Evaluating perinatal outcomes in different levels of care
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Introduction
Chapter 1

General introduction

Even with modern obstetrical practice the risk of a baby dying on the day of birth is greater than the average daily risk of death until the 92nd year of life. Consequently, perinatal mortality is an important and recurrently discussed subject in the medical literature. Health care systems are often debated, as the characteristics of the system can potentially influence perinatal outcome. The Dutch obstetric system is characterized by a formal distinction between community midwife-led and obstetrician-led care. Community midwives are independent certified health care professionals working in solo or group practices. If there are no risk factors (based on national guidelines) pregnant women are usually in midwife-led care, although they can opt for obstetrician-led care. Referral from midwife-led care to obstetrician-led care will follow when complications or risk factors occur at any moment during pregnancy, labour, or postpartum. Women starting labour in midwife-led care may opt for a home birth or short stay hospital birth. Around half of all term women start labour in midwife-led care. In 2015 approximately 87% of all women were in midwife-led care at the start of their pregnancy, and an overall 29% eventually give birth in midwife-led care (13% home births, 13% midwife-led hospital births and 2% birth centre births). Rates of referral to obstetrician-led care during or shortly after delivery were 43% and 2%, respectively. Intrapartum referral rates are highest for nulliparous women with an intended community midwife-led hospital birth with reported referral rates up to 70% compared to 59% for nulliparous women with an intended home birth, although large variation in referral rates exists among midwife practices.

The Dutch obstetric system is unique in the world, and therefore easily criticized. The results of the first EURO-PERISTAT study in 2003, which reported that The Netherlands had the highest perinatal mortality rate out of 15 European countries, had a great impact in the Netherlands. National initiatives were started, aiming to understand and most of all improve these data. There was an overall decline in perinatal mortality in the following PERISTAT-II and-III reports (regarding 2004 and 2010), which hardly had any effect on the ranking in 2004 but somewhat improved the position of the Netherlands to the midsection of 27 PERISTAT countries in 2010. Despite of all criticism there was no evidence for an association between the Dutch system and the relatively high perinatal mortality in the Netherlands. Nationwide studies in the Netherlands indicated no difference in perinatal
mortality among low risk women who started labour in midwife-led care at home versus midwife-led care in hospital, with lower intervention rates in the intended home birth group.\textsuperscript{13-15}

On an international level, advocates of midwife-led models of care received increasing support based on literature findings such as the 2013 (updated 2016) Cochrane review showing that women who received midwife-led continuity models of care were less likely to experience interventions and more likely to be satisfied with their care with at least comparable adverse outcomes for women and their infants as women who received other models of care.\textsuperscript{16-19} However, there were many different variations of midwife-led continuity models and the population (low risk or also high risk) to which it was applied. Therefore, it is important to view perinatal outcomes within the context of its system when comparing different levels of care at birth.

A study that refuelled the safety issues regarding the typical Dutch obstetric system was that of Evers \textit{et al} in 2010. Evers reported higher birth related perinatal mortality rates in term women who started labour in midwife-led versus obstetrician-led care in the Utrecht region of The Netherlands, with an incidence of 1.4‰ versus 0.60‰ respectively (unadjusted relative risk 2.3; 95% confidence interval 1.1–4.8).\textsuperscript{20} It was an unexpected finding, as the obstetrician-led care group consisted of women with predominantly high risk pregnancies. This motivated us to further investigate perinatal mortality but also intervention rates in community midwife-led versus obstetrician-led care, within the context of the Dutch system, while taking into account the methodological concerns of the Utrecht study.\textsuperscript{21} Evaluating these groups by start of labour is challenging, mostly due to the differences in patient characteristics in primary and secondary care. We aimed at a joint participation of gynaecologists and community midwives in study design, execution and analysis.

The second part of the thesis focuses on the importance of an ongoing quality cycle of clinical research, guideline development, implementation, and evaluation. How should we organize a continuum of scientific progress and apply knowledge in clinical practice for the benefit of our patients?
Chapter 1

The aim of the thesis

Part 1: To study term intrapartum- and neonatal mortality within different levels of care in the Netherlands by

1) comparing perinatal mortality rates, as well as intervention rates for women starting labour in midwife- versus obstetrician-led care in the Netherlands, 2) gaining insight into the pathways leading to perinatal mortality for each individual case and identifying risk factors to be targeted for improvement strategies, 3) evaluating cost-effectiveness for low-risk women who started labour in midwife-led versus obstetrician-led care, and 4) determining whether the frequently used outcome measure NICU admittance is a valid surrogate for neonatal morbidity when comparing perinatal outcomes in different lines of care

Part 2: To explain the importance of translating clinical research into guidelines and vice versa in an ongoing healthcare quality cycle, and present an example of such a guideline.

Outline of the thesis

Part 1: Intrapartum and neonatal mortality by level of care

Chapter 2 is a retrospective cohort study comparing the perinatal mortality risk and intervention risk between women who started labour in community midwife-led care versus obstetrician-led care in the Amsterdam region of the Netherlands, regardless of risk status, in order to be able to compare data to the study of Evers et al from the Utrecht region of the Netherlands.

Chapter 3 focuses on creating a more comparable population within the midwife-led and obstetrician-led care groups, by selecting only low risk pregnancies in a propensity score matched design, while reporting on outcomes of perinatal mortality and intervention risk.

Chapter 4 concentrates on providing the context of our quantitative results by describing the pathways of all individual perinatal deaths with classification of recurrent themes that might benefit most from improvement strategies. Furthermore, we statistically compare the
patient- and birth characteristics of women whose pregnancy ended in perinatal mortality to those ending in the birth of a neonate with a good start (5 minute Apgar score >7).

Chapter 5 studies the cost effectiveness of midwife- versus obstetrician led care in low risk pregnancies, measured from the onset of labour of the current pregnancy up to the postnatal period of a possible subsequent pregnancy.

Chapter 6 further evaluates the results from chapter 3 by addressing the same research question in a larger nationwide cohort, with use of more recent data (2010-2012) which were collected from the national cohort of the Perinatal Audit Netherlands (PAN).

Chapter 7 explores the validity of using the variable “NICU admission” as a surrogate outcome measure for neonatal morbidity, when comparing different levels of care. With perinatal mortality being only the tip of the iceberg, it would be interesting to report on perinatal morbidity. NICU admission is a frequently used outcome measure, but is the severity of morbidity comparable for neonates admitted from different levels of care?

Part 2: Guideline development in obstetrics

Chapter 8 elaborates on the importance of an ongoing quality cycle of clinical research, guideline development, and implementation and evaluation of health care within one system, and provides background information and recommendations on how to do so.

Chapter 9 presents the introduction of the guideline for the policy regarding extreme premature birth in The Netherlands. The development of this guideline was initiated by the Dutch Ministry of Public health, Welfare and Sport (VWS) in consequence of the PERISTAT results with the aim to reduce the variation in management of care for extremely premature born children and to gain insight in the prognosis of these children as a basis for improvement.

In Chapter 10, the general discussion and implications for future research will be discussed
References


