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Ansley Howe Date

Assessing Intrapartum Care Practices in Ntcheu, Malawi:

Current Use of the Partograph Tool

Ansley Howe

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Assessing Intrapartum Care Practices in Ntcheu, Malawi:

Current Use of the Partograph Tool

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Bachelor of Science in Nursing

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2008

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Abstract

Assessing Intrapartum Care Practices in Ntcheu, Malawi:

Current Use of the Partograph Tool

By Ansley Howe

Despite the existence of many interventions for the reduction of maternal mortality and morbidity in low-resource areas, death and disability related to pregnancy and childbirth persist at unacceptable levels throughout the world, and especially in sub-Saharan Africa. Appropriate implementation of interventions to improve the quality of maternal health services is essential for reduction of maternal mortality in low-resource countries. One such intervention is the partograph – a tool used during labor to monitor progress over time. However, evaluations of its use are limited.

This thesis project is an assessment of current use of the partograph by health workers in the rural district of Ntcheu, Malawi. Specifically, the aims of this project are to explore the extent of partograph use, the extent of partograph use as intended by global guidelines, and to assess for evidence of appropriately implemented obstetric interventions based on partograph indicators. Data from partographs collected in the study setting were analyzed and compared to World Health Organization standards of partograph use. Of an original sample of 196 births, only 44 partographs could be located and analyzed. The partographs that were found were often incomplete, with multiple indicators missing. In addition, information connecting indicators on the partographs to obstetric interventions was extremely limited. Further study is needed to evaluate partograph the extent of use and quality of use of the partograph and other maternal health interventions in developing country settings.

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Chapter 1: Introduction

INTRODUCTION AND RATIONALE

Maternal mortality continues to be one of the leading causes of death among women worldwide, with 99% of maternal deaths occurring in developing countries (Chowdhury et al., 2012). The World Health Organization (WHO) reports that 800 women die every day during pregnancy and childbirth (WHO, 2012). In 2010, an estimated 287,000 women died during pregnancy and childbirth globally (WHO, 2010). Among developing regions, sub-Saharan Africa has the highest maternal mortality ratio (WHO, 2014). For example, the maternal mortality ratio in Malawi shows a decreasing trend, but remains one of the highest in the world, reported at 675 per 100,000 (Malawi DHS, 2010).

Maternal mortality is a persistent challenge caused by many different factors. Worldwide, maternal deaths are most frequently the result of hemorrhage, hypertensive disorders, sepsis, and unsafe abortion; secondary causes include obstructed labor, anemia, and HIV and AIDS (Khan, Wojdyla, Say, Gulmezoglu, & Van Look, 2006). The causative factors of maternal death are in most cases preventable if the correct knowledge, infrastructure, and tools are available and implemented. Maternal mortality is closely linked to poverty and correlated with social structural issues (Tey, 2013). Populations that lack health care access, community infrastructure, health care personnel, education, and economic growth opportunities are at the highest risk of increased maternal mortality (Nyango, 2010; Tey, 2013). Examples of interventions used towards the reduction of maternal mortality are commonly focused in maternal health promotion areas such as prenatal care, intrapartum care, postpartum care, family planning, and through the availability of safe abortions (Freedman et al., 2007).

In order to address this global health problem, the international health community included the reduction of maternal mortality as one of eight Millennium Development Goals (MDGs). Specifically, Millennium Development Goal Five (MDG-5) aims to reduce maternal mortality by three quarters by the year 2015 (WHO, 2012). Maternal mortality has been recognized for decades as a critical measurement of community health status in resource-poor settings. Unfortunately, it continues to be one of the worst performing indicators among those used to quantify the progress of the Millennium Development Goals (Say, 2009; WHO, 2013). In addition, progress towards the achievement of MDG-5 is lagging far behind in most countries of sub-Saharan Africa: a 2013 WHO Maternal Mortality report listed the maternal mortality ratio at 510 deaths per 100,000 births in sub-Saharan Africa as compared to 16 deaths per 100,000 births in developed regions (WHO, 2014).

While maternal mortality continues to claim mothers' lives in resource-poor settings, important progress has been made globally in decreasing maternal deaths over the past few decades, with an estimated 47% reduction in maternal death from 1990 to 2010 (WHO, 2010). Some of the interventions to reduce maternal mortality that have been implemented include increased skilled attendance at births, systems to provide emergency obstetric care, and community-based participatory approaches. The degree by which maternal mortality ratios are decreasing varies greatly at the country level and also by region within countries. While progress towards these mortality declines in maternal mortality should be celebrated, a continued effort is necessary to question why maternal deaths continue to occur, and to provide functional, effective, and applicable solutions to decrease persisting maternal deaths.

One reason for the persistence of high maternal mortality rates in low-resource settings is that the implementation of the above-mentioned interventions often poses a significant challenge

(Freedman et al., 2007). Weak and ineffective health systems in low-resource communities--and the larger social, cultural, political and economic context in which they are embedded--create barriers in the efforts to successfully implement life-saving interventions for greatest impact (Peterson et al., 2012). Examples of these barriers include poor communication systems among health care workers and facilities, gaps in the medical supply chain, lack of transportation options for transfer to health facilities with a higher level of care, and political unrest leading health care access issues (Peterson et al., 2012). A creative, context-specific approach that addresses specific needs must be used in the analysis of current barriers to implementation and change. In addition, an evaluation of the quality of specific interventions is necessary. While essential to the reduction of maternal mortality, the presence of resources and health systems is not sufficient; programs and tools are not useful if their quality is poor (Freedman et al., 2007). A specific example of one important tool that can be implemented to affect maternal health outcomes if used appropriately is the partograph.

THE PARTOGRAPH TOOL

The partograph is a widely used intervention designed to improve care and monitoring during the intrapartum period, thereby decreasing maternal deaths in low-resource areas (Maclean, Wittgenstein, & O'Heir, 2010). Originally developed in the 1970s, the partograph is a tool intended to monitor the progress of labor over time and provide a basis for decision-making for health workers who supervise maternal care during labor and delivery (Orhue, Aziken, & Osemwenkha, 2012). By providing a standardized, graphic space for recording indicators such as cervical change, maternal and fetal vital signs, and the descent of the fetal head in the maternal pelvis, the partograph allows health workers to observe labor progress and guide decisions that prevent complications such as prolonged labor, obstructed labor, and sepsis. These complications

may lead to maternal death if not identified and managed appropriately (Maclean, Wittgenstein, & O'Heir, 2010). More detailed information regarding the purpose and of the partograph will be discussed in Chapter Two of this thesis.

CARE MALAWI PROJECT

This thesis project was completed in collaboration with CARE International and the regional office of CARE Malawi. In 2012, CARE initiated a study to improve implementation of maternal and newborn health services in Ntcheu District, Malawi. One of the objectives of this study was to appraisal CARE's Community Score Card (CSC), a social accountability tool innovated by CARE Malawi in 2002. The specific aim was to test the CSC's effect on health service governance and reproductive and maternal health service coverage, quality and equity in the rural district of Ntcheu. A sub-study on partograph use was included in the CARE project to obtain information on the quality of intrapartum care within this community and to provide data from the health centers that could compliment information gathered in surveys of mothers and health workers. After obtaining consent from individual women and local health facilities, a data collection team collected partographs and sent these records to the CARE International office in Atlanta.

For my Masters of Public Health (MPH) thesis project, I participated in the review and evaluation of the partographs that the research team located. Specifically, my responsibilities included creation of an extraction tool for converting partograph data into an excel spreadsheet, producing descriptive statistics, creating indices to compile summation scores for the individual partographs, and writing a manuscript intended for publication in a global health journal. I gained experience in data organization and analysis, and acquired knowledge and familiarity in interpreting and evaluating partographs. My involvement in drafting and editing the manuscript

provided a key learning experience in the field of scientific writing. Additionally, I presented my work and research findings to program directors in the Sexual Reproductive and Maternal Health (SRMH) Division at CARE International during an all-day session reviewing current CARE Malawi projects. I also presented my project and findings in the Global Health thesis poster presentation at the Rollins School of Public Health at Emory University on May 2, 2014.

PROBLEM STATEMENT

The WHO has made the reduction of global maternal mortality a priority (WHO, 2012). Despite what is known about reasonable and effective solutions for improving maternal care, women are still dying during pregnancy and childbirth. Maternal mortality remains unacceptably high, especially in the region of sub-Saharan Africa. Maternal mortality is not a problem exclusive to women of reproductive age; the survival and wellbeing of women is vital to their children, families, and communities. Gaps persist in the current literature involving the quality of maternal health care interventions and the feasibility of implementing these interventions at a sufficiently quality standard in low-resource settings (Graham & Varghese, 2011). Even though the partograph has been studied relative to other interventions used in intrapartum care, research regarding the quality of partograph use in association with labor outcomes is limited.

