Perinatal Mortality of Planned Out-of-Hospital Births Transferred to an Oregon Hospital

Doctor of Nurse Practice Clinical Inquiry Report

Lani Doser

Oregon Health & Science University School of Nursing

OREGON HEALTH & SCIENCE UNIVERSITY

SCHOOL OF NURSING

Ashland Klamath Falls La Grande Portland

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Student Name: Lani Doser

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APPROVED: yes!

Committee Chair: Cheryl Wright, FNP, PhD (name and credentials) Signature:

Committee Member: Stella Dantas, MD, FACOG OB/Gyn Physician (name and credentials) Signature:

Committee Member: N/A (name and credentials) Signature:

Christine A. Tanner, R.N., Ph.D, FAAN, Interim Dean, School of Nursing Signature:

Date: 5/23/2012

Submit completed original form to the Graduate Program office.

Perinatal Mortality of Planned Out-of-Hospital Births Transferred to an Oregon Hospital

Section 1: The Clinical Problem

Description and Significance

According to Oregon Health Authority (n.d), Vital Statistics reported 49,492 infants were born in Oregon in 2008. MacDorman, Menacker, and Declercq (2010) estimate that 1 percent of Oregonians intend to have an out-of-hospital (OoH) birth; however, a more accurate count may be at least 2 times higher (Cheyney, Everson, & Shames; n.d.). With a new data collection tool in 2008, Oregon Vital Statistics found 1,243 deliveries were *planned* home or birth center births. These numbers did not account for home births completed in the hospital. Yet, the count provided a gross estimate that 2.5 percent of Oregon women planned to birth outside of the hospital setting (Crombie, 2011; Oregon Vital Statistics, 2008b, Table 2-27, p. 2) (Appendix A).

Population and epidemiology. Hospitals are required to collect and release data on the safety of births at their facilities (Oregon Vital Statistics, 2008a, 2008b). Since 1993 when Oregon OoH birth became a covered cost by Medicaid, a law was passed to begin data collection on the fetal-maternal outcomes of licensed and unlicensed birth attendants (Oregon Regulatory Statute (ORS) 687.495, 1993). This law has not been enforced. From 1993 to 2011, the safety of Oregon OoH birth cannot be established and the outcomes of approximately 18,000 infants and 18,000 mothers are missing (M. Cheyney, board of direct-entry midwifery (BDEM) chair, public testimony, April 6, 2009; Cheyney & Everson, 2011, Appendix B; Randy Everitt, Director of Oregon Health Licensing Agency (OHLA), personal communication; July 25, 2011).

Prior to 2012 there was scant systematic data collected at the state or national level in the United States to describe the morbidity and mortality outcomes of hospital transfers from a home birth or birth center during labor or in the immediate postpartum period. Moreover, there are few

North American studies that have specifically analyzed the perinatal morbidity and mortality of fetal or neonatal transfers after an intended OoH birth.

Background. A significant knowledge gap existed relevant to the safety of planned OoH births for high-risk pregnancies (M. Cheyney, BDEM chair, public testimony, April 6, 2009; Bastian, Keirse, & Lancaster, 1998; de Jonge et al., 2009; Hutton, Reitsma, & Kaufman, 2009; Janssen et al., 2009; Mehl-Madrona & Madrona, 1997). Thus, the Oregon BDEM and their authorizing organization, the Oregon Health Licensing Agency (OHLA), expanded the midwifery scope of practice to include what has been identified as high-risk conditions in Dutch practice standards (Amelink-Verburg & Buitendijk, 2010). These risk include multiple gestation (twins), breech presentation (excluding footling), vaginal birth after up to three cesarean sections, rupture of membrane greater than 24 hours, and post-dates pregnancies (gestations up to 43 weeks) (OAR 332-025-0021, 2002). It is worrisome that Oregon is not capturing all maternal-fetal outcomes, and even more concerning, that the state enables high-risk practice despite the lack of an evidence-based safety record. Further concerns include financial ones. For instance, Oregon taxpayers pay for licensed home birth attendants whose practice may concurrently increase costs by elevating the number of preventable morbidity, mortality, and subsequent neonatal intensive care unit (NICU) admissions.

Significance to the Doctoral Advanced Practice Nurse. The Doctor of Nurse Practice (DNP) must develop research skills that realistically answer important, clinically based questions of care with relative speed, which will allow evidence-based knowledge to rapidly translate into practice. As a family nurse practitioner who will be treating patients who want to discuss the benefits, risks, and alternatives for all birthing options, including OoH births reimbursed by state Medicaid, I realized more data was needed to provide accurate information to clinicians and

consumers.

Desired outcomes. Long-term and individual goals of this study were to:

1. Improve state data to collect accurate information on morbidity and mortality outcomes for all Oregon mothers and infants, including those using alternative birthing locations.
2. Work with the state of Oregon to implement evidence-based risk selection criteria for OoH births.

Purpose statement. The purpose of this study was to describe the maternal and neonatal characteristics of planned OoH births transferred to a tertiary care facility in Portland, Oregon. Information was collected on this low visibility sample whose outcomes were unknown.

Clinical inquiry questions.

1. Of the sample perinatal deaths, how many were considered high-risk (including, but not limited to, breech presentation, twin gestation, gestational age > 42 weeks, and/or ruptured membranes greater than 24 hours prior to transfer)?
2. From the sample, what was the incidence of fetal/infant death (28 weeks gestation to 28 weeks of life) admitted or observed within 24 hours of birth to an Oregon tertiary labor and delivery unit (LDU) or quaternary NICU?

Synthesis of Evidence

Review of the literature. There is currently sound evidence that demonstrates the safety of low-risk home childbirth in developed countries that offer government provided healthcare. In Canada, the United Kingdom, and the Netherlands, home birth midwifery care is well-established with a clearly defined scope of practice and standards of care (Birthplace in England Collaborative Group, 2011; de Jonge et al., 2009; Hutton, et al., 2009; Janssen et al., 2009; van

der Kooy et al., 2011). These countries have existing protocols that exclude high-risk conditions such as, but not limited to, twins, malpositioned fetus (including all breech types), prolonged ruptured membranes, prolonged labor, presence of meconium, and post-dates pregnancies.

In the largest study of its kind, de Jonge et al. (2009) retrospectively examined 529,688 low-risk women from the Netherland's perinatal birth registry. They compared infant morbidity and mortality rates of midwifery home births to midwifery hospital births from 2000-2006. No significant differences were found between the two groups. In United States (US) studies, similar outcomes were found when the birth attendants were well-trained (meaning certified post-secondary education of 3 to 4 years or graduate education) and women adequately assigned based on risk (Anderson & Murphy, 1995; Devitt, 1977; Durand, 1992; Johnson & Daviss, 2005; Rooks, Weatherby, & Ernst, 1992). Rooks, Weatherby, and Murphy (1992) performed the largest prospective U.S. study on the safety of birth centers with 11,814 OoH births. This study included licensed direct-entry midwives (LDMs) and certified nurse midwives (CNMs). The overall perinatal mortality rate was low, 1.3 per 1,000 births, which suggests that OoH birth attendants could provide safe alternative birth care for healthy, low-risk women. Another large prospective study from the United Kingdom looked at 64,538 women based on planned place of birth for low-risk pregnancies and found that women who delivered at home with singleton, vertex babies at term gestation had no significant difference in morbidity and mortality outcomes (Birthplace in England Collaborative Group, 2011).

In contrast are studies on higher-risk home birth outcomes (Bastian et al., 1998; Kennare, Keirse, Tucker, & Chan, 2009; Mehl-Madrona & Madrona, 1997). Mehl-Madrona and Madrona (1997) retrospectively analyzed over 1,000 births by home birth midwives compared to 1,000 OoH births with physicians in California and Wisconsin. The authors used a preexisting,

voluntary home birth registry database. The comparison of family practice physician-attended home birth outcomes to apprentice-trained midwives revealed a 3.1 odds ratio for infant death in those births attended by a midwife. When adjusted for high-risk conditions, such as twins, breech, and post-dates, the outcomes were not statistically different.

A second study by Bastian, Keirse, and Lancaster (1998) supported Mehl-Madrona and Madrona's (1997) findings. Bastian and colleagues studied 50 perinatal fetal/neonatal deaths that occurred among 7,002 planned home births in Australia. The authors found, in those infants born at home without congenital malformation or extreme immaturity, a relative risk ratio of 2.7 for a fetal intrapartum death. They attributed the elevated death rate to the inclusion of higher risk pregnancies or intrapartum situations that included fetal malposition, presence of meconium, post-dates pregnancies, or twin gestations. In a subsequent retrospective South Australian study from 1991-2006, Kennare et al. (2009) found that the difference in mortality outcomes of 1,141 planned home births could have improved "substantially" if there had been better *risk* assessments, timely transfers, and closer fetal surveillance.

One other study specifically examined low-risk midwifery care to high-risk obstetric care. Evers et al, (2009) performed a prospective, two-year (2007-2008) cohort study of the Netherlands's two-tiered system of maternal-fetal risk assessment that examined the birthing system rather than home births. Of the over 18,000 low risk mothers in the sample, 22% had home births. The outcomes of low-risk mothers attended by midwives were compared to high-risk mothers attended by obstetricians. They found a 3.7 higher ratio of perinatal mortality for low-risk, midwife-attended women than high-risk, physician-attended births (Evers et al., 2009). These findings were specific to term fetuses. The authors did not conjecture on the causes for the different rates but identified that further study was needed.

Additional international and national studies have been published citing concerns over the perinatal mortality rate of planned OoH birth, but issues such as methodology (Wax, Pinette, Cartin, & Blackstone, 2009), case matching (Symon, Winter, Inkster, & Donnan, 2009), and estimations made without sufficient data (Mori, Dougherty, & Whittle, 2008) have called the results into question (Gyte & Dodwell, 2009). However, one relevant study (Symon et al., 2009) showed increased perinatal mortality for high-risk deliveries of breech presentations and twins. Although the research has led to some disagreement, researchers concurred that the United Kingdom needed more perinatal mortality studies (Birthplace in England Collaborative Group, 2011; Gyte, Sandall, & Macfarlane, 2009).

The perinatal/neonatal mortality rates for home birth. In two older North American studies of both certified professional midwives (a certification for direct-entry midwives) (Johnson & Daviss, 2005) and CNMs (Murphy & Fullerton, 1998), the combined intrapartum and neonatal death rates including hospital transfers were 2 per 1,000 and 1.5 per 1,000 live births, respectively. Comparatively, the combined neonatal death rates are significantly lower among international home birth studies that reported 0.35 to 1.0 per 1,000 in Canada (Janssen et al., 2009; Hutton et al., 2009) and 0.46 to 1.4 per 1,000 in the Netherlands (deJonge et al., 2009; Evers et al., 2010). In Oregon, Melissa Cheyney, the 2011 BDEM chair, stated (in an unpublished report) the licensed home birth midwives have an accepted, but undocumented, perinatal mortality rate of 2 per 1,000 (Cheyney & Everson, 2011, Appendix B).

Local literature. In 2005, five nurse-midwifery students at the same tertiary referral center undertook a similar project. This unpublished, collective master's thesis examined planned OoH births transferred to a hospital, and described the outcomes. The students used a written maternal birth log transcribed by admitting personnel to identify home births for the

years 1999-2004. From this log, they were able to identify 68 maternal cases. The authors stated only two of their identified cases met the definition of high-risk, one case of ruptured membranes for 6 days and one case of an attempted vaginal delivery after a classical incision cesarean birth. Unfortunately, the authors did not define "high-risk," and there were no cases of mortality found for infants or mothers. Additionally, the methods used to identify planned OoH transfers and outcomes raise concerns about the validity of their findings. Not all transfers to labor and delivery may have been captured, and neonatal admissions to NICU were not addressed (Schaefer, Albiez, Ramirez, Lawson, & Hinz, 2005).

Credibility of findings. Bastian et al. (1998), Kennare et al. (2009), and de Jonge et al. (2009) used perinatal databases. This information was collected through voluntary registries, but inclusion of the primary populations was thorough. Mehl-Madrona and her colleagues (1997) explored higher risk perinatal outcomes in the United States and their effects on fetal/neonatal mortality. They also used a much smaller voluntary database. One would expect with the smaller size that bias would be in favor of the midwives (voluntary sharing of only good outcomes); however, this was not the case. Remarkably, the Kennare et al. (2009) study calculated an even higher intrapartum fetal mortality rate while two of the studies examining higher risk outcomes (though in different countries and with different data sets) concluded with similar odds risk or relative ratios for fetal mortality (Bastian et al., 1998; Mehl-Madrona & Madrona, 1997).

Clinical significance of findings. The Netherlands (de Jonge et al., 2009; van der Kooy et al., 2011) and Canadian studies (Hutton, et al., 2009; Janssen et al., 2009) demonstrated that low-risk home birth with clear parameters for risk assessment is as safe as hospital birth. The U.S. (Mehl-Madrona & Madrona, 1997) and Australian (Bastian et al., 1998; Kennare et al., 2009) data suggest that higher risk home childbirth results in increased perinatal mortality.

Evidence gaps in practice or policy. These studies were particularly relevant to Oregon where higher risk OoH childbirth is legal (Oregon Administrative Rules (OAR), 332-015-030, 2011) and occurs without evidence to support this practice. With the push to practice evidence-based medicine (Ellwood, 2003; Oregon Health Authority, 2010, p. 47), Oregon public health policy needs to be reexamined with a goal to integrate evidence from national and international studies. The extant literature suggests that legal changes may be necessary to implement and enforce stricter inclusion/exclusion criteria for planned OoH births, and require a more transparent informed consent using current Oregon outcome data.

Oregon impact. In 2008, Oregon vital statistics began collecting additional information due to a change in the birth certificate. However, the results are skewed, because the variable did not collect for planned OoH births that transferred to a hospital (Jennifer Woodward, Oregon Vital Records Manager, personal communication; May 27, 2011) (Appendix B). This inquiry project led to health policy changes by highlighting the need for more accountable vital statistic data collection for all births – traditional and nontraditional, transferred and not transferred.

Unlike most states, Oregon has five types of non-physician OoH birth attendants who can legally deliver a baby: LDMs (usually have 3 years of post-secondary education), CNMs (4 years of undergraduate and 2 to 4 years graduate education), naturopathic physicians (ND) (4 years of undergraduate and 4 years graduate education), doctor of chiropractic (DC) (4 years of undergraduate and 4 years graduate education), and non-licensed birth attendants (NLBA) (no educational requirements). According to the 2008 vital statistics (Oregon Vital Records, 2008, vol. 1, table 2-27), only 7 percent of the successful OoH births (planned and unplanned) were attended by medical physicians (MDs or DOs), licensed medical persons, or CNMs. Twelve

percent were attended by NDs. The largest portion of deliveries, 67 percent, was attended by LDMs or NLBAs.

Oregon Board of Direct Entry Midwifery. The Oregon BDEM minutes provided a unique insight into the state's home birth policy, policy development, and history of home birth practice. Close reading of it yielded evidence of missing data or confusing information. For example, tables were submitted by the overseeing agency, now known as OHLA, citing 25 LDM fetal deaths for 2002 without providing a total number of LDM births attended (BDEM, Mar 2005). Consequently, an overall fetal death rate for that year could not be calculated. A year later (BDEM, September 2006), totals were presented for 2002 and 2003 that reported LDM term fetal mortality rates of 1 and 6.25 percent. This mortality rate was approximately 2 to 14 times *higher* than the rates listed for all other Oregon medical professionals including CNMs, MDs, and DOs (BDEM, Sep 2006, p. 87) (Appendix C).

In 2009, a request was made to the BDEM for Oregon OoH mortality statistics (BDEM, April 2009). BDEM current chair, Melissa Cheyney, stated that the OHLA mortality calculations were problematic (M. Cheyney, public testimony, April 6, 2009). An example given of a failed attempt to accurately collect data was a survey from OHLA that erroneously calculated more than double the home births that were actually attended for a six-year period (2002 –2007). Duplicate data sheets had been submitted from multiple birth attendants at the same birth. Miscalculations such as these were not caught until after tallying and review.

Due to an inability to gather information, the burden of data collection was removed in June 2011 from the home birth midwives' licensing agency, OHLA, and transferred to Oregon Vital Statistics (ORS 687.495, 2012). Another change to the birth certificate will now allow cases of intended OoH births that transfer to the hospital to be captured. Collection of this data

set began January 2012 (Appendix I). Unfortunately, this new system has a current turnaround time of 3-5 years before being released to the public (Randy Everitt, Director of OHLA, personal communication; July 25, 2011). However, Ms. Cheyney believes the information release will be quicker and perhaps available within 1 year (personal communication to Dr. Stella Dantas, December 10, 2011).

Evidence table. A literature search was conducted in MEDLINE (Ovid) databases with key words that included home birth, planned, high-risk, home + childbirth, outcomes, safety, risk assessment, transfer criteria, screening, and policy. The search dates were from 1948 to January 2012, and included published studies in which full text was available in English. (Appendix D.)

Summary. OoH birth outcome data is critical to understand the risk and benefit ratio for a common occurrence, birth. Without numbers, stakeholders cannot make evidenced-based informed decisions. Without state morbidity and mortality rates, licensed and unlicensed midwives cannot provide expectant mothers with the necessary information to give or receive true informed consent for planned OoH birth. Clinically, barriers exist between licensed medical staff and alternative birth attendants when outcomes are unclear. On a macro level, it is difficult for the BDEM or Oregon legislators to make decisions on scope of practice or standards of care without data. Case in point, allowing high-risk home deliveries that are not evidenced-based. Accurate and careful data collection and statistical analysis are greatly needed to increase transparency (IOM, 2001). Currently, Oregon analysis only includes successful OoH births, which excludes those women who transferred to the hospital when complications arose. Thus, the calculated benefits are inflated, and the apparent risks of out-of-hospital birth are decreased.

Section II: Methods

Clinical Inquiry Design

After receiving Institutional Review Board (IRB) approval, the first phase of the study was spent on development of the data extraction tool. The second phase was data abstraction, which occurred September 1, 2009, to August 31, 2011. The last phase was data analysis (August 2011 to March 2012) and dissemination (April 2012 to June 2012).

This project was retrospective, and electronic health records were accessed for a descriptive five-year study (2004-2008). The time period provided a robust sample size, and the years were selected to avoid reabstracting charts from the other unpublished OoH maternal transfer study (Schaefer et al., 2005). In 2009, only two tertiary care hospitals with quaternary NICUs existed in Oregon. Both were identified as potential facility participants. It was assumed these institutions, being the highest level of care, would receive the most OoH birth transfers. Between the two hospitals, one granted records access and had nurse researchers willing to abstract data. Although the second facility expressed interest, they could not provide researchers. Thus, one institution was chosen.

After identification of the facility, a collection tool (Appendix E) was created to abstract maternal and infant data. Contributors to the tool development included the nurse researchers, LDU/NICU nurses, perinatologists, obstetricians, and a neonatologist. Because cases could include both mother and neonate, specific forms for either were designed. The data abstraction tool was based on an unpublished National Institute of Child Health and Human Development (NICHD) observational study, currently in progress, to measure quality obstetric care (NICHD & MFMU Network, n.d.). The instrument was created because national and international quality measurement tools in obstetrics do not currently exist (Mann et al., 2006; Walker, Strandjord, &

Benedetti, 2011; Wagner et al., 2011). Data were collected and analyzed by nurse researchers to answer the two inquiry questions presented. The study used frequency analyses and descriptive statistics to discuss mortality among the sample cases.

Setting

The study hospital had approximately 2,600 births per year. Roughly 40 maternal admissions per annum resulted from planned home or birth center delivery. It was anticipated that 200-400 maternal and/or infant charts would be abstracted. Contact was made to all 12 tri-county hospitals in the Portland metropolitan area to gather the estimated total number of transferred, planned OoH births tabulated during the study years. This information was used as comparators and evaluated statistically in order to estimate the number of transfers the study facility represented.

