Interprofessional communication.
	Not involved in hands-on care	13 (10)	Feedback on audit or study equipment.
Skills	Technical	103 (79)	Medical devices, mask technique.
	Non-technical	23 (18)	Communication, role differentiation.
	Both	5 (4)	Role differentiation based on the physiology of delayed cord clamping.
Area of improvement	Medical devices	25 (19)	Order of starting up of devices, placement of sensors.
	Conduct of delivery room studies	24 (18)	Study protocol adherence, equipment for data collection, standard operating procedures.
	Clinical decision-making	22 (14)	Oxygen titration, moment of line placement or drug administration.
	Physiology	15 (9)	Larynx function, breathing patterns, effect of maternal drug usage.
	Mask technique	11 (7)	Balance mask leak versus applying too much pressure.
	Protocol establishment	9 (6)	Line placement, heat management during delayed cord clamping.
	Documentation	9 (6)	Documentation of rectal temperature or time until cord clamping.
	Role differentiation	8 (5)	Dedicated person for specifics tasks, delegation of tasks.

LESSONS LEARNED DURING PLENARY AUDITS (N = 131)		
	n (%)*	Examples
Communication	7 (4)	Interprofessional communication.
Self-assurance	7 (4)	Self-assurance, peer support.
Conduct of audit	6 (4)	Providers informed, involved and prepared for audit.
RFM	5 (3)	Interpretation of monitor signals.
Need for research	4 (3)	NeopuffTM and CO2 retention, trigeminal reflex.
Heat management	4 (3)	Heat management during delayed cord clamping.
Hand hygiene	3 (2)	Hand hygiene when using mobile phones.

* As lessons learned can be connected to different areas of improvement, n/% exceeds 131/100%. RFM: Respiratory Functioning Monitor.

Of all 131 captured lessons learned, 50 (38%) were beneficial for the medical team and 4 (3%) for the nursing team. Another 53 (40%) lessons learned were beneficial for both the medical and the nursing team. Of the remaining 24 (18%) lessons learned, 11 (8%) were beneficial for obstetrics, and 13 (10%) for staff members not involved in hands-on care. Lessons learned revealed various areas for improvement. Table 1 provides an overview of lessons learned and connected areas for improvement. We will shortly discuss the most important lessons learned.

CAPTURED LESSONS LEARNED

In total 108 (82%) lessons learned were connected to technical skills, of which 24 (22%) concerned medical devices. These included preparation of equipment, e.g. correct order of starting up devices, as well as to the correct usage of devices, e.g. correct placement of sensors. Another 23 (21%) lessons learned were connected to conduct of delivery room studies, especially standard operating procedures, study protocol adherence, preventing missing values, and study equipment.

Nineteen (18%) of the lessons learned were connected to clinical decision-making and alternative treatment options, e.g. oxygen titration, moment of drug administration or line placement. Audits frequently resulted in plenary discussions in which providers tended to reach consensus on best practice. Three times (8%) these discussions resulted in agreement on adaptation of the local guideline. These adaptations included initial evaluation before starting respiratory support, heat management

during delayed cord clamping, and the option to perform line placement in the delivery room, instead at the NICU, with a maximum of two attempts of line placements in the delivery room.

In 11 (28%) audits, providers transferred knowledge about physiology, resulting in 12 (11%) lessons learned. This included the physiology of transition, the physiology of breathing patterns, and the physiology of maternal drug usage. Eleven (10%) lessons learned were connected to mask technique, especially concerning leak during the provision of respiratory support. Another 9 (10%) lessons learned were connected to documentation, 5 (5%) to the respiratory functioning monitor (RFM), 4 (4%) to heat management, and 3 (3%) to hand hygiene.

When lessons learned were connected to cognitive, social or personal skills, they were categorized as non-technical skills. In total 28 (21%) lessons learned were connected to non-technical skills. Of these, 8 (29%) were connected to role differentiation and 7 (25%) to (interprofessional) communication. Six times, NICU providers requested to review a specific stabilization during an audit for self-assurance. Doing so enabled providers to ask for feedback and peer support.

Plenary audits furthermore resulted in insight in gaps in scientific knowledge. Providers reported the need for further research on the impact of the Neopuff™ on CO_2 retention, delivery room management for infants with twin-twin transfusion syndrome, and the impact of the trigeminal reflex during neonatal stabilization. The latter was followed up upon by studying the effect of applying a face mask for respiratory support on breathing in preterm infants at birth.(10)

DISCUSSION

When plenary audits were implemented at our NICU in January 2014, we aimed to improve guideline compliance and documentation in the medical record. Recently we reported that plenary audits indeed improved documentation in the medical record and guideline compliance.(8) During one year of plenary audits at our NICU, many other areas of improvement were identified and addressed, proving that plenary audits may not only improve guideline compliance and documentation, but can also contribute to other improvements.

An important identified area for improvement was usage of medical devices: of all 131 captured lessons learned, 25 (19%) involved medical devices. Guidelines

such as from the International Liaison Committee on Resuscitation(11) and the European Resuscitation Council(11, 12) advise usage of various devices to maintain normothermia, to objectively assess the infant, and to provide respiratory support during neonatal stabilization.(13) Preparation of equipment is one of the keys to successful neonatal stabilization.(13) In audits, providers were frequently reminded about the correct order of starting-up devices, ensuring successful preparation of equipment needed for neonatal stabilization. Furthermore, providers were reminded about the correct usage of medical devices. Inappropriate use of devices commonly occurs and is reported to be associated with patient safety incidents, causing harm(14) or even death(15). Audits may thus help to ensure successful equipment preparation and to prevent inappropriate usage of devices.

Another important area for improvement was conduct of delivery room studies: 24 (18%) lessons learned were connected to study protocols, especially study protocol adherence, data loss situations, and study equipment. At our NICU one up to three interventional studies are continuously being conducted in the delivery room. In audits, providers often identified protocol deviations. Protocol deviations commonly occur in research, which can be problematic, as protocol deviations may result in patient harm(16) or invalid research(17). Protocol deviations cannot be entirely avoided, but their occurrence and their impact on patient safety and validity of research can be reduced.(18) Audits help to identify and address protocol deviations. Consequently, providers may for instance be retrained in study procedures through simulation scenarios. Providing insight in non-compliance to study protocols may furthermore provide investigators with valuable insights, for instance on the feasibility of an experimental intervention. This may consequently improve future delivery room study protocols and future care.

Twenty-two (14%) lessons learned were connected to clinical decision-making and alternative treatment options. Clinical guidelines are established in order to standardize and clarify care and to improve efficiency, productivity, and safety.(19) As providers are recommended to follow guidelines in order to improve neonatal stabilization and outcome(1), we aimed to improve guideline compliance through auditing. However, when discussing guideline compliance during audits, it also turned out that more clarity in the guideline is needed in order to guide clinical decision-making. Moreover, providers agreed that the local guideline for neonatal stabilization could be improved upon. Furthermore, guidelines for neonatal stabilization are

designed for a standardized patient(20), whereas the clinical practice of providing care to transitioning infants is often more unruly. In audits, providers frequently openly discussed delivery room management for infants in these non-standard situations and the appropriateness of interventions for non-standard infants, trying to reach consensus on the best care, thus harmonizing care. Moreover, as well as learning the standardized guideline for neonatal stabilization, during audits junior learners can be trained when and how to adapt care for individual infants.

LESSONS LEARNED FROM AUDITING NEONATAL STABILIZATION

Audits at our NICU allowed providers to identify and address various areas for improvement. Oftentimes, improvements should be made by addressing knowledge and skill retention. Retention of knowledge and skills in the context of neonatal stabilization has been reported in various studies(21, 22), and boosting knowledge and skills is recommended.(23) During audits, knowledge is constantly boosted. Moreover, receiving feedback on clinical performance allows for continuous development of expertise(20) and may increase self-assurance, which was also reported to improve clinical skills(24). Furthermore, insight in what actually happens in the delivery room allows to identify non-compliance to guidelines and open discussions about best practice, as such harmonizing and improving care provided by providers.

SAFE LEARNING ENVIRONMENT

Successful audits require a safe learning environment. Important prerequisites for a safe learning environment include a blame-free, shame-free environment focusing on the benefits for learning and improving, proper information about the goal of audits, involvement of providers, and secured storage of recordings.(9)

In our experience, creating a safe learning environment is an ongoing process. This requires a lot of involvement of staff members and a process of auditing that is reshaped according to providers' needs. For our NICU this meant that over time audits evolved from meetings in which stabilizations were anonymously discussed using standarized evaluation criteria(8), into open discussions, discussing clinical decision-making and the appropriateness of interventions for individual patients, and boosting knowledge about e.g. medical devices and standard operating procedures of delivery room studies. Providers who were involved in the stabilization are present, ask for feedback on their care, and add valuable information that may improve discussions.

During audits, staff members suggested further adaptations to improve the process of auditing. As such, providers that were involved in the stabilization are now informed on beforehand and offered the opportunity to watch the recordings before the audit, or to prepare the audit together with the coordinator. Furthermore, stabilizations are only discussed when at least one of the involved providers can be present during the audit to provide extra information about the stabilization. This allows for more open discussions about the best care for the infant in the specific situation. Lastly, stabilizations are preferably not discussed the morning after a nightshift of one of the involved providers, as tiredness due to a (stressful) night shift may influence how feedback is received.

OPPORTUNITIES FOR FURTHER IMPROVEMENTS

Auditing care provided during neonatal transition allows providers of our NICU to identify areas for improvement. These areas for improvement can then be addressed in Plan-Do-Study-Act (PDSA) cycles. PDSA cycles are widely used to drive quality improvement in healthcare and consist of four stages in which a change aimed at improvement is identified, this change is tested, the success of this change is studied, and consequently this change is implemented or adapted, starting a new PDSA cycle(25). During audits, processes that need to be improve are identified, and oftentimes changes aimed at improvement are also discussed. By following the next stages of the PDSA cycle, we can systematically study the impact of these changes aimed at improvement. Doing so will be beneficial for our practice, but will also improve the evidence-base for auditing neonatal stabilization by providing outcome data about potential benefit for infants.

Analysing captured lessons learned showed that lessons learned are beneficial for various disciplines, including nursing staff and obstetrics. However, audits are mostly attended by the medical team of the NICU. As such, lots of opportunities to improve care needlessly get lost. Future efforts should concentrate on organising multidisciplinary meetings and studying the impact of such audits on improving patient safety and the quality of delivered care.

Successful neonatal stabilization demands a combination of technical and non-technical skills(4). In our practice, both technical and non-technical lessons learned were captured, yet the majority of lessons learned involved technical skills. This is probably related to the fact that in order to protect the privacy of our providers, our

recordings do not include audio and only capture the infant and providers' hands. However, providers themselves preferred to openly discuss stabilizations, instead of anonymously. We hope to add audio to the recordings in the near future, so we can start auditing communication, teamwork, clinical decision-making during stabilisation and other non-technical skills more in-depth.

CONCLUSION

At our NICU, auditing neonatal stabilization improved guideline compliance and documentation in the medical record and is considered as educational and beneficial for improving the quality of care provided during neonatal stabilisation. Furthermore, many lessons learned could be captured and areas for improvement could be identified and addressed by boosting knowledge and skills. Most important identified areas for improvement were the usage of medical devices and the conduct of delivery room studies. Moreover, clinical decision-making could be plenary discussed, allowing the local guideline for neonatal stabilization to be clarified and improved. As such, audits contribute to improving patient safety and the quality of care provided during neonatal stabilization. By reporting our experiences we hope to encourage other NICUs to also implement regular audit meetings, fitting to their improvement needs.

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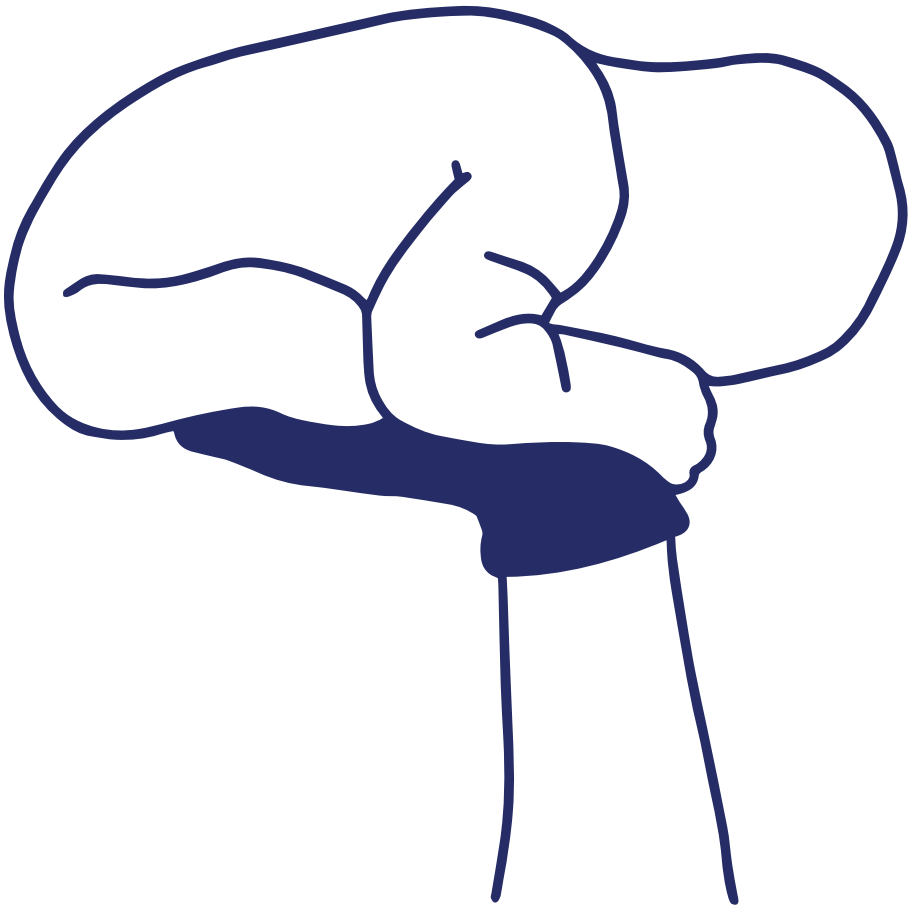

CHAPTER 7

REVIEWING RECORDINGS OF NEONATAL RESUSCITATION WITH PARENTS:

A QUALITATIVE STUDY

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Archives of Disease in Childhood - Fetal and Neonatal Edition 2021; Epub ahead of print

ABSTRACT

BACKGROUND

Recording neonatal resuscitation, including video and respiratory parameters, was implemented for research and quality purposes at the neonatal intensive care unit (NICU) of the Leiden University Medical Center, and parents are offered to review the recording of their infant together with a neonatal care provider. We aimed to provide insight in parental experiences with reviewing the recording of the neonatal resuscitation of their premature infant.

METHODS

This study combined participant observations during parental review of recordings with retrospective qualitative interviews with parents.

RESULTS

Parental review of recordings of neonatal resuscitation was observed on 20 occasions, reviewing recordings of 31 children (12 singletons, eight twins, one triplet), of whom four died during admission. Median (range) gestational age at birth was 27+5 (24+5 – 30+3) weeks. Subsequently, 25 parents (13 mothers, 12 fathers) were interviewed.

Parents reported many positive experiences, with special emphasis on the value for getting hold of the start of their infant's life and coping with the trauma of neonatal resuscitation. Reviewing recordings of neonatal resuscitation frequently resulted in appreciation for the child, the father, and the medical team. Timing and set-up of the review contributed to positive experiences. Parents considered screenshots/copies of the recording of the resuscitation of their infant as valuable keepsakes of their NICU-story, and reported that having the screenshots/video comforted them, especially when their child died during admission.

CONCLUSION

Parents consider reviewing recordings of neonatal resuscitation as valuable. These positive parental experiences could allay concerns about sharing recordings of neonatal resuscitation with parents.

INTRODUCTION

Adapting from foetal to neonatal life is a complex physiological transition. Approximately 10% of all infants require some degree of support during this transition(1), but a lower gestational age at birth is associated with an increased need of support, with up to 85% of extremely preterm infants requiring interventions at birth(2). To study and improve the quality of care delivered during neonatal transition, we implemented recording neonatal resuscitation, including video and respiratory parameters (see figure 1) at the neonatal intensive care unit (NICU) of the Leiden University Medical Center in 2014. All neonatal resuscitations are recorded, unless parents antenatally opt-out for recordings to be made. Postnatally, parents may request to delete recordings. Recordings are stored as part of the medical record of the infant and parents can request screenshots or a copy of the video recordings.