In particular, there is a substantial lack of knowledge regarding evaluations of use of partographs as intended--that is, analyzing the use of partographs against a standard of completion. Additional gaps in the literature include insufficient information regarding barriers to partograph use, and evaluations of effective systems to provide a structure for training, supervision and follow-up, and accountability regarding partograph collection and record management. Further study is needed to explore barriers to effective partograph use and the effects of these barriers on intrapartum interventions.

PURPOSE STATEMENT

The purpose of this thesis is to assess the extent of use and the quality of use of partographs during intrapartum care in the CARE project study sites in Ntcheu, Malawi. In the context of an intervention intended to influence maternal care and outcomes in low-resource countries, partographs will be evaluated to examine their use and completion as compared to WHO standards of partograph use. In order to determine the benefits of the partograph, this tool must be evaluated as it is implemented in the intrapartum setting and examined for quality and precision of use. Identification of effective methods to improve the overall quality of maternal care through tools such as the partograph is essential in working towards the reduction of maternal mortality in developing countries.

To this end, this study examines the following research questions: 1) To what extent are partographs being used in selected health facilities in Ntcheu, Malawi? 2) To what extent are partographs being used as intended in these health facilities? 3) Do the partographs reflect appropriate obstetric interventions, given what they indicate about labor progress?

SIGNIFICANCE STATEMENT

One approach to the reduction of maternal mortality in rural and poor areas is through the identification of methods by which health workers can more effectively provide intrapartum surveillance and support (Graham & Varghese, 2011). Research is needed to address inadequate knowledge regarding quality of services in the implementation of maternal care. The partograph is a tool that is used during the intrapartum period; its evaluation with respect to quality of use is limited.

This thesis will examine current practices involving partograph use in a rural district in Ntcheu, Malawi. The significance of this research is to provide a clearer picture of how

partographs are implemented in the low-resource setting, and possibly to provide information regarding the process of providing intrapartum care in Ntcheu. Understanding use of this tool on the ground (including possible challenges to its use) may assist maternal health programs to make better use of the partograph in the future. The thesis includes a manuscript intended for publication in the Global Health Science and Practice journal. The manuscript will be an original article that addresses a knowledge gap related to the partograph and its importance in the global health field of maternal health and the prevention of maternal mortality.

Chapter 2: Literature Review

INTRODUCTION

Information regarding maternal mortality, obstructed labor, the partograph, and the importance of quality within intrapartum care are organized in four separate sections in this literature review. The first part of the review presents common causes of maternal mortality in low-resource settings and demonstrates how the partograph relates to the prevention and reduction of maternal mortality through its appropriate use. Next, existing literature regarding the history of the partograph, the recommended standard of its use, and the current implementation of partograph use in low-resource areas are examined. The review will then discuss current literature that assesses knowledge of health workers providing intrapartum care and that examines quality of maternal health interventions in low-resource settings. Finally, the thesis research questions will be considered in context of the literature review and specific areas needing more study will be identified in order to guide future research in this area.

OBSTRUCTED LABOR AS A MAJOR CAUSE OF MATERNAL MORTALITY

A review of common causes of maternal mortality in low-resource areas is meaningful in order to understand how the partograph is intended as an intrapartum tool and why it may be useful during intrapartum care. Causes of maternal deaths vary by region (WHO, 2010). In sub-Saharan Africa, the leading direct cause of maternal mortality is obstetric hemorrhage (Ezegui et al., 2013), followed by sepsis, unsafe abortions, hypertensive disorders, obstructed labor, and HIV infections (Khan, 2006; WHO, 2010). The presence of HIV infection is a complicating factor in the scope of maternal mortality--HIV infection is responsible for 25% of maternal deaths either directly or indirectly in countries with high HIV infection prevalence (Calvert, 2013). Indirect causes of maternal mortality include poverty, violence against women, lack of

educational systems, and problems of healthcare access (WHO, 2010; Graham & Varghese, 2011).

Obstructed labor, or labor dystocia, is responsible for approximately 10% of all maternal deaths in developing countries (Dolea & AbouZahr, 2000). It is suspected that this is an underestimation of the actual number of deaths caused by obstructed labor, because these deaths are often listed under other complications associated with obstructed labor such as sepsis, postpartum hemorrhage, or ruptured uterus (Maclean, Wittgenstein, & O'Heir, 2010). Obstructed labor is defined as failure to progress in labor despite strong uterine contractions. This may be due to the failure of the cervix to dilate or failure of the fetal head to correctly advance in position in the maternal pelvis, possibly because of an insurmountable barrier (Maclean, Wittgenstein, & O'Heir, 2010).

The risk of obstructed labor is heightened by many factors, including large fetal size, small pelvic canal, maternal chronic disease or infection, fetal abnormalities, or abnormal fetal presentations (Fantu, Segni, & Alemseged, 2010). One of the most common causes of obstructed labor is cephalopelvic disproportion (CPD), which is defined as a small pelvis, large fetus, or both. In many cases, obstructed labor has no predisposing or risk factors (Dolea & AbouZahr, 2000). Complications of obstructed labor that may result in fatality include hemorrhage, maternal infection, and fetal asphyxia (Fantu, Segni, & Alemseged, 2010). If a mother survives, long-term complications include obstetric fistula and inability to deliver vaginally in subsequent pregnancies (Neilson, 2003). The consequences of obstetric fistula are often devastating, as this complication can result in lasting conditions such as bowel and bladder incontinence, infection, chronic discomfort, and sociocultural effects such as familial abandonment, inability to work or attend school, and rejection by community members (Cron, 2003).

Obstructed labor is dangerous for both the mother and fetus and can lead to severe morbidity and mortality (Dolea & AbouZahr, 2000). However, a trained health care worker can identify it and take subsequent actions to correct the dystocia during labor. When appropriate, a decision may be made to transfer the mother to a facility with a higher level of obstetrical care in order to deliver the infant in a vaginally assisted birth or cesarean section (Dolea & AbouZahr, 2000). To prevent maternal and neonatal morbidity and mortality, early identification and decision protocols must be in place and appropriate actions taken (Maclean, Wittgenstein, & O'Heir, 2010). This standard of appropriate intrapartum care may be established and maintained with tools such as the partograph.

THE PARTOGRAPH: A TOOL FOR PREVENTING OBSTRUCTED LABOR

The partograph is a graphical tool used to monitor labor for abnormal patterns in labor progression over time such as those seen in obstructed labor. The identification and management of labor obstruction with the partograph is intended to reduce adverse maternal and fetal outcomes. For effective use, a trained health worker must complete the partograph by filling in multiple physical assessment pieces observed over time during a woman's labor – especially as related to labor progress indicated by cervical change.

Historically, the partograph has been in use since its development in 1970 and was based on principles of a similar invention called the cervicograph (Philpott & Castle, 1972). Both the cervicograph and the partograph were modeled on Friedman's labor curve studies in the 1950s and 1960s, in which Friedman described the rate of cervical dilation in centimeters per hour during the first stage of labor, and outlined a basis for decision making for clinicians proving care to women in labor. (Neal, Lowe, & Patrick, 2010; Friedman, 1955).

In 1987, the World Health Organization (WHO) promoted universal use of the partograph during the Safe Motherhood Initiative Nairobi Conference (Fistula Care, 2012). Following this event, the WHO published a training document for midwives, physicians, and nurses in 1988. Beasley, Betts, and Chiphangwe (1988) summarized this training document as establishing the partograph as "inexpensive, effective, and pragmatic in a variety of different settings including developed and developing countries" (p. 3). This training document outlined evidence from the WHO that the partograph had been found to prevent prolonged labor, improve neonatal outcomes in the low-resource setting, and reduce operative deliveries. (Beasley, Betts, & Chiphangwe, 1988).

In 1994, the WHO published an updated four-part manual on partograph use called "Prevention of Prolonged Labor: The Partograph, a practical guide." This guide aimed to promote understanding of the intrapartum care process, to further the use of partographs, and to increase the accessibility of partograph implementation through clear, simplified language and multiple translations (WHO/FSE/MSM, 1994). In 2008, the WHO revised the partograph that was in current use, omitting the latent phase of labor and commencing the active phase at four centimeters of cervical dilation instead of three centimeters of dilation on the original partograph. The current partograph that is supplied for use globally is the aforementioned 2008 edition.

A trained health worker can use the structured space within the partograph to identify atypical patterns and symptoms in labor and make management decisions regarding obstructed labor, as well as other intrapartum complications such as preeclampsia, infection, dehydration, and hemorrhage (Mathai, 2009). To complete the partograph correctly, each indicator of maternal and neonatal health status is to be documented more than once on the partograph chart during labor, with differing frequencies of documentation over time required as outlined by the

WHO guidelines (Maclean, Wittgenstein, & O'Heir, 2010). The partograph allows for comparison of the woman's progress in labor to the defined normal curve of progress in labor; very slow progress or no progress alerts to health worker to a problem that may lead to further complications if not addressed (Maclean, Wittgenstein, & O'Heir, 2010).