Sample

All planned OoH births culminating in antepartum or intrapartum hospitalization were included if they resulted in delivery at the institution. Postpartum and neonatal hospital admissions or NICU observations were included if they occurred less than or equal to 24 hours after delivery. If there was any indication within either chart that this was an unplanned OoH delivery, the case was excluded. It is well known through replicated studies that unplanned OoH deliveries have poor outcomes (Declercq et al., 2010; MacDorman & Kirmeyer, 2009; Rhodie et al., 2002; Tew, 1990). As such, care was taken to identify only those women who desired home or birth center birth.

While electronic records were available for all admissions, the prenatal and labor records from home birth attendants were sometimes difficult to locate within the electronic record. This could occur if the midwife did not bring the complete chart (e.g., brought a 2 page summary

sheet of data) or in a few cases, a file was submitted to staff but was not scanned into the hospital medical record. Due to these missing chart components, sample totals ranged for each variable.

Description of Health Policy Being Evaluated

The study included understanding Oregon legislative policy on OoH births, the risk conditions that are legal for OoH births, the birth attendants who are authorized to practice, and the reimbursement policy allowed by Oregon Medicaid. This research project provides key stakeholders with perinatal mortality data and shows the critical need for ongoing study.

Data Instrument Measures

Two nurse researchers with obstetrical experience abstracted all cases. A neonatologist was consulted at intervals to review newborn data. Interrater reliability and data rigor were addressed through reabstraction. Seven percent of the charts of each year were reabstracted with averaged reliability of 94 percent agreement in all fields.

Data Collection Procedures

Charts were identified through review of admit logs. If the admit note stated “transport,” “transfer,” “home birth,” “midwife,” “birth center,” “home childbirth,” “water birth,” “home water birth,” or name of a home birth midwife or birth center, the chart was examined. In addition, electronic health records were queried for the key words listed above for the study years. LDU nurse researchers, with the aid of a neonatologist to assist in chart familiarity, terms, and flow, used the same methods above to identify neonatal charts.

When intended OoH cases were found, the researcher abstracted all records related to the maternal labor and delivery course including the neonate’s hospital course. Paper data forms were completed (Appendix E) for all identified cases. All recorded data had codes so that identifying information was not recorded onto data sheets. A log of codes and patient medical

record numbers were stored in a locked cabinet. Coded data without personal health information was entered into a Microsoft Access™ 2007 database. This information was imported into Microsoft Excel 2007 ™ for data analysis.

Analytic Methods

Perinatal mortality. Perinatal mortality was defined as fetal death between the 28 weeks gestation to 28 days of life. The perinatal mortality incidence was calculated as total fetal deaths divided by total live births plus fetal deaths (MacDorman & Kirmeyer, 2009).

Comparators. Some study comparators were found. The proportion comparisons were assessed with two-tailed *z* test procedures (Wang, 1996). The probability value for statistical significance was set at $p < 0.05$.

***Calculating planned out-of-hospital births*.** For the years of the study (2004-2008) Oregon's Department of Human Services (DHS) vital statistics included the number of total births and OoH births by county (Oregon Vital Statistics Annual Reports, 2004, 2005, 2006, 2007, 2008). OoH birth totals for 2004-2007 included both planned and unplanned births. Beginning in 2008, DHS reported additional birth information to include the facility and whether a successful OoH birth was planned or unplanned (Oregon Vital Statistics, 2008a, 2008b). Because unplanned OoH births are random events, the 2008 rate for the state is the maximum likelihood estimator for prior years' rates. The rate of unplanned OoH births observed in the 2008 data was therefore used to predict the unplanned OoH births in previous years (2004-2007) to arrive at the number of planned OoH births reduced by any planned OoH births occurring in a hospital managed birth center, n = 5,024.5 (Ostle, & Malone, 1988). (Appendix A.).

***Transferred versus untransferred, planned OoH births*.** Although a total was derived for planned out-of-hospital births, the number of births that were planned OoH but transferred to a

medical facility were not accounted. To estimate this number, two methods were used. First, only two hospitals in the state offered tertiary maternity care and quaternary NICU care with heart and lung bypass machines and the ability to repair cardiac defects. Therefore, it was assumed that these hospitals would receive the vast majority of transfers. Both medical centers operated within Multnomah county, and the study facility accounted for 61.1% of 2008 live births between them (Oregon Vital Statistics Annual Report, 2008) (Appendix F.). Although other NICUs existed in the region, they lacked the highest level of care.

As discussed above, an informal survey was conducted at all other hospitals in the Portland area. LDU and NICU nurse managers reported the total number of planned OoH births that came to their facility during the study years. Since these hospitals represented alternative transfer sites from the tri-county metro region, the results were used to calculate the proportion of regional OoH births transferred to the study facility. The other area hospitals accounted for approximately 40% of the total OoH birth transfers. Using this percentage conservatively, a transfer rate of 60% was assumed for the study hospital with 40% of transfers occurring at another facility. (Appendix F). This assumption allowed a calculation of the estimated planned OoH birth population for 2004-2008 (Morrison & Schmittlein, 1981), or

$$N = 5{,}024.5 + \frac{births\ transferred\ to\ study\ hospital}{0.60}.$$

Protection of human subjects/ethics

Retrospective analysis did not present any physical or psychological harm to the mother or neonates. The risk of breach of identity was addressed through confidentiality training of the chart abstractors and de-identifying data. In addition, codes linking de-identified data to personal health information were stored with the hard copies in a locked file cabinet within a locked office. Extreme care was used in reporting so that outcomes would be difficult to link to individuals.

Plan of Dissemination

The results of this study will be shared with stakeholder hospitals that expressed interest in the study. Beyond that, notification will also occur to all persons that originally met with the researchers (including some Oregon licensed and unlicensed midwives, nurse midwives, labor and delivery nurses, obstetricians, the BDEM, OHLA, Oregon Vital Statistics, Governor Kitzhaber's Health Policy Analyst, and the House Healthcare Co-Chair Honorable Mitch Greenlick). Additionally, dissemination includes a published poster by the researchers on May 8, 2012 at the 60th annual American College of Obstetricians and Gynecologists in San Diego, California (Doser, Snyder, & Dantas, 2011), OHSU Research Week conference in Portland, Oregon, and manuscript preparation for an obstetric-oriented medical journal.

Timeline for project

This project progressed as outlined in Table 1, below.

Table 1

Inquiry Project Timeline

Months 1-6
• Initiated CIP and study proposal • Requested IRB approval 3/5/2009, approval received 5/4/2009 • Applied for Sigma Theta Tau grant 3/15/2009 • Met with stakeholders (LDMs, BDEM) regarding data collection 4/2009 – 8/2009 • Created data form 6/2009 - 9/2009 • Received statistical advice from Principal Investigator Teresa Goodell.

Months 6 – 24
• Recruited & trained data abstractors 9/1/2009 – 12/31/2009 • Collected data 9/1/2009 – 8/15/2011 • Met with Oregon Health & Science University (OHSU) statistician Scott Mist for further guidance 7/25/2011 • Identified prospective journals or conferences for dissemination 9/1/2009 – 8/21/2011 • Continued to meet with stakeholders regarding shaping of data collection policy 9/2009 – 9/2011
Months 25-26
• Created DNP Committee 9/1/2011 • Data analyzed 9/1/2011 – 1/31/2012 • Met with statistician Randall Doser for further guidance 9/1/2011 – 1/31/2012 • Statistically determined an OoH live birth + perinatal mortality denominator 9/1/2011-1/31/2012
Months 27-34
• Completed CIP proposal 12/2/2011. • Drafted results 1/1/2012 – 3/14/2012 • Final results manuscript 4/30/2012 • Dissemination of results 5/1/2011 – 6/1/2012 o Submit a draft publication to a medical journal by 6/2012 with the other researchers o Attend ACOG conference as a poster presenter May 6-9, 2012 • Present to other DNP students and CIP committee on 5/23 – 5/24/2012

Section III: Results

Sample

Demographics. Over a 5-year period (2004-2008), 223 maternal-infant pairs, including 6 twin gestations, were identified as having a planned home or birth center birth. The overall

findings of 223 cases gave a potential total of 452 individual mothers and babies. After removing those without data (n=41) and babies with prenatally diagnosed congenital anomaly (n=5), 406 individuals remained. The 406 individuals included 197 mothers and 209 babies. The total sample of 406 mothers or babies transferred in the antepartum (20), intrapartum (141), or postpartum/neonatal (44) period (Table 2). These cases were limited to admission within 24 hours of delivery to meet the study protocols. The estimated Oregon population of planned and transferred planned OoH births during the study years 2004-2008 was 5,396, or

$$N = 5{,}024.5\ planned\ OoH\ births + \frac{223\ transferred\ births}{0.60} \approx 5{,}396.$$

Table 2

Timing and Gestation of Transfers Among All OoH Births to Facility.

Total (n=223)	Gestational age at transfer and delivery n (%)		
Time of transfer	Preterm	Term	Total
Antepartum	11 (61)	20 (10)	31 (14)
Intrapartum	6* (33)	141† (69)	147 (66)
Postpartum			
Maternal only		12 (6)	12 (5)
Neonatal only		26* (13)	26 (12)
Maternal & neonate	1(6)	6† (3)	7 (3)
Total	18 (100)	205 (100)	223 (100)

*Includes 2 twin pregnancies

†Includes 1 twin pregnancy

Of the 223 women with known ages, the range was 18-45, with a mean age of 30 and a standard deviation of 5. The women were mostly white (91%), not Hispanic, government or privately insured (96%), nulliparous (71%) and either married or partnered (96%) (Table 3).

Table 3

Demographic Characteristics

	Total n	%	Mortality Total n
Total	223	100	8
Maternal age			
≤ 34	175	78.4	5
≥ 35	48	21.5	3
Gravida			
Nulliparous	158	70.8	3
Multiparous	64	28.7	5
Not documented	1	0.4	0
Provider Type			
License Direct-entry Midwife	152	68.2	7
Certified Nurse Midwife	31	13.9	0
Naturopath	21	9.4	0
All others	19	8.5	1
Mode of Delivery			
Spontaneous vaginal delivery, cephalic	108	48.4	5
Cesarean birth	101	45.3	0
Vaginal breech	6	2.7	3
Vaginal assisted (in hospital)	8	3.6	0

Findings

High-risk conditions. Of the total 223 pregnancies, 75 percent of the transferred cases had at least one of the identified high-risk conditions. Approximately 43 percent of cases had meconium present, 21 percent had rupture of membranes for greater than 24 hours and/or

gestational dates greater than 42 weeks, 14 percent had maternal hypertension, 13 percent of cases had congenital anomalies, and 8 percent were related to breech fetal position (Table 4).

Table 4

Risk Conditions Related to Neonatal Mortality

Risk factor	n (Cases with documentation)	Prevalence among 8 perinatal deaths
Meconium present	91 (212)	4*
Rupture > 24 hours	45 (215)	1†
Gestational age ≥ 42 weeks	36 (174)	2
Maternal hypertension	30 (219)	4^
Congenital anomalies	30 (223)	1
Breech position delivered	17 (223)	3

* 6 of 8 mortalities had amniotic fluid characteristics documented
† 5 of 8 mortalities had onset time of rupture of membranes
^ 6 of 8 mortalities had maternal records present

Observed perinatal mortality. Of the 223 births with mortality data, eight perinatal deaths were found. There were no maternal deaths. The neonatal cases were reviewed to understand etiology and risk conditions that may have influenced the outcomes. The cases ending in death had the following characteristics: (Table 5)

Table 5

Gestational or Neonatal Age at Time of Transfer and Death

Total (n=8)	Gestational Age at Transfer				
Time of transfer	Preterm	Term	1-2 hour(s) age (Term)	>2 hours age (Term)	Total (%)
Antepartum	3				3 (37.5)
Intrapartum		2			2 (25.0)
Neonatal			2	1	3 (37.5)
	3 (37.5)	2 (25.0)	2 (25.0)	1 (12.5)	8 (100)

Total (n=8)	Gestational Age at Death				
Time of death	Preterm	Term	0-7 days age (Term)	8-28 days age (Term)	Total (%)
Antepartum	3	1			4 (50.0)
Intrapartum		1			1 (12.5)
Neonatal			2	1	3 (37.5)
Total (%)	3 (37.5)	2 (25.0)	2 (25.0)	1 (12.5)	8 (100.0)

One of the eight deaths was due to multiple congenital anomalies. The remaining seven deaths were from pregnancies where at least one of the risk conditions was present: maternal hypertension or intended out-of-hospital vaginal breech delivery. These two diagnoses may have included other risk conditions of meconium, rupture greater than 24 hours and/or gestational age greater than or equal to 42 weeks. Seven of the pregnancies were managed by licensed direct-entry midwives, and one by an unlicensed birth attendant. Fifty percent of the deaths were intended home births and 50 percent desired a birth center delivery. Thirty-eight percent of mortalities were associated with the same provider and 50 percent associated with a singular birth center. The incidence of mortality from a sample of 223 pregnancies transferred to a tertiary care center with eight neonatal deaths was 3.59 (CI 95%, 1.56 to 6.95) percent.

Section IV: Discussion

Interpretation

High-risk conditions. Of the perinatal deaths, eight of the eight would be considered high-risk using the Dutch obstetric guidelines (Appendix G, relevant areas highlighted). All would have been excluded by study parameters from Canada, the Netherlands, or the United Kingdom (Birthplace in England Collaborative Group, 2011; de Jonge et al., 2009; Hutton, et al., 2009; Janssen et al., 2009; van der Kooy et al., 2011). Three of eight cases were related to breech delivery and four of six cases (2 cases without maternal records) were linked to maternal hypertension or preeclampsia. Given the frequent mortality finding of hypertension or breech,

these conditions were further explored.

Preventable. All but one of the deaths may have been preventable. Of note, the one death with multiple congenital anomalies lacked a prenatal diagnosis of the condition. Such anomalies are identified through a prenatal ultrasound. With a medical center prepared for the emergent needs of the infant, the ultimate outcome, had the baby delivered with immediate access to a quaternary NICU, is unknown.

Two of the deaths were related to breech positioning. The malposition was known in the first stage of labor or prenatally. The mothers were healthy and delivered term, normal weight infants that subsequently died from hypoxic brain injury due to birth trauma. Four of the antepartum deaths had signs of hypertensive disorder that went unrecognized during prenatal blood pressure monitoring. One of the intrapartum deaths was caused by breech presentation and chorioamnionitis related to gestation greater than 42 weeks and rupture of membranes for approximately one week. With prenatal surveillance, intrapartum fetal monitoring, and rapid response to deteriorating fetal health, these cases may have been mitigated through emergent delivery in the hospital via augmentation and/or cesarean delivery with a medical team expediting care.

Hypertensive disorders during pregnancy. Approximately 14 percent of transferred pregnancies (30 of 219) were due to hypertension or preeclampsia. For this study, hypertensive disorder (HD) could include chronic hypertension, pregnancy induced hypertension, preeclampsia, eclampsia and hemolysis, elevated liver enzymes, low platelet count syndrome. It is generally agreed that this diagnosis increases mortality for the mother and term baby (Ananth & Basso, 2009; Chen et al., 2006; Hutcheon, Lisonkova, & Joseph; 2011). Five to 10 percent of pregnancies are affected by HD (Hutcheon et al., 2011). According to Ananth & Basso (2009) in

a retrospective analysis of singleton births in the U.S. from 2003-2004 (n=300,436), the expected perinatal mortality rate for HD would be 6.4 deaths per 1,000 (CI 95%, 6.1 to 6.7). If the highest percentage of HD incidence, 10 percent, were applied to planned OoH births' estimated denominator (N ≈ 5,396), then approximately 540 births would be affected by HD for the study years. Assuming that all HD mortalities for the state of Oregon transferred to the study facility, a conservative assumption, the rate of mortality due to HD based on the deaths observed in this study would be 4 per 540 or 7.4 (CI 95%, 2.0 to 18.9) per 1,000. This cautious approximation is higher than expected, but better than the 4 deaths per 30 (CI 95%, 1.1 to 9.2) for the study sample.

Breech. It is estimated that 1-3 percent of all term deliveries have breech presentation (Hickok, 1992), and that perinatal mortality increases with this diagnosis (Fischer, 2011). In a 1997-2008 Danish study among women who intended to deliver breech vaginally (n=7,039) (Hartnack Tharin, Rasmussen, & Krebs, 2011), the perinatal mortality rate was 2.1 deaths per 1,000 (CI 95%, 1.2 to 3.5). When applying the highest percentage of 3 to breech presentation and to the estimated study denominator of 5,396 planned OoH births, approximately 162 term breech deliveries are possible for years 2004-2008. If all of the breech mortalities for the state occurred at the study facility, a conservative assumption, an estimated breech mortality rate of 3 per 162 or 18.5 (CI 95%, 3.8 to 53.2) breech deaths per 1000 would be found. In this instance, the approximated rate is better than the observed 3 per 10 (CI 95%, 0.7 to 6.5) from the study sample.

Mortality. Although the number of deaths from transferred planned OoH births to the study facility was known, the number of deaths from planned OoH births that were not transferred or went to another hospital was unknown. It was unreasonable to assume that all planned OoH births resulting in death occurred within the sample. In an audit of 2004-2008

disciplinary actions by the BDEM (OHLA Final Orders, n.d.), five perinatal deaths among LDMs were reported that did not occur at the study facility (Appendix H). When using the estimated population denominator of 5,396 for the five study years compared to the 13 known mortalities (8 deaths at the study facility and 5 additional reported deaths) and conservatively assuming that all demises were reported or occurred at the study facility for the state, a neonatal mortality rate of 2.4 per 1,000 can be calculated. This rate is likely underestimated as the BDEM disciplinary board does not regulate unlicensed midwives (NLBAs have no controlling authority) or track infant demises, all mortalities did not exclusively transfer to the hospital of study, all mortalities for the study hospital were not captured due to study parameters, and not all mortalities are disciplined.

Context

This study originated from concerns of nurses and advanced practice nurses who were receiving OoH birth transfers. Obstetric and neonatal medical staff conjectured that the transferred OoH perinatal mortality and morbidity rates were concerning. However, Oregon studies did not exist to refute or support these anecdotal experiences. A higher level of perinatal morbidity and mortality was expected in a sample emergently transferring to a tertiary/quaternary medical center. Therefore, it was difficult to know if the study perinatal mortality rate was expected. Comparative studies specific to planned OoH birth transfer mortality rates were not found. However, the researchers were able to isolate five studies (Amelink-Verburg et al., 2008; Anderson & Murphy, 1995; Evers et al., 2010; Johnson & Daviss, 2005; Rooks & Weatherby, 1992) that reported both perinatal mortality and transfer from planned OoH birth or Dutch midwifery care. Unless otherwise specified, it was assumed that all cases of mortality reported in these studies experienced hospital transfer. For comparison

purposes, the Oregon sample was adjusted to match criteria reported in these previous studies (e.g. exclusion of preterm transfers, antepartum transfers, and/or congenital anomalies).

After adjustment for criteria relevant to the cited studies, we found a significantly higher proportion of perinatal mortality in our sample compared to one prospective North American birth-center cohort study (Rooks & Weatherby, 1992), one prospective Dutch study comparing midwifery to obstetric care (Evers et al., 2010), and one Dutch retrospective midwifery transfer study (Amelink-Verburg et al., 2008) (Table 6). We found no significant difference between transfer mortality rates in comparison to two other U.S. studies that examined certified nurse midwife- (Anderson & Murphy, 1995) and certified professional midwife-attended out-of-hospital births (Johnson & Daviss, 2005) (Table 7).