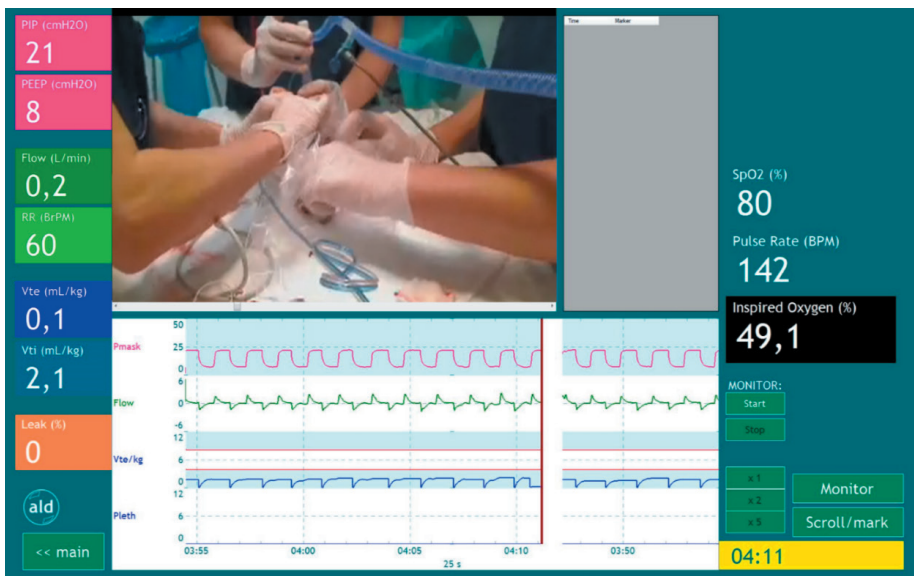

Figure 1. Recording neonatal resuscitation at the LUMC

Various studies showed that parental presence during neonatal resuscitation can be beneficial.(3-12) International guidelines on neonatal resuscitation recommend parental presence during neonatal resuscitation where possible.(13, 14) At our NICU, we encourage partners to be present during neonatal resuscitation, but mothers often cannot be present as resuscitation normally is not performed in the delivery

room. We therefore offer parents to review the recording of the resuscitation of their infant. With this study we aimed to explore parental experiences with reviewing recordings of very or extremely preterm infants.

METHODS

This qualitative explorative study is part of a wider project studying ethical aspects of recording and reviewing neonatal resuscitation. The study combined participant observations during parental review of recordings with retrospective semi-structured interviews.

REVIEWING RECORDINGS OF NEONATAL RESUSCITATION

In our NICU, to parents of each patient a primary neonatal care provider from the medical team is allocated as point of contact. This provider is responsible for the communication and has regular meetings with parents. The primary neonatal care provider informs parents about the possibility to review the recording of their infant and reviews the recording together with parents, providing medical information and answering questions of parents.

DATA COLLECTION

Data were collected between February 2018 and October 2019. In this period, all parents invited to watch the recording of their very or extremely preterm infant were approached to participate in this study, unless the primary neonatal care provider considered it inappropriate to approach parents for study participation due to emotional distress. In these cases, parents were invited to review recordings of their infant, but were excluded from participation in this study. Parents orally consented to both participant observation and participation in an interview, or either observation or interview.

Participant observations and interviews were performed by MB. In consistence with standards in qualitative research, observations were reported in field notes(15), and interviews were performed using a topic list that was adapted through an iterative process to ensure that the questions captured all relevant emerging themes(16). Inclusion of participants continued until thematic saturation(17) was reached.

ANALYSIS

Interviews were audio-recorded and manually transcribed. Field notes and transcripts were deidentified. Data were firstly reviewed in a process of open coding by two investigators independently, subsequently, data were thematically analysed. Main themes emerged during consensus meetings. The qualitative data analysis software program Atlas ti (V.8.4) was used to analyse data.

ETHICS

This study was reviewed by the Ethics Review Committee of the LUMC (reference number P16.316). In concordance with laws and guidelines, a statement of no objection against execution of the study was issued.

RESULTS

In the study period, recordings of neonatal resuscitation were reviewed on 27 occasions. In seven cases, parents were not approached for study participation due to emotional distress, however, the primary neonatal care providers reported positive parental experiences with reviewing recordings of their infant. All approached parents consented to participant observation during review. Parental review of recordings of neonatal resuscitation was observed on 20 occasions, reviewing recordings of 31 children, of whom four died during admission. Median (range) gestational age at birth was 27+5 (24+5 – 30+3) weeks. Further characteristics are presented in Table 1.

On three occasions, parents declined interview participation due to emotional distress. Four times, parents consented to be interviewed, however, their infants were transferred to another hospital before the interview could be conducted. As providers tended to ask parents about their experiences during the review, experiences of most of these parents were reported in field notes of participant observation. Eventually, 25 parents of 19 infants participated in an in-depth interview. On twelve occasions, both parents participated in an interview, on one occasion, only the mother participated in the interview. Further characteristics are presented in Table 2.

Table 1. Characteristics observations

Characteristics observations ***(n = 20 occasions reviewing recordings of 31 infants)***	
Interval between birth and review in days median (IQR)	34 (20-89)
Gestational age in weeks median (range)	27+5 (24+5 – 30+3)
Deceased *n infants* (%)	4 (13)
Type of pregnancy *n infants* (%)	
Singleton	12 (39)*
Twin	16 (52)
Triplet	3 (10)
Resuscitation *n infants* (%)	
CPAP	31 (100)
PPV	26 (84)
Intubation	4 (13)
Cardiac resuscitation	1 (3)
Requested screenshots or copy video *n occasions*(%)	13 (65)

***** On one occasion, parents reviewed recordings of two singleton infants, who were both born extremely premature.

Table 2. Characteristics interviews

Characteristics interviews ***(n = 13 interviews with 25 parents of 19 infants)***	
Fathers *n* (%)	12 (48)
Bereaved *n parents* (%)	2 (8)
Age median (range)	
Mothers	32 (23-41)
Fathers	34 (24-45)
Present during resuscitation *n* (%)	
Mothers	2 (15)*
Fathers	11 (92)
Mode of birth *n infants* (%)	
Caesarean section	8 (62)
Vaginal	5 (38)
Parity *n mothers* (%)	
Nulliparous	9 (69)
Multiparous	4 (31)

* As infants participated in the ABC2 study (NTR7194/NL7004)(34), infants were resuscitated with intact umbilical cord. Mothers were therefore present during resuscitation.

Four main themes could be identified: impact on parents; impact on child(ren); appreciation; and set-up and timing of the review.

IMPACT ON PARENTS

During the study period, all approached parents except for one father agreed to review the recording of their infant. The main motivation for parental review was curiosity about the first minutes of life of their infant:

> "I wanted to see it because I was not there. He can be with you for two seconds, and then they take him to that other room and you only see him again on the ward. So, you don't know what happened in between."
>
> LP03 – mother

Most parents, including all bereaved parents, reported positive experiences. Bereaved parents felt that reviewing supported them in their grieving process. Many parents reported that reviewing the recording helped them coping with the trauma of premature birth:

> "For me, as well as for many other mothers, it was traumatic. And going through the full story helps. (..) Knowing what happened helps bonding with your child, and it helps to cope."
>
> LP11 - mother

One father reported that he would have preferred not to watch the recording, but that he felt it was important to share this experience with his wife:

> "I would have preferred not to see it. But I wanted to watch it for my wife, you know."
>
> LP03 – father

Most interviewed mothers considered the moments directly after the birth of their infant as 'the missing piece of the puzzle' and reported that reviewing the recording of their infant helped them to fill these gaps:

> "I was really touched. All these pieces of the puzzle fell into place, because finally I got images fitting to the words I heard before."
>
> LP19 – mother

Mothers also reported that reviewing the recording helped them to create a common memory with their partner, allowing them to cope together. Coping together was also reported by fathers. Some fathers reported to consider reviewing the recording as a valuable possibility to share their experiences with their partner:

> "In order for her to know what happened during the resuscitation. (..) And in order for her to see what I experienced during the resuscitation."
>
> LP09 – father

Many parents (65%) requested a copy or screenshots of the video recording of their infant. Parents considered the video or screenshots of their infant as a keepsake of their NICU-story, and reported that having a copy or screenshots comforted them, especially when they had lost an infant:

> "Because we lost two children. And keepsakes, any keepsake, everything you can collect from your children, that's very valuable. (..) You don't know if you will ever do something with it, but you have it, just in case you want to watch it."
>
> LP16 – father

IMPACT ON CHILD(REN)

Parents reported that reviewing the recording of their infant could be beneficial for their child, as they now got a better understanding of the start of the life of their infant:

> "It's the very first start of their life. And if they have questions about that, I can now answer them. I really appreciate that. Otherwise I would have had to tell them that I don't remember."
>
> LP02 – mother

Parents furthermore reported that having a copy of the recordings may as well be valuable for their child, as this would allow their child to watch the recording in the future. Parents felt this could be beneficial for their child, for instance when their child had questions about their birth. On two occasions, parents requested a copy in order to be able to show the recording to a surviving sibling of the deceased sibling(s):

> "And if our daughter is gonna make it, we have something we can show her. Look, you had a brother and a sister. They didn't make it, but this is how it all started. As such she also has an idea of how it all started."
>
> LP16 – father

APPRECIATION

Reviewing recordings of neonatal resuscitation often resulted in appreciation. While watching the recording, parents remembered how small their infant was at birth, and they were proud of the developments their infant had made. Parents furthermore often stated to be proud of their infant during the resuscitation, especially when the provider pointed out the infant's breathing effort as visualized by the respiratory parameters:

> "She so much wanted to breathe, and she did! I am so proud of her!"
>
> LP11 – mother

Many mothers were touched by watching the first contact between father and child. Some mothers reported that seeing the father taking care of their infant resulted in appreciation for their partner:

> "And to see that your partner is there in these moments, that helped. (..) To see him navigating between the two boys. What do I have to do? What's going on? (..) It was such an intense experience for him. And I think it helped him too that I could tell him how much I appreciated him being there."
>
> LP19 – mother

Reviewing recordings frequently resulted in parental appreciation for the providers' efforts to deliver the best care to their infant. Parents appreciated to see providers' professionalism:

> "And all care, it was so calm, and centered around her. (..) I really appreciated to see that everybody was working towards the same goal."
>
> LP07 – father

Parents furthermore appreciated the efforts of providers to be open to parents by showing them the recordings. Some parents even reported that this openness would make them less likely to hold providers responsible for medical malpractice:

> "You're human, and humans make mistakes. And if a mistake is made, you have to be honest about it. (..) In the end, I think that is way more valuable for parents than to just keep on saying: no, I did not make a mistake. (..) When you are honest about it, I am ok with it, but if you lie about it, I will sue you."
>
> LP02 – father

SET-UP AND TIMING OF THE REVIEW

Positive experiences with reviewing the recordings were also related with the set-up of the review. Parents frequently reported the importance of having a provider present during the review to explain the medical context:

> "I think it helps when somebody sits next to you and tells you this is normal. For us this is normal. (..) Someone who can really put into perspective what is normal for a premature or a newborn."
>
> LP07 – mother

Parents furthermore reported that they appreciated that providers took time to sit down with them and to go through the full story:

> " I think that's probably the best thing, that they carefully go through what happened then."
>
> LP19 – mother

Parents considered timing of the review as the most important condition for a positive experience. Parents of surviving infants considered their infant being relatively stable as the most important precondition:

> "I think it is important to watch the recording when your child is stable and slowly getting better. Because you need peace of mind. Otherwise you are only worrying about your child."
>
> LP07 – father

Parents of infants who died during admission normally reviewed the recordings during the follow-up meeting for parents of deceased infants. During this meeting, parents and the primary neonatal care provider reflect on the infant's stay at our NICU and the period after. Once, parents requested to review the recording of their infant on the estimated date of delivery, as they considered reviewing the first minutes of their infant's life as a ritual to commemorate their infant.

DISCUSSION

At our centre, we consider reviewing recordings of neonatal resuscitation with parents as standard care and parents may request screenshots or a copy of these recordings. However, concerns about sharing recordings of neonatal resuscitation with parents, for instance because of medicolegal consequences, are also reported.(18) Our study explored parental experiences with reviewing the recording of the resuscitation of their very or extremely preterm infant. Parents reported many positive experiences, with special emphasis on the value for getting hold of the start of their infant's life and coping with the trauma of neonatal resuscitation. Reviewing recordings of neonatal resuscitation frequently resulted in appreciation for the child, the father, and the medical team. Timing and set-up of the review contributed to positive experiences. Parents considered screenshots or copies of the recording of their infant as valuable keepsakes of their NICU-story. These positive parental experiences may reduce concerns about sharing recordings of neonatal resuscitation with parents.

Premature childbirth is recognized as a traumatic experience for parents, and various studies investigated interventions to help parents cope with this trauma.(19, 20) In our study, many parents reported to consider the resuscitation of their infant as traumatic, with some fathers reporting being present during the resuscitation as a traumatic experience, and many mothers considering not knowing what had happened with their infant directly after birth as traumatic. Parents reported that reviewing the recording of the resuscitation helped them to cope with these traumas. This may be because parents are exposed to a trauma-related cue, i.e. the resuscitation of their infant, in absence of danger, which is one of the most empirically validated treatments for posttraumatic stress disorder.(21) Knowing the outcome of the resuscitation, with their infant being relatively stable, parents are exposed to the full story of the resuscitation of their infant. As parents are accompanied by their primary neonatal care provider during the review, parents receive appropriate medical information about their infant. This was also reported to reduce mental stress of parents.(22, 23)

At our NICU, partners are invited to be present during the entire neonatal resuscitation. As soon as possible, parents are talked through the interventions that are being performed. Furthermore, parents are encouraged to touch their infant as soon as the condition of the infant allows to do so. Despite these efforts to support parents during the resuscitation of their infant, some interviewed fathers considered being present during the resuscitation as traumatic. Negative impact on fathers that were present

during neonatal resuscitation was also reported by Harvey et al.(24) In their study, various fathers reported that they wanted to talk about their feelings and experiences , but that they felt this was inappropriate. The need to talk was also reported by fathers in our study, who reported the desire to share their experiences with their partner as the main reason to review the recording. Reviewing the recordings allowed fathers to share their experiences and feelings with their partner, either during the review, or afterwards, and to reflect on their experiences with their primary neonatal care provider. When reviewing the recordings, mothers frequently appraised fathers for their role during resuscitation, thus empowering fathers in their parental role. This may as well be beneficial for fathers as earlier studies reported that fathers of preterm infants are concerned about the loss of parental roll.(25, 26)

A major concern of parental presence during the resuscitation of their child is the lack of communication to parents.(3) Providing parents with information during an emergency procedure can be complex, time-consuming and challenging, and even when medical information is provided, highly distressed parents may not be receptive to provided information.(24) In our study, parents reported that due to the timing of the review they could be more receptive to the provided information and that they highly valued the communication during the review. Parents reported to appreciate the time efforts and dedication of providers during review. Furthermore, many parents pointed out that providers seemed not stressed during the resuscitation and that they felt a lot of personal investment. Parents also reported to appreciate the openness of providers about provided care and that this openness and transparency would make them less likely to hold providers responsible for medical errors, a mechanism that is confirmed by studies about disclosing medical errors.(27) As such, reviewing recordings of neonatal resuscitation with parents can be valuable for parental coping and can enhance the parent-provider relationship.

Reviewing recordings of neonatal resuscitation with parents is time-consuming and requires preparation, e.g. the technical set-up of the review, which explains the relatively low number of occasions of parental review. During the study period, preparations could be done by investigators, but in the daily NICU practice it can be challenging to offer all parents the possibility to review the recording of the resuscitation of their infant. However, given the clear benefits of parental review of these recordings reported in this study we argue it is important to offer this possibility to all parents of very or extremely preterm infants as standard of care. Future efforts

should therefore be on finding feasible ways for doing so, for instance by appointing a dedicated provider that prepares review meetings, and establishing more evidence about the benefits of parental review of neonatal resuscitation by conducting follow up studies, such as a quantitative questionnaire among parents, studying outcomes of this study more in-depth. Furthermore, in this study, we solely studied experiences of parents of very or extremely preterm infants. More research is needed in order to evaluate whether reviewing recordings of neonatal resuscitation is also valuable for parents of birth asphyxiated infants.

About two-third of the parents in our study requested screenshots or a copy of the recordings of the resuscitation of their infant. Other studies also reported that patients are interested in receiving a copy of the recording of their procedure.(28, 29) Makary et al(30, 31) and Joo et al(32) argued that sharing videos of medical procedures may improve patient satisfaction, which was also reported in our study. Parents in our study highly valued copies of the recordings as keepsakes. The value of keepsakes for parents of infants admitted to the NICU was reported before.(33) Parents furthermore reported that having a copy comforted them and helped them coping, and that they expected the recording to be valuable for commemorating infants that deceased during admission. None of the parents connected the recordings with medicolegal purposes, which may allay earlier reported concerns about medicolegal consequences of sharing recordings of neonatal resuscitation with parents.(18)

Based on the experiences reported by parents in our study, we argue that reviewing recordings of neonatal resuscitation with parents of very or extremely preterm infants can be recommended. Furthermore, the benefits for parental coping and enhancing the parent-provider relationship may as well apply to reviewing recordings of the neonatal resuscitation of birth asphyxiated infants, resuscitation of older children, or other intensive procedures in pediatrics. However, reviewing recordings of resuscitation should preferably not replace parental presence during the resuscitation of their child, but should be considered as an additional tool to provide family-centered care.

CONCLUSION

Interviewed parents consider reviewing recordings of neonatal resuscitation of their very or extremely preterm infant as valuable. Parents reported that reviewing recordings can help them cope with the trauma of neonatal resuscitation. Reviewing recordings furthermore frequently resulted in appreciation for the child, the father, and the medical team. Moreover, parents considered a copy of the video recording of the resuscitation of their infant as valuable keepsakes. These positive parental experiences could allay concerns about sharing recordings of neonatal resuscitation with parents.