When a woman reaches active labor, defined on the current partograph as cervical dilation of four centimeters, the health provider plots the pelvic descent of the baby, as well as the dilation of the woman's cervix, to track whether the woman's labor is progressing normally (Neal, Lowe, & Patrick, 2010). The health provider also records information on the condition of both the mother and the baby on the partograph, including: fetal heart rate, color of amniotic fluid, presence of molding, contraction patterns, maternal heart rate, maternal blood pressure, maternal temperature, maternal urine output and proteins, and medications given to the woman (Neilson, 2003).

Management of these indicators and understanding how to correctly fill out the partograph while safely monitoring the laboring mother's progress requires training and practice. The health provider must be competent in attending a normal labor and delivery, in assessing the maternal and fetal statuses though collection of vital signs, abdominal examinations, and vaginal examinations, and in plotting this information on a graph (MNH, 2002; USAID, 2002). The standard for labor monitoring in order to keep a mother within a safe parameter of healthy labor is a cervical change of one centimeter of dilation per hour. If the labor is slower than this, the cervical change line will cross an alert line and eventually an action line on the partograph. At these two points, it is the responsibility of the health care provider to use evidence-based knowledge and prudence to decide what interventions or referrals may be necessary. In this

manner, the partograph may guide trained health workers in decision-making and implementation of appropriate interventions.

RESEARCH ON THE PARTOGRAPH

The partograph has been the subject of much research during the past few decades. The process of measuring the partograph as a tool and its use in the scope of improving maternal and neonatal outcomes is varied. Large meta-analyses and comprehensive literature reviews that include partograph use exist, as well as regional studies within health systems and smaller studies that examine individual hospitals or health facilities.

Based on findings of a multicenter trial in Southeast Asia, WHO recommended that partographs be used in monitoring of all labors to help identify abnormal progress and laboring women who require further interventions (WHO Maternal Health and Safe Motherhood Programme, 1994). The study demonstrated that when the partograph was introduced into clinical practice along with a management protocol, labor outcomes were improved. Use of the partograph reduced the number of prolonged labors, the need for augmentation of labor with oxytocin, rates of cesarean section, and the incidence of infection (WHO Maternal Health and Safe Motherhood Programme, 1994). As mentioned in the introduction, the findings of this study provided the basis upon which the WHO initially recommended partograph use.

In a comprehensive review in 2010, Hofmeyr et al. examined a number of distinctive obstetrical care implementations in low-resource settings. These authors found “promising [obstetrical] interventions include the use of the partograph.” (p. S21). The comprehensive review compiled research articles and study reports that focused on obstetrical interventions and outcomes. Multiple interventions for obstetric complications were reviewed for content, impact, risk-benefit, and feasibility. Specific interventions that were studied included the partograph,

symphisiotomies, amnioinfusions, therapeutic maneuvers for shoulder dystocia, and continuous labor support.

In a 2008 Cochrane Review that highlighted partograph use, researchers examined the effect of partograph use on maternal outcomes in women in spontaneous term labor. Two of the studies assessed partograph use versus no partograph use. The review of partograph versus no partograph found a non-significant reduced risk of cesarean delivery overall which was statistically significant in low-resource settings (Lavender et al., 2008). The review suggested that explicit recommendations regarding partograph use could not be made from the literature included, however, "many units, in high- and low-income settings, currently use a [partograph] and have reported quality of care benefits in terms of ease of recording, provision of pictorial overview of progress, auditing of care, training of clinicians, and transferring of care" (Lavender et al., 2008, page 11). In conclusion, the review stated that further research is needed to comprehensively evaluate the partograph (Lavender, 2008).

Leanza and colleagues (2011) present another review that examines the usefulness of the partograph in 28 studies that include a total of 7,827 women. Selected studies included comparisons of partograph use versus no partograph use during labor, as well as studies of differing partograph designs. This review found that if used as designed, partograph use could reduce morbidity and mortality in both the mother and the newborn (Leanza et al., 2011). Specific information regarding quality of use of the partograph and provider understanding were unclear. The authors recommended further trial evidence to establish the real and significant utility of the partograph (Leanza et al., 2011).

Papers that examine maternal health interventions and partograph use in sub- Saharan Africa were also included in this literature review to provide a picture of how this tool is

performing in this region specifically. While still uncertain, the bulk of the evidence on the partograph in sub-Saharan Africa seems to suggest that this tool is effective but that its use is low. For example, a survey of nurse midwives in primary health clinics in Nigeria showed that although all health workers reported that they regularly participated in intrapartum care and deliveries, only 5.6% reported "occasional" use of the partograph to monitor labor within the health facilities (Nyango, Mutihir, Laabes, Kigbu, & Buba, 2010).

Other studies conducted in African settings report similar findings. One research paper compiled health facility census data in Tanzania in an effort to grade essential maternal intervention use in childbirth care in health facilities and hospitals. A total of 159 facilities in five districts in Southern Tanzania were included in the study. The paper used 'partograph use' (yes/no) as a measure for grading essential intervention use in health facilities and hospitals. This indicator of partograph use was a measurement of use only, not quality of use or visualization of use. In the findings, "All hospitals, 11 (85%) health centers and 83 (63%) dispensaries stated that they monitor labor with help of a partograph" (Hanson et al., 2013, page 3). It was found that partographs were indeed being used in this context, especially in the higher levels of obstetrical care. However, it was also found that the monitoring of maternal blood pressures during labor was very low (Hanson, et al., 2013). Recording maternal blood pressure is an important indicator on the partograph in that this practice monitors the physical status of the mother in labor over time.

Finally, a study conducted in Nigeria in 2010 assessed knowledge and use of the partograph among health care workers. The study found gross deficits in knowledge of both partograph use and general knowledge of management of the intrapartum period. Fawole stated in 2010, "Less than 50% of all respondents knew the normal duration of labor and just about

50% understood assessment for progress of labor" (Fawole, 2010, p. 203). It was also found that "Knowledge about partograph and assessment during labor is grossly deficient." (Fawole, 2010, p. 204). This study questions whether or not health care workers are knowledgeable about labor management in general. The authors conclude that, if gaps persist in knowledge of intrapartum care and management, use of the partograph is impractical (Fawole, 2010). Interventions focused on the education and training of health care workers should be the priority intervention in this setting, with knowledge and training regarding the partograph coming after this training.

QUALITY OF CARE IN MATERNAL HEALTH

Increasing numbers of women are seeking childbirth in health facilities. As the population receiving care in health facilities grows, it is important to ensure that the quality of care provided is optimal (Graham and Varghese, 2011). According to Graham and Varghese (2011), "There is indeed a need to do things differently: to reposition quality on the pathway to achieving mortality reduction goals" (p. 1). Priority interventions to address maternal mortality in Sub Saharan Africa currently include increasing accessibility and use of health centers for births and postpartum care, increasing numbers of skilled birth attendants, and finding ways to measure quality of maternal health interventions at the community level. As Tey and colleagues (2013) state, "Factors that prevent women from receiving or seeking health care during pregnancy and childbirth include inadequate services, poverty, distance, lack of information, and cultural practices" (p. 1). In many cases, maternal mortality remains high due to the poor quality of maternal services available in health facilities (Ezegwui et al., 2013).

Despite an emphasis to increase coverage of delivery care by skilled health personnel, in some areas the presence of skilled personnel has not improved outcomes. Graham and Varghese reported in 2011, "In sub-Saharan Africa, high levels of coverage of so-called skilled care at

delivery often coincide with very high maternal and newborn mortality, which prompts questions about who receives care and whether it is of sufficient quality" (p. 1). Often national surveys collect data on coverage of services but not the quality of services. The presence of services alone does not guarantee that the quality will be sufficient and outcomes will be improved (Montoya, 2014).

A recent systematic review of the quality of health systems and hospital care in sub-Saharan Africa illuminated the need for an examination of quality of service delivery of maternal health care (Montoya, 2014). Through a meta-analysis of 64 studies, strong evidence was found for the importance of quality of services offered in facilities and the presence of quality skilled birth attendance. Throughout the sub-Saharan region, skilled birth attendance and type of available hospital services accounted for 44% of the total variation of maternal mortality ratio between studies. The authors concluded, "There needs to be improvement in the quality of care offered in health facilities by increasing the percentage of skilled birth attendance, especially in areas where maternal mortality remains extremely high" (Montoya, 2014, p. 19). The link between the quality of services provided and maternal outcomes is clear.