Table 6:

Perinatal Mortality Comparisons – Intrapartum transfers + early (<8 days of life) neonatal deaths for infants born at term gestation without congenital anomalies/intrapartum transfers

Authors (study years)	Numerator	Denominator	Rate per 1000	p value
Oregon study (2004-8)	2	182	10.99	Reference
Amelink-Verburg et al (2001-3)	136	89,255	1.52	***p < 0.01***
Evers et al. (1999-2004)	12	5,492	2.19	***p = 0.02***

Table 7:

Perinatal Mortality Comparisons – Intrapartum death + neonatal deaths up to 42 days of life for infants born at term gestation with congenital anomalies/intrapartum transfers

Authors (study years)	Numerator	Denominator	Rate per 1000	p value
Oregon study (2004-8)	5	185	27.03	Reference
Rooks et al. (1985-7)	11	1869	5.89	***p = 0.02***
Anderson & Murphy (1987-91)	30	1091	27.50	p = 0.97
Johnson & Daviss (2000)	12	653	18.38	p = 0.46

The rate of mortality among the Oregon transferred population was higher than that of three other studies (Amelink-Verburg et al., 2008; Evers et al., 2010; Rooks & Weatherby, 1992),

which is notable because these studies included mostly low-risk populations without twins, breech, meconium, postdates, congenital anomalies, and hypertensive disorders and/or had elevated rates of transfer to the hospital. Our findings were not significantly different from one study (Johnson & Daviss, 2005), where conditions such as twins, meconium, breech presentation, postdate gestation, and hypertensive disorders were not contraindicated to out-of-hospital delivery. A similar mortality rate was seen in a study (Anderson & Murphy, 1995) where practice standards dictated inclusion of some conditions (postdates, meconium, and hypertensive disorders) and exclusion of others (breech and twins). It is unknown whether the observed differences in transferred mortality rates stem from underlying demographic differences, practice standards related to risk selection criteria, overall rate of transfer, and/or issues related to transfer time and continuity of care.

Financial Considerations

Building a business case. This study (removing preterm deliveries, congenital anomalies, and those without data) revealed a total of 182 neonates or approximately 36 term babies per year admitted or observed in the NICU. Unpublished analysis of 2008 OoH morbidity data by Cheyney & Everson (Appendix B) reported 16 NICU admissions for the year.

In June 2011, Governor Kitzhaber signed House Bill 2380 into law (ORS 687.495, 2012). This law changed how birth and death certificate data is collected to include transported OoH births. Prior to the signing, there was controversy about whether or not to include the following questions:

1. For mothers transferred to a hospital, did she intend to have her baby at a freestanding birth center or a private home when labor started?
2. What type of birth attendant was planned?

Specifically discussed was the cost to the state for additional data (Appendix J). The total, one-time charge was $26,000, to which there was resistance. However, the average cost per day for an NICU stay is $3,500 and it is not uncommon to have a million dollar cost for one neonate due to prolonged hospitalization (Muraskas & Parsi, 2008). When calculated, these added questions represented the expense of seven NICU days. It seemed plausible that with better data collection and analysis and possible changes to risk stratification, some of these full term infants could avoid hospital intensive care. As a result, it was decided by the legislature that the expenditure was minimal and the ethical responsibility greater.

Costs of the study. The study had minimal cost. The study facility allowed access to the electronic medical records without fee. The data collected by nurse researchers were time-intensive but no charge was incurred. Other consultants volunteered both time and knowledge. A small grant was secured to pay for dissemination. However, to continue this research, a sizable grant would be needed to collect, clean, and calculate the data. If we had billed for the time of 2 nurse researchers, (full-time for 6 months equaling $64,000), physician/doctoral consultation fees of $200 per hour for 20 hours of time ($4,000), it would cost approximately $68,000 to replicate this study at a similar-sized medical facility with provided software, computers, and office space.

Situational Analysis

In 2009, I became aware of the lack of data within BDEM minutes that did not record an overall OoH perinatal mortality rate. Members of the research team went to the BDEM with our concerns (BDEM notes, April 2009). Although we, the researchers, supported low risk home birth, we were met with opposition. We attempted to open dialogue with “bridging sessions” to talk with NLBAs and LDMs to discuss data collection while supporting legislative work, HB

2059 (later ORS 676.150). These meetings were, at best, awkward and eventually halted. November 2009, I accompanied a small group of nurses to testify in front of the House Healthcare Committee (HHC, 2009) to report on prior studies about home birth and risk assessment criteria that created better outcomes for OoH delivery. The testimony was well attended by the LDM/NLBA community and their clientele with signs and matching t-shirts; they filled two additional rooms. The following year, 2010, was marked by a civil rights lawsuit from home birth midwives to protest a subpoena of files that documented transported, high-risk conditions (Rojas-Burke, 2010). Interestingly, the case was settled with the stipulation that an intercollaborative quality executive council, put in place to monitor and report OoH birth transfers, be altered. To date, what once was an interdisciplinary team performing careful, thorough review was reduced to a few individuals with a greatly abbreviated timeline altering the abilities to deliberate.

This study has provided valuable information about an unstudied, at-risk population, and it identified areas for further investigation and research. As a DNP student, I have had a swift emergence into policy and politics. I have met with stakeholders, testified in front of legislators, and listened to mothers both helped and harmed by home birth. I committed to this subject academically, professionally, and politically. The ability to bring together realms of health policy, clinical practice, and translational research are the hallmarks of a DNP professional. This project has given me ample opportunity to explore and blend these roles.

Outcomes

Associated outcomes to this project were changes in Oregon Regulatory Statutes.

1. HB 2059 (ORS 676.150, 2010) mandatory reporting of unprofessional or prohibited conduct of other licensees.

2. HB 2380 (ORS 687.495, 2012) changing the birth and death certificates to collect transported OoH births.

HB 2059 mandates that any licensed individual (RNs, MDs, CNAs, EMTs, etc.) must report "unprofessional conduct," such as inappropriate risk assessment, of LDMs or other licensed birth attendants. It is only through reporting all losses or near misses that OHLA, the licensing agency, could be aware of issues that may be compromising OoH birth safety. Since this law, there has been a significant increase in reporting (Randy Everitt, Director of OHLA, personal communication; July 25, 2011). However, it is unknown if additional reporting will cause a change in LDM practice.

HB 2380 (See Financial Considerations above) requires all birth and death certificates that transfer to a hospital include the intended place of birth and intended birth attendant regardless of where the actual birth or death occurs. It is unknown how soon this information will be available to the public, or if it will cause a change of OoH birth practice.

Limitations

Study comparators could only be achieved by studying data within publications and applying the same limiters to our data. In addition, eight deaths is a small number and even the difference of one death will greatly influence the sample perinatal mortality rate. Nonetheless, accurate recording of these and the circumstances around the deaths remain important. Further limitations included under-representation of neonatal deaths within the study facility. Not captured were those transferred after more than 24 hours after delivery. At least two other planned OoH births associated with neonatal deaths were found, but were excluded because they were admitted to the NICU after more than one day had elapsed from time of delivery. Moreover,

this is an under-representation of all neonatal deaths for the state as five external deaths for the study years were found in public disciplinary documents.

Retrospective studies are built on data. In this untracked population, information was missing. Statewide, no comparison of outcomes existed in available vital records. The true denominator for planned, but transferred out-of-hospital births was neither known, nor was the exact proportion the transfer sample represented. Additionally, internal data collection was limited by the amount of information available to the researchers. Prenatal files were missing in almost 30 percent of cases and labor records missing for more than half of mothers. The majority of missing data were due to records not accompanying the patients. In some cases, the prenatal records may have been provided to the hospital, but were not scanned into the electronic medical record. However, given that this population was completely unknown, this study served as an important first step and indicates further prospective research is warranted with a larger sample size.

Conclusion

We identified that both death and high-risk conditions were present in our sample from 2004-2008. Oregon condones high-risk OoH birth practices by legalizing and reimbursing birth attendants for these diagnoses through Medicaid. The state has been able to claim ignorance on the safety of home birth for the last 18 years due to lack of data, and the BDEM has not kept accurate records that would allow for a correct assessment of safety. Despite this lack of data, scope of practice has been widened to encompass midwifery managed high-risk pregnancies. This was passed in the face of international standards that do not include this practice, and with three additional studies (Bastian et al., 1998; Kennare, Keirse, Tucker, & Chan, 2009; Mehl-Madrona & Madrona, 1997) that show higher morbidity and mortality with midwifery-attended

high-risk OoH births. Although an Oregon policy shift has started data collection on these births, the issue of high-risk home delivery has been unaddressed. However, the home birth community remains firm. Based on this study, all of the deaths had high-risk conditions and the deaths were likely preventable. Notably, the Netherlands created an interdisciplinary council to create standards that has become more conservative over time with subsequent improved outcomes (Amelink-Verburg & Buitendijk, 2010).

The problem of missing mortality data is magnified when it is not linked to the provider or facility. It was startling to find three deaths linked to a single provider and four associated to one birth center. This information is not publically available. It is assumed that birthing families would like to know the mortality rate of their chosen birth center or birth attendant, licensed or unlicensed. Because births centers and home birth midwives are not compelled to report such numbers to their clients or regulatory body, the public must make decisions on where to birth with little information. Ultimately, families must rely on national and international OoH birth studies with protocols that exclude high-risk deliveries and compare the outcomes to local hospital birth data that enfold transferred high-risk OoH birth totals in their rates.

This pilot study suggests more research is needed to examine the outcomes of all OoH births, mothers and babies, transferred and not transferred, especially those with higher risk diagnoses like HD, post-dates, and/or breech presentation. Our research revealed deficient Oregon OoH birth data collection. A true denominator and total morbidity and mortality are needed to develop accurate, evidence-based professional standards of care. While statistics are now being collected, results are not yet available and will not be available for 3-5 years (Randy Everitt, Director of OHLA, personal communication; July 25, 2011). It is hoped the findings from this sample of 406 individuals may provide adequate evidence to develop a scope of

practice that will include risk criteria stratification to improve mother-baby outcomes. A prudent clinician giving prenatal advice to women inquiring about high-risk OoH birth should carefully consider whether the evidence supports the law. An evidenced-based practitioner would recommend the adoption of OoH birth standards that demonstrate safety.

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Appendix A: Calculation of Planned / Unplanned Out-of-Hospital Births by Geo-Political Region

	2008	2007	2006	2005	2004	Total
Live Births						
Multnomah County	11,027	10,820	10,697	10,540	10,739	53,823
Bi-County	18,716	19,012	18,796	18,308	18,378	93,210
Tri-County	23,550	23,537	23,480	22,722	22,785	116,074
Statewide	49,492	49,872	49,089	46,715	46,453	241,621
Out-of-Hospital (OoH) Births (planned and unplanned)						
Multnomah County	375	330	330	284	221	1,540
Bi-County	571	504	498	413	378	2,364
Tri-County	662	587	563	485	452	2,749
Statewide	1,322	1,152	1,046	969	921	5,410
Unplanned OoH Births (for years prior to 2008 estimated as 0.160% of Live Births)						
Multnomah County	18	*17.3*	*17.1*	*16.8*	*17.1*	*86.3*
Bi-County	29	*30.3*	*30.0*	*29.2*	*29.3*	*147.9*
Tri-County	36	*37.6*	*37.5*	*36.3*	*36.4*	*183.7*
Statewide	79	*79.6*	*78.4*	*74.6*	*74.1*	*385.7*
Planned OoH Births **						
Multnomah County	357	*312.7*	*312.9*	*267.2*	*203.9*	*1,453.7*
Bi-County	542	*473.7*	*468.0*	*383.8*	*348.7*	*2,216.1*
Tri-County	626	*549.4*	*525.5*	*448.7*	*415.6*	*2,565.3*
Statewide	1,243	*1,072.4*	*968.1*	*894.1*	*846.9*	*5,024.5*
Planned OoH Births as a Percent of Total						
Multnomah County	3.24%	*2.89%*	*2.93%*	*2.53%*	*1.90%*	*2.70%*
Bi-County	2.90%	*2.49%*	*2.49%*	*2.10%*	*1.90%*	*2.38%*
Tri-County	2.66%	*2.33%*	*2.24%*	*1.97%*	*1.82%*	*2.21%*
Statewide	2.51%	*2.15%*	*1,97%*	*1.91%*	*1.82%*	*2.08%*

Numbers in grey italics are estimates rather than actual census results.

****** Planned out-of-hospital births included a birth center that was affiliated with a hospital and was staffed by CNMs and an obstetrician. One hundred and eight births occurred at this center in 2008. Because this center is different in risk management protocols and is dependent on a hospital facility, their births were excluded. The 108 births accounted for 46.6% of OoH births in Lane County. This percentage was retroactively applied to adjust for OoH births in the prior years of the study (2004-2007). Thus, the calculated planned OoH birth rate only reflects the number of nonhospital related births.

Appendix B: Unpublished Preliminary Draft: 2011 Report on LDM / DEM births, excerpted, bolding added

Recommendations for the Oregon Health Licensing Agency's Policy on Perinatal Health Outcome Surveillance and Annual Reporting for Direct -entry Midwife-Attended Births

Melissa Cheyney, PhD, CPM, LDM
Assistant Professor of Anthropology
Oregon State University
Chair, Oregon Board of Direct Entry Midwifery
Chair, Division of Research
Midwives Alliance of North America

Courtney Everson, MA
Medical Anthropology Doctoral Student
Oregon State University

History of the Suspension of OHLA's Data Collection Form

Prior to 2006, the Board of Direct Entry Midwifery relied solely on of the Human Services Office of Public Health Vital Statics for data collection. However, this **reporting mechanism was problematic**: **adverse outcomes generally went into the hospital birth statistics**, because when the care of the mother was transferred during labor, any adverse outcomes were not counted for the attending midwife. Further confounding accurate data collection was the inconsistent and inaccurate use of acronyms (such as LDEM instead of LDM). Working to resolve the data collection inconsistencies and to follow the requirements of ORS 687.495, in October 2006 the agency required each LDM to report on a Statistical Occurrence Reporting Form that was to be submitted upon renewal of a license. However, serious reporting inconsistencies continued for reasons such as more than one midwife attending a single birth reporting the same outcomes. OHLA and the board suspended this reporting requirement on April 6, 2009, because the information was so inaccurate. In 2009, OHLA received information from Vital Records that corrected the fetal death rate record by attendant from 2001 through 2007. However, this correction still did not clearly delineate if the birth was a planned home or birth center delivery, or if a transfer of care was made to a hospital during labor; this continued to **skew the numbers for out of hospital (OOH) birth outcomes**. In the report that follows, we review the work completed by the Board of Direct Entry Midwifery over the last two years in an effort to improve OHLA's ability to track perinatal health outcomes for licensed and unlicensed Direct Entry Midwives.

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Gaps in Vital Records Reporting: An Analysis of the 2008-2010 Data on Home and Birth Center Deliveries Attended by Oregon Direct Entry Midwives

Statistical data on maternal and infant health outcomes for deliveries occurring in Oregon State is currently collected by the Oregon Center for Health Statistics, Vital Records Office. Data is collected and reported annually, and the Oregon birth certificate is used as the statewide data collection tool. Upon Institutional Review Board approval from Oregon State University and permission from the Center for Health Statistics, Offices of Disease Prevention and Epidemiology in Portland, Oregon, we received access to and analyzed de-identified birth certificate data for all completed home and freestanding birth center deliveries attended by direct-entry midwives occurring in Oregon in 2008. Our analysis revealed several areas where out of hospital (OOH) surveillance via vital records is currently inadequate. We summarize the main problems below, and provide data from our 2008 analysis to illustrate concerns and trends.

The Oregon birth certificate currently collects data on actual place of delivery, including options for planned home birth and birth center deliveries. However, because planned home birth and birth center delivery are only accounted for in actual site of delivery, the current birth certificate does not have the ability to capture data on intended place of delivery. Transports from home/birth center to hospital that occur

during labor are lost, and thus, birth outcomes from these deliveries are currently and erroneously being attributed to the hospital where the intended OOH birth is completed after transport.

Transports during labor are one of three forms of home/birth center to hospital transport, and are the most commonly occurring type of transport (neonatal transports and postpartum transports account for the remaining types). Neonatal transports (NEO) occur when the infant is successfully delivered OOH, but is then transferred to the hospital for complications in the immediate postpartum period. Postpartum transports (PP) occur when the birth is completed OOH, but the mother is then taken to the hospital for complications, the most common reason for which is postpartum bleeding that cannot be controlled by the anti-hemorrhagic medications available in an OOH setting (Johnson and Daviss, 2005). The third form, transports in labor, are called "Intrapartum" transports (IP) in the literature, and they occur when a mother is transferred to the hospital in labor prior to delivery. Because these infants are born in the hospital and their data are being lumped in with hospital statistics, it is currently impossible to calculate several key markers of the safety of Ooh birth, including cesarean section rate and rate of low 5-minute APGAR score. The widely used definition of "out of hospital delivery" includes all births where the mother goes into labor intending to deliver at home or birth center, regardless of actual place of delivery (Fullerton et al., 2007). In sum, it is currently not possible, using vital records, to capture IP transport data because there is no where to indicate on the birth certificate intended OOH delivery.

Based on published studies (Cheyney 2010; Johnson and Daviss 2005; Fullerton et al. 2007) on OOH delivery, it can be estimated that approximately 10-12% of intended home/birth center deliveries result in an intrapartum transport. Because the analysis below of 2008 OOH data only accounts for completed home/birth center deliveries without IP transports included, we are missing a substantial portion of the data on OOH deliveries and are limited in the variables we can calculate. For example, as mentioned above, we cannot calculate an accurate mode of delivery rate (spontaneous vaginal, forceps/vacuum, or cesarean) because of the loss of IP transports. According to the 2008 data, LDMs in Oregon have a 100% spontaneous vaginal delivery rate, clearly due to the fact that cesareans are not performed OOH; the birth certificate is only capturing data on completed home/birth center deliveries. Similarly, we cannot calculate an IP transport rate, nor can we can assess any indicator of mortality or morbidity for mothers and babies transported in labor.

Despite an inability to capture IP data, we were able to analyze key variables for all completed, planned home and birth center deliveries attended by Licensed Direct-entry Midwives and unlicensed Direct-entry Midwives (traditional midwives) in 2008. Results are summarized below for both Licensed and unlicensed Direct-entry Midwives.

Licensed Direct-entry Midwives

There were 757 completed out of hospital deliveries attended by LDMs in 2008 (See Appendix E for tables and graphs of all LDM outcome analyses). Of these, 298 were completed in a freestanding birth center and 459 were completed at home, for a rate of 60% home birth and 40% birth center delivery attended by LDMs. In examining presentation at delivery, 98.4% were vertex presentations (n = 745) and 1.3% were breech presentations (n = 10). Twin birth accounted for 2% (n = 15) of all deliveries, and 98% were singleton deliveries (n = 742). 3.6% (n = 27) of women delivering OOH with an LDM completed vaginal births after cesarean, and 96.4% (n = 730) were women with no previous cesarean. In examining gestational age (via clinical assessment of the newborn), 4.9% of babies had a gestational age of greater than 41 weeks (n = 37) and no baby had a gestational age of >42 weeks. When all LDM-attended OOH deliveries were examined for low five-minute Apgar scores -- the most commonly cited indicator of neonatal morbidity, defined as a score of six or below at five minutes after delivery -- only 3.4% (n = 9) of the 757 babies had low five-minute Apgar scores; 96.6% of infants born OOH had scores of seven or above with a mean of 9.31 out of a possible 10. For mortality, there were two demises at birth out of 757, for an intrapartum mortality rate of 2.64/1000 births. While an intrapartum transport rate was not possible to calculate, neonatal and postpartum maternal transport data are captured (accurately?) in the current birth certificate form. The NEO transport rate for completed OOH births with LDMs was 1.7% (n = 13) and the PP transport rate was 0.13% (n = 1).