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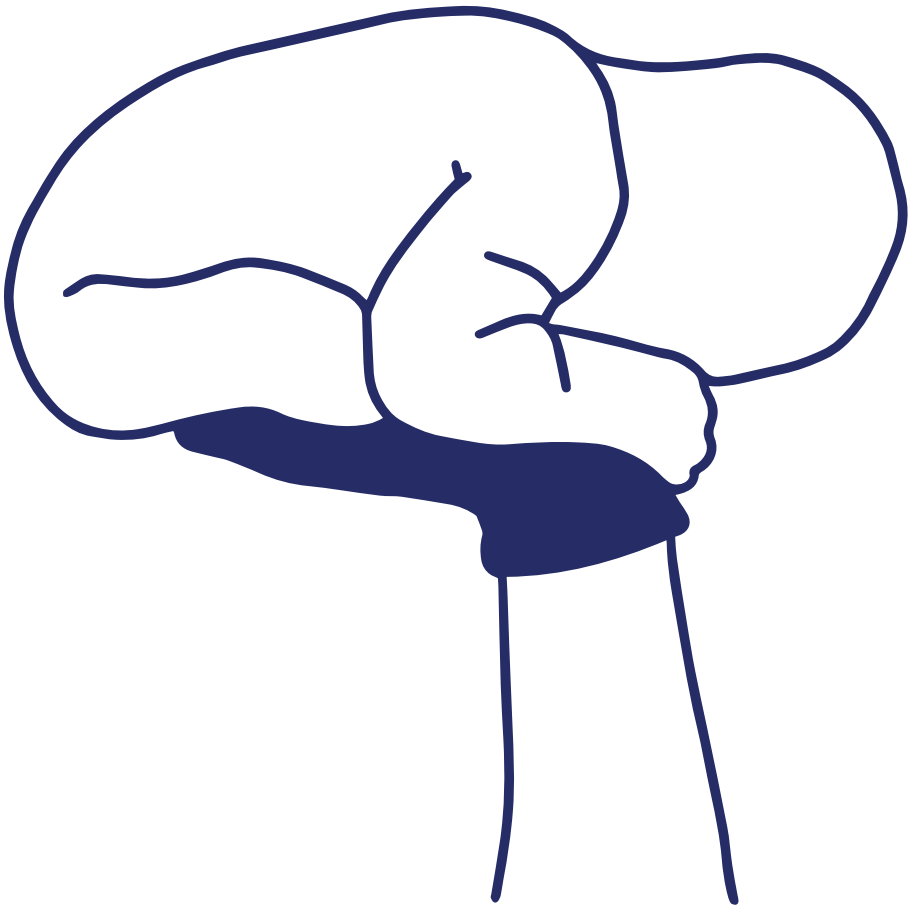
PART 4

DISCUSSION AND SUMMARY



GENERAL DISCUSSION

Approximately 10% of all neonates require support at birth. For the majority, this support consists of simple interventions, however, up to 3% of all neonates require intensive interventions, such as assisted ventilation, or even endotracheal intubation or cardiac resuscitation.(1) A lower gestational age at birth is associated with an increased need and level of support.(2, 3) Unfortunately, robust evidence on neonatal resuscitation interventions is still lacking.(4) Continued efforts to study and improve neonatal resuscitation are therefore needed(5), but doing so can be ethically challenging. This thesis aimed to provide guidance for the ethical conduct of activities to study and improve neonatal resuscitation. In order to do so, moral experiences of stakeholders of neonatal resuscitation, i.e. neonatal care providers and parents of very and extremely premature infants, were explored. This was done for two cases: consent for delivery room (DR) studies and recording and auditing neonatal resuscitation.

In the following paragraphs we will describe the moral landscape of improving neonatal resuscitation using Reflective Equilibrium (RE) for consent for DR studies and recording and auditing neonatal resuscitation. The method of RE has been used to solve various moral problems and consists of working back and forth between considered moral judgments about particular cases, the principles that govern these judgments, and the theoretical considerations behind the considered judgments and principles. By adding the moral experiences of neonatal care providers and parents of very and extremely premature infants to the RE, we will describe the existing tensions between theory and practice and propose a solution to address these tensions. Finally, future perspectives are considered.

CONSENT FOR DR STUDIES

Voluntary participation and informed consent for research involving human subjects are considered a cornerstone in **research ethics**. The principle of informed consent protects the autonomy of participants and is embedded in several ethical codes and regulations, such as the **Declaration of Helsinki** and the **European regulation on clinical trials**. In order to be valid, consent should be provided **voluntary** by a participant, or in well-defined situations by a proxy, that is deemed to be **mentally competent**, has **received appropriate information** and is **able to understand** this information.(6, 7) Obtaining a voluntary and valid informed consent for DR studies can be particularly challenging due to emotional and physical distress of parents

and the tight time-schedule for decision-making.(8, 9) As a consequence, neonates that require emergency resuscitation, which are generally the most sick neonates, are often excluded from DR studies. Excluding them from DR studies would cause selection bias, resulting in **decreased generalizability and less externally valid research**.(10, 11) Although a fairly settled body of guidelines for prospective consent for DR studies exist, appealing to these guidelines does not lead to a balanced moral practice. In order to solve existing challenges of this prospective consent approach, guidelines on deferred consent for DR studies(12, 13) were established. A deferred consent approach implies that neonates can be enrolled in a DR study without parental consent. As soon as reasonably possible, parents are informed and approached for their permission to continue their infant's study participation and to use already obtained data. However, the actual usage of a deferred consent approach raised various new ethical questions. For instance: how do providers experience approaching parents for deferred consent? How do parents consider being approached for deferred consent? And when is it inappropriate to approach parents for prospective consent? In the present study, these and other questions were posed to neonatal care providers working at the Neonatal Intensive Care Units (NICUs) of the Leiden University Medical Center (LUMC) and of the Hospital of the University of Pennsylvania (HUP) (Chapter 1) and to parents of very and extremely premature infants admitted at the NICU of the LUMC (Chapter 2).

THIRD PERSON PERSPECTIVES

Interviewed neonatal care providers and parents of very and extremely preterm infants considered conducting DR studies as very important. Parents reported various positive perceptions about DR studies, including the importance of research for improving neonatal resuscitation and trust in scientific integrity, and expressed altruistic motives to consent to DR studies. Despite this generally positive attitude towards DR studies, both providers and parents imagined that some parents would not want to participate in research in general, thus highlighting the importance of the **parental right to refuse** their infant's participation in DR studies.

Although both providers and parents considered the prospective consent approach as the most preferable approach, various concerns about the usage of a prospective consent were also reported. Providers worried that a prospective consent approach could be burdensome to parents, as parents are in a very stressful situation, information about study participation can be too much to process, and many parents

are often approached for study participation, whereas their infant never becomes eligible for the study. Nonetheless, despite being in a stressful situation, **parents considered being approached for study participation valuable**. According to interviewed parents, **appropriate timing and communication, compassion** and **researchers not being obtrusive** were key factors for a positive experience with being approached for study participation. Addressing these factors more in-depth in future research will allow to inform trainings for research personnel involved in obtaining consent for DR studies. As such, the prospective consent procedure for DR studies can be improved.

Providers reported various benefits of a prospective consent approach, with special emphasis on **parental autonomy**. Parents also considered autonomy as an important theme. When analysing interviews with parents, it was noted that parents oftentimes interpreted autonomy as having a sense of control about what happens to their infant and **being actively involved in the decision-making** regarding their infant's research participation. According to parents, active involvement in the decision-making regarding their infant's participation in DR studies is indispensable, especially **when risk of harming the infant is associated with the specific DR study**. Interestingly, there was no consensus about the amount of risk involved in specific DR study interventions. Providers and parents generally approached the amount of risk intuitively, with perceptions of parents oftentimes being affected by the medical needs of their infant. Providing insight in how stakeholders perceive risks associated with specific DR studies may improve discussions about decision-making regarding study participation of very and extremely preterm infants.

DEFERRED CONSENT FOR DR STUDIES

Although parents expressed the need to be actively involved in the decision-making regarding their infant's participation in DR studies, this did not directly imply that a deferred consent approach would be inappropriate. The need of a deferred consent approach was acknowledged by both providers and parents, but concerns were also reported. Apart from concerns about parental autonomy, parents and providers reported concerns about the **risk of undermining the provider-parent relationship** when using a deferred consent approach, especially in case of bad outcomes after neonatal resuscitation. However, according to parents, risks of using a deferred consent approach could be countered. Various options were reported,

including informing parents about DR studies earlier in pregnancy at a routine prenatal appointment with the midwife or obstetrician and an antenatal broad opt-out for DR studies that meet strict requirements. The usage of an antenatal broad opt-out was also suggested by providers. This concept is not new; Janvier and Farlow already proposed a 'blanket prenatal opt-out consent'.(14) Janvier and Farlow advocated that primary stakeholders, including parents, should be given a voice in the discussion about the appropriateness of using such an approach. The present study suggest that primary stakeholders might consider an antenatal blanket opt-out appropriate.

Most parents and providers emphasized minimal risk as a precondition for the usage of a deferred consent approach for DR studies. Various parents furthermore considered a deferred consent approach appropriate for observational studies. In light of prevailing legislation, this is an interesting finding, as according to prevailing legislation about deferred consent(12), observational studies do not qualify for a deferred consent approach. Further deliberation about the usage of a deferred consent approach for observational studies may improve consent procedures for observational studies.

REMAINING QUESTIONS

By providing insight in the moral experiences of stakeholders on consent for DR studies, various questions could be answered. However, doing so also raised new questions. A frequently emphasized concern of providers about consent for DR studies was that a prospective consent approach could be burdensome, as it implies that many parents are approached for study participation of an infant that, fortunately, never becomes eligible for the specific DR study. This concern is supported by the literature. For example, of the 2228 mothers that were approached for study participation in the Surfactant Positive Airway Pressure and Pulse Oximetry Randomized Trial (SUPPORT), solely 581 (26.1%) mothers delivered within the studied gestational age window.(15) Consequently, almost 75% of approached mothers were approached unnecessarily. In the present study, parents of infants that eventually were not enrolled in the specific DR studies were interviewed. However, these infants were excluded due to, for instance, lack of time to randomize the infant, not because the infant was eventually not delivered very or extremely premature. Further research is needed in order to understand whether parents that were approached unnecessarily consider this burdensome.

Although one of the aims of the interviews with parents was to provide insight in parental experiences with deferred consent, eventually only one parental dyad that has been approached for deferred consent was interviewed. This may be due to the fact that in order to be eligible for the present study, parents needed to be approached to review the recording of the neonatal resuscitation of their infant. Parents could thus not be purposively sampled on experience with being approached for deferred consent. Therefore, more insight in parental experiences with being approached for deferred consent is needed.

Some interviewed providers wondered whether a prospective consent is valid. Consent is considered ethically valid when it is informed, understood and voluntary. During interviews with parents, however, it was noted that consent for DR studies was oftentimes not fully comprehended. Yet, **parents did not question the validity of their consent and considered it valuable**. Although it has been argued that research consent that is not fully comprehended can still be valid(16), this does not absolve research personnel from striving for parental comprehension about specific study procedures. Furthermore, parents considered research as inherent to being admitted to a university hospital. Comprehension about research concepts may be improved through public education. The establishment of communication strategies for informing individual parents about specific study procedures, as well as for informing the public about research concepts is therefore needed. As such, consent for DR studies can become both valuable and ethically valid.

According to interviewed parents and providers, timing of approaching parents for consent is key for successful usage of a deferred consent approach. Timing is also important according to the European legal requirements of usage of a deferred consent approach, as it states that informed consent for continued participation should be sought as soon as possible.(12, 17) However, as soon as possible may not be the moment that parents and providers perceive as the most appropriate timing. A possible solution could be found in Australian legislation about deferred consent, that states that consent should be sought as soon as *reasonably* possible. (17) Yet, this does not provide guidance on the best moment to approach parents. Future research may guide appropriate timing of approaching parents for consent for continued research participation of their infant.

RECORDING AND REVIEWING NEONATAL RESUSCITATION

In 1969, Peltier et al first described video recording in the medical setting.(18) In the neonatal setting, video recording medical care was first described by Hoyt et al.(19) Thereafter, Finer et al pioneered video recording neonatal resuscitation as part of a quality assurance procedure in 1999.(19) According to Finer and Rich, recording neonatal resuscitation is a good method to objectively evaluate neonatal care providers' competencies.(20) However, video recording does not provide information about the quality and effect of the interventions. This information can be added by recording vital physiological parameters, including pulse oximetry, ECG, and respiratory functioning monitoring (RFM). Doing so results in accurate and transparent documentation about neonatal resuscitation that can be used for quality assurance and improvement, education, research and audits.

Despite the clear benefits of recording and reviewing neonatal resuscitation, only a limited number of NICUs in Australia, the USA, France, Germany and the Netherlands have reported to regularly record neonatal resuscitation.(21-26) Even less NICUs reported to review these recordings in regular plenary meetings. In fact, to the best of our knowledge, **the NICU of the LUMC is the only NICU in the world that reported to conduct weekly plenary audit meets**. NICUs that have implemented recording and reviewing neonatal resuscitation reported various concerns, including **ethical concerns about parental and provider consent**(23, 27-32)**, data storage**(23, 30-33)**, impact on providers and parents**(19, 28, 32)**, privacy of providers and infants**(23, 28, 29, 31, 33, 34)**, and medicolegal consequences**(23, 28, 29, 31, 32)**.** These concerns may explain difficulties with implementing recording and reviewing neonatal resuscitation. The present study aimed to explore how these and other ethical concerns may be addressed in order to enable successful implementation of recording and reviewing neonatal resuscitation. In order to do so, interviews were conducted with neonatal care providers working at the NICUs of the LUMC and the HUP (Chapter 5), and with parents of very and extremely preterm infants admitted to the NICU of the LUMC, who were offered to review the recordings of the neonatal resuscitation of their infant together with their primary neonatal care provider (Chapter 7).

THIRD PERSON PERSPECTIVE

The LUMC and the HUP differ in both their method of recording and their process of auditing neonatal resuscitation. First, the position and the number of cameras differs between NICUs: at the LUMC, only providers' hands are recorded, whereas at the HUP, a second camera provides an overview of the resuscitation room. Second, at the HUP, audio is recorded, whereas at the LUMC, this is still being considered. Third, at the LUMC providers use an RFM, both during resuscitations and audits. Lastly, the LUMC conducts weekly audits that last fifteen minutes, whereas the HUP conducts six one hour-lasting audits a year. Despite these differences, providers of both NICUs reported similar positive experiences with auditing neonatal resuscitation. When conducting interviews with neonatal care providers, it was noted that providers put striking emphasis on the **educational benefits** of recording and reviewing neonatal resusciation. Providers valued the technique as a powerful tool for learning and improving: providers reported that they regard the technique as actually **improving patient safety and the quality of provided care** during neonatal transition. However, providers emphasized that a **safe learning environment** is indispensable for successful audits.

Providers reported to use recordings of neonatal resuscitation for several learning activities, including audits, training, debrief, and orientation, as well as for conducting quality improvement projects and retrospective studies. These specific activities often include various learning outcomes. For instance, during plenary audit meetings, recordings are used to assure and improve the quality of care provided during neonatal resuscitation. Providers provide feedback on their own and each other's performances and discuss guideline compliance and treatment alternatives. The audit meetings frequently include components of training as well: providers are trained on physiology of transition at birth and the use of an RFM and other equipment during neonatal resusciation, amongst others. Auditing the recordings furthermore provides more insight in what is actually happening in the DR, which subsequently informs quality improvement projects and clinical studies. Moreover, combining insights from research and plenary audit meetings allows to elaborate on key factors of successful neonatal resusciation, given the specific equipment and team structures of a NICU (Chapter 6). These educational benefits were not solely emphasized by providers; parents also connected reviewing neonatal resuscitation to learning and improving and applauded efforts of providers to do so.

Another important difference between the LUMC and the HUP is that at the LUMC, **parents are offered to review the recordings of the neonatal resuscitation of their infant** together with their primary neonatal care provider. Parents reported many positive experiences with reviewing these recordings, with special emphasis on **the value for getting hold on the start of their infant's life and coping with the trauma of neonatal resuscitation**. Doing so furthermore oftentimes resulted in appreciation for the infant, the father and the medical team. As recordings of neonatal resuscitation are part of the medical record, parents can request a copy of the video of their infant. These videos were considered **valuable keepsakes** of their NICU-story, and parents reported that having the video comforted them, especially when their infant died during admission. Neonatal care providers working at the LUMC also considered sharing recordings of neonatal resuscitation with parents valuable. Providers working at HUP, however, acknowledged the potential benefit of sharing these recordings with parents, but could not imagine how this could be implemented in regard to the Pennsylvanian **medicolegal climate**.

ETHICAL DILEMMAS OF RECORDING AND REVIEWING NEONATAL RESUSCITATION

Recordings of neonatal resuscitation are used during various learning activities, resulting in various learning outcomes. Furthermore, at the LUMC, recordings of neonatal resuscitation are shared with parents. Activities using recordings of neonatal resuscitation and outcomes of doing so are related to various contexts that represent several domains of health care, such as clinical care, education, research, and quality assurance. As these domains differ in their moral and legal frameworks, ethical dilemmas and questions may arise when recordings are simultaneously used within multiple domains (Chapter 4). For instance, should parents and providers consent to the recordings, given that consent is necessary for research and education, but often deemed unnecessary for quality assurance purposes(35)? How to deal with the privacy of neonates, providers, and parents that may be present during neonatal resuscitation, when providers, trainees, researchers, and parents can review the recordings? Can recordings be stored in order to use them for further research, or should recordings be deleted after initial use, as is required when using the recordings for quality assurance purposes? And what would be the legal status of recordings in court? In our experience, it is reasonable to assume that these questions withhold other NICUs from implementing recording and reviewing neonatal resuscitation. The

easiest way to solve these questions and dilemmas would be to implement recording and reviewing neonatal resusciation as a tool for only one domain, either clinical care, quality assurance, education or research. However, this would limit the potential of this technique for learning and improving care provided during neonatal transition considerably.