Quality of maternal care is difficult to measure. It is easier to assess whether or not a tool is in place as opposed to whether or not it is used correctly or whether or not health care workers understand the objective and process of its use. There are multiple dimensions to measuring quality, and as population and maternal health indicators have been historically gathered in developing countries through household surveys and weak health information systems, our knowledge of technical quality aspects is limited (Graham and Varghese, 2011).

Evidence shows that coverage of maternal health services is necessary, but not sufficient in saving mothers' lives and accelerating progress (Graham and Varghese, 2011). While there is

evidence of a relationship between coverage of skilled health providers and maternal mortality, it is mixed (WHO, 2010; Neal et al., 2010; UN Population Fund, 2009). In addition, there is evidence that demonstrates that poor quality of care can result in coverage of care to level off or even decline (Bell, Curtis, and Alayón, 2003). Women and families who experience a perceived poor quality of obstetric care are less likely to seek care in the same facilities in the future, and may discourage friends and other community members from seeking a similar care experience.

Efforts to position comprehensive quality of care as a key element to accelerate progress has recently gained momentum in maternal health; quality is featured prominently in the 2013 *Manifesto for Maternal Health Post-2015* and the most recent international Maternal Health Task Force Conference (2013) was entirely focused on quality of care (WHO, 2013; GMHC, 2013). With this increased focus comes the challenge of robust monitoring of quality, which is a challenging endeaver given both quality itself and maternal health care are multi-dimensional (WHO, 2006). Quality of care refers to care that is safe, effective, patient-centered, timely, efficient and equitable (IOM, 2011); or as Godlee (2009) boils it down, care that is "effective, safe and a good patient experience." (Godlee, 2009, p. 11). In order to continue to understand the contributing factors to maternal mortality and explore ways to improve the prevalence of maternal deaths in global communities, a better understanding is needed of the quality of key maternal health interventions.

Quality of care is a critically important consideration in the use of partographs. Simply utilizing this tool is not sufficient to identify labor obstruction or worrisome physical signs in the laboring mother or fetus. Partographs must be implemented in accordance with the standards set by the WHO, including use by a trained person who is attentive to detail and aware of the intentions of monitoring labor with a partograph over time. If not used according to standard

guidelines, partographs will not be capable of alerting health workers of potential problems or able to guide decisions for appropriate obstetric interventions.

SUMMARY OF CURRENT PROBLEM AND RELEVANCE

Maternal mortality has been well studied in the literature. A vast body of knowledge, both past and recent, exists to detail the epidemiology, causes, and effects of maternal deaths globally. Although a great deal is known about the extent and impact of maternal mortality, limited research exists that explicitly studies the connections between the quality of specific maternal interventions and maternal outcomes.

While research exists that includes the partograph as an intervention in a study of maternal health programs or that document the partograph as an effective tool, literature that documents evaluations of quality of partograph use is incomplete. The partograph has been in use for many years. It has been revised multiple times, and its use as a labor tool has been evaluated. When used in some maternal health situations and under certain supervision, it has shown to improve maternal health outcomes. However, in multiple studies, confounding factors were not studied. Remaining gaps in the literature include an organized method of grading the partograph against a scale or scorecard in order to evaluate the quality of completion of the partograph. Further understanding of how and why the health care worker used and implemented partographs is needed. In addition, further information is needed to assess what the partograph record can tell us, if anything, about the quality of intrapartum care in health facilities more generally.

This study will provide an assessment of partograph quality through use of an extraction tool that allows graphical partograph information to be converted into a dataset and objectively analyzed for quality of use. Specifically, this study will provide important information regarding

the extent of partograph use and the understanding of health care workers as they complete the partograph during labor monitoring. Finally, an attempt will be made to evaluate whether the partographs reflect appropriate obstetric interventions, given what they indicate about labor progress. The identification of both successes and potential challenges in the implementation of intrapartum tools and the compilation of information is important because it may help to guide future decisions about partograph use and maternal care in low-resource settings.

Chapter 3: Manuscript

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CARE USA, CARE Malawi

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Measuring quality of care

ABSTRACT

Introduction: Maternal mortality is a persistent global health problem. One measure that may reduce maternal mortality in low-resource areas is improving quality of intrapartum care in health facilities. Evaluation of tools and interventions used in the intrapartum care setting such as the partograph is required to better understand quality of care for women during childbirth.

Objective: This paper examines partograph use by health workers attending births in 17 health facilities in Ntcheu District, Malawi. The extent of partograph use, the extent of use of partographs as intended, and the evidence of appropriate obstetrical interventions based on partograph data are explored. Evaluations of intrapartum care interventions assist in understanding gaps in knowledge of interventions and quality of care. Insight into the obstacles to correct partograph use will improve maternal outcomes in global low-resource settings.

Methods: Using WHO standards for partograph use, an extraction tool was created to analyze the fill and quality of partographs (n=44) collected in selected health facilities in Ntcheu, Malawi in 2012. The partograph extraction tool converted graphical data from collected partographs into numerical data, allowing for calculation of descriptive statistics. Indices were created to present summative tables of the data. Information was collected regarding referrals to other facilities during labor, outcomes of referrals, and unfavorable outcomes following labor and delivery.

Results: Consent was granted to collect 195 partographs, but only 44 partographs were located (23% of the target number). Quality of partograph use was low, as determined by scoring from the partograph extraction sheet. From the partographs examined, limited information was available regarding maternal and neonatal morbidity and mortality during the intrapartum and postpartum periods.

Conclusions: Partograph use was infrequent; although many births took place in health centers, partograph completion was uncommon. Further research is needed in this area to evaluate the extent and quality of partograph use. Findings from the partograph extraction tool may aid in the comparison of partographs from different global settings to WHO standards for partograph use.

INTRODUCTION

Important progress has been made in decreasing maternal deaths with an estimated 47% reduction from 1990 to 2010 (WHO, 2012). Despite this global improvement, maternal mortality remains one of the leading causes of death among women in some regions. In 2010, an estimated 287,000 women died during pregnancy or childbirth with ninety-nine percent of these deaths occurring in developing countries (WHO, 2012). Sub-Saharan Africa has the highest maternal mortality ratio (WHO, 2014), representing 57% of the global burden (Zureick-Brown, et al., 2013). For example, the maternal mortality ratio in Malawi shows a decreasing trend but remains one of the highest in the world, reported at 675 per 100,000 (DHS, 2010). Worldwide, a majority of maternal deaths are the result of hemorrhage, hypertensive disorder, sepsis, and unsafe abortion; secondary causes include obstructed labor, anemia, and HIV and AIDS (Khan, Wojdyla, Say, Gulmezoglu, & Van Look, 2006).

Although highly effective interventions for saving women's lives are well known to the global health community, maternal deaths persist in many developing countries. It is known why, how, and where maternal deaths occur, and we have effective interventions to prevent these deaths, yet unacceptable numbers of women continue to die in pregnancy and childbirth (Rosmans and Grahman, 2006). Evidence shows that coverage of maternal health services is necessary but not sufficient in saving mothers' lives and accelerating progress; the coverage must also be high quality (Graham and Varghese, 2011). In addition, there is evidence demonstrating how poor quality of care may result in the coverage of care leveling off or declining (Bell, Curtis, and Alayón, 2003). There is growing consensus that poor quality of care is an important factor in this equation (Langer, Horton, and Chalamilla, 2013). As Graham and Varghese (2011) stated, "a global insanity--continuing over and over again to delivery poor-

quality health services for women and children and expecting positive results" (Graham & Varghese, 2011, p. e5). In many sub-Saharan African countries including Malawi, priorities are being focused towards the removal of health system constraints that prevent the delivery of high-quality health care implementation (Mueller, Lungu, Acharya, and Palmer, 2011).

Efforts to position comprehensive quality of care as a key element to accelerate progress in maternal health implementations have gained momentum; quality is featured prominently in the 2013 *Manifesto for Maternal Health Post-2015.* With this increased focus comes the challenge of robust monitoring of quality, given that both quality itself and maternal health care are multi-dimensional (Graham and Varghese, 2011; WHO, 2006). Quality of care refers to care that is safe, effective, patient-centered, timely, efficient and equitable (IOM, 2011); or as Godlee (2009) states, care that is "effective, safe, and a good patient experience" (2009, p. 11). A vast range of evidence-based norms and standards are required of health care providers in order to ensure high quality care during pregnancy, the intrapartum period, and in the postpartum period (WHO, UNFPA, UNICEF, and World Bank, 2006). One method by which standards of care may be implemented and quality of care may be improved during the intrapartum period is by use of the partograph, a tool used to monitor labor progress. This study examines use of the partograph tool by health workers attending births in rural Ntcheu District, Malawi.