Unlicensed (traditional) Direct-entry Midwives

For comparative purposes, we also calculated key statistics for all planned home and birth center deliveries attended by traditional midwives (unlicensed midwives) in 2008 (See Appendix F for all analyses run for unlicensed DEMs). There were 188 completed out of hospital deliveries attended by traditional midwives in 2008. Of these, 3 were completed in a freestanding birth center and 185 were completed at home,

for a rate of 98.4% home birth and 1.6% birth center delivery. In examining presentation at delivery, 99.5% were vertex presentations (n = 745) and 0.5% were breech presentations (n = 1). There were no twin births among unlicensed midwives in 2008. 6.91% (n = 13) of women delivering OOH with a traditional midwife completed vaginal births after cesarean, and 93.1% (n = 175) were women with no previous cesarean. In examining gestational age (clinical assessment of the newborn), 5.8% of babies had a gestational age of greater than 41 weeks (n = 11) and no baby had a gestational age of >44 weeks.[1] When all traditional midwife-attended OOH deliveries were examined for low five-minute Apgar scores -- the most commonly cited indicator of neonatal morbidity, defined as a score of six or below at five minutes after delivery -- only 6.4% (n = 9) of the 188 babies had low five-minute Apgar scores; 93.6% of infants had scores of seven or above with a mean of 9.25 out of a possible 10. For mortality, there were no intrapartum demises out of 188 deliveries, for an intrapartum mortality rate of 0.00/1000 births among traditional midwives. While an intrapartum transport rate was not possible to calculate, neonatal and postpartum maternal transport data are captured in the current birth certificate form. The NEO transport rate for completed OOH births with traditional midwives was 1.6% (n = 3) and there were no PP transports in the sample.

Finally, it is well established that the reliability and validity of birth certificate data differs considerably by variable (Northam and Knapp, 2006; Rooks, 1999; Vedam, 2003; Wagner, 2006) and as such, we have concerns over the accuracy of some of the variables reported for completed, midwife-attended OOH births. For example, the current Oregon birth certificate reportedly captures data on whether an infant or mother was transferred to a higher-level facility following delivery. Based on these two questions, we calculated the NEO transport rate and PP transport rate, respectively, for all deliveries occurring OOH in 2008. While the resulting NEO transport rates were reasonably aligned with published studies on NEO transport rates for OOH deliveries, the PP transport rate was surprisingly low, requiring us to question the reliability/validity of this variable and leading to speculation that this question is misunderstood by midwives in the State of Oregon.

Recommended Changes to the Oregon Birth Certificate

Based on the above analysis, we recommend that two questions be added to the live birth and fetal death certificates. For all records where hospital is checked as the place of delivery add:

1) Did mother go into labor intending to deliver at home or in a birth center?
   Yes, No, Unknown. If "yes" is selected, ask:
2) Primary attendant at the onset of labor?
   Certified Nurse Midwife[2], Chiropractor, Doctor of Chiropractic medicine, MD, Licensed Direct Entry Midwife, Midwife, Nurse Practitioner, Other (specify), Physicians Assistant, RN, Other Licensed Medical (specify)

Intended place of delivery is key for identifying IP transports and subsequent birth outcomes. This language is also consistent with how OOH birth data is reported in the existing safety literature. The question on primary attendant at the onset of labor will allow the agency to tease a part LDM and unlicensed Direct Entry Midwife birth outcomes, post-transport.

Summary and Conclusion

In summary, we recommend that the agency proceed as planned with implementing annual reporting for midwives through the MANA Statistics Project, while simultaneously working with vital records to add two additional questions to the live birth and fetal death certificates. This two-fold data collection strategy will allow the agency to: 1) track basic outcomes for licensed and unlicensed DEMs through vital records while; 2) simultaneously collecting more specific data on OOH birth outcomes essential for rule making and quality assurance via the MANA Statistics Project.

[1] 0 babies at 43 weeks gestational age, 1 baby at 44 weeks gestational age
[2] These are the options currently available for attendant type.

Appendix C: Board of Direct Entry Midwives Minutes March 2005

Number of Births/Fetal Demises - Oregon Occurrence In / Out of Hospital, 2004

Type Of Attendant	Number of Births	Number of Fetal Demises	% of Fetal Demises
Medical Doctor (MD)	37, 142	171	.46
Doctor Osteopathy (DO)	1,577	7	.44
Naturopathic Doctor (ND)	116	N/A	N/A
Certified Nurse Midwife (CNM)	6,586	14	.21
Registered Nurse (RN)	196	4	2.04
Licensed Direct Entry Midwife (LDEM)	298	3	1.00
Other Licensed Medical	18	1	5.55
Non Medical	520	1	.19
Total	**46,453**	**201**	**.43**

Number of Births/Fetal Demises - Oregon Occurrence In / Out of Hospital, 2003

Type Of Attendant	Number of Births	Number of Fetal Demises	% of Fetal Demises
Medical Doctor (MD)	37, 126	170	.45
Doctor Osteopathy (DO)	1,743	7	.40
Naturopathic Doctor (ND)	130	N/A	N/A
Certified Nurse Midwife (CNM)	6838	3	.04
Registered Nurse (RN)	218	N/A	N/A
Licensed Direct Entry Midwife (LDEM)	208	13	6.25
Other Licensed Medical	18	1	5.55
Non Medical	563	2	.35
Total	**46,844**	**196**	**.41**

Appendix D: Table of evidence: Safety and outcomes

Synopsis			Findings		Applicability
Citation Author, year only	Question, variables Independent (I Var) and Dependent (D Var) Variables	Design Design, Sample Population	Significance Statistical & clinical significance	Credibility Rigor in data collection, analysis	To whom and under what situations could findings apply
Amelink-Verburg, M.P., Verloove-Vanhorick, S.P., Hakkenberg, R.M.A., Veldhuijzen, I.M.E., Bennebroek Gravenhorst, J., &Buitendijk, S.E. (2008).	Assess the outcomes of intrapartum referrals from primary to secondary care within the Dutch system. 2001-3.	Descriptive study 2001-2003 using a Dutch midwifery database. Cover 95% of all midwifery care and 80% of all Dutch pregnancies. Population – low risk women Classified by no referral, urgent referral, nonurgent referral Retrospective 89,255 intrapartum w/o anomaly, term births, 136 deaths w/in 24 hrs of birth up to 7 days of life	68.1% completed birth without referral. 28.3% with referral without urgency (usu 1st stage labor) and 3.6% urgent referral. Planned home delivery had a significantly lower transfer rate at 29.3% as compared to 37.2% for those in the hospital. 32% xferred intrapartum	(N=280,097) robust database with good participation. Perinatal mortality was 0.05% in spite of high mortality in the urgent referrals of 1.07%.	Risk selection is a crucial element in the Dutch obstetric system and postpartum period leading to low transport rates. This is in contrast to Oregon birth that does not have strict risk criteria. Reasons for urgent referral- fetal distress, postpartum hemorrhage. Nonurgent referrals were for complications allowed in Oregon for home birth including: ROM without labor, abnormal presentation, and meconium stained fluid, FTP in 1st stage. All infant deaths require an investigation by collaborative obstetric groups. Not the practice in Oregon. ≠ < 35w ≠ < twins & breech ≠ < HTN ≠ < thick meconium ≠ > 42 wk gestation ≠ < VBAC
Anderson, R.E. & Murphy, P.A. (1995).	What are the outcomes for planned OoH HB in the US with CNMs from 1987-	Voluntary survey of 90 midwives over 13 years. The largest U.S. sample specific	Perinatal mortality rate 4.2 per 1,000 compared to U.S.	66.2% response rate, voluntary data collection, also	With standard risk assessment and well-educated CNMs, LOW risk HB can have similar to less

Synopsis			Findings		Applicability
Citation Author, year only	Question, variables Independent (I Var) and Dependent (D Var) Variables	Design Design, Sample Population	Significance Statistical & clinical significance	Credibility Rigor in data collection, analysis	To whom and under what situations could findings apply
	1999	to home birth (see Rooks for BCs) Retrospective See Table 2, p486. 1,014 xferred at intrapartum (include ante death w/ intra xfers) (905) and neonatal (109) = 1,014 + 79 (maternal xfers) = 1093 – 2 premie cases = 1091. There were 32 intra/neo deaths removing 2 for prematurity = 30 intra;/neo deaths up to 13days of age. 27.5% xferred mortality rate intrapartum, neo with anomaly	rate.	utilized very well well-educated CNMs v. LDMs, CPMs, or DEMs 9% xferred intrapartum	perinatal mortality rates to hospital birth. Relevance to HB in Oregon? 99% ≠ **< 35w** (86/ 508 referred antepartum) 96% ≠ **twins** (20/ 508 referred antepartum) **fetal malpresentation** (include breech?) (46 / 508 referred antepartum; 76 nonvertex xferred / 905 intrapartum xfers) 93% ≠ **HTN** (41/ 508 referred antepartum; 20 xferred / 905 intrapartum xfers) 91% ≠ **thick meconium** (116 xferred / 905 intrapartum xfers) 61% ≠ > **42 wk gestation** (8/ 508 referred antepartum) 59% ≠ **VBAC**
Bastian, H, Keirse, M, & Lancaster, P (1998)	Perinatal death rate for home births vs. all Australian births	Retrospective, descriptive study. A data comparison of planned home births 1985-1990 per Homebirth Australia. Found 50 deaths (31 fetal and 19 neonatal). Death rate of 7.1 per 1000. Some were born in hospital, some out-of-hospital. Compares to 6.4 per 1000 in Australia as whole.	Hard to tell if significant: 7.1/1000 (95% CI 5.2 to 9.1) home vs 6.4/1000 (95% CI 4.6 to 8.3) hospital Probably signifiant 5.7 vs. 3.6 per 1000; rr 1.6; 1.1 to 2.4)	Info provided by homebirth practitioners (HBPs) (from database) requested annual summary from those who did not provide forms. Had 89.6% response from HBPs (N=207 midwives). Data from N=7002 planned home births.	Great source for comparison with our numbers. Remarkable compliance by HBPs. See methods re: definition of perinatal death (stillborn, death within 28 days after birth if weight >500g. See results re: asphyxia deaths and warning signs seen (meconium, post dates, bradycardia).

Synopsis			Findings		Applicability
Citation Author, year only	Question, variables Independent (I Var) and Dependent (D Var) Variables	Design Design, Sample Population	Significance Statistical & clinical significance	Credibility Rigor in data collection, analysis	To whom and under what situations could findings apply
		With wt>2500gm, death rate was 2.7 vs 0.9 per 1000 in home birth vs. all births. 52% of deaths were intrapartum asphyxia.		Used state perinatal data to supplement	36% of neonatal deaths occurred in poster-term, twins, preterm and breech presentations. Note use of registered v. unregistered midwives mimics Oregon's licensed and unlicensed midwives for home birth.
Berg, M. & Dahlberg, K. (2001).	What is the role of the midwife in Sweden for the woman with high-risk obstetric complications	Qualitative study of 11 midwives with privileges at a high-risk hospital with > 5yrs of midwifery experience	N/A – no discussion of statistical test for qualitative significance.	10 interviews of 11 midwives grouping the theme into 4 repeated subject areas. Appears rigorous.	Appropriate to discussion of patients and how to provide nursing care when they are no longer under nursing care but under physician care.
Birthplace in England Collaborative Group. (2011).	What are the perinatal and maternal outcomes by planned place of birth in low risk pregnancies in the U.K.	Prospective, 2-year study of 64,358 women. Excluded c/s before labor, planned c/s	No significant differences in morbidity and mortality outcomes overall. Significant differences in morbidity between nullip and multips.	Large sample size, low risk, ¾ of the units had 85% participation rate. La	Excluded were: breech, VBAC, twins, elevated BP, gestation diabetes, preterm deliveries <37 wks, hx of shoulder dystocia, low or high AFI. While not reaching significance the reported perinatal mortality rate was 3X higher for HB, see Table 8.5 in the 78 pg supplement.
Bradley, P, Bray, K (1996)	Overview of Maternal child health care system in Netherlands	Interviewed health care providers, nurse supervisors, and health care system clients. Also observational via home visits.	Data appears accurate, no p-values because it was not a statistical analysis.	Pregnancy-related care provided by midwives (42.4%, OBs 42.5%, & GPs 15.1%). Lots of additional services	Contrasts system; "house physicians" (like GPs) work closely with and refer to specially trained midwives for most low-risk pregnancies (not a competitive field between MDs

Synopsis			Findings		Applicability
Citation Author, year only	Question, variables Independent (I Var) and Dependent (D Var) Variables	Design Design, Sample Population	Significance Statistical & clinical significance	Credibility Rigor in data collection, analysis	To whom and under what situations could findings apply
				available after birth – growth booklet, maternity care helper, advice hotlines, well-child visits	and MWs).
Burnett, C.A., III, Jones, J.A., Rooks, J., Chen, C.H., Tyler, C.W., Jr., & Miller, C.A. (1980).	A retrospective review of neonatal deaths in North Carolina between 1974-1976 using birth record coding to determine mortality by birth characteristics.	All lay midwife deliveries were assumed planned because a permit is required by the state health department as being at low risk of complications. If not compliant the midwife could have her permit revoked. All infants < 2000g wt were assumed unplanned. All infant deaths were individually reviewed by the birth and death certificates, with the county health department, and when necessary the birth attendant.	Grouped into 1-unplanned RR=4 greater infant mortality (CI .95, 1.4-11.4), 2 - planned without medical screening with RR=8 (CI .95, 2.2-31), 3 –planned with selection criteria, medical screening, experienced attendant RR=1	N=1296 home deliveries over 2 yrs. 72% planned or 933. Of the 933, 768 were attended by lay midwives. 19% were unintended home deliveries. Of these, 51 infants were 2000g or less and 199 were either “precipitate” or “failure to plan”.	Planned home deliveries without known medical screening and without a trained attendant resulted in high infant mortality despite having a low risk demographic profile. (planned HB v. unplanned HB) When unplanned home births and high-risk births were excluded, mortality rate was not significantly difference between planned home birth and hospital birth. High-risk meant those without medical screening. No study of hospital transports.
Cawthon, L. (1996).	Perinatal data for Medicaid women in the state of Washington who were cared for by licensed midwives between 1989-1994.	Births categories were by place of birth, maternal characteristics, prenatal care, and birth outcomes as compared to licensed midwives and all other Medicaid women.	Infant mortality rate: 10.3/1000 with LDM + some PNVs 9.4/1000 for all other Medicaid	N=2,054 women cared for by LDMs,	Major cause of infant death was congenital anomalies and DIS. # of stillbirths or neonatal deaths at home were zero suggesting that all who died were transferred to a hospital. Not studied were infants who

Synopsis			Findings		Applicability
Citation Author, year only	Question, variables Independent (I Var) and Dependent (D Var) Variables	Design Design, Sample Population	Significance Statistical & clinical significance	Credibility Rigor in data collection, analysis	To whom and under what situations could findings apply
			women, p-0.66, RR 1.10 (CI 95, 0.72-1.69)		started with a home delivery and transferred to a hospital.
Chang, J.J. & Macones, G.A. (2011)	Birth outcomes of planned home births in Missouri from 1989-2005.	A retrospective cohort study using MO Vital Records to compare risk of newborn seizure and infant death in planned home births attended by CNMs/physicians or non-CNMs with hospital/birth center births.	Adjusted odds risk ratio was 11.24 (CI 95%, 1.43, 88.29). and 20.33 for planned home births attended by non-CNMs and by physicians as compared to hospital/birth centers.	N=859,873, robust amount of data Studied newborn seizure as a way to identify poor outcome.	Without major congenital anomalies, twins, or breech presentation. Planned home births were associated with increased adverse birth outcomes of seizure (5X) and death. Chose a low risk population between 36-44 wks of age. This is not by definition truly low risk. Not able to identify planned home births that transferred to the hospital.
Davies, J., Hey, E., Reid, W., & Young, G. (1996).	To collect data from a group of women who request a home birth delivery in the UK.	Retrospective study post delivery through anonymous questionnaires sent through the post.	N=256 women, 142 (57% delivered at home), 17 (7%) had c/s. Women did not feel supported to birth at home by their providers.	85% return on questionnaires. Unsure the credibility of this study. Few statistics were reported. Mostly reporting of quotes and attitudes without statistical analysis.	The study examined the out ome of the pregnancy, indications for hospital Xfer, and the attitudes of the mothers, midwives, and general practitioners. Many women were transferred during labor or not offered the opportunity for home birth. Some Midwives were concerned about lack of equipment and feeling isolated. Not to examine the safety of HB

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De Reu, P.A.O.M., Nijhuis, J.G., Oosterbaan, H.P., & Eskes, T.K.A.B. (2000)	Who was responsible for the client at the moment perinatal death occurred or became inevitable? Whether perinatal death was possibly or probably avoidable. Assessed consensus among panel of perinatal audit group.	Retrospective study over 2 years 1994-95. Investigation of 73 perinatal deaths resulted from 8509 newborns in a rural Dutch region.	Kappa value 0.9 for assessing consensus (indicates good agreement among panel, because so close to 1.0)	Notes discrepancy between state (CBS) mortality data and that collected by authors. No significant difference in perinatal mortality between Holland and Belgium.	Perinatal mortality 8.58% including wt <500g and congenital anomalies. 5.77% of births after 28 weeks GA. (=0.858 and 0.577 in 1000)
Declercq, E., MacDorman, M.F., Menacker, F., & Stotland, N. (2010).	To estimate the differences in the characteristics of mothers having planned and unplanned home births that occurred at home in a 19-state reporting area in the United States in 2006.	Data from the 2006 US vital statistics natality file. Information on whether a home birth was planned or unplanned was available in 19 states representing 49% of all home births nationally.	Unplanned births were more likely non white, younger, unmarried, foreign born, smokers, no college education and with little prenatal care.	N=11,787 home births with planning status recorded. 9,810 planned. Nonvoluntary data from VS.	Examined maternal characteristics, prenatal care, type of home birth (planned or unplanned). Did NOT identify births that transferred to the hospital. No discussion of outcomes just characteristics. Not about HB safety
De Jonge, A., van der Goes, B.Y., Ravelli, A.C.J., Amelink-Vergurg, M.P., Mol, B.W., Nijhuis, Bennebroek Gravenhorst, J., & Buitendijk, S.E. (2009).	To compare perinatal mortality and severe perinatal morbidity between planned home birth and planned hospital birth among LOW-RISK women.	A nationwide retrospective cohort study of the entire Netherlands. Analysis of national perinatal and neonatal registration data over a period of 7 years.	Quantitative analysis using logistic regression analysis was used to control for differences in baseline characteristics of parity, gestational age, maternal age, ethnic background, socioeconomic	N=529,688. largest study on the safety of home birth to date. Voluntary database but with 99% midwifery and 100% physician participation.	Inclusion criteria was strict: no twins, no malpresentation, no previous postpartum hemorrhage, between 37-42 wks gestation, no prolonged ROM (> 24 hrs), without CTX, no IUFDs, no congenital anomalies, transfer to the hospital for FTP-abnormal FHTs-meconium and no known medical or obstetric risk conditions. No significant differences

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			status.		were found in RR for mortality within 24 hr and 7 days after birth or admissions to NICU. Showed relative safety of planned home birth in low risk population as compared to planned hospital birth in the Netherlands.
Environmental Public Health Tracking (n.d.) for Oregon	Oregon birth data, results, trending from 2000-2006	Used Oregon Vital Statistics information from 2000-2006. Mortality information was calculated from 2000-2005	Perinatal mortality is calculated as 1.1 per 1000 for years 2000-2005.	Retrospective review from a state agency using objectively collected numbers	Relevant to our study by providing a stable perinatal mortality rate for the state, by county, by year. Could be used as a comparator. See Table 12 on p. 29.
Evers, A.C.C., Brouwers, H.A.A., Hukkelhoven, C.W.P.M., Nikkels, P.G., Boon, J., van Egmond-Linden, A., HIllesgersberg, J., Snuif, Y.S., Sterken-Hooisma, S., Bruinse, H.W., & Kwee, A. (2010).	In a two tiered system based on high and low risk, what are the outcomes of those that are low-risk (22% of whom are HBs) with a midwife as compared to those that are high-risk with a physician in the Netherlands. 2007-2008	Used the Netherlands perinatal registry. Prospective study from 1/1/2007 to 12/31/2008, 2 years. Only pregnant women at 37 wks gestation with a singleton without any congenital abnormality. Collected data on all antepartum stillbirth, intrapartum stillbirth, neonatal death, and admit to tertiary NICU w/in 7 days of birth in the catchment area 5,492 transferred intrapartum,	N=37,735. Overall perinatal death rate 2.62 per 1000. Infants of pregnant women at low risk had a significant higher risk of delivery r/t to perinatal death than infants of pregnant women at high-risk whose labor was under the obstetrician. (RR 2.33, 1.12-4.83)	Prospective, cohort study over 2 years. Large cohort. n=18,686 of low risk and n=18,958 of high-risk. 15% xferred intrapartum	If referred in labor from a midwife to an obstetrician, the RR = 3.66 of perinatal death than a woman laboring, high-risk, with a MD. Findings were unexpected. The Netherlands are upheld as the exemplar HB society with 54approx.. 30% HB. Attributed the difference to delays that could have caused the mortality: Dx by midwife delayed, Xfer delay, perception by the MD as being low risk delay.