REMAINING QUESTIONS

Insight in stakeholders' perceptions regarding recording and reviewing neonatal resuscitation raised new questions. Although providers and parents emphasized the potential of recording and reviewing neonatal resuscitation for learning and improving, concerns about medicolegal consequences remained, especially among American providers. Providers working at the HUP applauded the Dutch practice, where recordings are stored for further research and shared with parents, but could not imagine this could become standard of care at their NICU. In the Netherlands, recordings of neonatal resuscitation that are solely used for quality assurance are protected by the **Healthcare Quality, Complaints and Disputes Act** (Wet Kwaliteit, Klachten en Geschillen Zorg). However, at the LUMC, recordings of neonatal resuscitation are stored as part of the medical record and recordings could therefore be used for medicolegal purposes under the Medical Treatment Contracts Act (Wet op de geneeskundige behandelingsovereenkomst). So far, our recordings of neonatal resuscitation have never been requested for medicolegal purposes. Yet, other Dutch NICUs are still reluctant to implement recording and reviewing neonatal resuscitation due to medicolegal concerns. Establishing a robust evidence-base for the efficacy of recording and reviewing neonatal resuscitation for improving the quality of neonatal resuscitation and the value of sharing these recordings with parents may diminish medicolegal concerns, thus enabling successful implementation of recording and reviewing neonatal resuscitation at other NICUs.

During interviews, parents reported positive perceptions regarding recording and reviewing neonatal resuscitation. However, at the moment, recordings of neonatal resuscitation performed at the LUMC do not include audio and only show the providers' and parent's hands. Recording audio or changing the camera angle so that parents become identifiable may impact parents. The impact of these changes, both on parental perceptions of auditing neonatal resuscitation, as well as on their experiences with reviewing recordings of the neonatal resuscitation of their infant, will be studied in a future study that is now being prepared at the NICU of the LUMC.

THE 'THINKER' EMBEDDED

During the entire study period, the author of this thesis conducted participant observations as a member of the medical team of the NICU of the LUMC. Over time, her position in the team changed a lot: while firstly being a relative outsider, she became a member of the research team that approaches parents for consent for the participation of their infant in DR studies, as well as the coordinator of the audits. The author of this thesis became the coordinator of the audit only after the completion of interviews with providers, but started to approach parents for consent for DR studies before interviews with parents.

Upon the start of the present study, the author of this thesis had mixed feelings about the appropriateness of a deferred consent approach for DR studies. Although scientifically sound, she wondered whether this approach would be too much of a breach of parental autonomy. As part of the research team approaching parents for consent, she experienced the impact of prospective consent on patient accrual. Obtaining prospective consent as often as possible was really part of the strategy of obtaining consent for DR studies. In this endeavour, the author of this thesis experienced various obstacles, which made her truly understand the burden that could be experienced by research personnel. Combined with insight from a first rounds of interviews with parents, she changed her opinion in favour of deferred consent. However, after a longer period of approaching parents for consent and additional interviews with parents, her opinion changed again, this time in favour of an antenatal blanket opt-out for DR studies that meet strict requirements.

During interviews, providers emphasized a safe learning environment as a precondition for successful audits. As coordinator of the audit, the author of this thesis experienced at first hand that creating a safe learning environment requires continuous efforts of all involved. After several audits, she was confronted with upset providers. Discussions with these providers allowed the process of the audit to be reshaped according to providers' needs. Furthermore, as part of being the coordinator of the audit, the author of this thesis wanted to acquaint herself better with theories about evaluating technical skills, non-technical skills and patient safety. By doing so, she discovered parallels between auditing neonatal resuscitation and the theories behind Safety II(36) and Just Culture(37), not solely in her observations of the practice, but also in how participating providers expressed their experiences with auditing. Safety II refers to a view of safety which defines safety as the ability to succeed

under varying conditions. According to Safety II, in order to understand how care can be delivered successfully, it is necessary to understand the everyday functioning, meanwhile ensuring that as much as possible goes right, instead of focusing on what went wrong.(36) In opposite to a blame culture, a Just Culture creates an environment where individuals feel free to report errors and organizations are enabled to learn from mistakes.(37)

REFLECTIVE EQUILIBRIUM

The present study aimed to explore the moral landscape of improving neonatal resuscitation by using Reflective Equilibrium (RE) for two cases, consent for DR studies and recording and reviewing neonatal resuscitation. These two cases are exemplary for the complexity of the context of improving neonatal resuscitation, as coherence between theory and practice is lacking. For the present study, moral experiences of third persons regarding consent for DR studies and recording and reviewing neonatal resuscitation were explored. Integrating moral experiences of neonatal care providers and parents of very and extremely premature infants in an RE provides insight in existing tensions between theory and practice. Addressing these tensions may offer scope for the ethical conduct of a great variety of activities to study and improve neonatal resuscitation.

CONSENT FOR DR STUDIES

Figure 1 represents the RE for consent for DR studies. For consent for DR studies, a fairly settled body of legislation and guidelines exist, but appealing to these does not lead to a balanced moral practice. This situation is acknowledged by parents and providers: due to the importance of parental autonomy and the right to refuse research participation, consent is considered valuable, however, consent procedures, both prospective and deferred, could be improved upon. Reported key factors for positive experiences with consent for DR studies were appropriate communication, timing, compassion and researchers not being obtrusive. Parents and providers reported similar concerns about the usage of a deferred consent approach, with special emphasis on concerns about parental autonomy and undermining the parent-professional relationship. These risks could be countered by adding an antenatal procedure to the deferred consent approach.

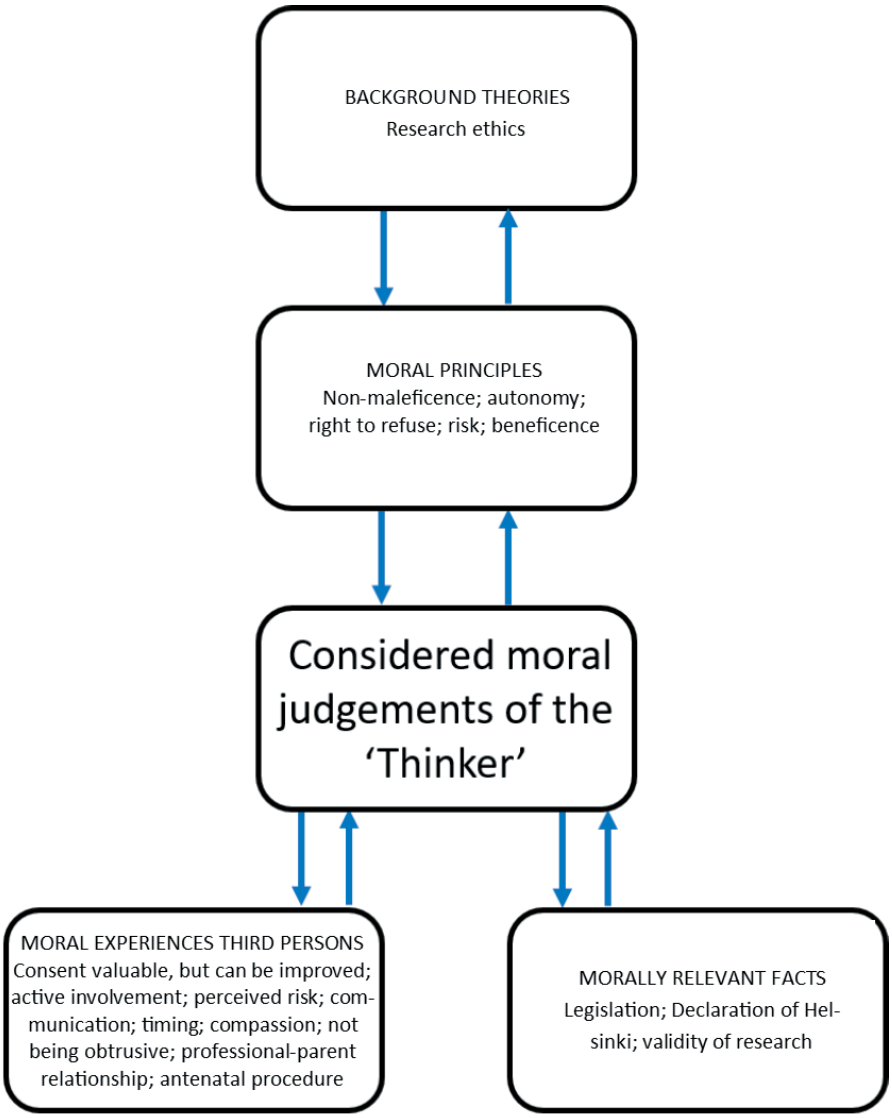


Figure 1. RE Consent

Parents expressed the need to have a sense of control about what happens to their infant and the wish to be actively involved in the decision-making regarding their infant's study participation. This was considered even more important when the specific DR study is associated with the risk of harming their infant. The importance

of the risk of harm in discussions about consent for DR was also acknowledged by providers. Interestingly, considerations about the appropriate consent approach were oftentimes not in line with considerations in prevailing legislation and guidelines. For instance, parents considered a deferred consent approach, or even a full waiver of consent, appropriate for observational studies, whereas observational studies do not qualify for a deferred consent approach according to prevailing legislation.

RECORDING AND REVIEWING NEONATAL RESUSCITATION

Figure 2 represents the RE for recording and reviewing neonatal resuscitation. In contrast to consent for DR studies, legislation and guidelines for recording and reviewing neonatal resuscitation fall short, resulting in questions about the moral justification for the practice. However, providers of NICUs that do record and audit neonatal resuscitation reported various educational benefits and acknowledged that doing so can improve patient safety and the quality of provided care during neonatal resuscitation. Providers therefore recommend other NICUs to also implement recording and reviewing neonatal resuscitation, but emphasized the importance of a safe learning environment. Approaching recording and reviewing neonatal resuscitation within the context of Safety II and Just Culture may contribute to a safe learning environment.

Parents also reported positive perceptions about recording and reviewing neonatal resuscitation. Just as providers, parents considered that auditing neonatal resuscitation may improve care and patient safety. Parents putted special emphasis on the benefits of sharing recordings with parents for parental coping and trust in the neonatal care providers.

Despite positive perceptions of stakeholders, wider implementation of recording and reviewing neonatal resuscitation is hampered. This may be explained by the fact that recordings of neonatal resuscitation are used for various activities that are related to various domains of health care, including clinical care, clinical research, education and quality resuscitation. As these domains differ in their moral and legal frameworks, various ethical dilemmas and questions may arise when using recordings for various activities. These ethical dilemmas and questions may impede usage of recordings of neonatal resuscitation in more than one domain of health care.

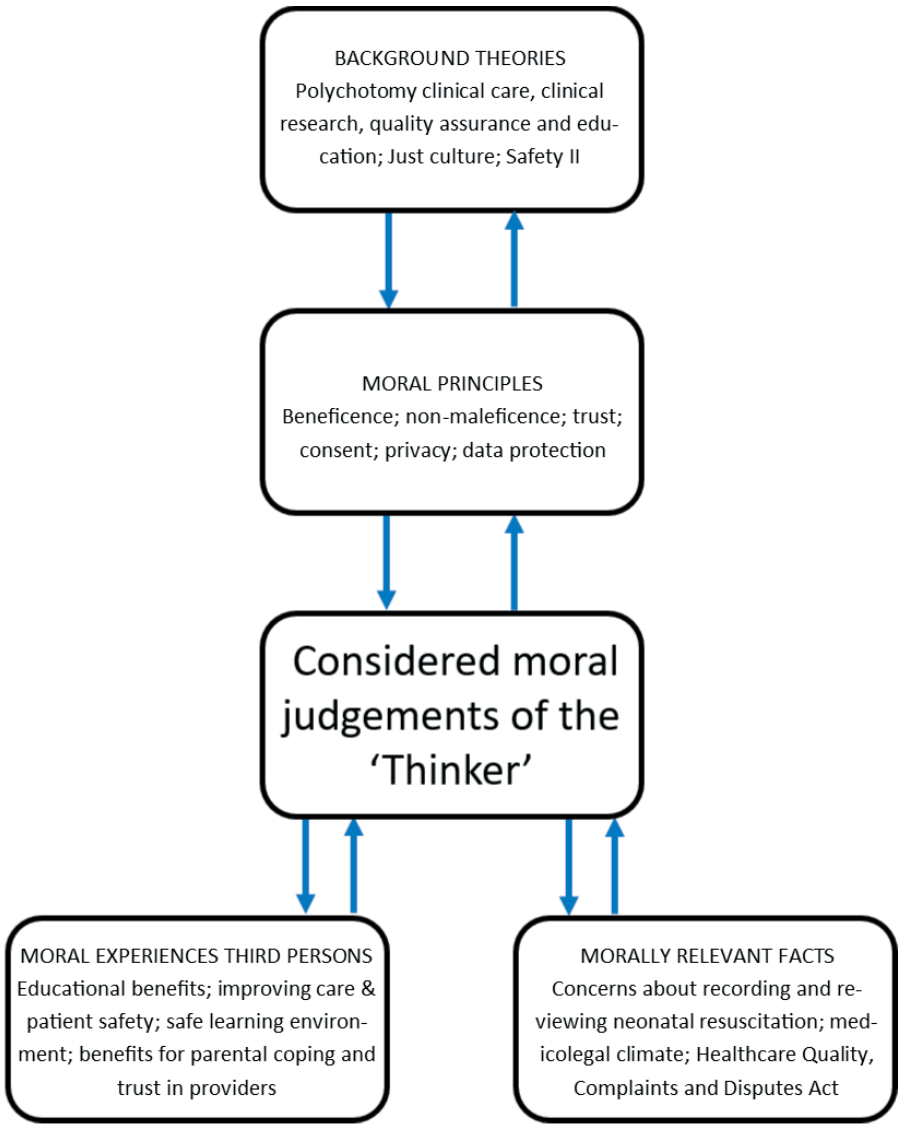


Figure 2. RE Audit

A LEARNING HEALTH SYSTEM FOR IMPROVING NEONATAL RESUSCITATION

Insight in the RE for consent for DR studies and recording and reviewing neonatal resuscitation clarified existing tensions between theory and practice. Based on

experiences of researchers involved in DR studies, it was already suggested that a Learning Health System (LHS) could improve the deferred consent approach (Chapter 3). However, an LHS could also be used to address other tensions between the theory and practice of improving neonatal resuscitation. By approaching existing tensions within the context of an LHS, scope can be offered to the ethical conduct of activities aimed at studying and improving neonatal resuscitation.

The call for organizing health care as an LHS is increasing.(38) The concept of an LHS was developed by the Institute of Medicine in 2007. It is defined as a system in which knowledge generation is captured as an integral by-product of the care experience, leading to continual improvement in care and the best evidence for health care choices of each patient and provider.(39) An LHS ensures innovation, quality, and safety in health care.(39, 40) The system puts a moral emphasis on continuously conducting and participating in learning activities in order to improve patient safety and the quality of clinical care, implying that all who benefit from delivered care owe a duty of contributing to learning activities.(38) Learning activities are at the core of an LHS. In an LHS, learning activities are defined as activities that involve care delivery and are targeted at learning how to improve clinical practice.(38) Many of these learning activities use data that are generated in the routine provision of care and contribute simultaneously to generalizable knowledge and best clinical outcomes for individual patients.

In an LHS, data on care provision is routinely collected, analysed and interpreted, and its results are subsequently fed back in practice in order to improve patient safety, the quality of health care delivery, and further research. Recording neonatal resuscitation offers data about routinely provisioned care that, combined with recordings of imaging and vital parameters, offer a comprehensive story that cannot be matched by solely written documentation. Review of these recordings during various learning activities contributes to new knowledge on what actually happens in the delivery room, allowing us to improve our care and patient safety, and as such reach the best clinical outcomes for our patients. Recording and reviewing neonatal resuscitation may therefore be considered exemplary for learning activities using routinely collected high quality data.

Reluctance to the implementation of recording and reviewing neonatal resuscitation illustrate the problem of strictly distinguishing between clinical care, clinical research,

quality assurance and education, as existing ethical and legal frameworks of these domains hamper the recordings to be simultaneously used for the wide variety of learning activities. As such, recordings of neonatal resuscitation cannot be used to its full potential and opportunities to improve patient safety and the quality of neonatal resuscitation will needlessly go lost. A similar problem can be seen for DR studies. Various research designs are used to study and improve neonatal resuscitation, including observational studies, comparative effectiveness studies comparing standard-of-care interventions and randomized controlled trials (RCTs). These can all be considered as learning activities. However, existing ethical and legal frameworks for clinical research complicate the conduct of these studies, thus abating opportunities to improve patient safety and the quality of care provided during neonatal resuscitation (figure 3). In order to advance learning activities, an LHS advocates a new ethical framework for learning activities, in which the polychotomy of research, patient care, quality assurance and education is resolved.