The Partograph

One major cause of maternal and neonatal deaths in low resource areas is obstructed labor. (Neilson, Lavender, Quenby, & Wray, 2003). Obstructed labor is most likely to occur if a woman's pelvis is not large enough for her baby's head to pass through or if a woman's uterus does not contract sufficiently (ICM Midwifery Guidelines, 2008; WHO, 2010). Obstructed labor leads to serious complications including sepsis, hemorrhage, fetal infection or hypoxemia, or

rupture of the uterus and may be fatal for the mother or the fetus or both (Khan, Wojdyla, Say, Gulmezoglu, & Van Look, 2006; WHO, 2012). If the woman survives, lasting effects of experiencing obstructed labor include obstetric fistulas and inability to deliver vaginally in subsequent pregnancies due to physical trauma and anatomic changes (Neilson, 2003).

The partograph, a chart for recording information about the progress of labor and the condition of the woman and her baby, is a tool to aid health providers in preventing and treating prolonged labor and its complications (Maclean, Wittgenstein, & O'Heir, 2010). Partographs are intended to be monitoring devices where physical change and progress of labor over time may be documented according to World Health Organization (WHO) guidelines (Maclean, Wittgenstein, & O'Heir, 2010). Health providers can use the partograph to assess labor over time and support decisions regarding interventions (Orhue, Aziken, & Osemwenkha, 2012).

Partographs are used to collect and store many information pieces regarding labor and labor status changes. When a woman reaches active labor, the health provider begins to plot the pelvic descent of the baby, as well as the dilation of the woman's cervix, to track whether the woman's labor is progressing normally (Neal, Lowe, & Patrick, 2010). The health provider also records information on the condition of both the mother and the baby on the partograph, including fetal heart rate, color of amniotic fluid, presence of molding, contraction patterns, maternal heart rate, maternal blood pressure, maternal temperature, maternal urine output and proteins, and medications given to the woman (Neilson, 2003). Training and practice are required in order to implement the partograph correctly. The health provider must be competent in attending normal labor and delivery, assessing the maternal and fetal statuses though collection of vital signs, abdominal examinations, and vaginal examinations, and plotting this information on a graph (MNH, 2002; USAID, 2002).

Time standards are important elements on the partograph to identify normal labor progress. To keep a mother within a safe parameter of labor movement, a cervical change of one centimeter of dilation per hour is the standard. If the labor is slower than this, the cervical change line will cross an alert line and eventually an action line on the partograph. At these two points, it is the responsibility of the health care provider to use evidence-based knowledge and prudence to decide what interventions or referrals may be necessary. In this manner, the partograph is intended to guide health workers in decision-making and implementation of appropriate interventions (Maclean, Wittgenstein, & O'Heir, 2010).

Global partograph implementation began in 1987, when WHO promoted universal partograph use during the Safe Motherhood Initiative Nairobi Conference (Fistula Care, 2012). Following this event in 1988, a partograph training document was printed for midwives, nurses, and physicians, establishing the partograph as "inexpensive, effective, and pragmatic in a variety of different settings including developed and developing countries" (Beasley, Betts, & Chiphangwe, 1988, p. 3). Based on findings of a multicenter trial in Southeast Asia in 1994 (WHO Maternal Health and Safe Motherhood Programme, 1994), WHO officially recommended that the partograph should be used in the monitoring of all labors as a tool that can assist health workers to recognize abnormal labor progress. This study demonstrated that labor outcomes were greatly improved when the partograph was introduced into clinical practice along with a management and treatment protocol. Specifically, use of the partograph reduced the number of prolonged labors, the need for augmentation of labor with oxytocin, rates of cesarean section, and the incidence of infection.

Several comprehensive reviews have highlighted partograph use. In a Cochrane Review published in 2008, a comparison of partograph use versus no partograph use found a non-

significant reduced risk of cesarean delivery overall which was statistically significant in low-resource settings (Lavender et al., 2008). The authors reported that in many settings, providers reported quality of care benefits related to partograph use, especially in areas of training of clinicians and transferring of care (Lavender et al., 2008). Another comprehensive review that examined the usefulness of the partograph as an intrapartum tool included twenty-eight studies encompassing 7,827 women. Selected studies included the comparison of partograph use versus no partograph use during labor management. The review found that if used as designed, partograph use could reduce morbidity and mortality in both the mother and the newborn (Leanza et al., 2011). However, specific information regarding quality of partograph completion and provider understanding were unclear. The authors recommended further trial evidence to establish the real and significant utility of the partograph (Leanza et al., 2011).

The bulk of the evidence regarding the partograph seems to suggest that this tool is effective, but also that its use remains low. A survey of nurse midwives in primary health clinics in Nigeria showed that, although all health workers reported that they regularly participated in intrapartum care and deliveries, only 5.6% reported "occasional" use of the partograph to monitor labor in health facilities (Nyango, Mutihir, Laabes, Kigbu, & Buba, 2010).

Purpose of the study

Despite what is known about reasonable and effective solutions for improving maternal care, maternal mortality remains unacceptably high, especially in sub-Saharan Africa. Gaps persist in the current literature involving the quality of maternal health care interventions and the feasibility of implementing these interventions at a sufficiently quality standard in low-resource settings (Graham & Varghese, 2011). Although the partograph has been studied relative to other interventions used in intrapartum care, research regarding the quality of partograph use during

labor in association with labor outcomes is limited. In particular, there is a substantial lack of knowledge regarding evaluations of use of partographs as intended--that is, analyzing the use of partographs against a standard of completion. Additional gaps in the knowledge base include insufficient information regarding barriers to partograph use and evaluations of effective systems to provide a structure for training, supervision and follow-up, and accountability for partograph collection and record management. Further study is needed to explore barriers to effective partograph use and the effects of these barriers on intrapartum interventions.

This paper examines intrapartum care as implemented in Ntcheu, Malawi through an exploration of partographs used by health workers during labor monitoring. To this end, this study examines the following research questions: 1) To what extent are partographs being used in selected health facilities in Ntcheu, Malawi? 2) To what extent are partographs being used as intended in these health facilities? 3) Do the partographs reflect appropriate obstetric interventions, given what they indicate about labor progress?

METHODS

This partograph study is part of a larger evaluation project carried out in 2012 in Ntcheu, Malawi for examination of CARE's Community Score Card (CSC), a social accountability approach innovated by CARE Malawi in 2002. The overall objective of the ongoing CARE CSC project is to use a cluster randomized control design to test the effect of the CSC on health service governance and reproductive and maternal health service coverage, quality, and equity. At baseline, separate, cross-sectional surveys were carried out among two target populations – women of reproductive age and health workers – in both intervention and comparison sites. In addition, for a subset of women participating in the women's survey, maternal register records and partographs were reviewed. The partograph review was included in the study in an attempt

to obtain information on the quality of intrapartum care. The protocol for this study was reviewed and approved by the Government of Malawi research ethics board.

The target population for the women's survey was women aged 15-49 years who had given birth within the past twelve months and whose babies were still living. Women were administered face-to-face questionnaires in Chichewa (the national language of Malawi) by a trained interviewer in a private place in their homes. For women who met the above eligibility criteria and also gave birth in a health facility, the interviewer asked for consent to review her maternity register record and partograph. Upon agreement, information regarding the woman's name, date and time of delivery, and facility at which she delivered was collected.

It was expected that about 10% of the total number of women included in the survey would meet the inclusion criteria. Using the information provided by the women, data collectors went to the health facility where the women said they had given birth and received permission from the health facility to extract information from the maternity register record and partograph. When the records were located, the data collector copied the information from the register and partograph onto a blank register and blank partograph chart by hand. If a partograph could not be located, the reason why it was missing was noted on the copied record by the data collector whenever possible. These reasons were explained by health care workers at the health centers present at the time of collection, or were found within the records as listed in the maternity record book.

Data collection and management

In order to evaluate the information recorded on the partographs, a tool was created to collect information. For a number of items, if data related to the item was noted on the partograph at least once (>=1), at least twice (>= 2), or to WHO standard, this information was

noted. The items to which these criteria applied included fetal heart rate, color of amniotic fluid, molding of the fetal head, cervical dilation, presence of uterine contractions, maternal pulse, maternal blood pressure, and maternal temperature. The WHO standard was defined by incorporating the educational guidelines from manuals published to teach nurses and midwives correct partograph implementation and use (Maclean, Wittgenstein, & O'Heir, 2010).

The rationale for choosing these three categories stemmed from the necessity to assess if the partograph was used at all, if the partograph was used over time as intended, and if the partograph was filled out to WHO standard. Table 1 illustrates how information from the partograph was collected: if cervical dilation was noted on the partograph at least once (>=1) during labor, if it was noted at least twice (>=2) in monitoring changes over time, and if it was noted on the partograph every four hours, to the WHO standard. Other items had different time-related specifications according to WHO standards. For example, fetal heart rate is to be noted every 30 minutes.