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		term, 12 deaths at term up to 7 days of life . See p5, table 3			ONLY study with Hi v. Lo risk however not specific to HB. ≠ < 35w ≠ twins & breech ≠ HTN ≠ thick meconium ≠ > 42 wk gestation ≠ VBAC
Gyte, G. & Dodwell, M. (2008).	A review of evidence regarding planned home birth	Grading home birth studies and their results to reflect on safety	Used 3 levels of inclusion: on bias, risk, and whether in the UK and 4 levels to grade quality.	Unsure. The author is well-known for her strident support of HB.	This is a nice synopsis of level of evidence for LOW risk HB. Not as helpful for High-risk HB.
Hendrix, M., Van Horck, M., Moreta, D., Nieman, F., Nieuwenhuijze, M., Severens, J., & Nijhuis, J. (2008).	To investigate why low risk nulliparous women were not willing to be placed in a RCT for place of birth. Originally to a RTC study but by 6 mo only 1 participant. Changed study to above subject.	A prospective study in the Netherlands. All low-risk nulliparous women starting their pregnancy under a midwife. Measured why women did not accept randomization for place of birth.	A questionnaire for 107 nullips willing to participate in a cohort study on place of birth but declined to participate in an RCT.	79 % participation. Not an RCT.	Four themes for nonparticipation: Women had already chosen their place of birth even by 2 weeks of pregnancy. Women strongly value their autonomy, wishes to avoid the wrong place of birth for child, and wished to avoid undesired tx.
Hutton, E.K., Reitsma, A.H., & Kaufman, K. (2009).	To compare outcomes of all women planning from birth with a matched sample of women planning hospital birth.	Retrospective cohort study from 2003-2006 using the Ontario Ministry of Health Midwifery Program (OMP) database	The home birth group had lower c/s (RR 0.64), maternal morbidity/mortality (PP 0.77) and neonatal	N=6692 home birth, N=6692 hospital birth	Ontario midwives provide adequate screening for women planning home births. Women excluded for > 1 c/s, breech, multiples, preterm

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			mortality/morbidity (RR 0.80)		gestation, induction, and any transfers of care.
Janssen, P.A., Lee, S.K., Ryan, E.M., Etches, D.J., Farquharson, D.F., Peacock, D., & Klein, M.C. (2002)	How do maternal and neonatal outcomes differ for planned home vs hospital birth. Outcomes included epidural use, episiotomy, induction/augmentation rates, c-section rates, and perinatal mortality, 5-minute apgar <7, mec aspiration syndrome, or need to transfer for special newborn care.	Planned homebirths with midwives planned hospital births Prospective cohort from 1/1/98-12/31/99. Registered women at 36 weeks if intended to deliver at home. Hospital-intended pts were registered if they met all inclusion criteria for homebirth (i.e. only LOW Risk hospital birth group).	There were 31 emergency transports (=3.6%). Homebirth group more likely to have intact perineum (p=.003). No sig diff btw PPH or 3-4th degree lacs. Neo outcomes taken for babies without major congenital anomalies; 3 cases of perinatal death in homebirth group, only 1 in hosp group. (nonsig RR 0.27-24.5 with 95%CI)	n=862 with midwife, n=1314 with hospital birth (571 w/midwives and 743 w/MDs.	All midwives (58 in BC) have passed written, oral, and practice exams set by College of Midwives of BC and all services are covered through a nationally-funded midwifery plan. EXCLUDED from homebirth and this study: multiple gestation, PIH/PET, diabetes, breech/abnormal presentation, more than one prior c-sec, GA<37w or >41w.
Janssen, P.A., Saxell, L., Page, L.A., Klein, M.C., Liston, R.M., & Lee, S.K. (2009).	How do maternal and neonatal outcomes differ for planned home vs hospital birth? Primary outcome was perinatal mortality. Secondary outcomes included obstetric interventions and adverse	Included ALL planned home birth from 2000 to 2004. In BC, Canada Followed the SAME midwives who delivered both in home and hospital (lessens variability between providers) n = 2889 midwife attended home births and n = 4752 of	Perinatal mortality 0.35 (95% CI 0.00-1.03) planned home births 0.57 (95% CI 0.00-1.43) planned hospital births with midwife 0.65 (95% CI 0.00-	Perinatal mortality 0.35 (95% CI 0.00-1.03) planned home births 0.57 (95% CI 0.00-1.43) planned hospital births with midwife 0.65 (95% CI 0.00-	All midwives in Canada are registered and have either graduated with a baccalaureate degree in midwifery or registered with the college and passed written, oral, and practice-based exams. RISK EXCLUSIONS: gestational

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	maternal and neonatal outcomes	the same midwives in the hospital. Included a matched sample of MD hospital births of n = 5331. RISK EXCLUSIONS: gestational diabetes requiring insulin, > 1 fetus, malpresentation (cephalic only), <36 weeks and <41 weeks completed pregnancy, no more than one previous cesarean birth**, spontaneous labor Must be LOW risk as defined above Publically funded insurance Midwives are mandated to give low risk women the option of home or hospital delivery	1.56) planned hospital birth with MD Planned home birth transfer rate to the hospital 21.2% Planned home birth with significantly less obstetric intervention adverse maternal outcomes (e.g. 3-4th degree tear [RR] 0.41, 95% CI 0.28-0.59, and postpartum hemorrhage* [RR] 0.62, 95% CI 0.49-0.77).	1.56) planned hospital birth with MD Planned home birth transfer rate to the hospital 21.2% Planned home birth with significantly less obstetric intervention adverse maternal outcomes (e.g. 3-4th degree tear [RR] 0.41, 95% CI 0.28-0.59, and postpartum hemorrhage* [RR] 0.62, 95% CI 0.49-0.77).	diabetes requiring insulin, > 1 fetus, malpresentation (cephalic only), <36 weeks and <41 weeks completed pregnancy, no more than one previous cesarean birth**, spontaneous labor Must be LOW risk as defined above Publically funded insurance Midwives are mandated to give low risk women the option of home or hospital delivery LOW rate of perinatal mortality with planned home birth in women who are low risk PUBLICALLY RETRACTED SUMMARY. 2 HB deaths and none in the hospital group
Johnson, K, Daviss, B (2005)	Measured transfer rates, medical intervention rates (epidural, epis, forceps, vacuum, c-section), neonatal deaths. (no maternal deaths). Used North American Registry of Midwives, n=502 midwives, made participation in data collection mandatory for recertification. Peer reviews for all cases of	Prospective cohort study: all 5,418 women expecting to deliver in 2000 at home with certified professional midwives. xferred 655 women, 2 cases removed for death > 24 hrs of life then admitted(see p. 6 table on narrative of death) deaths = 14 with 2 cases removed for death> 24 hrs of life then admitted	No mention of p values in comparing home to hospital data	Validated info via 10% random sample where they contacted mother details of birth as reported in registry. HB deaths NOT compared to low risk hospital births. Study funded by HB foundation. Johnson	12.1% transferred to hospital intra or post partum. 83.4% of these intrapartum. Found 4 stillbirths from before labor, 3 births with fatal birth defects, which were excluded. Neonatal death rate 2.0 per 1000 but down to 1.7/1000 after excluding breech and twins. 2/93 = 2.15% death with breech or twins *see chart on p. 5 comparing other data sources, and narrative

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	neonatal mortality. Studied the U.S. & Canada, year 2000.	**excluded 4 antepartum term stillborns born OoH, 3 w/ anomalies		former Dir MANA. 12% xferred intrapartum	on p. 6 about neonatal deaths. **Breech** = 80 planned cases w/ 2 deaths, 3 xferred intrapartum / 655 **Twins** =13 sets of total / 5,418, 0 deaths **<37wk** = 77 cases of total / 5,418 **HTN** = 13 cases xferred intrapartum / 655 **thick meconium** = 49 xferred intrapartum / 655 **> 42 wk gestation** = unreported xfer #, 1 death = ?cases VBAC = ?cases
Kennare, R., Keirse, M.J. & Tucker, G.R. (2009).	To examine differences in outcomes b/t planned home births occurring at home or in hospital and planned home births	Retrospective population based study on all births and perinatal deaths from 1991-2006 in South Australia. Main measures are APGAR, asphyxia during birth, neonatal care, operative delivery, and perineal injury and postpartum delivery.	Planned home birth was 0.38% of 300,011 birth in South Australia. They had the same perinatal mortality rate BUT 7X higher risk of intrapartum death (95% CI, 1.52-35.87), 27X higher risk of intrapartum asphyxia (95% CI, 8.02-88.83).	N=1141 planned home birth, 297,192 hospital births	Includes TRANSFERRED and HIGH-RISK home births. Planned home birth was ANY birth that intended to occur at home The perinatal deaths were attributed to “inappropriate inclusion of women with risk conditions for home birth and inadequate fetal surveillance”. Had postdates death, twin death and poor surveillance. Summary: perinatal safety may be improved greatly with risk

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					assessment, timely transfer and close fetal surveillance. RESULTS mimic this study.
Leslie, M.S., Romano, A. (2007)	Systematic review of home birth and birth center safety studies.	Followed standard methods including reporting levels of evidence, disclosure of inclusion / inclusion criteria, and search strategies.	See pg 816 for chart of summary evidence.	Has specific parameters. Not as relevant for Oregon that allows for unlicensed (so can be uneducated) midwives and high-risk home deliveries. Not a peer reviewed scientific journal.	LOW risk women only to have a planned home birth according to authors. Compared hospital birth, home births and hospital birth and birth center births. Summary: OoH low risk births had similar outcomes and lower interventions.
Mac Dormand, M. Declercq, E., Menacker, F. (2011).	Trends and characteristics of home births in the Unites States.	Descriptive data using the U.S. National Center for Health Statistics focusing on race, ethnic, and geographic differences from 1999-2006.	See chart on pg 4 for % of home births across US	In 2006 38,568 OoH births in US. Of these 24,970 were home births.	NOTE: does not differentiate between planned and unplanned home births until 2006 with only 19 states reporting. Helpful for increasing home birth trends nationally. Not investigating HB safety
Malloy, M.H. (2010).	Examine the safety of homebirth with CNMs as compared to CNMs in hospital and “other midwife” out-of-hospital.	Retrospective cohort study using linked US birth and death certificate files from National Center for Health Statistics from 2000-2004. ONLY singleton, vertex, and vaginal deliveries were counted.	Deliveries at home attended by CNMS or “other Midwives” were associated with higher risk of mortality than CNM in hospital	N=1,237,129 CNM hospital births. 17,389 in-hospital “other” midwife attended birth. 13,529 home CNM births. 25,319 birthing center CNM births.	Did not distinguish planned or unplanned home birth. However by title of MW or Other MW one would assume it was planned versus EMT or freebirth. No definition for “other” midwife.

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			deliveries.		Found risks higher b/t CNM v. other MW with excessive bleeding, PH, precip deliveries, PROM.
Mehl-Madrona, L. & Madrona, M.M. (1997)	Analyzed home births attended by midwives and physicians 1970 to 1985	Retrospective, chart review & data form from total of 4361 midwife –attended and 4107 family physician attended. Midwives attended twin, breech, and post-dates labors at significantly higher rates. Matched 1000 for age group, insurance status, parity, and medical risk (Popras scoring system) to compare numbers, then used t-test, logistic regression	30% response rate from midwives invited to participate. Found significant differences in numbers of breech, twin, and post-dates deliveries. Nonsig difference in fetal death. Sig. less mortality (fetal and neonatal deaths) overall among FP group(14 vs. 5 in 1000 matched). And sig more neonatal resus with midwife group (22 vs. 6)	Seems pretty rigorous, though data was non random	Popras scoring system Used logistic regression to see if year of delivery had effect (none found). 3.1 relative risk of mortality for high-risk population delivering at home (EITHER lethal anomalies, breech, post dates, or twins) (95% CI 2.1-12.3, p=.002). Mentions increased perinatal mortality for breech births in hospital as well (per Williams Obstetrics)
Mori, R., Dougherty, M., & Whittle, M. (2008).	What is the best estimate of intrapartum related perinatal mortality rates for booked home births in England & Wales from 1994-2003.	Retrospective case control study over 10 yrs in Europe	Unsure. The # of woman with planned OoH birth – estimated number of unplanned + es # of xfers. The % of	The estimates seem to vary widely. Criticism was made that the authors estimated unplanned OoH of all home	In a response, even in changing the estimate as the detractors suggested, made little difference to the total data. The criticizers say the whole study lack validity or reliability. The original study

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			Xfer was estimated from 3 UK studies over 10 yrs.	births. They should have estimated unplanned OoH from the total and not the subset.	authors felt they were careful to state this was a cautious estimated study. **Use caution with estimates.
Murphy, P.A. & Fullerton, J. (1998).	To describe the outcomes of intended home birth practices of certified nurse-midwives.	29 US CNM practices were recruited for the study in 1994 to 1995. Outcomes for all enrolled women were ascertained. p. 465, Table 4 127 intrapartum / neonatal xfer within 24 hrs of delivery admit. 5 deaths intrapartum / infant within 24 hrs. intrapartum / neonate xfer (within 24 hrs of delivery) mortality rate of 39 per 1,000.	Whole sample 2.5/1000 infant mortality. For those birthing at home 1.8/1000 mortality. This is a higher intrapartal mortality rate. Usually .4/1000.	N=1404 women enrolled, N=102 were transferred to the hospital Relevance HB in Oregon? 95% ≠ < twins 90% ≠ breech 90% ≠ preterm 27% ≠ < VBAC	INCLUDES Xfers of care. Intrapartal problems were associated with transfer to hospital-based care. Higher intrapartal mortality with meconium passage and postdates. LOW RISK women only with highly trained, educated midwives = lower mortality or no significant different of fetal mortality.
Nguyen et al. (2009)	Whether OoH birth transfers had predictability Reasons for transfer	Prospective San Diego study on 12 birth centers from 1994 to 1996.	The focus was not on mortality outcomes but within their data, 626 planned OoH births transferred antepartum with 5 cases r/t intrauterine fetal demises	Calculated perinatal mortality rate of 8 per 1,000. Direct mortality not stated. May have had more deaths (e.g. prematurity) but only stated reason for xfer and 5 were for stillbirth.	*low risk* OoH births at birth centers. US perinatal mortality rate for antepartum xfers with IUFDs.

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Olsen, O. (1997).	How do perinatal outcomes differ between planned home vs. planned hospital births. Measured apgar scores, laceration rate, and intervention rate.	Meta analysis of 6 controlled-observational studies. Came up with Odds Ratio for safety of home birth.	No significant difference found in overall safety of home vs. hospital birth. (OR=0.87, 95% CI=0.541-.41.	Thorough lit search and inclusion criteria for studies. Only 2 studies included twins, non vertex, and c-section (those had hosp. Birth safer.) Different countries represented.	Table on p. 7 compares studies, including transfer rate, years, place. Shows difficulty of getting good data in many parts of the world, including US. Significantly less intervention, augmentation, operative delivery, episiotomy, and c-sec rate in hospital birth.low APGAR scores.
Olsen, O., & Jewell, M.D. (1998)	Metanalysis of randomized controlled trials	Comparing planned home births to planned hospital births for these outcomes: interventions, complications and morbidity.	Not significant.	The selection criteria was rigorous. Only one trial was included (n=11).	This sample was too small to draw any conclusion about the safety of home birth. Compared hospital group that includes high-risk home birth
Pang, J., et al. (2002).	Compare outcomes of planned home vs. hospital births in Washington State 1989-1996. N=5854 home births, N=279 transfers, N=10,593 hospital births) Compared neonatal death, apgar scores, prolonged labor, and pph	Population-based cohort study using Washington state birth certificate data from 1989 to 1996 (birth certificates included links to death certificates as well as apgar scores, neonatal respiratory distress, postpartum bleeding, and prolonged labor. Defined planned home births as singleton newborns > 34 wks delivered at home with midwife, nurse, or MD listed as birth attendant. Excluded	RR of neonatal death 1.99 for home vs hospital birth (95% CI 1.06-3.73). Stronger in nulliparous (RR 2.73 95% CI; 1.09-3.97). RR of pph 2.76 (95% CI 1.74-4.36). RR of prolonged labor 1.73, 95%CI 1.28-2.34). RR of very low	Large N, 95% CI – appears rigorous. Wide confidence intervals Definition of prolonged labor? Definition of very low apgar score: <3 Neonatal mortality 3.5 in 1000 live births for planned home births and 1.7 in 1000	Unbiased analysis (MPH), high N, limited by birth certificate data being incomplete, uncertain of intended home births. DOES address population with intended home birth and transfer to hospital. Discusses other data from Missouri and North Carolina ?contact author: Jenny Pang, MD, MPH. jwpang@u.washington.edu

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		pregnancy-related complications such as anemia, cardiac disease, diabetes, lung disease oligo, HSV, HTN, cervical incompetence, and more – see methods.	Apgar scores at 5 minutes 2.31, 95% CI 1.29-4.16) after age adjustment.	for hospital births	HB increases risk of death
Rooks, Weatherby, and Ernst (1992)	Studied 84 North American birth centers for 2.5 years from 6/1985 to 12/1987. Part III specific to complications includes mortality and OoH xfers	2.5 year prospective study on the outcomes of women who birthed in birth centers. Follow up in 4-6 wks on mother and baby. Of 1,869 term intrapartum women transferred from a birth center to a hospital from an intended out-of-hospital (OoH) birth, 11 neonatal deaths were found (including 5 with congenital anomalies) See Table 18 p.380	The transferred intrapartum to neonatal OoH mortality was ~6 per 1,000 including anomalies.	Large N., US study 16% intra/ peri/ postpartum	In their study report about complications, a transferred neonatal mortality rate could be calculated. 16% xferred. Liberal use of transfers to hospital. Included 3 LDM run centers / 84 BCs **Preterm** = 32 xfer intrapartum **twins** = 12 sets, 4 xferred; 6 were known prior to delivery nonvertex (breech?) = 39 xferred **HD** = 152 xferred intra/ peri/ postpartum **thick meconium** = 210 xferred intra/ peri/ postpartum **> 42 wk gestation** = 254 xferred intrapartum Seemed to have earlier xfers and smoother xfers of care?
Schramm,	A study of 4,054 Missouri	Compare the outcomes of	Neonatal mortality	N=4054 total. 3,645	For planned home births attended

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W.F., Barnes, D.E., & Bakewell, J.M. (1987).	home births from 1978-1984	planned home births in Missouri	was elevated for planned home births (17 observed deaths v. 8.59 expected)	births whose status was identified. 3,067 births were planned OoH.	by physicians, CNMs or Missouri recognized midwives, there was little difference in mortality rates. Study shows the importance of having trained attendants at planned home births. Mortality increased with unskilled attendants. Relevant to Oregon with unlicensed and licensed attendants.
van der Kooy, J., Poeran, J., de Graaf, J.P., Birnie, E., Dentkas, S., Steegers, E.A.P., & Bonsel, G.J. (2011).	A comparison of the Netherlands registry for intrapartum and early neonatal deaths in low risk pregnancy b/t OoH and hospital births	Voluntary perinatal registry outcomes of n=679,952 (2002-2007)	Observed PM of 0.15% planned OoH v. 0.18 in low risk planned hospital births RR 0.80.	Largest perinatal registry of its kind, government health care, small country	OoH birth for LOW RISK was lower for planned home birth using the “perfect” risk guideline approach.
Wax, JR., Lucas, F.L, Lamont, M., PInette, M.G., Cartin, A., Blackstone, J. (2010a)	Meta-analysis of the safety of planned home versus planned hospital birth.	Meta analysis showed odds risk ratio of 3X higher infant mortality with home birth v. hospital birth. Used 12 studies and 500,000 births from U.S. Canada, Australia, Sweden, the Netherlands, & Switzerland.	Unsure, the American data is not able to differ between planned and unplanned HB. The reason for death was usually breathing and resuscitation failure.	Lacking. Used selective inclusion and exclusion criteria that is flawed	Results show that there is a 3X higher rate of mortality with home birth rather than hospital birth. However researchers used studies that could not differentiate (e.g. Pang) between planned and unplanned home birth (known to be much higher risk.)