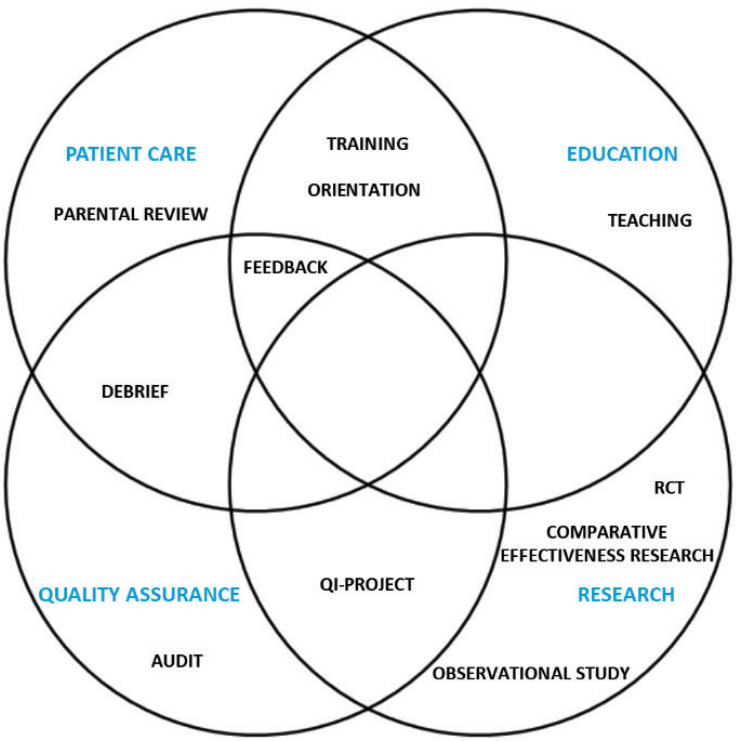


Figure 3. Improving neonatal resuscitation in the current situation

A NEW ETHICAL FRAMEWORK FOR IMPROVING NEONATAL RESUSCITATION

In an LHS, the moral priority is on continuously evaluating and improving healthcare. An LHS requires the integration of knowledge development and translation into the core of the healthcare delivery process.(41) By advancing learning activities, clinical care is continuously studied, innovated and improved.(42) An LHS therefore proposes a new ethical framework to conduct learning activities: instead of judging activities within the polychotomy of research, patient care, education and quality assurance, learning activities should be judged based on the ways in which they can negatively or positively affect the rights or interests of patients, providers and other stakeholders.(38) An LHS thus strives to enable learning activities while also protecting the rights, interests, and wellbeing of stakeholders. When assessing regulation for learning activities within this paradigm it is important to consider risks, burdens and benefits of the specific learning activities.(43) Various risks, burdens and benefits are associated to studying and improving neonatal resuscitation. For instance, studying and improving neonatal resuscitation protects future neonates that require neonatal resuscitation from receiving effective care. Furthermore, individual neonates may benefit from participating in learning activities. However, learning activities may also expose neonates, providers or parents to risks. These and other risks, burdens and benefits are taken into account when estimating the regulation for a specific learning activity (figure 4).

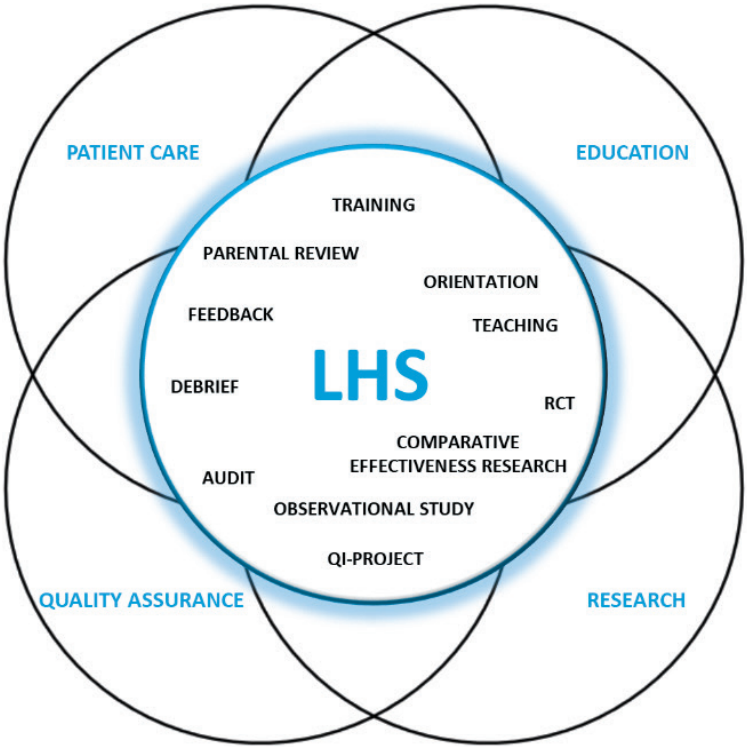


Figure 4. Improving neonatal resuscitation within an LHS

IMPROVING NEONATAL RESUSCITATION IN AN LHS

An LHS demands extensive consultation with providers, parents, and other stakeholders on whether, when and how studying and improving neonatal resuscitation is acceptable. This requires insight in stakeholders' views regarding various questions and challenges. For instance, how can privacy, autonomy and voluntariness of stakeholders be preserved when recordings of neonatal resuscitation are used for various learning activities? And how do stakeholders perceive risks, benefits and burdens associated with learning activities aimed at studying and improving neonatal resuscitation? By approaching these and other questions in an ongoing dialogue between stakeholders of neonatal resuscitation and establishing empirical evidence on stakeholders perceptions, uniform and evidence-based criteria for the conduct of learning activities aimed at studying and improving neonatal resuscitation can be established.

Approaching neonatal resuscitation within the context of an LHS will serve the implementation of recording neonatal resuscitation as routinely collected data that can be used for various learning activities, meanwhile establishing frameworks that protect stakeholders from being negatively impacted by doing so. This may for instance allow auditing and training without explicit parental consent, but with an option to opt-out. When recording neonatal resuscitation is standard practice, recordings may be stored as part of the medical record and recordings may then be used for future research or quality improvement projects, using an opt-out approach if appropriate. Recordings may furthermore be shared with parents, improving accountability, transparency and parent satisfaction.(44) Using recordings at external conferences or for teaching medical students, however, may demand explicit consent procedures in order to protect stakeholders' privacy. Insight into how stakeholders estimate and value risks, burdens and benefits of study interventions and the appropriateness of different consent approaches can furthermore result in uniform criteria for the usage of different consent approaches for DR studies. For instance, in an LHS, observational DR studies may be conducted using a waiver of consent. Furthermore, minimal risk DR studies that meet strict requirements, such as comparative effectiveness studies comparing standard-of-care interventions, may be conducted using an a deferred consent for continued study participation and the usage of already collected care combined with an antenatal blanket opt-out. On the contrary, RCTs that may expose risk to the infant may only be conducted after explicit prospective parental consent.

THE ROLE OF PARENTS IN AN LHS

Patient engagement is at the core of an LHS.(38) Parents, as proxies, should therefore be actively involved in discussions about the risks, harms and benefits of learning activities and their perceptions and experiences should be studied more in-depth. This could be done by involving parents when their infant is admitted at the NICU, or at a later stage, by involving veteran parents through parent support groups, parent support organization or Internet support groups. Furthermore, future parents should be informed about the importance of improving neonatal resuscitation. As such, the public can also be involved in in discussions about the regulation of learning activities.

Apart from active involvement in discussions about the regulation of learning activities, an LHS implies that all who benefit from delivered care owe a duty of contributing to learning activities.(38) Sharing recordings of neonatal resuscitation with parents may

provide valuable insights in what parents consider good care. For instance, parents can provide insight in how parents can be involved during neonatal resuscitation and how communication to parents during neonatal resuscitation can be improved. As such, sharing recordings of neonatal resuscitation of an infant may not only benefit its parents, but also parents of future infants that require neonatal resuscitation at birth.

Within an LHS, patient safety and the quality of care provided during neonatal resuscitation can be improved in various ways whilst stakeholders can be protected from being negatively affected by learning activities. Instead of having existing policies impede learning and improving, scope can be provided to the ethical conduct of activities aimed at learning and improving neonatal resuscitation, which allows to reach the best clinical outcomes for infants.

LIMITATIONS

The present study has potential limitations. Most importantly, the RE that were gained in the present study needs to be considered as temporary. Providing insight in the remaining questions that were posed above may affect the gained REs For example, larger studies on stakeholders' perceptions of risks associated with specific DR interventions may provide new insights in perceived risks, which subsequently may affect the RE for consent for DR studies.

For the present study, perceptions and experiences of 48 neonatal care providers, representing the whole spectrum of neonatal care providers working at the NICU of the HUP and the LUMC, were explored in-depth. As their perceptions and experiences are specific to their particular context, outcomes of the present study may not be generalizable. Further quantitative studies on providers perceptions regarding consent for DR studies and recording and reviewing neonatal resuscitation are therefore needed. However, as the number of NICUs that is auditing neonatal resuscitation is rather limited, conducting quantitative studies on providers' perceptions regarding doing so can be challenging.

In addition to neonatal care providers, 25 parents of very or extremely preterm infants admitted to the NICU of the LUMC were interviewed. Parents were selected through convenience sampling. The sample of parents was diverse in its social demographics, however, parents with limited comprehension of the Dutch or the English language are lacking. Although efforts were made to review recordings of

neonatal resuscitation together with an interpreter, this only happened once, and parents considered the subsequent interview with an interpreter too burdensome. Interviewed parents considered communication as an important topic regarding both consent and auditing neonatal resuscitation, which may be of even more importance for parents with a limited understanding of the Dutch or the English language. Further research is therefore needed in order to understand experiences and perceptions of parents with limited comprehension of the Dutch or the English language.

Due to the retrospective design, recall bias may have occurred. This may be the case for the providers' perceptions of auditing neonatal resuscitation. By adding perspectives of providers working at the HUP, who had only limited experience with auditing neonatal resuscitation, the present study aimed to counter the risk of recall bias. However, interviews with providers of the HUP were conducted several months after the implementation of auditing neonatal resuscitation. Therefore, recent positive experiences with the audit may have eclipsed initial negative perceptions. Various providers briefly touched on initial concerns, but highlighted that these have been overcome by experiencing educational benefits of auditing neonatal resuscitation. At the moment, a mixed-method study is therefore being prepared at the LUMC. By prospectively studying the implementation of auditing non-technical skills during neonatal resuscitation and audits of other complex procedures at the NICU, this study aims to provide generalizable insights in providers' perceptions regarding auditing complex procedures and to explore preconditions for psychological safety and a culture of learning.

Recall bias may furthermore have occurred during interviews with parents, as the outcome of neonatal resuscitation of their infant may have affected perceptions of neonatal research and consent for DR studies. However, just as conducting DR studies, conducting prospective research on parental perceptions of consent for DR studies can be arduous. Studying parental perceptions prospectively in hypothetical situations, such as done by McCarthy et al(45), provides insight in parental preferences, yet, hypothetical studies lack the element of parental anxiety. Both research designs, prospective and retrospective, therefore have their limitations, but combining outcomes from various studies may still provide valuable insights in parental perspectives regarding consent for DR studies.

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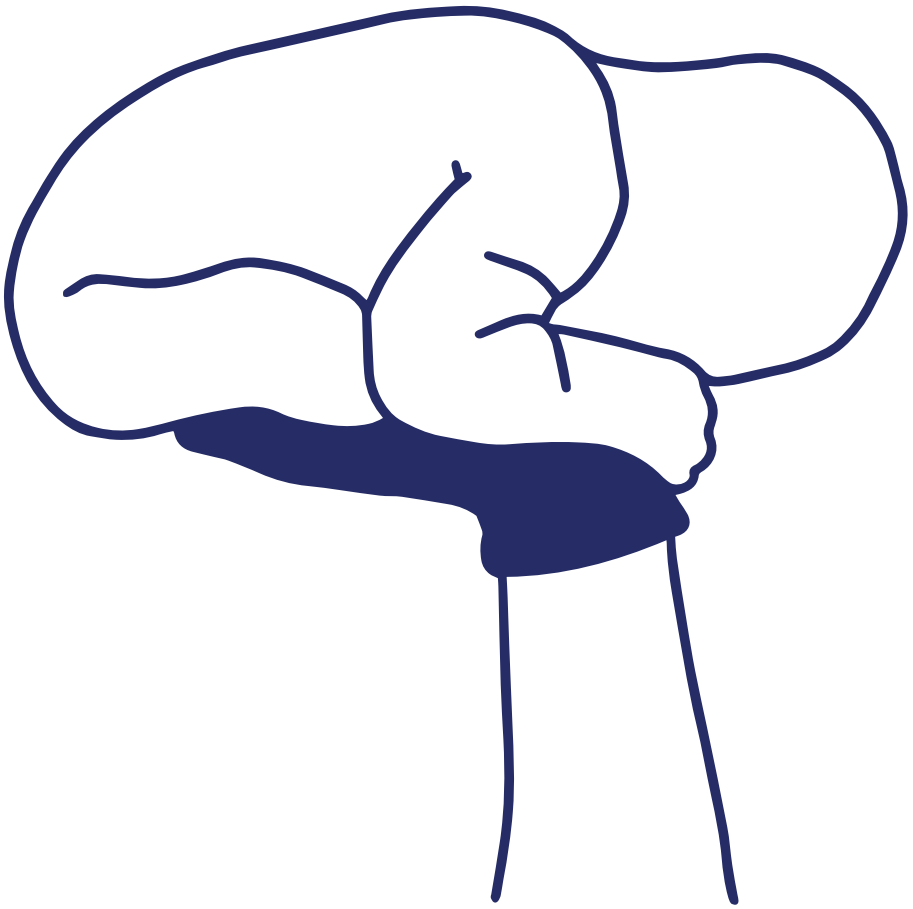


SUMMARY

This thesis is about ethics and neonatal resuscitation. More specifically, this thesis discussed ethical challenges that are raised after the decision to provide active care, when neonatal care providers strive to provide the best possible care. The provision of the best possible care during neonatal resuscitation can be assured through conducting research and quality improvement activities. However, conducting these activities can be ethically challenging. By combining empirical research with ethical reasoning, this thesis aimed to provide guidance for the ethical conduct of activities to study and improve neonatal resuscitation.

IMPROVING NEONATAL RESUSCITATION

Approximately 10% of all neonates require support at birth. For the majority, this support consists of simple interventions, however, up to 3% of all neonates require intensive interventions, such as assisted ventilation, or even endotracheal intubation or cardiac resuscitation. A lower gestational age at birth is associated with an increased need and level of support. Unfortunately, robust evidence for neonatal resuscitation interventions is still lacking. Continued efforts to study and improve neonatal resuscitation are therefore needed. Doing so can be ethically challenging, as neonatal resuscitation often occurs in emergency situations and involves both very ill infants and physically and emotionally distressed parents.

Just as many others, neonatal care providers working at the neonatal intensive care unit (NICU) of the Leiden University Medical Center (LUMC) participate in various activities to study and improve neonatal resuscitation. Using Reflective Equilibrium (RE), this thesis discussed the ethical challenges that they encounter in two cases: consent for delivery room (DR) studies and recording and auditing neonatal resuscitation. The central research question of this thesis is: what are the ethical challenges of consent for DR studies and recording and reviewing neonatal resuscitation? In order to answer the central research question, various subquestions were addressed, focused on stakeholders' perceptions on these issues. The discussed cases are exemplary for the complexity of improving neonatal resuscitation. In the case of consent for DR studies, a fairly settled body of guidelines exists, however, appealing to these guidelines creates new ethical challenges and thus does not necessarily lead to a balanced moral practice. In contrast, guidelines for recording and auditing neonatal resuscitation fall short, resulting in questions about the moral justification for the practice. For the present study, moral experiences of stakeholders of neonatal resuscitation, i.e. neonatal care providers and parents of very and extremely premature infants,

were explored and added to the RE. The method of RE consists of working back and forth among considered moral judgments about particular cases, the principles that govern these judgments, and the theoretical considerations behind the considered judgments and principles. By combining normative and empirical data, that is, information stemming from theory (moral principles and background theories) and from practice (morally relevant facts and moral experiences of third persons), the moral landscape of improving neonatal resuscitation was explored.

CONSENT FOR DR STUDIES

Since 2005, various DR studies have been conducted at the NICU of the LUMC. Conducting DR studies can be ethically challenging as obtaining informed consent can be arduous. Informed consent is considered a cornerstone in research ethics. The principle of informed consent protects the autonomy of participants and is embedded in several ethical codes and regulations. In order to be valid, consent should be provided voluntary by a participant, or in well-defined situations by a proxy, that is deemed to be mentally competent, has received appropriate information and is able to understand this information. Approaching parents faced with an imminent premature birth for research participation can be burdensome and the validity of consent obtained in a tight time-schedule for decision-making from emotionally and physically distressed parents can be challenged. As a consequence, neonates that require emergency resuscitation, which are generally the sickest neonates, are often excluded from DR studies. This is problematic, as excluding them from DR studies would cause selection bias, resulting in decreased generalizability and less externally valid research. Furthermore, many parents will be approached unnecessarily, as their infants, fortunately, never become eligible for the specific DR studies, reflecting an unnecessary burden on both parents and research personnel. In order to manage challenges of this prospective consent approach, guidelines on conducting studies using a deferred consent approach were established. A deferred consent approach implies that neonates can be enrolled in a DR study without parental consent. As soon as reasonably possible, parents are informed and approached for their permission to continue their infant's study participation and to use already obtained data. Since 2008, the NICU of the LUMC has used a deferred consent approach for several DR studies if time to approach parents for consent was lacking, or approaching parents for consent was considered inappropriate. However, concerns about the usage of a deferred consent approach were also reported in the literature.

In order to gain insight in experiences and perceptions of neonatal care providers regarding consent for DR studies, semi-structured interviews were conducted with 46 providers working at the NICU of the LUMC and of the Hospital of the University of Pennsylvania (HUP). Results of this study are reported in **Chapter 1**. At the time interviews were conducted, the NICUs of the LUMC and the HUP participated in the same DR studies, but used different consent approaches for these studies. Furthermore, at the LUMC, several studies had been using a deferred consent, whereas at the HUP solely a complete waiver of consent had been used for one observational DR study. Despite these differences, similar perceptions were reported. Interviewed providers reported benefits and concerns about both a prospective and a deferred consent approach. Although providers reported to regard the prospective consent approach as the most preferable consent approach, they acknowledged that a deferred consent approach is needed for high quality DR management. However, providers reported concerns about parental autonomy, approaching parents for consent, and ethical review of study protocols that include a deferred consent approach. Providers furthermore differed in perceived appropriateness of a deferred consent approach for the studies that were being conducted at their NICUs. Interviewed providers reported risk for the neonate when participating in a study as an important factor that influences the appropriateness of deferred consent for specific DR study protocols. However, providers differed strongly in how risk of specific study interventions was perceived. Providers with first-hand experience with deferred consent reported positive experiences that they attributed to appropriate communication and timing of approaching parents for consent.