Table 1: Extraction of cervical dilation information from partograph

	Cervical Dilation	Yes = 1 No = 0
a.	Cervical dilation noted at least once	
b.	Cervical dilation noted at least twice	
c.	Cervical dilation noted to WHO standard—documented every four hours in coordination with vaginal examination and marked with an 'X'	

To more closely examine monitoring of labor progress over time, information was also collected on whether date of labor onset noted and hour of labor onset were noted on partograph

correctly. Whether health workers noted urinary output and the presence of ketones and protein in the urine was also recorded. According to the WHO standard guidelines, the health care provider should ask the mother to pass urine every 2-4 hours. Urine should be documented on the partograph every 2-4 hours, with notations for amount and concentration. The standard also states that every specimen should be tested for protein and ketones.

Information regarding whether the health worker recorded additional details on maternal status was also collected. Such information included general condition on admission, fundal height, fetal lie, the presentation, and the position of the fetus. This section on maternal status was noted as filled out at all or filled out completely. After this information was extracted from each partograph, the data was double entered into an excel spreadsheet and frequencies were run. Finally, information was collected on whether the woman was referred to another facility, whether a reason for referral was recorded on the partograph, and what reason was given.

For the data collection tool, three indices were created to compile similarly scored items noted during the data collection process (see Table 2). The first index compiled all possible items on the partograph that could be noted at least once. The second index compiled all possible items on the partograph that could be noted at least twice. Finally, the third index compiled all possible items that could be noted according to the WHO standard. For each of these three indices, the range of the score that an individual partograph could receive was 0-9.

Table 2: Indices

Index	Description	# of items	Range
Noted at least once (>=1)	Index summing the total number of items recorded on the partograph at least once: fetal heart rate, characteristic of amniotic fluid, molding of the fetal head, cervical dilation, fetal head descent, presence of uterine contractions, maternal pulse, maternal blood pressure, and maternal temperature	9	0-9

Noted at least twice (>=2)	Index summing the total number of items noted on the partograph at least twice: fetal heart rate, color of amniotic fluid, molding of the fetal head, cervical dilation, fetal head descent, presence of uterine contractions, maternal pulse, maternal blood pressure, and maternal temperature	9	0-9
Noted to standard, as defined by WHO guidelines	Index summing the total number of items noted on the partograph to WHO standard: fetal heart rate, color of amniotic fluid, molding of the fetal head, cervical dilation, fetal head descent, presence of uterine contractions, maternal pulse, maternal blood pressure, and maternal temperature	9	0-9

To address the third research question, which explores information regarding appropriate obstetric interventions utilized during the intrapartum period, the partographs were evaluated for any notation, comments, or indication that abnormalities in labor occurred and evidence of subsequent action by the health worker. Any detail that could be collected regarding maternal health outcomes both during and after the woman's labor course and delivery was noted. Each partograph was examined for evidence of referral of the mother to a different facility. If a referral occurred, we attempted to find the reason for referral and the outcome of referral. Additionally, any information that could be found regarding complications during labor such as prolonged abnormal maternal or fetal vital signs, failure of labor to progress, maternal sepsis, hemorrhage, or maternal or neonatal mortality was collected.

The final step of data management involved use of the excel file to produce descriptive statistics and simple summative tables of the items collected from the partographs. Bar graphs were created for each item, illustrating the number of times that each item, such as color of amniotic fluid, was noted once on the partographs, was noted at least twice on the partographs, or was noted to WHO standard. Additional tables were created to look at timing indicators related to whether or not the labor curve was applied on the partograph and correctly filled out over time.

RESULTS

During the women's survey, the data collection team found that 195 women in the study setting had delivered within the last 30 days. All of these 195 women consented to have their maternity records and partographs pulled from the health centers where they delivered. When the team went to the health centers to find the hard copies of these maternal records and partographs, however, they were only able to locate 98 maternity registers and 44 accompanying partographs. The 44 partographs that were located accounted for just 23% of the original 195 partographs that were sought.

When possible, the research team noted the reasons for missing partographs (see Table 3). The reasons listed include a lack of paper copies available at the health centers during labor and delivery, patients delivering while still at home or while in transit to the health center, and loss of records due to transfer to other facilities. Overall, most reasons for missing partographs were unknown, followed by a lack of available paper partographs for completion during labors.

Table 3: Reasons reported for missing partographs:

	Listed reason for missing partographs	Number of partographs
A.	Patient delivered while in-transit to health center	4
B.	Patient delivered while still at home	5
C.	No blank partographs (physical stationary) available at health center	7
D.	Graphs taken by district/other officials: not returned	2
E.	Patient referred to hospital post-delivery, records not returned	2
F.	Graph blank, unknown reason "Local health workers were asked and did not know why blanks were present."	18
G.	Patient had to pay for services; record subsequently lost in "accounts office"	1

The following tables address information collected to identify extent of correct partograph use, as found within the collected partograph records. Presented in Table 4 are nine

items pulled from the data collection tool that could be grouped together due to the common characteristic that they monitor labor over time according to correct partograph completion. Although the specific numbers and frequencies differ, Table 4 demonstrates a clear trend with respect to items on the partograph. For example, in the case of fetal heart rate, the percentage of the partographs (n=44) with the fetal heart rate marked once on the partograph is 86%. The percentage of partographs with the fetal heart rate marked twice or more is 56%. The percentage of partographs with the fetal heart rate marked to standard, at a recording of the fetal heart rate every 30 minutes, is 27%. This same pattern can be seen across all items: partographs had a high percentage of items noted at least once time during the course of labor, a lower percentage of items noted twice or more, and a very low percentage of items marked on the graph to WHO standard.

Table 4: Items indicating monitoring over time on partographs

	Item	Total partographs assessed	Noted at least once on the partograph		Noted at least twice on the partograph		Noted to WHO standard on the partograph	
		#	#	%	#	%	#	%
A.	Fetal heart rate	44	38	86%	26	59%	12	27%
B.	Amniotic fluid "Liquor"	44	38	86%	18	41%	7	16%
C.	Molding of fetal head	44	34	77%	15	34%	4	9%
D.	Cervical dilation	44	41	93%	34	77%	3	7%
E.	Fetal head descent	44	39	89%	36	82%	12	27%
F.	Presence of uterine contractions	44	41	93%	30	68%	13	30%
G.	Maternal pulse	44	34	77%	11	25%	3	7%
H.	Maternal blood pressure	44	28	64%	10	23%	3	7%
I.	Maternal temperature	44	25	57%	4	9%	3	7%

To examine the results from a different angle, three summative indices were created using compiled scores of the nine items from the partograph extraction tool that are listed in Table 4. The first summative index combines the total number of items noted on the partographs at least once. The second summative index combines the total number of items noted on the partographs at least twice. The third summative index combines the total number of items that were completed according to the WHO standard.

A pattern can be seen in this table as well. For the index that sums the number of items recorded on partograph one time, the mean score of all 44 partographs is 7. For the index that sums the number of items that are marked on the partographs at least twice, the mean score of all partographs is 4, with the same range of 0-9. Finally, for the index that sums the number of items that are recorded to WHO standard on the partographs, the mean is 1.5, with a range of 0-9. Most of the partographs demonstrated that items were recorded once. Some of the partographs noted indicators that were noted twice or more. A very small number of partographs were found with items filled out to WHO standard of completion.

Table 5: Results of Summative Indices

Index	Description	Sample	# of Items	Mean	Range
Recorded at least once (>= 1)	Index summing the total number of items recorded on the partograph at least once: fetal heart rate, color of amniotic fluid, molding of the fetal head, cervical dilation, presence of uterine contractions, maternal pulse, maternal blood pressure, and maternal temperature	44	9	7	0-9
Recorded at least twice (> = 2)	Index summing the total number of items noted on the partograph at least twice : fetal heart rate, color of amniotic fluid, molding of the fetal head, cervical dilation, presence of uterine contractions, maternal pulse, maternal blood pressure, and maternal temperature	44	9	4	0-9

Recorded to WHO standard	Index summing the total number of items noted on the partograph to WHO standard: fetal heart rate, color of amniotic fluid, molding of the fetal head, cervical dilation, presence of uterine contractions, maternal pulse, maternal blood pressure, and maternal temperature	44	9	1.5	0-9

Table 6 presents the results of two items that are related to the ability of the partograph to track labor progress over time. Out of 44 partographs, 35 (78%) were found with the date of labor onset noted on the graph. However, only six (14%) noted the hour of active phase onset correctly on the partograph. This means that only six out of the 44 total partograph records had a graph that was correctly filled out, so that the point of time where a woman reached four centimeters of cervical dilation was correctly indicated on the active labor line.