Synopsis			Findings		Applicability
Citation Author, year only	Question, variables Independent (I Var) and Dependent (D Var) Variables	Design Design, Sample Population	Significance Statistical & clinical significance	Credibility Rigor in data collection, analysis	To whom and under what situations could findings apply
Wax, JR., Pinette, M.G, Cartin, A., Blackstone, J. (2010b)	A retrospective population based cohort study to evaluate perinatal mortality by place of birth – hospital, birth center, home)	Used US birth cert data from 19 states through the CDC for year 2006.	Lacking. This study did not differentiate between planned and unplanned home birth with potential to greatly skew results.	Lacking. This study did not differentiate between planned and unplanned home birth with potential to greatly skew results.	HB are associated with less frequent adverse perinatal outcomes (excluding those < 37 wk, smokers, gestation diabetes, diabetes I, PIH or prior c/s). However, home births had more abnormal labors, lower apgars, and lower birthweights. This study did not differentiate between planned and unplanned home birth with potential to skew results.

Appendix D: Table of evidence: Out-of-Hospital Birth Ethics & Policy

Synopsis			Findings		Applicability
Citation Author, year only	Question, variables Independent (I Var) and Dependent (D Var) Variables	Design Design, Sample Population	Significance Statistical & clinical significance	Credibility Rigor in data collection, analysis	To whom and under what situations could findings apply
Amelink-Verburg, M.P. & Buitendijk, S.E. (2010).	How the concept of "normal" birth (or high v. low risk) birth was developed into the Dutch List of Obstetric Indications	39 LOIs in 1958 143 LOIs in 143 How/who developed the additional LOIs?	Odds of an obstetrician being involved in a birth increased from 24.7% in 1964 to 59.4% in 2002.		These "normal" parameters were built by a multidisciplinary group and as a result the outcomes for Dutch home birth are improved with a perinatal mortality rate of 0.46 to 1.4 per 1,000 live births in the Netherlands (deJonge et al., 2009; Evers et al., 2010). Risk selection is an integral part of the Dutch birthing system.
Anonymous, Lancet (2010).	Ethics editorial	Discussed maternal autonomy v. infant risk of HB delivery	N/A	N/A	Summary: HB is a good option for those that are low risk, have a midwife with good resus skills (accredited), and live in a location that has quick access to higher level care.
Bell, A.F. (2007)	Ethics of childbirth from a researcher, CNM perspective	Discussed the concept of being a nurse midwife and being a researcher scientist and how to navigate the waters ethically.	N/A	N/A	This discussed how to study an intuitive, intimate process, birth, while remaining ethical. Chiefly not to disrespect a woman by assuming she is NOT making an informed choice because it is not what I deem healthiest for her of the baby.
Cheyney, M.C. (2008).	How do some women arrive at the decision to birth outside the hospital (p.	Used a modified ground theory to create a qualitative study. Had a convenience	Using a research tool (Ethnograph), developed	Her paper was clear in its study question; the qualitative	Reasons why women choose home birth. Conclusion that homebirthers

Synopsis			Findings		Applicability
Citation Author, year only	Question, variables Independent (I Var) and Dependent (D Var) Variables	Design Design, Sample Population	Significance Statistical & clinical significance	Credibility Rigor in data collection, analysis	To whom and under what situations could findings apply
	255)?	sample of 13 women from a "Pacific Northwest college town" then 37 women from a Midwest college town from the years of 2000-2002	categories, completed her data analysis and sent the findings to the participants for a final focus group for further comment and critique.	approach was appropriate Was a convenience sample, but seemed representative of the question being asked;.	desire intimacy, power and knowledge Discussion about awareness of these issues for women who xfer. , Did not state in her limitations that she was a home birth midwife.
Hafner-Eaten, C. & Pearce, L.K. (1994)	A Constitutional medical-legal analysis of whether home birth with DEMs are a safe alternative to physician attended hospital birth. Researchers from OSU.	Oregon is used as an example discussing Oregon Midwifery Council as a self-regulatory body.	Based on the definition that low to moderate risk home birth are being attended by DEMs and is as safe. Do not believe this is an evidenced based statement.	In 1994, Oregon was performing low risk home birth as defined by the state. In 2001 this was changed to include greater parameters including VBAC, twins, and breech. This is an invalid argument now based on old rules.	Two questions asked: 1. Should DEMs be legally recognized as valid birth attendants and 2) Do parents have a constitutional right to choose site of birth.
Hosmer, L. (2001).	A discussion on the evidence and history of HB	A brief review of history of obstetrics, why women birth at home, who births at home, planned v. unplanned HB, safety of HB – international and national studies	N/A	N/A	Safe HB should include well trained attendant, low risk, adequate screening, back up physician, and xfer to a nearby hospital
McLachlan, H. & Forster, D.	What does the evidence say about home birth?	A commentary on what the evidence does forward.	N/A	N/A	Low risk HB w/ an educated provider w/ good transport

Synopsis			Findings		Applicability
Citation Author, year only	Question, variables Independent (I Var) and Dependent (D Var) Variables	Design Design, Sample Population	Significance Statistical & clinical significance	Credibility Rigor in data collection, analysis	To whom and under what situations could findings apply
(3009)					protocols & seamless back up is EVB practice
Newman, L.A. (2008).	Why planned homebirth should be more widely supported in Auz	Discussed the differences btwn evid for LOW risk v. High-risk HB M&M	N/A	N/A	Summary: that Auz should provide more options for LOW risk HB.
Symon, A., Winter, C., Donnan, P.T., & Krikham, M. (2010).	Examined UK midwifery management and decisionmaking in 14 instances of perinatal term (36 wk or>) gestational death	Qualitative analysis using case studies to identify themes. Case notes were from the time of management to infant death.	HB was attempted in 13 of the 15 cases. Women were with high-risk conditions. 4 of the 15 had known causes. 7 deaths were unpreventable. Elective c/s may have changed the outcome in 8 cases.	N=15 term infant deaths in UK	Signif & multiple risk conditions were identified including twins, VBAC, breech and maternal illness. Only 2 deaths were risked as low risk. Some women declined all or part of routine screening. 3 of the deaths were prior to labor onset. Xfer of care was a problematic with communication and being dismissed in urgency Authors felt that women should make decisions that allow that high-risk situations are acceptable
Torres, J.M. & De Vries, R.G. (2009)	A review of moral and ethical problems that women face during prenatal, intrapartum and postpartum	Using a naturalized bioethics approach as forwarded by Margaret Walker and colleagues	N/A	N/A	Respect parental choice in informed consent for prenatal testing, desires to avoid invention, Tx for illness,
Vedam, S. and Kolodji, Y. (1995).	Guidelines for the right client for HB	Choosing the appropriate pt for HB that includes health, social, and psychological	N/A	N/A	See p. 509 for a list of generally accepted Medical Conditions that are High-risk. VBAC is not

Synopsis			Findings		Applicability
Citation Author, year only	Question, variables Independent (I Var) and Dependent (D Var) Variables	Design Design, Sample Population	Significance Statistical & clinical significance	Credibility Rigor in data collection, analysis	To whom and under what situations could findings apply
					listed.
Walker, J. (2000).	Conference gathering regarding the quality of home birth midwifery in around the world	Report of opinions regarding the state, education, and sustainability of HB.	N/A	N/A	Synopsis of HB MW in Europe and Africa mostly.

Appendix D: Table of evidence: Other Sources of Evidence: Professional Organization Policy Statements

American College of Nurse Midwifes. (n.d.). The American College of Nurse-Midwives: ACNM expresses concerns with recent AJOG publication on home birth. Retrieved from http://www.midwife.org/documents/ACNMstatementonAJOGhomebirthstudy_071310_2__2_.pdf

American College of Nurse Midwifes. (2006). Position statement: Home birth. Washington, D.C.: *American College of Nurse-Midwives*. Retrieved from http://www.midwife.org.siteFiles/position/homeBirth.pdf

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American Congress of Obstetricians and Gynecologists. (2011). The American College of Obstetricians and Gynecologists issues opinion on planned home births. Retrieved from http://www.acog.org/from_home/publications/press_releases/nr01-20-11.cfm

Department of Health, South Australia. (2007). Policy for planned birth at home in South Australia. Adelaide: Government of South Australia, 2007. Retrieved from http://www.health.sa.gov.au/PPG/Default.aspx?tabid=189

Governing Council of the American Public Health Association. (2001). Policy statement no. 2001-3: Increasing access to out of hospital maternity care services through state-regulated and nationally-certified direct-entry midwives. Washington, APHA. Retrieved from http://mana.org/APHAformatted.pdf

Royal Australian and New Zealand College of Obstetricians and Gynaecologists. (1987, updated 2001, updated 2009). College statement: C-Obs 2 home births. Retrieved from http://www.ranzcog.edu.au/publications/statements/C-obs2.pdf

Royal College of Obstetricians & Gynaecologists, and Royal College of Midwives. (2007). Homebirths. Joint statement No. 2 April 2007. Retrieved from http://www.rcog.org.uk/index.asp?PageId=2023

World Health Organization. (1996). Care in normal birth: A practical guide. Geneva: WHO Safe Motherhood Technical Working Group. Retrieved from http://whqlibdoc.who.int/hq/1996/WHO_FRH_MSM_96.24.pdf

Appendix E: Maternal Form – Abridged

Complete this form for each intrapartum transfer. Complete as much as possible for each neonatal transfer.

ADMISSION

1. Number of fetuses: ____

A. IF ≥ 2 fetuses & u/s done, Chorionicity: ___
0 = Not documented
1 = Di-Di
2 = Mono-Di
3 = Mono-Mono

2. Primary reason for admission to OHSU: ____ ____

00 = Mom never admitted to L&D
01 = Failure to progress 1st stage
02 = Failure to progress 2nd stage
03 = Non-reassuring fetal status
04 = prolonged ROM
05 = Preterm PROM
06 = Preterm labor
07 = Maternal request
08 = Vaginal bleeding / abruption
09 = Meconium stained amniotic fluid
10 = Maternal fever
11 =Preeclampsia /gestational HTN
12 =Breech / other malpresentation
99 = Other

If "Other" (99), specify, _____

Was xfer □ **ante** □ **intra** □ **post – partum?**

3. Prenatal record available to L&D at delivery: ____
0 = No
1 = Yes
8 = Not documented

6. Labor record available at time of transfer? ____
0 = No
1 = Yes, complete record
2 = Summary sheet only
8 = No, but not applicable

7. Title of primary antenatal care provider: ___
0 = No prenatal care
1 = CNM
2 = Naturopathic doctor (ND)
3 = Family Practitioner
4 = Licensed midwife (LM or LDM)
5 = Unlicensed midwife (DEM)
6 = Co-managed with OB or MFM

MEDICAL / OB HISTORY

13. Total pregnancies (G): ____ ____
Include current pregnancy and past miscarriages, abortions, & stillbirths.

# of previous c/s deliveries:___ ___

IF above >0, answer all the following:

d1) Any classical, T, or J uterine incision documented? □ yes □ no
d2) Are all prior c-sections documented as Low Transverse? □ yes □ no
d3) Were any prior c-sections performed ≤ 18 months before current EDD? □ yes □ no
d4) Total completed VBACs, if applicable ___ ___

d5) Primary Indication for prior c-section ___ ___
01 = Non reassuring fetal status
02 = Dystocia
03 = Cord prolapse
04 = Non cephalic presentation
05 = Cofetal indication
06 = Suspected macrosomia
07 = Abruption
08 = Previa w/ hemorrhage
09 = Previa w/o hemorrhage
10 = Prior cesarean
11 = Failed induction
12 = Other medical complications

LABOR & DELIVERY

19. Time from hosp arrival to delivery: ___ ___ ___hrs

20. Gestational Age @ delivery: _____ W _____ d

21. Cervical dilation at admit: _____ cm

22. Membrane status at admit: _____
0 = Intact
1 = Ruptured

23. Presentation at delivery: _____

1 = vertex
2 = Breech: frank
3 = Breech footling
4 = Breech, double footling
5 = Breech, no type specified
6 = Non-breech malpresentation (i.e. transverse lie)
7 = Vertex but asynclitic
8 = Multiple gestation (not applicable)
9 = Not documented

24. Successful delivery mode: _____
1 = Spontaneous vaginal
2 = Vaginal forceps
3 = Vaginal vacuum
4 = Breech extraction
5 = Cesarean delivery
6 = Forceps at cesarean
7 = Vacuum at cesarean

If C/S delivery (# 5, 6, 7),

Primary indication _____ _____
01 = Non reassuring fetal status
02 = Dystocia
03 = Cord prolapse
04 = Non cephalic presentation
05 = Cofetal indication
06 = Suspected macrosomia
07 = Abruption
08 = Previa w/ hemorrhage
09 = Previa w/o hemorrhage
10 = Prior cesarean
11 = Failed induction
12 = Other medical complications

POSTPARTUM (VAGINAL & C / S)

25. Perineal or other laceration requiring suture?
☐ **yes** ☐ **no**

26. Estim. blood loss: ___ ___ ___ ___ ml

27. Pertaining to postpartum complications, were any of the following conditions present:

A. Maternal ICU admission? ☐ **yes** ☐ **no**
B. Uterine rupture? ☐ **yes** ☐ **no**
C. Postpartum Blood transfusion? ☐ **yes** ☐ **no**
D. Postpartum IV Iron administration? ☐ **yes** ☐ **no**
E. Significant maternal complications not mentioned above? ☐ **yes** ☐ **no**
If yes, please specify: _____

INFANT

28. Live or stillbirth: _____
1 = Live birth
2 = Intrapartum stillbirth
3 = Antepartum stillbirth (IUFD prior to labor)

29. Birth weight: _____ gms

30. Congenital malformations? ☐ **yes** ☐ **no**
Was congenital abnormality identified prenatally?
☐ **yes** ☐ **no**

31. Apgar scores:
a. 1 minute: _____ _____
b. 5 minute: _____ _____
c. 10 minute: _____ _____

32. Highest level of care required: ____
1 = Well baby nursery/routine care
2 = DNCC observation
3 = DNCC admission
4 = Baby died before NICU admit

33. Was baby readmitted to NICU in first 28 days of life?
☐ **yes** ☐ **no**

Please fill out NICU sheet if needed.

For twin gestations, please fill out next 2 pages for TWIN B. Or check here if ☐ n/a

ANSWER THESE QUESTIONS FOR TWIN B ONLY

34. Live or stillbirth: _____
1 = Live birth
2 = Intrapartum stillbirth
3 = Antepartum stillbirth (IUFD prior to labor)

35. Birth weight: _____ gms

36. Congenital malformations? ☐ **yes** ☐ **no**
Was congenital abnormality identified prenatally?
☐ **yes** ☐ **no**

37. Apgar scores:
d. 1 minute: _____ _____
e. 5 minute: _____ _____
f. 10 minute: _____ _____

38. Highest level of care required: ____
1 = Well baby nursery/routine care
2 = DNCC observation
3 = DNCC admission
4 = Baby died before NICU admit

39. Was baby readmitted to NICU in first 28 days of life?
☐ **yes** ☐ **no**

Initials of person completing form:_____

Time to complete form: _____:_____ (hour : minute)

Please fill out separate NICU sheet for twin B if needed.

Appendix E: NICU Form

Complete form for every baby observed or admitted to NICU.

1. Birth order if >1 gestation: _____

2. Date admitted to NICU / intermediate nursery. (mo/ day/ year)
___ ___ / ___ ___ / _____

3. Main reason for admittance: _____
01 = RDS at term
02 = Prematurity
03 = TTN
04 = Suspected infection
05 = Hypovolemia
06 = Anomaly
07 = Hypoglycemia
08 = Suspected HIE
09 = Meconium aspiration
99 = Other
If Other (99) , Specify:

4. Continuous positive airway pressure (CPAP)? ☐ **yes** ☐ **no**
If YES, # of days on CPAP:
_____ _____ _____ days

5. Ventilator support w/in 24 hrs of birth?
☐ **yes** ☐ **no**
If YES, # of days on ventilator:
_____ _____ _____ days

6. Respiratory distress syndrome (RDS)? :☐ **yes** ☐ **no**

a) Meconium Aspiration syndrome?:
☐ **yes** ☐ **no**

7. Bronchopulmonary dysplasia (BPD) ☐ **yes** ☐ **no**

8. Persistent pulmonary hypertension of the newborn (PPHN)? ☐ **yes** ☐ **no**

9. Seizures: _____
0 = No, 1 = Suspect, 2 = Yes

10. EEG done? : ☐ **yes** ☐ **no**
If YES, a. EEG confirmed seizure.
☐ **yes** ☐ **no**
b. burst suppression pattern dxed?
☐ **yes** ☐ **no**

11. Cardiopulmonary resuscitation w/in first 24 hrs? ☐ **yes** ☐ **no**

12. Proven newborn sepsis?
☐ **yes** ☐ **no**

13. Pneumonia confirmed by x-ray or culture? ☐ **yes** ☐ **no**

14. Proven meningitis?
☐ **yes** ☐ **no**

15. Necrotizing enterocolitis (NEC)?
☐ **yes** ☐ **no**
If YES, Stage: _____
1 = Stage I, 2 = Stage II, 3 = Stage III

16. Neurologic injury or prolonged hypo-tonicity within 72 hrs of birth? ☐ **yes** ☐ **no**

17. CT or MRI performed?
☐ **yes** ☐ **no**

18. Head ultrasound performed?
☐ **yes** ☐ **no**

19. Most severe grade of intra-ventricular hemorrhage (IVH): ____
0 = None / not done
1 = Grade I
2 = Grade II
3 = Grade III
4 = Grade IV

HYPOXIC-ISCHEMIC ENCEPHELO-PATHY

20. Level of consciousness: _____
1 = Normal
2 = Lethargic
3 = Stupor / coma
8 = Not documented

Dx of HIE in chart?: ☐ **yes** ☐ **no**

21. Spontaneous activity: ____
1 = Normal
2 = Decreased activity
3 = No activity
8 = Not documented
Posture: ____
1 = Normal
2 = Distal flexion, complete extension
3 = Decerebrate
8 = Not documented

22. Tone: _____
1 = Normal
2 = Hypotonia
3 = Flaccid
4 = Hypertonia
8 = Not documented

23. Reflex: ____
1 = Normal
2 = Weak
3 = Absent
4 = Not documented

24. Pupils: ____
1 = Normal
2 = Constricted
3 = Deviation / dilated /non-rxt light
8 = Not documented

25. Heart rate: _____
1 = Normal
2 = Bradycardia
3 = Variable HR
8 = Not documented

26. Respiration: ____
1 = Normal
2 = Periodic breathing
3 = Apnea
4 = Retracting, grunting or flaring
5 = On ventilator
8= Not documented

27. Number of days admitted to DNCC: _____

28. Final status of infant: _____
1 = Died before final discharge
2 = Discharged to home
3 = Discharged to chronic care facility
8 = Not documented

29. Is there a note of infant death anywhere in chart? _____
0 = No
1 = Died first 7 days of life
2 = Died 8-28 days of life
3 = Died 29days – 1 yr of life

If YES,
cause:_____
_____
_____

Further comments on back of form.