Experiences and perceptions of parents of very and extremely preterm infants regarding consent for DR studies are reported in **Chapter 2**. For this study, 25 parents were interviewed. All interviewed parents had been approached for neonatal research. In one case, the mother delivered so quickly after admission that time to approach parents or enter the neonate in a DR study protocol was lacking, in another case, time to approach parents was lacking, however, the neonate could be entered into DR studies and parents were approached for deferred consent. All approached parents consented to at least one DR study. Despite being in an emotional and stressful situation, most parents considered being approached for DR studies as valuable. This was mostly due to appropriate timing and communication, compassion and the researcher not being obtrusive. According to interviewed parents, active involvement in the decision-making regarding their infant's participation in DR studies

is indispensable, especially when risk of harming the infant is associated with the specific DR study. However, parents differed strongly in how risk of specific study interventions was perceived. There was no consensus among parents on deferred consent for DR studies running at our NICU, however, parents considered deferred consent appropriate for observational studies.

Based on experiences of researchers involved in DR studies, suggestions for improvement of the deferred consent approach for DR studies were made in **Chapter 3**. It was argued that a deferred consent approach creates new challenges when conducting international multicentre DR studies and that more uniformity in the usage of a deferred consent approach for DR studies is needed. An approach to deferred consent for DR studies within the context of a learning health system (LHS) was advocated. Doing so implies engagement of clinicians, researchers, research ethics committees, parents and the public in an on-going dialogue between these stakeholders about the appropriateness of deferred consent for DR studies and the establishment of empirical evidence about this delicate matter. This may ultimately result in uniform and evidence-based criteria, providing guidance and clarity for both the ethical review process and the implementation of a deferred consent approach for DR studies, which will support the objective of performing high quality research to improve care for neonates requiring neonatal resuscitation.

RECORDING AND REVIEWING NEONATAL RESUSCITATION

In 2009, the NICU of the LUMC implemented recording neonatal resuscitation for research purposes. Evaluating recordings of neonatal resuscitation revealed that providers frequently diverge from the prevailing guidelines and that mask technique is often inadequate. Comparing recordings with the medical record furthermore revealed that documentation in the medical record is often incomplete or inaccurate. In order to improve the quality of care provided during neonatal resuscitation and the documentation in the medical record, weekly plenary audits reviewing recordings of neonatal resuscitation were implemented in 2014. During audits, for which all NICU staff members are invited, provided care is reviewed, discussing, amongst others, mask technique, compliance to the prevailing local guideline, and clinical decision-making and alternative treatment options. Although recording and reviewing neonatal resuscitation can be beneficial, doing so also creates controversy.

Only a limited number of NICUs in Australia, the USA, France, Germany and the Netherlands have reported to regularly record neonatal resuscitation. Even less NICUs reported to review these recordings in regular plenary meetings. NICUs that have implemented recording and reviewing neonatal resuscitation reported various ethical concerns. These concerns are summarized in **Chapter 4**. Reported concerns included concerns about privacy of providers and infants, medicolegal consequences, data storage, the impact on providers and parents and provider and parental consent. NICUs reported that recordings of neonatal resuscitation are used for quality assurance, education and research. We observed that ethical dilemmas arise as the review process is operating in several domains of health care that all have their specific moral and legal framework with requirements and conditions on issues such as consent, privacy and data storage. These moral and legal requirements and conditions furthermore vary due to local circumstances.

Providers' experiences with recording and auditing neonatal resuscitation are reported in **Chapter 5**. For this study, 48 neonatal care providers of the NICUs of the LUMC and the HUP were questioned about their experiences with auditing neonatal resuscitation. The LUMC and the HUP differ in both their method of recording and their process of auditing neonatal resuscitation. However, reported experiences and attitudes are broadly similar. Positive experiences and benefits were reported by all providers, with special emphasis on educational benefits. Apart from usage in audits, providers reported that recordings of neonatal resuscitation are also used for various other learning activities, such as in meetings in which the team that conducted the neonatal resuscitation reviews their performances and as tool for objective feedback. Providers reported to learn from reviewing their performance during resuscitation, as well as from reviewing performances of others. Improved time perception, reflection on guideline compliance, and acting less invasively during resuscitations were often mentioned as learning outcomes. All providers would recommend other NICUs to implement recording and reviewing neonatal resuscitation, as it is a powerful tool for learning and improving. However, providers emphasized preconditions for successful implementation, such as providing information to all neonatal care providers, not being punitive and focusing on the benefits for learning and improving.

In **Chapter 6**, the experiences of the NICU of the LUMC with auditing neonatal resuscitation are recapitulated. During one year of audits, 131 lessons learned could be captured. Lessons learned were applicable to the medical staff (38%), the nursing

staff (4%), both the medical and nursing staff (40%), obstetrics (8%), and people not involved in hands-on care (9%; e.g. researchers). Most lessons learned were connected to medical devices (19%; e.g. correct usage of devices), study protocols (18%; e.g. protocol compliance), clinical decision-making (14%; e.g. moment of drug administration), and physiology of neonatal transition (9%; e.g. larynx function). Lessons learned could be connected to several areas of improvement for clinical care and patient safety. Important areas for improvement were guideline compliance, documentation, the usage of medical devices, the conduct of delivery room studies, and clinical decision-making. Moreover, clinical decision-making could be discussed plenarily, allowing for the local guideline for neonatal resuscitation to be clarified and improved. Auditing neonatal resuscitation may thus contribute to improving patient safety and the quality of care provided during neonatal resuscitation.

At the LUMC, recordings of neonatal resuscitation are not solely reviewed by neonatal care providers, also parents can review recordings of the resuscitation of their infant. In **Chapter 7**, parental experiences with reviewing recordings of the resuscitation of their infant together with their primary neonatal care provider are reported. This study combined participant observations during parental review of recordings with retrospective qualitative interviews with parents. Parental review was observed in 20 occasions, reviewing recordings of 31 children. Subsequently, 25 parents participated in a semi-structured interview. Interviewed parents reported many positive experiences, with special emphasis on the value for getting hold of the start of their infant's life and coping with the trauma of neonatal resuscitation. Reviewing recordings of neonatal resuscitation frequently resulted in appreciation for the child, the father, and the medical team. Timing and set-up of the review contributed to positive experiences. Parents considered screenshots or copies of the recording of the resuscitation of their infant as valuable keepsakes of their NICU-story, and reported that having these screenshots or the video comforted them, especially when their infant died during admission.

In the **General discussion**, the principal results of this thesis are discussed and future perspectives are proposed. Using RE, the moral landscape of improving neonatal resuscitation is described. For consent for DR studies, a fairly settled body of legislation and guidelines exist, but appealing to these does not lead to a balanced moral practice. This situation is acknowledged by parents and providers. Due to the importance of parental autonomy and the right to refuse research participation,

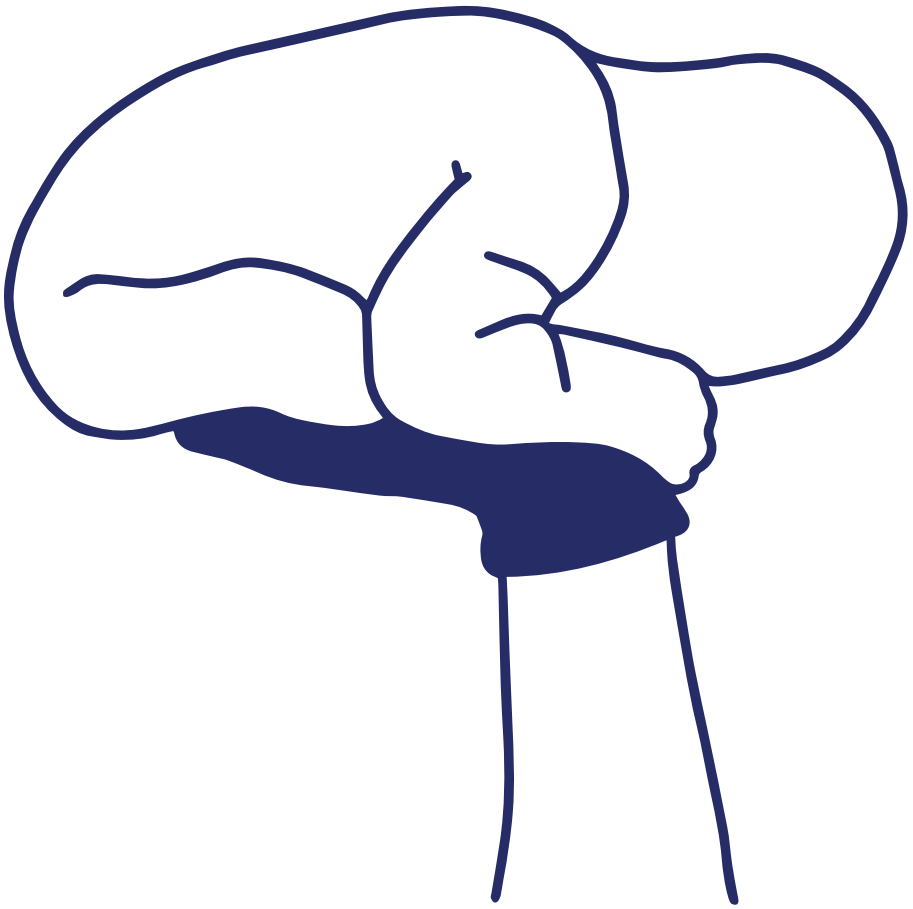
consent is considered valuable, however, consent procedures, both prospective and deferred, could be improved upon. Parents expressed the need to have a sense of control about what happens to their infant and the wish to be actively involved in the decision-making regarding their infant's study participation. This was considered even more important when a specific DR study is associated with the risk of harming their infant. The importance of the risk of harm in discussions about consent for DR was also acknowledged by providers. Interestingly, considerations about the appropriate consent approach were oftentimes not in line with considerations in prevailing legislation and guidelines. For example, both providers and parents considered a deferred consent approach appropriate for observational studies, however, according to prevailing legislation observational studies do not qualify for a deferred consent approach.

In contrast to consent for DR studies, legislation and guidelines for recording and reviewing neonatal resuscitation fall short, resulting in questions about the moral justification for the practice. However, providers of NICUs that do record and audit neonatal resuscitation reported various educational benefits and acknowledged that doing so can improve patient safety and the quality of provided care during neonatal resuscitation. Providers therefore recommend other NICUs to also implement recording and reviewing neonatal resuscitation, but emphasized the importance of a safe learning environment. Parents also reported positive perceptions about recording and reviewing neonatal resuscitation. Just as providers, parents considered that auditing neonatal resuscitation may improve care and patient safety. Furthermore, parents have put special emphasis on the benefits of sharing recordings with parents for parental coping and trust in the neonatal care providers. Despite these positive experiences, wider implementation of recording and reviewing neonatal resuscitation is hampered, as ethical dilemmas and questions may impede usage of recordings of neonatal resuscitation in more than one domain of health care.

A possible solution to solve remaining challenges of improving neonatal resuscitation may be to approach improving neonatal resuscitation within the context of an LHS. An LHS demands extensive consultation with providers, parents, and other stakeholders on whether, when and how studying and improving neonatal resuscitation is acceptable. This requires insight in stakeholders' views regarding various questions and dilemmas. For instance, how can privacy, autonomy and voluntariness of stakeholders be preserved when recordings of neonatal resuscitation are used

for various learning activities? And how do stakeholders perceive risks, benefits and burdens associated with learning activities aimed at improving neonatal resuscitation? By approaching these and other questions in an on-going dialogue between stakeholders of neonatal resuscitation and establishing empirical evidence on stakeholders perceptions, uniform and evidence-based criteria for the conduct of learning activities in neonatal resuscitation can be established. Within an LHS, patient safety and the quality of care provided during neonatal resuscitation can be improved in various ways whilst stakeholders can be protected from being negatively affected by these activities. Instead of having existing policies impede learning and improving, scope can be provided to the ethical conduct of activities aimed at learning and improving neonatal resuscitation, which allows to reach the best clinical outcomes for infants.

In conclusion, conducting activities aimed at studying and improving neonatal resuscitation can be ethically challenging. Interviews with neonatal care providers and parents of very and extremely preterm infants provided valuable insights in their perceptions of the conduct of activities aimed at improving neonatal resuscitation. Most important themes were the risk of harm, benefits for learning and improving neonatal resuscitation and parental involvement in decision-making. Insights from the present study may guide the ethical conduct of activities aimed at improving neonatal resuscitation. For example, reported experiences of neonatal care providers may guide successful implementation of audits of neonatal resuscitation at other NICUs. Furthermore, reported experiences of parents that reviewed recordings of neonatal resuscitation of their very or extremely preterm infant may allay concerns of sharing these recordings with parents. Moreover, insight in experiences of parents and neonatal care providers with consent for DR studies may help to establish consent procedures that are considered both ethically valid and valuable. Still, ethical challenges and questions regarding improving neonatal resuscitation remain. These challenges and questions should be addressed in future research and on-going dialogues about the ethical conduct of activities aimed at improving neonatal resuscitation.



NEDERLANDSE SAMENVATTING

SAMENVATTING

Dit proefschrift gaat over ethiek en de neonatale opvang van extreem vroeg geborenen. In het bijzonder gaat dit proefschrift over de ethische uitdagingen die kunnen ontstaan nadat er is gekozen voor neonatale opvang van een pasgeborene en zorgverleners streven naar het bieden van de best mogelijke zorg. De opvang van pasgeborenen heeft zich de afgelopen decennia sterk ontwikkeld, maar verdere verbetering is mogelijk. Daarvoor zijn wetenschappelijk onderzoek en kwaliteitsverbeteringsactiviteiten belangrijk. In dit proefschrift worden de ethische uitdagingen die het streven naar verdere verbetering van de opvang van pasgeborenen met zich meebrengt in kaart gebracht. Het doel is om handvatten te bieden om op een ethisch verantwoorde wijze met wetenschappelijk onderzoek en kwaliteitsverbetering in de neonatale opvang om te gaan.

HET VERBETEREN VAN DE NEONATALE OPVANG

Ongeveer 10% van alle pasgeborenen heeft bij geboorte ondersteuning nodig. In de meeste gevallen gaat het om relatief simpele interventies. Echter, ongeveer 3% van de pasgeborenen heeft meer intensieve ondersteuning nodig, zoals beademing of zelfs intubatie of reanimatie. We noemen dit neonatale opvang. Wanneer een kind te vroeg wordt geboren, heeft het vaak meer ondersteuning nodig. Een groot deel van de interventies die te vroeg geboren kinderen nodig hebben is helaas nog niet voldoende wetenschappelijk onderbouwd. Onderzoek wordt gecompliceerd doordat de neonatale opvang vaak gebeurt in een noodsituatie, waarin het kind vaak ernstig ziek is, en ouders emotioneel en bezorgd zijn.

Net zoals veel andere neonatale zorgverleners, voeren zorgverleners van de neonatale intensive care unit (NICU) van het Leids Universitair Medisch Centrum (LUMC) verschillende activiteiten uit om de neonatale opvang te bestuderen en te verbeteren. In dit proefschrift zullen de ethische uitdagingen die zij hierbij ondervinden door middel van empirisch onderzoek gecombineerd met ethische analyse

worden onderzocht en bediscussieerd. We onderzoeken twee casus: het vraagstuk van de geïnformeerde toestemming voor wetenschappelijk onderzoek naar de neonatale opvang (opvangstudies) en het vraagstuk van het opnemen en auditen van de neonatale opvang. De hoofdvraag van dit proefschrift is: wat zijn de ethische uitdagingen bij het vraagstuk van de geïnformeerde toestemming voor opvangstudies

en het opnemen en auditen van de neonatale opvang? Om deze hoofdvraag te beantwoorden, zullen verschillende deelvragen worden behandeld. Deze deelvragen focussen zich op de percepties van belanghebbenden van de neonatale opvang. De bediscussieerde casus zijn exemplarisch voor de complexiteit van het verbeteren van de neonatale opvang. In het geval van geïnformeerde toestemming voor opvangstudies bestaan er duidelijke richtlijnen. Echter, bij het volgen van deze richtlijnen kunnen er ethische uitdagingen ontstaan. In het geval van het auditen van de neonatale opvang bestaan er juist geen duidelijke richtlijnen, wat eveneens kan zorgen voor verschillende ethische uitdagingen. Voor dit proefschrift werden de morele ervaringen van belanghebbenden van de neonatale opvang, te weten neonatale zorgverleners en ouders van extreem vroeggeboren kinderen, onderzocht en toegevoegd aan het Reflectief Evenwicht (RE). De methode van het RE bestaat uit het afwegen van ethische theorieën en morele ervaringen. Door normatieve data (voortkomend uit theorie) te combineren met empirische data (voortkomend uit de praktijk) zal in dit proefschrift het morele landschap van het verbeteren van de neonatale opvang worden geschetst.