Table 6: Timing noted on partographs

	Indicator	Total partographs assessed	Number of indicators on the graph	Any notation percent: number/44=%
a.	Date of labor onset noted on partograph	44	35	78%
b.	Hour of beginning of active phase (defined as cervical dilation of 4 centimeters) documented correctly on partograph	44	6	14%

In the partograph extraction tool, two criteria were created to measure completion of the admission exam--the section where information is completed to demonstrate initial assessment of the mother upon admission. As seen below in Table 7, nearly all of the partographs examined (98%), were found to have at least some of the exam complete, assessed by 1-9 items present. Additionally, 84% of the partographs had all 10 of the items in the admission exam section completed.

Table 7: Exam on admission recorded on partographs

	Indicator	Total partographs assessed	Noted at least once on the partograph	
			#	**%**
a.	Exam on admission: partly recorded (>=1 item, <10 items)	44	43	98%
b.	Exam on admission: fully recorded (=10 items)	44	37	84%

Table 8 presents the information extracted from the partographs regarding urine measurement and testing. One partograph of the 44 that were examined noted that urine output had been measured. There were no partographs that recorded testing of either ketones or protein in a urine sample during labor.

Table 8: Urine output measured and tested

	Indicator	Total partographs assessed	Noted at least once on the partograph	
			#	**%**
a.	Urine output noted at least once	44	1	2%
b.	Urine tested for ketones or protein at least once	44	0	0%

Information gleaned from the partographs regarding maternal and newborn complications and health outcomes was limited. We attempted to gather details regarding any notation of intrapartum complications or adverse events and associated health worker action or response. However, very little information in this area could be found on any of the partographs examined. One partograph indicated that a referral to a higher level of obstetrical care occurred. From a note on the partograph, this particular reason was related to a facial presentation of the infant, and the partograph was filled out for one cervical exam before the mother was transferred due to the fetal malpresentation. Table 9 organizes the details from five of the 44 partographs that

reported a complication that occurred during the intrapartum or postpartum periods. These events may or may not have led to additional adverse outcomes, as none of the partographs examined indicate whether there were any maternal or neonatal deaths or "near-miss" events.

Table 9: Intrapartum and Postpartum complications noted on partographs

	Complications reported on partographs	Number of partographs
A.	Postpartum hemorrhage	2
B.	Neonatal asphyxia	1
C.	Obstructed labor	1
D.	Face presentation	1

DISCUSSION

Partograph use is recommended as a standard of intrapartum care and a key tool in guiding decisions for health care workers attending births. The partograph tool is recommended by the World Health Organization as a standard of intrapartum care in health facilities where births occur. It is important to know how health care workers understand and implement the partograph, and whether or not partographs are useful and effective in the improvement of maternal health services.

Extent of partograph use in Ntcheu

Of 195 births, only 44 partographs were found (22% of the total). It is unknown whether the majority of the missing partograph records were a result of provider misunderstanding related to use, inability to complete partographs in the available time frame (possibly due to a heavy workload and human resource shortages), or for some other reason that the study didn't identify. Birth at home or while in transit to the health center was listed as the reason for nine of the missing partographs. Maternal health records from these nine deliveries were found at the health

centers indicating likelihood that the mothers arrived at the health centers following delivery for an evaluation. No information could be garnered regarding the reason for delivering on the way to the health centers or delivering at home. It is unknown whether the mothers delivered rapidly following initiation of labor, whether there were access problems reaching the health centers, or whether or not (in the cases of mothers who delivered at home) an attempt was made to travel to the health center during labor.

Another relatively common reason for missing partographs involved a lack of blank paper records. In other words, no partograph copies were available at the time of labor simply because there was not the paper and printing capacity to produce the physical partograph tool. The maternal health record was present in the line list, but when the data collection team tried to obtain the partographs, they found that the tools were not available because they had not been filled out during the intrapartum period.

Informal discussions with health care workers involved in the data collection process indicated that an additional reason for missing partographs involves a lack of supervision and accountability between health workers, facility managers, and health officials at the district level. Health workers reported that, in many cases, years passed by without any supervising personnel requesting partograph records for review or collecting the partographs for data compilation purposes. Indeed, it appeared that partographs were not evaluated at a district level, or used to guide decisions about further health worker training or improvement of the intrapartum care process. Such lack of supervision and accountability may lead to a laissez-faire attitude about fulfilling job requirements and complicate the ability to provide high quality care.

Similar findings of low partograph availability and use are seen in the literature. During an assessment of provider knowledge of partograph use in Nigeria, only 9.1% of the obstetrical

providers responded that partograph charts were available on their labor wards. (Fawole, 2013). In a cross-sectional study of 229 births with professional midwives in Ministry of Health facilities in Cote d'Ivoire, partographs were completed during labor in only 5% of the births (Delvaux et al., 2007).

Extent of partograph use as intended

Overall, the quality of partograph completion was poor. Many indicators were missing, and although many partographs were noted with items once during the woman's labor, the number of items marked on the partographs to WHO standard was small. Notations associated with equipment and supply use, such as blood pressure monitoring, temperature monitoring, fetal heart monitoring, and urine output measurement and simple urine analysis, were also found to have low numbers and frequencies on the partographs. The reason for this lack of item recording is unclear. It is unknown if the information is missing because the equipment (such as a blood pressure cuff or thermometer) was broken or unavailable, if the health care provider did not know how to use the equipment, if there simply wasn't available time to complete all items, or if the information was obtained but not recorded on the partographs.

There are many possible reasons why information on the partographs was missing. These may include insufficient numbers of health workers in the health centers and a work load that demands patient care comes before paperwork, lack of understanding or misunderstanding of the purpose of partograph use, lack of accountability from higher levels of supervision or inadequate training regarding partograph use, or partographs being completed retrospectively with incomplete information.

In many of the partographs examined, it appears as though the health worker was using the tool as a checklist instead of a graphical measurement of labor that requires completion over

time. Indicators of the mother and baby's physical wellbeing charted once only gives a snapshot of labor status--conclusions cannot be made regarding the progress of labor or the identification other complications. The indicators relating to onset of the labor are among some of the most important. If the time of onset of active labor is not correctly placed on the graph, the main objective of partograph use--prevention of obstruction of labor--is futile.

Obstetric complications and health worker response

Due to the limited information provided regarding complications during the intrapartum periods and also the small sample size of partographs, it is not possible to make conclusions in this study regarding the quality of partograph fill as it relates to changes in maternal and fetal morbidity and mortality. Except for the frequencies and descriptive analysis, further analysis regarding health outcome information could not be completed. As partographs are intended as tools to identify complications during labor and guide decision making, the point of using the tool is defeated if it is not being used to intervene in cases of prolonged or obstructed labor.

The sample size in this study was small. Although an attempt was made to collect nearly 200 partographs, 44 were found. A larger sample size would provide more information regarding partograph use and maternal outcomes. But the lack of partographs found is in itself is an interesting finding. As a studied and recommended WHO tool for intrapartum care, obstacles to availability, understanding, and correct completion of the partograph must be explored in order to describe why the extent of use is so low.

Another limitation of the study involves the hand copying of partograph records by the data collectors onto new paper records. Partographs could not be photocopied in the health centers due to lack of equipment. It is likely that some error occurred in hand copying the records from the original partographs, (which would have been recorded at the time of the delivery by

another individual, possibly increasing mistakes in reading the handwriting) to the new blank partographs, which were evaluated at a later time.

Our geographical distance from the location of partograph completion and collection was another limitation in this study. We evaluated the collected partographs in this project while sitting in an office in Atlanta, attempting to decipher the information recorded on the graphs without the vast knowledge and experience from Ntcheu health workers to assist us. Although we were able to communicate with data collectors in Malawi to address specific questions and glean some anecdotal information, this isolation from the actual realities faced by health workers made the interpretation of the results difficult. Further research is needed in order to continue completing our picture of knowledge of challenges faced by health workers in intrapartum settings.

Further research is needed to assess the quality of intrapartum care by examining partograph use in low-resource areas. One way to examine partographs could be in coordination with interviews with health care workers and an in-depth evaluation of other factors that affect the quality intrapartum monitoring and care. For example, quantitative evaluations of partographs could be combined with qualitative interviews with health workers to piece out the reasons for missing records and incomplete graphs.

In addition, programmatic changes to improve partograph use and quality of use could be enacted. Given the very poor use and quality of use of partographs currently, a much more concerted, widespread effort in developing countries to routinely monitor and evaluate the use of the partograph in all maternal health programs and services. Also, in-service training sessions and evaluations of these training should be established to ensure clear comprehension of partograph use.

Finally, there is a dire need to better understand the implementation of all aspects of intrapartum care in rural settings where quality may be severely compromised due to inadequate technical supports, understaffing, or lack of understanding of implementations or the labor and birth process. The partograph may be an inexpensive, simple, and effective tool in improving quality of intrapartum care in the low resource setting. However, more research is required to compare partographs to other interventions and assess health care worker's perceptions of other effective ways that intrapartum care can be developed.