Initials of person completing form: ____

Time to complete form: ____:___ hr:min

Appendix E: Form Instructions

1. Black ink must be used when completing all data forms, with the exception of the screening logs. If a change is made, line out the old value, write the new value just above the old value, and clearly initial and date. Tape, correction fluid, or erasures should never be used to alter an entry. The original entry should remain legible.

2. Complete the header information with the patient code on each page.

3. Dates should be recorded using an MMDDYYYY format, i.e., the date November 2nd, 2007 will be recorded as "11/02/2007".

4. Record time using a 24-hour clock. For instance, 10:15 a.m. should be recorded as "10:15", and 10:15 p.m. should be recorded as "22:15".

5. Only times "00:00" through "23:59" are acceptable times. The time 11:59 p.m. on September 30, 2007 will be recorded as "09/30/2007" and "23:59", but one minute later will be recorded as "10/01/2007" and "00:00".

6. If you are aware that the value you are writing is "out of range," write your initials and the date alongside the field.

7. With the exception of gestational age, the traditional rounding-off rule should be used when necessary (five and up should be rounded up, four and below should be rounded down). For example, a height of "62.65 cm" should be rounded up to "63 cm". If gestational age in weeks is requested, completed weeks should be used. If the patient is 25 weeks, 5 days, then 25 weeks gestation is answered. If hours are requested then 3 hrs and 15 minutes = 3 hrs and 3 hrs and 30 minutes = 4 hours for an estimation example.

8. For questions that request a text answer ("specify" or "explain" fields), concise explanations should be entered in the field provided. Do not enter "see comment". Answers that are too long for the "specify" field should be continued in the comment field for that question.

9. The initials recorded on the form should be those of the person who is completing the form, not the person who is entering the data into fields.

10. If none of the codes in a code box reflect the correct answer, enter an asterisk (*) and enter a comment with the correct answer.

11. If there are conflicting data in the chart (eg, nurse's admitting note says the patient smokes and provides amount, but the MD admitting note says the patient does not smoke), use your best judgment (in this example, the coordinator believes the nurse's notes). For outcomes of interest around the time of delivery, such as estimated blood loss, the delivery chart may be best.

12. Definitions for time periods for intrapartum and postpartum are all defined by delivery of the baby, not the placenta: intrapartum - time period ends at delivery of the baby (before delivery of last born in a multifetal pregnancy); postpartum - time period begins at delivery of the baby (delivery of the last born in multifetal gestations).

13. Time periods that begin at admission, or say during admission, are referring to the delivery admission

and will include triage, unless otherwise specified.

Missing Data Values

Missing data values should be recorded as follows:

- A temporarily missing value is defined as data that are not available when the form is completed but will be available in the future; for example, if a test report has not yet been filed in the patient's medical chart. This should be indicated using a question mark (?). The question mark should be placed beside the box for which the data are unavailable.

- A permanently missing value is defined as data that will **never** be available; for example, results for a test that was never performed. This should be indicated using an asterisk (*). Use of the asterisk in this fashion applies to dates and times as well. If the question involves printed options (as in YES/NO questions), cross out the printed options and write an asterisk (*) beside it. Some questions will require a comment to explain why the data are missing. If one of the options in the code box is "Not Documented", then the answer to the question should never be missing (*).

Instructions for Completing Maternal Form

Patient Group: Complete for each delivery
Who completes: Certified study personnel
Special Instructions:

- To complete the form, use clinical diagnoses of the various conditions as noted in the patients' charts, unless instructed otherwise.

Instructions for Completing Delivery and Neonatal Baseline Form

Patient Group: All infants/fetuses
Who completes: Certified study personnel
Special Instructions:

- A separate form is completed for each infant/fetus, no matter the outcome of the eligible pregnancy.

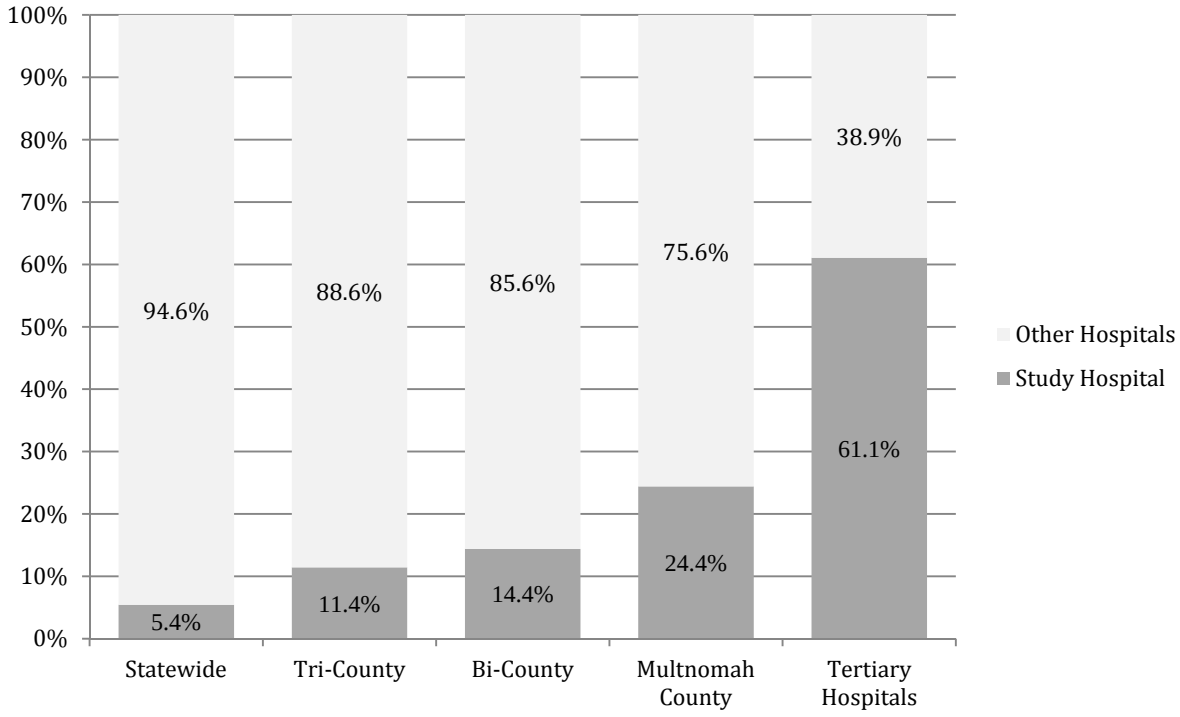
- Information for this form is obtained from the infant and maternal chart.

- For infants that remain in the hospital past 120 days, do not include outcomes that occur after 120 days from the date of delivery.

- A separate NICU Summary Form must be completed for each infant that goes to a NICU/intermediate nursery.

Further explicit instructions on each variable are on file with the authors and can be requested.

Appendix F: Percentage of 2008 Live Births Occurring at the Study Hospital



Appendix G: 2009 Netherland's List of Obstetric Indicators

OBSTETRIC MANUAL

Final report of the Obstetric Working Group of the National Health Insurance Board of the Netherlands (abridged version)

The List of Obstetric Indications

What follows is the list of specific obstetric indications, including an explanation of the description of the obstetrical care provider and guidelines on how to deal with the consultative situation.

The obstetric indication list is divided into six main groups, within which reference is made to the various obstetric and medical disorders and diseases. Where necessary, an explanation is provided about the obstetric policy related to specific indications and upon what the referral policy is based. The right-hand column shows for each indication who is the most suitable care provider.

The main purpose of the indication list is to provide a guide for risk-selection. The primary obstetric care provider, midwife or GP is primarily responsible for this risk-selection. The Manuel is a consensus document showing the agreement reached by the professional groups on their decision-making structure.

Explanation of the codes used for the care providers

Code	Description	Care provider
A Primary obstetric care	The responsibility for obstetric care in the situation described is with the primary obstetric care provider.	midwife/G.P.
B Consultation situation	This is a case of evaluation involving both primary and secondary care. Under the item concerned, the individual situation of the pregnant woman will be evaluated and agreements will be made about the responsibility for obstetric care (see Section 4.5).	depending on agreements
C Secondary obstetric care	This is a situation requiring obstetric care by an obstetrician at secondary level for as long as the disorder continues to exist.	obstetrician
D Transferred primary obstetric care	Obstetric responsibility remains with the primary care provider, but in this situation it is necessary that birth takes place in a hospital in order to avoid possible transport risk during birth.	midwife/G.P.

List of specific obstetric indications

1. Pre-existing disorders – non-gynaecological

In cases of pre-existing disorders that are relevant to obstetrics, other care providers other than the midwife are regularly involved with care of the pregnant woman. In cases requiring consultation, it is necessary to involve the other care providers in the consultation.

For this reason, in disorders given code B in this section, attention should be given to collaboration with others outside the field of obstetrics. Attention should be paid to the counselling of women who are considering the possibility of becoming pregnant.

1.1	Epilepsy, without medication	A
1.2	Epilepsy, with medication Prenatal diagnostics are recommended in connection with the disorder and its medication. Optimal care requires consultation between all care providers concerned (midwife, G.P, obstetrician, neurologist).	B
1.3	Subarachnoid haemorrhage, aneurysms Care during puerperium can be at primary level.	C
1.4	Multiple sclerosis Depending upon the neurological condition, a complicated delivery and the possibility of urine retention should be taken into account. For optimal care, consultation between all care providers concerned is indicated.	B
1.5	Hernia nuclei pulposi This represents a C-situation in cases of a recently suffered HNP or where there are still neurogenic symptoms. It is an A-situation after treated hernia, especially if a previous pregnancy was normal. Both the medical history and the current clinical condition are relevant.	A/C
1.6	Lung function disorder The opinion of the lung specialist should be taken into account during evaluation.	B
1.7	Asthma Care during pregnancy, birth and puerperium can only take place at a primary level when the asthma involves lengthy symptom-free intervals, whether or not use is made of inhalation therapy. Consultation with the GP/specialist involved is recommended.	A/C
1.8	Tuberculosis, active Tuberculosis, non-active In cases of an active tuberculoses process and subsequent treatment, consultation should take place with the physician involved and the obstetrician regarding the clinical condition and care during pregnancy and birth. In cases of non-active tuberculosis, care during pregnancy and birth can take place at a primary level.	C A

1.9	HIV-infection As a result of the current possibilities of medical therapy for preventing vertical transmission, these patients should be cared for during pregnancy and birth in a hospital equipped for the treatment of HIV and AIDS.	C
1.10	Hepatitis B with positive serology (Hbs-AG+) Since 1988 it is important that a screening programme for this serology is carried out on pregnant women.	A
1.11	Hepatitis C Consultation with the obstetrician and follow-up by the pediatrician is recommended.	B
1.12	A heart condition with haemodynamic consequences Pregnancy and birth will have an effect on the pre-existing haemodynamic relationships. A cardiac evaluation is important.	C
1.13	Thrombo-embolic process Of importance are the underlying pathology and the presence of a positive family medical history. Pre-conceptual counselling is important.	B
1.14	Coagulation disorders	C
1.15	Renal function disorders When there is a disorder in renal function, with or without dialysis, referral to secondary care is recommended.	C
1.16	Hypertension Pre-existing hypertension, with or without medication therapy, will require referral to secondary care. Hypertension has been defined by the ISSHP as: A single event of diastolic blood pressure of 110 mm Hg or more (Korotkoff IV). Diastolic blood pressure of 90 mm Hg or more at two subsequent blood pressure measurements with an interval of at least 4 hours between the two measurements. A distinction should be drawn between a diastolic blood pressure under 95 mm and a pressure of 95 mm and higher. Extra attention should be paid to a pregnant woman with a diastolic pressure between 90 and 95 mm; from 95 mm, referral to secondary care should take place.	A/C
1.17	Diabetes mellitus	C
1.18	Hyperthyroidism	C
1.19	Hypothyroidism In cases of biochemical euthyroid, without antibodies and without medication, or stable on levothyroxine medication, care can take place at a primary level. Where levothyroxine medication	B

	is given, specific tests are recommended due to the frequent increase in medication required during pregnancy.	
1.20	Anemia, due to a lack of iron Anemia is defined as Hb<6.0 mmol that has existed for some time.	B
1.21	Anemia, other This includes the haemoglobinopathies.	B
1.22	Inflammatory Bowel Disease This includes ulcerative colitis and Crohn's disease.	C
1.23	System diseases and rare diseases These include rare maternal disorders such as Addison's disease and Cushing's disease. Also included are systemic lupus erythematosus (SLE), anti-phospholipid syndrome (APS), scleroderma, rheumatoid arthritis, periarteritis nodosa, Marfan's syndrome, Raynaud's disease and other systemic and rare disorders.	C
1.24	Use of hard drugs (heroin, methadone, cocaine, XTC, etc.) Attention should be paid to actual use. A urine test can be useful even in cases of past use in the medical history. The involvement of the pediatrician is indicated during the follow-up postpartum.	C
1.25	Alcohol abuse The fetal alcohol syndrome is important. The involvement of the pediatrician is indicated during the follow-up postpartum.	C
1.26	Psychiatric disorders Care during pregnancy and birth will depend on the severity and extent of the psychiatric disorder. Consultation with the physician in charge is indicated.	B

2. Pre-existing gynaecological disorders

2.1	Pelvic floor reconstruction This refers to colpo-suspension following prolaps , fistula and previous rupture. Depending on the cause, the operation technique used and the results achieved, the obstetrician will determine policy regarding the birth. A primary caesarean section or an early primary episiotomy can be considered, to be repaired by the obstetrician. If the chosen policy requires no special measures and no specific operating skill, then care during birth can be at primary level.	C
2.2	Cervical amputation	C

	Cervical cone biopsy	B
	Cryo- and lis-treatment The practical application of obstetric policy in this field can be worked out in local mutual agreements. If an uncomplicated pregnancy and birth have taken place following cone biopsy then a subsequent pregnancy and birth can take place at primary level.	A
2.3	Myomectomy (serous,mucous) Depending on the anatomical relationship, the possibility of a disturbance in the progress of the pregnancy or birth should be taken into account.	B
2.4	Abnormalities in cervix cytology (diagnostics, follow-up) There should be differentiation according to obstetric versus gynaecological policy. Gynaecological consultation can be indicated even without obstetric consequences. Participation in national cervical cancer screenings program is not provided pregnant women. The gynaecological follow-up is not an impediment to obstetric care at primary level.	B/A
2.5	DES-daughter (untreated and under supervision) There should be a differentiation according to obstetric versus gynecological policy. Gynaecological care related to the problems surrounding DES may be necessary, while obstetric care can take place at primary level.	B
2.6	IUD in situ	B
	Status following removal of the IUD	A
2.7	Status following infertility treatment In practice, the wish of the patient to be cared for at secondary level plays a role here, even though the pregnancy and birth are otherwise normal. There is no question of an increased obstetric risk.	A
2.8	Pelvic deformities (trauma, symphysis rupture, rachitis) Consultation should take place at the start of the last trimester. It should be pointed out that care at secondary level has not been shown to have any added value in cases of pelvic instability and symphysis pubis dysfunction.	B
2.9	Female circumcision/Female genital mutilation Circumcision as such can require extra psychosocial care. Where there are serious anatomical deformities, consultation should take place in the third trimester.	A/B

3. Obstetric medical history

3.1	Active blood group incompatibility (Rh, Kell, Duffy, Kidd)	C

	ABO-incompatibility Pregnancy and birth can take place at primary care level in cases of ABO-antagonism, but one should be on the alert for neonatal problems. Consultation is indicated.	B
3.2	Pregnancy induced hypertension in the previous pregnancy	A
	Pre-eclampsia in the previous pregnancy	B
	HELLP-syndrome in the previous pregnancy	C
3.3	Habitual abortion (3 times) If an abortion should occur again, the need to carry out pathological study of fetal material should be discussed. Genetic counselling prior to pregnancy is also advised.	A
3.4	Pre-term birth (<37 weeks) in a previous pregnancy If a normal pregnancy has taken place subsequent to the premature birth, then a further pregnancy can be conducted at primary care level.	B
3.5	Cervix insufficiency (and/or Shirodkar-procedure) Secondary level care during pregnancy is indicated up to 37 weeks; with a full term pregnancy, home birth is allowed. If a subsequent pregnancy was normal, then future pregnancies and deliveries can be conducted at primary care level.	C/A
3.6	Placental abruption	C
3.7	Forceps or vacuum extraction Evaluation of information from the obstetrical history is important. Documentation showing a case of an uncomplicated assisted birth will lead to the management of the present pregnancy and birth at primary care level. Consultation should take place when no documentation is available or when there are signs of a complicated assisted birth.	A/B
3.8	Caesarean section	C
3.9	Fetal growth retardation (Light for date) A birth weight of P<2.3 or obvious neonatal hypoglycemia related to fetal growth retardation.	C
3.10	Asphyxia Defined as an APGAR score of <7 at 5 minutes. It is important to know whether a pediatrician was consulted because of asphyxia at a previous birth.	B
3.11	Perinatal death Such an obstetrical history requires consultation. It is also important to know whether there was a normal pregnancy following the perinatal death. Pregnancy and birth can then be conducted at primary care level.	B

3.12	Prior child with congenital and/or hereditary disorder It is important to know the nature of the disorder and what diagnostics were carried out at the time. If no disorders can currently be discerned, then further care can be at primary care level.	B
3.13	Postpartum haemorrhage as a result of episiotomy	A
3.14	Postpartum haemorrhage as a result of cervix rupture (clinically demonstrated) The assumption is that there is a chance of a recurrence; the pregnancy and birth can be conducted at primary care level. The decision can be taken to allow birth to take place in the hospital.	D
3.15	Postpartum haemorrhage, other causes (>1000 cc) In view of the chance of a recurrence, although the pregnancy and birth can be conducted at primary care level, the decision can be taken to allow birth to take place in the hospital.	D
3.16	Manual placenta removal in a previous pregnancy In view of the increased recurrence risk, the next following pregnancy and birth can be cared for at primary care level, with the birth taking place in hospital. When the birth following one in which the manual placenta removal has taken place has had a normal course, a subsequent pregnancy and birth can be cared for at primary level. When in the previous birth a placenta accreta is diagnosed, obstetrical care at secondary level is indicated.	D
3.17	4th degree perineal laceration (functional recovery/no functional recovery) If satisfactory functional recovery has been achieved following the 4th degree tear, then pregnancy and birth can be managed at primary care level. The possibility of performing a primary episiotomy during birth should be considered. If secondary repair surgery was necessary, then referral to secondary care is indicated (similarly to that which is stated for pelvic floor reconstruction). If no functional repair has been achieved following a 4th degree tear , then birth should be managed at secondary care level.	A/C
3.18	Symphysis pubis dysfunction There is no added value to managing pregnancy or birth at secondary care level in cases with a symphysis pubis dysfunction in the history or with pelvic instability.	A
3.19	Postpartum depression There is no added value to managing pregnancy or birth at secondary care level in cases with a p.p.d. in the history. Postpartum depression occurs at such a time postpartum that even the puerperium can be cared for at primary care level.	A
3.20	Postpartum psychosis It is necessary to distinguish whether there is a case of long-term medicine use. It is important to have a psychiatric evaluation of the severity of the psychosis and the risk of recurrence.	A
3.21	Grand multiparty	A

	Defined as parity >5. There is no added value to managing a pregnancy and birth at secondary care level.	
3.22	Post-term pregnancy Post-term pregnancy in the obstetrical history has no predictive value for the course of the current pregnancy and birth.	A

4. Developed/discovered during pregnancy

In this section it is the case that supervision at secondary level care is necessary in situations given the code C, as long as the problem described still exists. If it no longer exists, then the patient can be referred back to primary level care.