TOESTEMMINGSPROCEDURES VOOR OPVANGSTUDIES

Sinds 2005 worden er op de NICU van het LUMC opvangstudies uitgevoerd. Het uitvoeren van opvangstudies kan ethisch uitdagend zijn, omdat het lastig kan zijn om geïnformeerde toestemming te verkrijgen. Geïnformeerde toestemming is belangrijk. Het beschermt de onderzoeksdeelnemers en wordt beschouwd als het fundament van de onderzoeksethiek. Het principe van geïnformeerde toestemming is daarom verankerd in verschillende ethische codes en richtlijnen. Geïnformeerde toestemming is enkel geldig wanneer het vrijelijk wordt gegeven door een goed geïnformeerde, wilsbekwame onderzoeksdeelnemer, of in heel specifieke gevallen, door een gemachtigde proxy. In het geval van een pasgeborene zijn de ouders over het algemeen de gemachtigde proxies.

Wanneer ouders worden geconfronteerd met een dreigende vroeggeboorte kan het belastend zijn om hen te benaderen voor opvangstudies. Als ouders in een dergelijke stressvolle situatie toestemming geven voor opvangstudies kan de geldigheid hiervan worden betwist, zeker wanneer deze toestemming werd gegeven onder tijdsdruk. Daardoor worden pasgeborenen die na een spoedsituatie geboren worden vaak uitgesloten van deelname aan opvangstudies. Over het algemeen zijn dit de ziekste

kinderen. Deze kinderen uitsluiten van opvangstudies is onwenselijk, omdat dit zorgt voor selectiebias. Hierdoor zijn de uitkomsten van het onderzoek niet geldig voor alle kinderen die ondersteuning nodig hebben bij geboorte. Daarnaast kan een dreigende extreme vroeggeboorte vaak nog worden geremd, waardoor het kind gelukkig niet extreem te vroeg geboren wordt. Vaak worden deze ouders echter wel benaderd voor opvangstudies. Dit zorgt voor onnodige belasting van ouders én onderzoekers.

Om de hierboven beschreven uitdagingen van de zogenoemde 'prospectieve toestemming' het hoofd te bieden, zijn er richtlijnen opgesteld om onderzoek te kunnen doen gebruikmakend van 'uitgestelde toestemming'. Wanneer er voor opvangstudies gebruik wordt gemaakt van uitgestelde toestemming, kunnen pasgeborenen zonder toestemming van hun ouders geïncludeerd worden in een opvangstudie. Vervolgens worden ouders zo snel als redelijkerwijs mogelijk is geïnformeerd over de studie en gevraagd om toestemming voor het vervolg van de studie en het gebruik van al verzamelde data. Sinds 2008 wordt er op de NICU van het LUMC voor specifieke opvangstudies gebruik gemaakt van uitgestelde toestemming. Dit gebeurt uitsluitend in specifieke gevallen: wanneer er voor geboorte te weinig tijd is om ouders te benaderen (noodsituatie) of wanneer er wordt ingeschat dat het ongepast is om ouders te benaderen, bijvoorbeeld wanneer moeder heel erg ziek, of ouders heel erg emotioneel zijn. Er bestaan echter ook zorgen over het gebruik van uitgestelde toestemming voor opvangstudies.

Om inzicht te verkrijgen in de ervaringen en percepties van neonatale zorgverleners met toestemmingsprocedures voor opvangstudies werden in totaal 46 zorgverleners van de NICU van het LUMC en de NICU van het Hospital of the University of Pennsylvania (HUP; Philadelphia, Verenigde Staten van Amerika) geïnterviewd. De resultaten van dit onderzoek zijn beschreven in **Hoofdstuk 1**. Op het moment van de interviews werden er op de NICUs van het LUMC en het HUP dezelfde opvangstudies uitgevoerd. Het HUP gebruikte voor deze studies alleen prospectieve toestemming, terwijl het LUMC naast prospectieve toestemming ook uitgestelde toestemming gebruikte. De percepties van Nederlandse en Amerikaanse zorgverleners met betrekking tot toestemming voor opvangstudies vertoonden grote overeenkomsten. Geïnterviewde zorgverleners rapporteerden zowel voordelen als nadelen van prospectieve toestemming en uitgestelde toestemming. Hoewel zorgverleners over het algemeen van mening waren dat prospectieve toestemming te prefereren is boven uitgestelde toestemming, erkenden zij de noodzaak van uitgestelde toestemming voor het doen

van onderzoek naar de best mogelijke zorg tijdens de neonatale opvang. Zorgverleners maakten zich echter zorgen om de autonomie van ouders, het benaderen van ouders voor uitgestelde toestemming en het toetsen van onderzoeksprotocollen die gebruik maken van uitgestelde toestemming. Zorgverleners die ervaring hadden met het benaderen van ouders voor uitgestelde toestemming rapporteerde positieve ervaringen, welke zij toeschreven aan goede communicatie en het gekozen moment waarop ouders werden benaderd voor uitgestelde toestemming.

Geïnterviewde zorgverleners verschilden van mening over de geschiktheid van uitgestelde toestemming voor de opvangstudies die op dat moment werden uitgevoerd op hun NICUs. De belangrijkste overweging om te bepalen of een opvangstudie gebruik kan maken van uitgestelde toestemming was volgens zorgverleners het risico voor de pasgeborene. Zorgverleners verschilden echter sterk in hoe zij het risico van specifieke interventies voor de pasgeborene inschatten.

De ervaringen en percepties van ouders van extreem prematuur en zeer prematuur geboren kinderen met toestemmingsprocedures voor opvangstudies zijn beschreven in **Hoofdstuk 2**. Voor dit onderzoek werden 25 ouders van pasgeborenen die waren opgenomen op de NICU van het LUMC geïnterviewd. Deze ouders werden allen benaderd voor deelname aan onderzoek dat werd uitgevoerd op de afdeling neonatologie. Zij werden echter niet allemaal benaderd voor deelname aan opvangstudies. Bij één moeder verliep de bevalling zo snel verliep dat er niet genoeg tijd was om ouders te benaderen voor opvangstudies, noch om het kind te includeren in opvangstudies. Bij een andere moeder verliep de bevalling zo snel dat er niet genoeg tijd was om ouders te benaderen voor opvangstudies, maar nog wel genoeg tijd om het kind te includeren in twee opvangstudies. Deze ouders werden na geboorte benaderd voor uitgestelde toestemming. Alle ouders die werden benaderd voor opvangstudies hebben toestemming gegeven om hun kind te includeren in ten minste één opvangstudie.

Ondanks het feit dat ouders erg emotioneel waren en veel stress ervoeren door de dreigende vroeggeboorte van hun kind, vonden geïnterviewde ouders het toch waardevol om benaderd te worden voor deelname aan opvangstudies. Ouders gaven aan dat dit voornamelijk kwam door goede timing van het moment waarop ouders werden benaderd, de manier waarop onderzoekers communiceerden met ouders en het feit dat onderzoekers empathie toonden en niet opdringerig waren.

Geïnterviewde ouders gaven verder aan het ontzettend belangrijk te vinden om zich betrokken te voelen bij de besluitvorming rondom het includeren van hun kind in opvangstudies, zeker wanneer er mogelijke risico□s en nadelen aan deelname aan het onderzoek zitten. Ouders verschilden echter sterk in hoe zij het risico van specifieke interventies voor hun kind inschatten. Daarnaast waren ouders het ook niet eens over de geschiktheid van uitgestelde toestemming voor de opvangstudies die op het moment van interviews werden uitgevoerd op de NICU. Ouders waren het echter wel eens over het feit dat uitgestelde toestemming geschikt is voor observationele studies.

Op basis van ervaringen van onderzoekers die betrokken zijn bij opvangstudies, worden er in **Hoofdstuk 3** suggesties gedaan voor het verbeteren van de uitgestelde toestemmingsprocedure bij internationale multicenter opvangstudies. Bij internationale multicenter opvangstudies kan de diversiteit aan lokale besluitvormingsprocedures rondom toestemmingsprocedures zorgen voor nieuwe ethische uitdagingen. Daarom is er meer uniformiteit nodig bij het gebruik van uitgestelde toestemming voor multicenter opvangstudies. Er wordt bepleit om uitgestelde toestemming te benaderen binnen de context van een lerend systeem. Dit impliceert dat zorgverleners, onderzoekers, medisch-ethische commissies, ouders en de samenleving betrokken moeten worden in een voortdurend dialoog over de geschiktheid van uitgestelde toestemming voor opvangstudies. Daarnaast is het noodzakelijk om door middel van wetenschappelijk onderzoek meer kennis te vergaren over uitgestelde toestemming voor opvangstudies. Uiteindelijk kunnen dan uniforme en wetenschappelijk onderbouwde criteria voor het gebruik van uitgestelde toestemming voor opvangstudies worden opgesteld. Deze criteria zorgen voor houvast en duidelijkheid tijdens de ethische toetsing en het uitvoeren van opvangstudies die van deze toestemmingsprocedure gebruikmaken. Dit verbetert de kwaliteit van wetenschappelijk onderzoek waardoor de zorg voor pasgeborenen tijdens de neonatale opvang kan verbeteren.

HET OPNEMEN EN TERUGKIJKEN VAN DE NEONATALE OPVANG

Sinds 2009 wordt de neonatale opvang op de NICU van het LUMC opgenomen voor onderzoeksdoeleinden. Deze opnames bestaan uit video-opnames van de neonaat en de handen van zorgverleners en opnames van fysiologische parameters. Uit evaluatie van deze opnames bleek dat zorgverleners vaak afwijken van de richtlijn voor

de neonatale opvang en dat de manier waarop de ademhaling van de pasgeborene wordt ondersteund (maskertechniek) vaak inadequaat is. Verder bleek dat wanneer de opnames van de neonatale opvang worden vergeleken met het medisch dossier, de documentatie over de neonatale opvang vaak incompleet of onnauwkeurig is. Om de zorg tijdens de neonatale opvang en de documentatie in het medisch dossier te verbeteren werden er in 2014 wekelijkse audits van de neonatale opvang geïmplementeerd. Tijdens deze audits, waarvoor alle zorgverleners van de NICU van het LUMC worden uitgenodigd, worden de opnames van de neonatale opvang teruggekeken en worden onder andere het naleven van de richtlijn voor de neonatale opvang, de maskertechniek, de medische besluitvorming en mogelijke alternatieve interventies besproken. Hoewel het opnemen en terugkijken van de neonatale opvang een positieve bijdrage kan leveren aan de zorg tijdens de neonatale opvang, zorgt het ook voor controverse.

Slechts een klein aantal NICUs in Australië, de Verenigde Staten, Frankrijk, Duitsland en Nederland hebben beschreven de neonatale opvang regelmatig op te nemen. Nog minder NICUs bespreken deze opnames regelmatig in audits. NICUs die het opnemen en terugkijken van de neonatale opvang hebben geïmplementeerd rapporteerden verschillende ethische vraagstukken. Deze vraagstukken zijn samengevat in **Hoofdstuk 4**. Gerapporteerde ethische vraagstukken omvatten onder andere de privacy van zorgverleners en pasgeborenen, de opslag van opnames, medico-legale aspecten, de impact op zorgverleners en ouders en toestemming van zorgverleners en ouders. NICUs rapporteerden de opnames van de neonatale opvang te gebruiken voor kwaliteitsverbetering, onderwijs en onderzoek. Daarmee betreffen ze verschillende domeinen van de gezondheidszorg met elk hun eigen ethische en juridische kaders met veelal specifieke eisen voor toestemming, privacy en de opslag van data. Deze specifieke eisen kunnen verder nog variëren door lokale wet- en regelgevingen. We constateerden dat het gebruiken van opnames van de neonatale opvang binnen verschillende domeinen leidt tot het ervaren van ethische spanning en dilemma's.

Ervaringen van zorgverleners met het opnemen en terugkijken van de neonatale opvang zijn beschreven in **Hoofdstuk 5**. Voor dit onderzoek werden 48 zorgverleners van de NICUs van het LUMC en het HUP geïnterviewd. Het LUMC en het HUP verschillen in de manier waarop de neonatale opvang wordt opgenomen en de manier waarop audits worden uitgevoerd. Gerapporteerde ervaringen en attitudes komen echter

grotendeels overeen. Alle zorgverleners rapporteerde positieve ervaringen, met bijzondere nadruk op de educatieve voordelen van het opnemen en terugkijken van de neonatale opvang. Zorgverleners rapporteerden de opnames van de neonatale opvang te gebruiken voor uiteenlopende leeractiviteiten. Zo gebruikten ze de opnames om een moeilijke opvang na te bespreken met de betrokken zorgverleners. Daarnaast gebruikten artsen in opleiding de opnames om hun supervisors om feedback op hun medisch handelen te vragen. Zorgverleners rapporteerden te leren van het terugkijken van opnames van hun eigen medisch handelen, maar ook van het terugkijken van het medisch handelen van anderen. Regelmatig gerapporteerde leeropbrengsten waren een verbeterd besef van tijd, reflectie op het naleven van de richtlijn voor de neonatale opvang en minder invasief handelen tijdens de neonatale opvang. Omdat zorgverleners het opnemen en terugkijken van de neonatale opvang beschouwen als een krachtig instrument voor leren en verbeteren, raadden zij allemaal andere NICUs aan om het eveneens te implementeren. Zorgverleners benadrukten echter verschillende randvoorwaarden voor een succesvolle implementatie van het opnemen en terugkijken van de neonatale opvang, waaronder het goed informeren van alle betrokken zorgverleners, zorgverleners niet afrekenen op hun medisch handelen tijdens de neonatale opvang en het focussen op de voordelen voor leren en verbeteren.

In **Hoofdstuk 6** worden de ervaringen van het LUMC met het auditen van de neonatale opvang samengevat. Tijdens audits die in een periode van een jaar werden uitgevoerd op de NICU van het LUMC werden 131 leerpunten geformuleerd. Deze leerpunten waren relevant voor de artsen (38%), voor de verpleegkundigen (4%), zowel voor artsen en verpleegkundigen (40%), voor zorgverleners van de obstetrie (8%) en voor mensen die niet direct betrokken zijn bij de patiëntenzorg (9%; e.g. onderzoekers). De meeste leerpunten hadden betrekking tot medische apparatuur (19%; e.g. het correcte gebruik van apparatuur), onderzoeksprotocollen (18%; e.g. het correct uitvoeren van onderzoeksinterventies), medische besluitvorming (14%; e.g. wanneer medicijnen moeten worden gegeven) en de fysiologie van de neonatale transitie (9%; e.g. de functie van het strottenhoofd tijdens de neonatale transitie). Leerpunten gaven zorgverleners inzicht in verschillende verbeterpunten, waaronder het naleven van richtlijnen, documentatie in het medisch dossier, het gebruik van medische apparatuur, het uitvoeren van opvangstudies, en medische besluitvorming. Als gevolg van plenaire discussies over medische besluitvorming werd de lokale

richtlijn voor de neonatale opvang op meerdere punten verhelderd of aangepast. Audits van de neonatale opvang kunnen dus op verschillende manieren bijdragen aan patiëntveiligheid en de kwaliteit van zorg tijdens de neonatale opvang.

De opnames van de neonatale opvang worden in het LUMC niet enkel door zorgverleners teruggekeken; ook ouders mogen de opname van de neonatale opvang van hun kind bekijken. In **Hoofdstuk 7** zijn de ervaringen beschreven van ouders die samen met hun gespreksarts de opnames van de neonatale opvang van hun kind bekeken. Voor dit onderzoek werd data verzameld door middel van participerende observatie tijdens het terugkijken van de opnames en door interviews met ouders van extreem prematuur en zeer prematuur geboren kinderen. Participerende observaties werden uitgevoerd tijdens 20 gelegenheden waarbij opnames van 31 kinderen werden teruggekeken. Vervolgens namen 25 ouders deel aan een semigestructureerd interview. Geïnterviewde ouders rapporteerde veel positieve ervaringen, met bijzondere nadruk op de waarde van het terugkijken van de opnames voor het grip krijgen op het begin van het leven van hun kind en het kunnen omgaan met het trauma van de neonatale opvang. Het terugkijken van de neonatale opvang resulteerde regelmatig in waardering voor het kind, de vader en het medisch team. Ouders rapporteerde dat de timing van het terugkijken en de manier waarop de opnames werden teruggekeken bijdroegen aan de positieve ervaring. Ouders beschouwden screenshots of kopieën van de opnames van hun kind als waardevolle herinneringen aan hun tijd op de NICU. Het hebben van de screenshots of de kopieën van de opnames biedt ouders troost, zeker wanneer het kind gedurende opname op de NICU is overleden.

In de **General Discussion** worden de belangrijkste bevindingen uit dit proefschrift bediscussieerd en worden er toekomstperspectieven geformuleerd. Gebruikmakend van het RE wordt het morele landschap geschetst van het verbeteren van de neonatale opvang. Voor toestemming voor opvangstudies bestaat er uitgebreide wet- en regelgeving. Deze wet- en regelgeving zorgt echter niet voor een gebalanceerde morele praktijk. Dit wordt bevestigd door ouders en zorgverleners. Doordat zij veel waarde hechten aan de autonomie van ouders en het recht om deelname aan onderzoek te weigeren vinden zij toestemming voor opvangstudies erg belangrijk. Ouders en zorgverleners zijn echter van mening dat toestemmingsprocedures verbeterd kunnen worden, zowel voor prospectieve toestemming als voor uitgestelde toestemming. Ouders gaven uiting aan de behoefte aan het gevoel van controle

over wat er gebeurt met hun kind en de wens om actief betrokken te worden in de besluitvorming rondom studiedeelname van hun kind. Voor ouders was dit zelfs nog belangrijker wanneer er mogelijke risico's en nadelen aan deelname aan een opvangstudie zitten. Ook zorgverleners benadrukten de rol van risicoclassificaties in discussies over toestemmingsprocedures voor opvangstudies. Interessant genoeg kwamen overwegingen van zorgverleners en ouders met betrekking tot de geschiktheid van de verschillende toestemmingsprocedures vaak niet overeen met de overwegingen in de wet- en regelgeving. Zo meenden zowel ouders en zorgverleners dat uitgestelde toestemming gepast is bij observationele studies, terwijl dit type onderzoek volgens de huidige wetgeving niet in aanmerking komt voor uitgestelde toestemming.

In tegenstelling tot toestemmingsprocedures voor opvangstudies schiet de huidige wet- en regelgeving voor het opnemen en terugkijken van de neonatale opvang tekort, waardoor er vragen bestaan over de morele rechtvaardiging van het opnemen en terugkijken van de neonatale opvang. Zorgverleners van NICUs die de neonatale opvang opnemen en terugkijken rapporteren echter verschillende educatieve voordelen. Verder erkennen zij dat het opnemen en terugkijken van de neonatale opvang de patiëntveiligheid en de kwaliteit van zorg kan verbeteren. Zorgverleners raden daarom andere NICUs aan om het eveneens te implementeren, mits er aan randvoorwaarden voor een veilig leerklimaat wordt voldaan. Ook ouders rapporteerde positieve percepties over het opnemen en terugkijken van de neonatale opvang. Net als zorgverleners zijn ouders van mening dat het opnemen en terugkijken van de neonatale opvang de patiëntveiligheid en de kwaliteit van zorg kan verbeteren. Ouders benadrukten verder de waarde van het terugkijken van de neonatale opvang van hun kind voor coping en het vertrouwen in zorgverleners. Ondanks deze positieve ervaring blijft het lastig om het opnemen en terugkijken van de neonatale opvang te implementeren, doordat het gebruik van deze opnames binnen verschillende domeinen van de gezondheidszorg tot ethische vragen en dilemma's leidt.

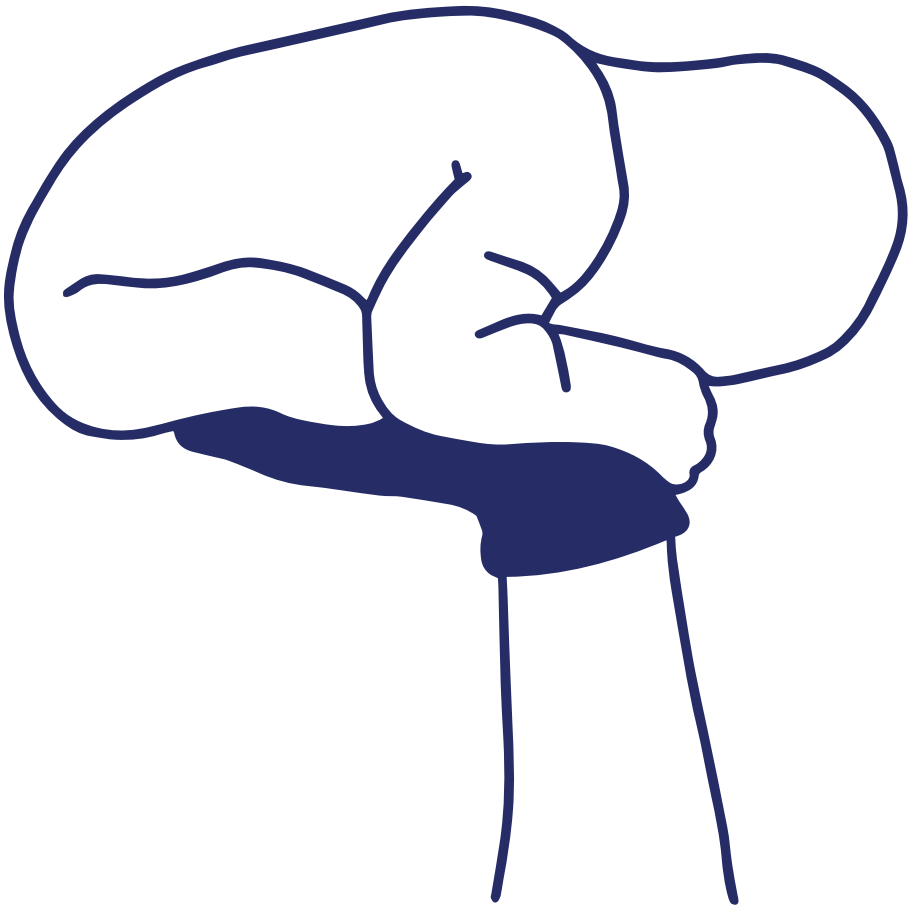
Door het verbeteren van de neonatale opvang te benaderen binnen de context van een lerend systeem kunnen ethische uitdagen mogelijk worden opgelost. Een lerend systeem veronderstelt dat zorgverleners, ouders en andere belanghebbenden worden geconsulteerd over of, wanneer en hoe het bestuderen en verbeteren van de neonatale opvang acceptabel is. Dit vereist inzicht in de visie van belanghebbenden op verschillende vragen en dilemma's. Bijvoorbeeld: hoe kunnen privacy, autonomie en

vrijwilligheid worden gewaarborgd wanneer opnames van de neonatale opvang voor verschillende leeractiviteiten worden gebruikt? En hoe schatten belanghebbenden de risico's, voordelen en nadelen van verschillende leeractiviteiten gericht op het verbeteren van de neonatale opvang in? Door deze en andere vragen te bespreken in een voortdurende dialoog met belanghebbenden en door wetenschappelijk onderzoek te doen naar de percepties van belanghebbenden kunnen uniforme en wetenschappelijk onderbouwde criteria worden opgesteld voor het uitvoeren van leeractiviteiten gericht op het verbeteren van de neonatale zorg. In een lerend systeem kunnen de patiëntveiligheid en de kwaliteit van zorg tijdens de neonatale opvang worden verbeterd terwijl belanghebbenden worden beschermd tegen mogelijke negatieve gevolgen van leeractiviteiten. Op die manier kan er ruimte worden geboden aan het op een ethisch juiste manier uitvoeren van activiteiten gericht op het bestuderen en verbeteren van de neonatale opvang, waardoor de best mogelijke uitkomsten voor pasgeborenen bereikt kunnen worden.

Concluderend, het uitvoeren van activiteiten gericht op het bestuderen en verbeteren van de neonatale opvang kan ethisch uitdagend zijn. Interviews met neonatale zorgverleners en ouders van extreem prematuur en zeer prematuur geboren kinderen verschaften waardevolle inzichten in hun percepties over het uitvoeren van deze activiteiten. De belangrijkste thema's die uit interviews naar voren kwamen waren het risico op schade, de voordelen voor leren en verbeteren en het betrekken van ouders in de besluitvorming. Inzichten uit dit proefschrift kunnen richting geven aan het op een ethisch juiste manier uitvoeren van activiteiten gericht op het verbeteren van de neonatale opvang. Gerapporteerde ervaringen van zorgverleners kunnen bijvoorbeeld bijdragen aan het succesvol implementeren van audits van de neonatale opvang op andere NICUs. Daarnaast kunnen gerapporteerde ervaringen van ouders die de opnames van de neonatale opvang van hun kind bekeken zorgen over het delen van deze opnames met ouders verminderen. Verder kan inzicht in de ervaringen van ouders en zorgverleners met toestemmingsprocedures voor opvangstudies bijdragen aan de totstandkoming van toestemmingsprocedures die ethisch valide en waardevol zijn. Niet alle ethische uitdagingen en vragen met betrekking tot het verbeteren van de neonatale opvang zijn daarmee weggenomen. Voortgaand onderzoek naar het op een ethisch juiste manier uitvoeren van activiteiten gericht op het verbeteren van de neonatale opvang is gewenst.

PART 5

APPENDICES



LIST OF ABBREVIATIONS

DR	Delivery Room
HIPSTER	High Flow Nasal Cannulae as Primary Support in the Treatment of Early Respiratory Distress trial
HHCP	Hospital of the University of Pennsylvania healthcare professional
HUP	Hospital of the University of Pennsylvania
LHS	Learning Health System
LHCP	Leiden University Medical Center healthcare professional
LP	Leiden Parent
LUMC	Leiden University Medical Center
MONitoR	MOnitoring Neonatal Resuscitation trial
NICU	Neonatal Intensive Care Unit
PDSA	Plan-Do-Study-Act
PEEP	Positive End-Expiratory Pressure
PPROM	Preterm Prelabour Rupture of Membranes
RE	Reflective Equilibrium
REC	Research Ethics Committee
RFM	Respiratory Functioning Monitor
SAIL	Sustained Aeration of Infant Lungs trial
SUPPORT	Surfactant, Positive Pressure, and Oxygenation Randomized Trial
USA	United States of America

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CURRICULUM VITAE

Maria Christiane (Marieke) den Boer was born on the 19th of September 1988 in Breda, the Netherlands. After completing secondary school at the Newman College in Breda in 2006, she started studying Medicine at the University of Leiden, the Netherlands. From 2010 until 2012 she worked as a volunteer at the Communauté de Taizé in France. Upon her return in the Netherlands, she continued studying Medicine with a research internship at the Department of Medical Ethics and Health Law of the Leiden University Medical Center. During this internship, her interest in ethics in neonatology started. She furthermore decided not to continue her studies in Medicine, but to attend the master program Spiritual Counseling at the University of Utrecht, the Netherlands. After completing this program, she spent six months working as a volunteer in Siem Reap, Cambodia.

In September 2016, Marieke started as a PhD candidate under supervision of prof. dr. A.B. te Pas (Department of Pediatrics, Leiden University Medical Center, the Netherlands), dr. M. Houtlosser (Department of Medical Ethics and Health Law, Leiden University Medical Center, the Netherlands), prof.dr.mr. D.P. Engberts (Department of Medical Ethics and Health Law, Leiden University Medical Center, the Netherlands), and later prof.dr. M.C. de Vries (Department of Medical Ethics and Health Law, Leiden University Medical Center, the Netherlands). She visited the Hospital of the University of Pennsylvania in Philadelphia, the United States of America, for two months in 2017 to conduct interviews with neonatal care providers working at the Neonatal Intensive Care Unit under supervision of E.E. Foglia, MD, MA, MSCE. Since October 2020, Marieke is working as a researcher at the Academic Collaborative Center 'Living with an Intellectual Disability' of Tranzo, the scientific center for care and wellbeing of the Tilburg School of Social and Behavioral Sciences of Tilburg University in Tilburg, the Netherlands.

Marieke married Sjoerd in 2017. In 2020 they welcomed their son Kai in their life.

ACKNOWLEDGEMENTS

As we tell stories about the lives of others, we learn how to imagine what another creature might feel in response to various events. At the same time, we identify with the other creature and learn something about ourselves.

Martha Nussbaum

In 2016 begon ik mijn promotietraject op de afdeling neonatologie van het LUMC als vreemde eend in de bijt. Op de vooravond van de verdediging van mijn proefschrift kijk echter terug op een mooie, intensieve periode waarin ik als onderdeel van een groot, hecht team onderzoek heb mogen doen en waarin ik ontzettend veel heb mogen leren en groeien. Dit had niet gekund zonder de hulp van vele betrokkenen. Mijn dank gaat uit naar hen allemaal! Een aantal van hen wil ik in het bijzonder bedanken.

Mijn dank gaat allereerst uit naar allen die mij hun verhalen toevertrouwden. Ik hoop dat ik met dit proefschrift recht doe aan jullie verhaal. In de eerste plaats wil ik graag alle ouders bedanken die mij deelgenoot maakten van een van de moeilijkste momenten in hun leven: dank voor jullie openheid en de tijd die jullie namen om mij te woord te staan, terwijl jullie op dat moment al zo veel aan jullie hoofd hadden.

To all neonatal care providers: thank you very much for sharing your experiences and perceptions.

Prof. dr. A.B. te Pas, beste Arjan. Al in ons eerste gesprek werd ik geraakt door jouw enorme drive om de neonatale opvang te willen verbeteren. Wat ben ik dankbaar voor het vertrouwen dat je in mij stelde en de kans die je me bood om samen met jou en je team midden in de praktijk onderzoek te doen. Het zal niet altijd gemakkelijk zijn geweest om mij te begeleiden, maar steeds opnieuw zette jij me in mijn kracht. Hierdoor kon ik mij op heel veel gebieden ontwikkelen en ontdekte ik mijn passie voor het doen van onderzoek. Bedankt voor alles de afgelopen jaren, ik had me geen betere mentor kunnen wensen!

Prof. dr. M.C. de Vries, beste Martine. Al heel vroeg in mijn promotietraject werd ik geïnspireerd door jouw visie op het lerend systeem, maar bovenal werd ik geïnspireerd door jouw *homo ludens*. Onderzoek doen is zo veel leuker, als je ook kunt spelen!

Dr. M. Houtlosser, lieve Mirjam. Had iedere promovendus maar een Mirjam! In de afgelopen jaren ben je zoveel meer geweest dan een begeleider. Dank voor al

je support en je geloof en vertrouwen in mij en mijn kunnen. Door jou weet ik als onderzoeker mijn mannetje te staan!

Prof. dr. mr. D.P. Engberts, beste Dick. Zonder jou was mijn PhD-traject er nooit geweest. Door jouw intellectuele input heb je richting gegeven aan ons onderzoek, dank daarvoor!

Zorgverleners van de NICU van het LUMC. Dank voor het vertrouwen dat jullie in mij stelden door mij coördinator van de audit te laten zijn. Maar bovenal dank voor jullie kwetsbaarheid, waardoor jullie niet alleen zorgden voor leerzame audits, maar mij ook weer lieten inzien wat een ontzettend mooi vak jullie hebben!

Collega's van de sectie Ethiek en Recht van de Gezondheidszorg. Dank voor de theoretische verdieping en bovenal voor alle gezelligheid. Ondanks mijn nogal wisselvallige aanwezigheid bij jullie op de afdeling heb ik mij nooit gast gevoeld, maar altijd onderdeel van het team!

Dear Liz, thanks for enabling to gain research experience in Philly. It's been an honor to be part of your research team! Dear DD, Aasma and Trix, thanks for welcoming me as your bonus roommate. Dear G and P, thanks for being my big brothers in the ghetto!

Co-authors, thank you for all valuable input and support!

Collega's van het Platform Kwalitatief Onderzoek. Met jullie hulp heb ik uit mogen groeien tot een echt kwalitatief onderzoeker. Dank voor alle samenwerking, uitwisseling, inspiratie en verdieping. Tom, Fia, Jaco, Mareline, Ria en Martine, keep up the good work!

Collega's van de AWVB. Wat ben ik blij dat ik samen met jullie verder mag gaan met leren en het vertellen van verhalen!

Lieve PhDummies, Arjan's Minions en zovele Roomies. Wat was het fijn om niet alleen samen met jullie onderzoek te doen, maar ook de hoogtepunten en dieptepunten te kunnen delen met heel veel taart en af en toe een gin-tonic. Corona heeft me nog meer doen beseffen hoe veel leuker je werk is, als je het samen kunt doen met zulke lieve, betrokken collega's. Sorry voor de 'intellectuele uitlaatgassen'!

Lieve Sophie C, dank voor alle support bij het maken van de infographic!

Lieve Tessa, er is zo veel om jou voor te bedanken, maar bovenal dank voor alle keren dat je me weer wist op te beuren!

Lieve Snorries, door jullie waren de afgelopen jaren nog snorriger!

Lieve Arend, goede vriend, personal GVer en tevens klaagmuur. Dank dat je me steeds hebt laten zien dat je dingen ook van een andere kant kunt bekijken!

Lieve paranimfen, jullie zijn van onschatbare waarde geweest tijdens mijn promotietraject en ik ben dan ook erg blij dankbaar dat jullie naast mij staan tijdens mijn verdediging. Lieve Emma, ongeveer tegelijkertijd zijn we begonnen aan ons promotietraject, waardoor we gelijke processen doorliepen en we ons aan elkaar op konden trekken. Wat was het fijn om dit samen te doen, om samen heerlijk te klagen, maar ook samen te vieren! En natuurlijk samen naar Toronto! Bedankt voor alle support, maar vooral voor alle gezelligheid! Lieve Hilda, mijn kwalitatief-onderzoek-maatje, samen gingen we het PKO-avontuur aan. Ik bewonder je om je enorme passie en gedrevenheid, waarbij je altijd tijd en aandacht voor de ander hebt. Bedankt dat je een voorbeeld voor mij bent!

Lieve vrienden, ik heb jullie de afgelopen jaren nogal verwaarloosd, en toch waren jullie er altijd voor mij. Dank voor jullie onvoorwaardelijke vriendschap!

Lieve Albert en Marianne, wat ben ik blij met jullie als extra ouders. Bedankt dat jullie mijn ouders gelukkig maken! Lieve Corrie en Wim, altijd geïnteresseerd en betrokken en nooit te beroerd om weer eens een keer op te passen, dank daarvoor! Lieve broers en zussen, heel, half, stief en schoon, wat is het fijn om onderdeel uit te maken van zo'n groot gezin!

Lieve papa, door jouw voorbeeld had ik de moed om van het gebaande geneeskundepad af te wijken. Lieve Joost, peetvader en -moeder tegelijk, door jouw voorbeeld wist ik vervolgens welke weg ik in moest slaan, en door jou kon ik deze weg ook vervolgen. Lieve mama, hopelijk word ik net zo'n moeder als jij; zonder al jouw hulp had ik nooit zo ver kunnen komen! Aan jullie draag ik dit proefschrift op.

Lieve Sjoerd, "Loving life is easy when you are abroad"[5], maar door jou kan ik het nu ook thuis. Lieve Kai, jij vult ons thuis met nog meer liefde en geluk. Jullie zijn mijn alles, mijn lommeltjes!

[5] Hannah Arendt. In: Rahel Varnhagen: The Life of a Jewess.