4.1	Uncertain duration of pregnancy by amenorrhoea >20 weeks Consultation is required when the duration of pregnancy is uncertain after 20 weeks amenorrhoea. The primary care provider has access to sufficient additional diagnostic tools in the first 20 weeks.	B
4.2	Anemia (Hb<6.0 mmol/l) It is important that the nature and the severity of the anemia are analysed during consultation.	B
4.3	Recurrent urinary tract infections One can speak of recurrent urinary tract infection when an infection has occurred more than twice. Further analysis of the infection is required. The risk of renal function disorders and the risk of pre-term birth are important. The course of further diagnostics can take place within the local mutual agreements made between the three professional groups.	B
4.4	Pyelitis Hospital admission is required for the treatment of pyelitis, so that care will have to be at secondary level. After successful treatment of the pyelitis, further care during pregnancy and birth can be at primary level.	C
4.5	Toxoplasmosis, diagnostics and therapy Referral to secondary level is required both for diagnostics and for therapeutic policy.	C
4.6	Rubella An increased risk of fetal growth retardation, pre-term birth and visual and hearing disorders should be taken into account in a case of primary infection with rubella during pregnancy.	C
4.7	Cytomegalovirus An increased risk of perinatal death and subsequent morbidity should be taken into account.	C
4.8	Herpes genitalis (primary infection)	C

	Herpes genitalis (recurrent) During a primary infection there is a (slight) risk of transplacental fetal infection. In the first year after the primary infection, there is a higher frequency of recurrences and asymptotic virus excretion. If a primary infection occurs shortly before or during birth, there is an increased risk of neonatal herpes. Due to the possibility of treatment with antiviral drugs, referral to secondary care is indicated for primary infections. For recurrences and where herpes genitalis is in the medical history, it is advisable to carry out a virus culture from the oropharynx of the neonate. If there are frequent recurrences (>1/month) or where there is a recurrence during birth, referral is indicated due to the increased risk of infection of the neonate. It is as yet not clear whether the presence of antibodies are sufficient protection for the child.	A
4.9	Parvo virus infection This infection can lead to fetal anemia and hydrops. Possibilities exist for treating these problems.	C
4.10	Varicella/Zoster virus infection This refers to a maternal infection. Primary infection with varicella/zoster virus (chicken pox) during the pregnancy might require treatment of the pregnant woman with VZV-immunoglobulin due to the risk of fetal varicella syndrome. If varicella occurs shortly before birth or early during the puerperium, there is a risk of neonatal infection. Treatment of the mother and child with an antiviral drug is sometimes indicated. If there is a case of manifest herpes zoster (shingles), then there is no risk of fetal varicella syndrome.	B
4.11	Hepatitis B (Hbs-Ag+)	A
4.12	Hepatitis C This is an indication for referral to secondary care for consultation. Attention must be given to follow-up by the pediatrician.	B
4.13	Tuberculosis This refers to an active tuberculous process.	C
4.14	HIV-infection In connection with the present possibilities of medical therapy for preventing vertical transmission, care for these patients during pregnancy and birth should take place in a hospital/center equipped to deal with HIV and AIDS.	C
4.15	Syphilis Positive serology and treated	A
	Positive serology and not yet treated	B
	Primary infection Attention should be paid to collaboration between the primary and secondary care providers involved during referral. It is important to ensure perfect information exchange between the	C

	midwife, the GP, the obstetrician and the venereologist. Structural agreements can be worked out in local collaboration.	
4.16	Hernia nuclei pulposi, (slipped disk) occurring during pregnancy Policy should be determined according to complaints and clinical symptoms. Where there are no complaints, (further) care can take place at primary level.	B
4.17	Laparotomy during pregnancy As soon as wound healing has occurred and if the nature of the operation involves no further obstetric risks, care for the pregnant woman can return to primary level. During hospitalisation the obstetrician will be involved in the care. If there are no further obstetric consequences then care for the pregnant woman can return to primary level.	C
4.18	Cervix cytology PAP III or higher What is important here is that further gynaecological policy (for the purpose of subsequent diagnostics) may be necessary, while the pregnancy and birth can be conducted at primary level.	B
4.19	Medicine use What is obviously important here is the effect of drugs on the pregnant woman and the unborn child. Attention should also be paid to the effect on lactation and the effects in the neonatal period. In cases of doubt, consultation should take place. Note: information is available from the NIAD (030-2971100) and from the teratology center of the RIVM (030-2742017).	A/B
4.20	Use of hard drugs (heroin, methadone, cocaine, XTC etc.) The severity of the addiction to hard drugs is important here and their effects during pregnancy and birth and in the puerperium, particularly for the neonate.	C
4.21	Alcohol abuse This involves the fetal alcohol syndrome. Obviously the long-term involvement of the pediatrician can be necessary during follow up.	C
4.22	Psychiatric disorders (neuroses/psychoses) The severity of the psychiatric problems and the opinion of the physician in charge of treatment are important.	A/C
4.24	Hyperemesis gravidarum Referral to secondary care is necessary for treatment of this condition. After recovery the pregnancy and birth can take place at primary care level.	C
4.24	Ectopic pregnancy	C
4.25	Antenatal diagnostics Attention should be given to the presence of a risk for congenital deformities. If no deformities	C

	can be found, then further care can take place at primary level. In cases of an age-related indication, direct referral from primary care level to a genetic center can take place.	
4.26	(Suspected) fetal deformities	B
4.27	Pre-term rupture of membranes (<37 weeks amenorrhoea)	C
4.28	Diabetes Mellitus (incl. pregnancy diabetes)	C
4.29	Pregnancy induced hypertension This refers to hypertension (according to the ISSHP definition, see 1.16) in the second half of pregnancy in a previously normotensive woman. Distinction is drawn between diastolic blood pressure up to 95 mm and blood pressure starting at 95 mm. At a diastolic pressure between 90 and 95 mm, a pregnant woman should receive extra care, from 95 mm upwards, she should be referred to secondary level care.	A/C
4.30	Pre-eclampsia, super-imposed pre-eclampsia, HELLP-syndrome Pre-eclampsia is a combination of pregnancy induced hypertension and proteinuria. The latter is defined by an albustix ++ in a urine sample or by a total protein excretion of 30 mg or more during a period of 24 hours. A super-imposed pre-eclampsia exists when there is 'de novo' proteinuria during a pregnancy in a patient with pre-existing hypertension. The HELLP-syndrome is characterised by the combination of haemolysis, liver function disorder and a decrease in the number of platelets.	C
4.31	Blood group incompatibility	C
4.32	Thrombosis	C
4.33	Coagulation disorders	C
4.34	Recurring blood loss prior to 16 weeks	B
4.35	Blood loss after 16 weeks After the blood loss has stopped, care can take place at primary care level if no incriminating causes were found.	C
4.36	Placental abruption	C
4.37	(Evaluation of) negative size-date discrepancy A negative size-date discrepancy exists if the growth of the uterus remains 2 to 4 weeks behind the normal size for the duration of the pregnancy.	B
4.38	(Evaluation of) positive size-date discrepancy	B
4.39	Post-term pregnancy This refers to amenorrhoea lasting longer than 294 days.	C

4.40	Threat of or actual pre-term birth As soon as there is no longer a threat of pre-term birth, care during the pregnancy and birth can be continued at primary care level.	B
4.41	Insufficient cervix Once the pregnancy has lasted 37 weeks, further care can take place at primary care level.	C
4.42	Symphysis pubis dysfunction (pelvic instability) This refers to complaints that started during the present pregnancy	A
4.43	Multiple pregnancy	C
4.44	Abnormal presentation at full term (including breech presentation)	C
4.45	Failure of head to engage at full term If at full term there is a suspected cephalo-pelvic disproportion, placenta praevia or comparable pathology, consultation is indicated.	B
4.46	No prior prenatal care (full term) Attention should be paid to the home situation. The lack of prenatal care can suggest psychosocial problems. This can lead to further consultation and a hospital delivery.	A
4.47	Baby up for adoption The prospective adoption often goes hand-in-hand with psychosocial problems. This can lead to further consultation and a hospital delivery.	A
4.48	Dead fetus If the mother prefers to give birth at home, the care she receives should be the same as if the birth were to take place in a hospital. Attention should be paid to postmortem examination study and evaluation according to protocol.	C
4.49	Obstetrically relevant fibroids (myoma) Depending on the anatomical proportions, the possibility of a disturbance in the progress of pregnancy or birth should be taken into account.	B

5. Occurring during birth

For the C-category in this section, when one of the items mentioned below occurs, an attempt should still be made to achieve an optimal condition for further intrapartum care, whilst referral to secondary care level may be urgent ,depending on the situation. When referring from the home situation, the risk of transporting the woman also needs to be included in the considerations.

5.1	Abnormal presentation of the child What counts here is abnormal presentation and not abnormal position.	B
5.2	Signs of fetal distress It is important that fetal distress can be expressed in various ways (fetal heart rate, meconium staining in the amniotic fluid).	C
5.3	Intrapartum fetal death Attention should be paid to post-mortem examinations	C
5.4	Pre-labour rupture of membranes Referral should take place the morning after the membranes have been broken for 24 hours.	C
5.5	Failure to progress in the first stage of labour If the contractions are good, both regarding strength and frequency, but there is no change in the cervix or progress in dilation after the latent phase for a duration of 4 hours, one can speak of a failure to progress in labour. Consultation is necessary to be able to determine further treatment based on an analysis of the possible cause.	B
5.6	Failure to progress in second stage of labour This exists where there is a lack of progress, after a maximum of one hour, in cases with full dilation, ruptured membranes, strong contractions and sufficient maternal effort.	C
5.7	Excessive bleeding during birth The degree of bleeding during birth cannot be objectively measured, but needs to be estimated. Excessive loss of blood can be a sign of a serious pathology.	C
5.8	Placental abruption	C
5.9	Umbilical cord prolaps	C
5.10	(Partial) retained placenta It is not always possible to be sure of the retention of part of the placenta. If there is reasonable cause to doubt, then referral to secondary care should take place	C
5.11	Fourth degree perineal laceration	C
5.12	Meconium stained amniotic fluid	C
5.13	Fever It is obviously important to find out the cause of the fever. In particular, the possibility of an intrauterine infection should be taken into account and the administration of antibiotics intrapartum	C

	should be considered.	
5.14	Analgesia It is important to be aware of the effects on dilatation and respiratory depression. The use of painkillers during birth is a subject that can be covered during local discussions with the aid of guidelines. One should attempt to achieve well-founded consensus.	B
5.15	Vulva haematoma Treatment policy is determined according to the complaints intrapartum and in the early puerperium.	C
5.16	Symphyiolysis This refers to rupturing of the symphyseal rupture. It should be distinguished from pelvic instability. The added value of consultation in cases of pelvic instability has not been proven.	B
5.17	Birth with no prior prenatal care A lack of prenatal care can be a sign of psychosocial problems and in particular addiction. Intrapartum monitoring, serological screening and immunisation are of utmost importance.	C

6. Occurring during the puerperium

6.1	Puerperal fever It is important to know the underlying cause. In cases of reasonable doubt, referral should be considered.	A/C
6.2	(Threat of) eclampsia, (suspected) HELLP-syndrome	C
6.3	Thrombosis	C
6.4	Psychosis It is important to involve (non-obstetrically) the GP and the psychiatrist in treating the psychiatric disorder.	B
6.5	Postpartum haemorrhage	C
6.6	Hospitalisation of child It is obviously important here to involve (non-obstetrically) the GP and the pediatrician. The bonding between mother and child are important in the period following birth.	C

Retrieved from http://blog.lib.umn.edu/kuli0015/studygroup/2007/02/dutch_list_of_obstetrical_indi.html

on 17 April 2009

Appendix H: Case numbers for perinatal deaths from the BDEM final orders (2004-2008)*

2006

Case No: 06-2429: Related to Pregnancy induced hypertension ending in fetal demise.

2007

Case No: 07-5100: Related to breech delivery ending in fetal demise.

2008

Case No: 08-5222L Related to vaginal birth after cesarean causing uterine rupture ending in fetal demise and maternal hysterectomy.

Case No: 09-5591: Related to transverse positioning ending in fetal demise

Case No: 08-5454: Related to meconium present ending in fetal demise.

NOTE: All cases are available through request from Oregon Health Licensing Agency.

*Final orders cases were checked against the collected mortalities from the study hospital. Cases were rule out based on the licensed midwife's name and year. If the midwife name and year from a final order ending in mortality matched the midwife name and year for a transferred mortality, it was assumed they were the same and were removed from the overall mortality total.

Appendix I: Changed Vital Statistics Birth/ Death Data Collection

PUBLIC HEALTH DIVISION
Center for Health Statistics
John A. Kitzhaber, MD, Governor

Oregon Health Authority

800 NE Oregon Street, Suite 225
Portland, Oregon 97232-2162
Voice: 971-673-1180
FAX: 971-673-1201
TTY: 971-673-0372

October 4, 2011

Dear Colleagues:

I am writing to update you on the work the Public Health Division has been doing to improve the quality of the information on midwife attended births and fetal deaths, and to share plans for implementation of House Bill 2380.

Data Quality Assurance
Since last summer we have added steps to our quality assurance and editing processes for both the fetal death and birth files to ensure that the information on the paper certificates is captured correctly in the fetal death file.

Data Analysis
We have finalized the 2008 and 2009 birth and fetal death files, and are completing final editing on the 2010 data. We plan to start a more thorough analysis of birth outcomes by attendant type this fall.

House Bill 2380
As part of the implementation of House Bill 2380, we will be collecting the information below for any birth or reported fetal death that occurs in Oregon on or after January 1, 2012:

> Did the mother go into labor intending to deliver at home or in a freestanding birth center? If yes, what was the primary attendant type at the onset of labor?

Training materials, web-based training courses, instructions and worksheets are being prepared for birth clerks and hospital staff to facilitate accurate and consistent completion of these items.

We plan to have a meeting in the next month to update you on the implementation of HB2380 and to get your input on how to communicate to hospital staff the importance of collecting the new data items.

Please feel free to contact me at 971-673-1185 or at Jennifer.A.Woodward@state.or.us if you have any questions.

Sincerely,

Jennifer A. Woodward, PhD
State Registrar/Manager

c: Katherine Bradley, PhD, RN

Appendix J: Cost of Adding Questions to Birth/ Death Certificates

From: Katy KING [mailto:katy.king@state.or.us]
Sent: Tuesday, May 24, 2011 3:49 PM
To: Jennifer A WOODWARD; **********
Cc: Suzy Funkhouser; Courtni Dresser
Subject: Re: FW: data collection

Hi *******,
We've reserved 810 at the Portland State Office Building for the meeting on Friday, May 27 at 11 am. (Directions attached.) If people need to call in (I will probably need to do so,) the Conference Call Line is 1-888-***-****. The participant code is ***. I will host the call.

Jennifer provided some comments to your proposed amendments, which are below. She has also provided comment using 'tracked changes' on your document.

****
These amendments have additional forms and reporting requirements that involve hospital staff and the Medical Examiners office. I believe the OHA and the State Medical Examiner's office should be notified as well. There are also additional duties for OHA which will have a fiscal impact.

The estimated fiscal related to the A4 amendment Option 2 is based on 2 questions being added to the electronic birth certificate and 2 questions being added to the electronic fetal death report at $6,500 per question **(total $26,000).** The additional $4000 is estimated to change the paper forms, prepare the databases, update all the training manual, prepare training, and provide training. **This is a one time cost**.
****
Thanks for your offer of lunch! If the meeting goes over, there is a cafeteria in our building.

Katy

Katy King
Government Relations Manager
OHA Public Health Division
800 NE Oregon Street, Suite 925
Portland, OR 97232
971-673-1265

Executive Summary of Clinical Inquiry Project

Lani Doser, FNP-C, MN, RN
Doctor of Nursing Practice Candidate, Oregon Health & Science University, School of Nursing
March 2, 2012

Introduction: In Oregon, a law requiring data collection on the fetal-maternal outcomes of licensed and unlicensed midwives has not been enforced, and the safety of out-of-hospital births between 1993 and 2011 in Oregon, possibly totaling 18,000 deliveries, cannot be established. Our purpose was to document the mortality experienced in this sample.

Methods: A five-year (2004-8) retrospective study examined the outcomes of women and/or newborns transferred to an Oregon tertiary care hospital during a planned home or birth center birth. Subjects with transfer leading to hospital delivery or presented within 24 hours of out-of-hospital delivery were included.

Results: 229 births from 223 pregnancies were identified (Table 1). Of the 223 cases with documented neonatal outcomes, 8 deaths were found (Table 2). This suggests a perinatal mortality rate for planned out-of-hospital births transferred to the study hospital of 3.59 (CI 95%, 1.56 to 6.95) percent. Of the 8 deaths, one infant had multiple congenital anomalies. The following higher risk conditions were present with the 7 other deaths: breech presentation (3 cases), hypertensive disorder (4 cases), meconium stained fluids (5 cases), and postdates gestation (2 cases). Seven of the 8 deaths had licensed direct-entry midwives and an unlicensed midwife cared for the 1 case with anomalies.

Conclusion: This is the first published data from Oregon examining planned out-of-hospital births with hospital transfer. We identified that risk conditions were present in all cases of perinatal death in our sample from 2004-2008. Meconium and/or hypertensive disorder were present in at least half of all deaths. These findings suggest that more research is needed to assess the maternal/fetal risk conditions or provider-related factors that may contribute to the incidence of perinatal mortality among OoH births, particularly those with hospital transfer.

Outcomes: Associated outcomes to this project were changes in Oregon Regulatory Statutes.

1. HB 2059 (ORS 676.150, 2010) mandatory reporting of unprofessional or prohibited conduct of other licensees.
2. HB 2380 (ORS 687.495, 2012) changing the birth and death certificates to collect transported OoH births.

DNP implications: The role of the DNP student in this project was to successfully participate in the conduction and translation of research on a micro level at a medical facility while addressing and advocating for macro changes through the state regarding health policy and OoH data collection. I was able to fluidly span healthy policy, clinical practice, and translational research. This project was an effective pedagogical experience for learning the hallmarks of a DNP professional.