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Chapter 4: Discussion

SUMMARY OF FINDINGS

In this project we collected partographs to explore the extent of their use and the quality of their use in Ntcheu District, Malawi. Information gathered from the partograph records was subjected to a standardized data extraction process and organized into graphs and indices. We anticipated that the submission of collected partographs to an evaluation process would provide information about partograph use and perhaps more generally about intrapartum care, as partographs were employed to guide labor management practices. Few conclusions about the partographs could be made due to the small number of partographs found.

The absence of partographs itself, however, is an important finding. Despite extensive health facility visits and thorough searching, the stark lack of partographs that could be collected in Ntcheu suggests that multiple barriers to partograph use and completion exist. In addition to the small number of located partographs, the quality of completion was very poor. Many partographs demonstrated minimal documentation. On a number of partographs, details such as maternal physical status and fetal heart tones were recorded only once: no record of labor progress over time was evident. In one case, three partographs that were collected from the same health facility documented nearly identical vital signs, physical findings, and birth outcomes, despite differing maternal names and register numbers.

As discussed in earlier chapters, unacceptably high rates of maternal mortality persist in some countries despite effective interventions and programs to decrease the prevalence of maternal death. Our findings of missing and poor quality partographs are important because partograph use is recommended as a standard of intrapartum care and a key tool in guiding health care workers during the intrapartum period. If this tool is not being used or not being used

appropriately, its influence on maternal care in low-resource settings--whether positive, negative, or negligible--cannot be evaluated. Expanding our knowledge of the implementation and use of partographs during labor monitoring is important as we strive to better understand and improve maternal care in low resource settings.

INTERPRETATION OF FINDINGS

Infrastructure and training

While this study did not identify all of the exact causes for missing and incomplete partographs, we suspect several reasons exist for the small number and poor quality of use of partographs in this project. One cause of poor quality care in low resource areas is inadequate infrastructure. The absence of sufficient medical supplies is one infrastructure challenge in health facilities that contributes to the study findings. In informal conversations with health workers in the study setting, we learned that missing partograph records were often simply due to a lack of paper —materials and copies were not supplied at the district level for months at a time. Mothers continued to arrive at the health center during labor, but the health workers did not have blank partographs available for labor monitoring or paper available to copy more.

Another infrastructure challenge in Ntcheu is the poor state of roads and absence of public transportation systems. Health workers reported that women often deliver while on their way to health centers due to long distances and unmanaged roads leading to arduous journeys by motorbike or truck. Women in labor sometimes choose home deliveries in the face of these access barriers. One health worker stated that presence at health centers for deliveries is seasonal—in rainy seasons when the roads are flooded the number of facility births declines dramatically. The data collectors stated that although mothers delivered at home or en route to the health centers, they would still attribute the local health center as the place of the infant's

birth for record-keeping purposes. A delivery might be listed in the maternal register of the health center, but the partograph would be missing as no facility health worker had attended and monitored the woman's labor.

Inadequate training and education among health workers in Ntcheu may also contribute to the findings of this study. The majority of the Ntcheu health workers completing the partographs are nurses with some training in labor and delivery care. Many received formal training at school; others received training on-site in health centers from experienced staff members. The poor quality of partograph completion may be due to inadequate training. Inadequate training influences not only the quality of information recorded but also the level of motivation among health workers as they complete monitoring and charting tasks during labor. A misunderstanding of the partograph's usefulness decreases its priority among the standard activities during labor support and monitoring.

We learned that although health workers in Ntcheu are familiar with partographs and aware that partograph completion is expected during labor and delivery, partograph-focused trainings are rare and supervision of partograph completion is nonexistent. In conversations with the data collectors who searched for the partograph records, they stated that at times the partographs are filled out by cleaners or ancillary staff at the health centers, and at times the completion occurs retrospectively—the mother may be delivered and back at home with her newborn by the time her labor graph is filled out. These circumstances lead to questions regarding the quality of information found on partographs completed by staff, and also questions regarding the nurses' ability to complete the partographs due to high patient load (data collectors reported that at times a solitary health worker managed 3-4 laboring women at one time, with no other health providers on-site to assist with monitoring and management). The partograph is not

intended to be completed retrospectively, but during labor so that it can assist health workers to observe possible danger signs in labor progression.

Accountability

Lack of accountability in health care systems in rural Malawi may be another reason for inadequate use of partographs. Accountability refers to the sharing of responsibility for service improvement and is a critical piece of the development, monitoring, and evaluation of health care systems (Brinkerhoff, 2003; Cleary et al., 2013). Health workers in Ntcheu indicated that support supervision of nurses and facility staff members is essentially nonexistent. Supervisors rarely visit facilities, and there is very little communication or support regarding the improvement of services in rural facilities. Such absence of accountability may leads to a lack of motivation to implement tools and complete tasks--including partograph completion.

Close collaboration among different departments and levels of the health care system is important to facilitate communication, address needs, improve quality of care, and use available resources wisely. “Accountability mechanisms are governance tools that seek to regulate answerability between the health system and the community (external accountability) and/or between different levels of the health system (bureaucratic accountability)” (Cleary, 2013, p. 4). Accountability mechanisms may be implemented in various ways, including frequent collection of data, evaluation of resource needs, and plans for future improvements. These methods lead to increased and improved quality of use of maternal health care implementations. Freedman & Shaaf dissected the extensive gap between methods of developing ideal reproductive health and rights solutions and the actual reality that people experience in health services on the ground; they also explored the potential role of accountability in addressing this gap (Freedman & Shaff,

2013). As applied to health care systems in low resource areas, mechanisms for promoting more accountability have not been extensively studied.

RECOMMENDATIONS

Further research is needed to fill the knowledge gaps involving partograph use and the quality of its implementation. More partographs must be collected and analyzed in association with interviews with health care workers. Further evaluation of other factors influencing intrapartum care and monitoring in the low-resource setting are needed. In addition, more study is necessary to explore other areas of intrapartum care in rural settings where quality of care is being compromised due to lack of resources, staffing, or essential understanding of the labor and birth process.

Many challenges, both concrete and abstract, create barriers to the implementation of quality intrapartum care. While these factors are context specific, similar challenges are present in low resource areas globally. We evaluated the collected partographs in this project while sitting in an office in Atlanta, trying to decipher the information recorded on the graphs without a great deal of knowledge and experience from the Ntcheu health workers. This isolation from the actual realities faced by health workers made the interpretation of the results difficult. Further research is needed in order to continue completing our picture of knowledge of challenges faced by health workers in intrapartum settings.

The lack of available partographs and poor quality of partographs alone is not adequate information for making broad statements about the quality of care in Ntcheu, Malawi. However, the partograph data that was collected for this study leads to a questioning of other elements of care that might be neglected or missing in these health facilities. For example, missing vital sign information may indicate inadequate measurement of vital signs during labor, or perhaps an

insufficiency of technological supports and equipment such as stethoscopes, blood pressure cuffs, and thermometers. Many questions remain regarding the reasons behind missing pieces of data, and further study is needed to address these questions.

In regards to programmatic recommendations for improved use and quality of use of partographs in low-resource areas, several areas of program implementation must be considered. One method of improving partograph use through program implementation is through increased monitoring and evaluation. Partographs are intended to be simple and inexpensive tools that aid in improving health outcomes for mothers and babies. However, in the context of Malawi, one method of improving use of this simple tool is by increased focus in areas of widespread routine monitoring and evaluation of intrapartum programs. With structured methods of monitoring and evaluating many aspects of maternal health care implementations, roadblocks regarding use of tools such as the partograph may be identified and addressed, improving comprehension of the tool and consistency of its use.

Persistent challenges with community infrastructure and the need for improved training and supervision in Ntcheu and in other low-resource areas must be addressed creatively and in a context-specific approach. Issues such as access barriers to health services due to poor quality roads and lacking transportation systems and lack of necessary medical supplies and equipment must be addressed with collaboration between local health workers and district managers. In addition, accountability mechanisms must be implemented to ensure that problems are addressed and solved in a timely and appropriate manner, and that all parties are taking responsibility for workable and lasting solutions.

Maternal health programs must focus on the collaboration of resources, personnel, infrastructure, and skills training in order to improve the quality of services provided and thereby

improve outcomes. The field of quality evaluations of health systems and implementations is a new field--one that merits further study and development. In order to address the maternal health disparities that continue to fester in global low-resource areas, we must dig deeper into the problem of poor quality implementations and seek solutions.

PERSONAL RESPONSE

I completed this project as part of the fulfillment requirements for a Masters in Public Health degree. Although I had previously spent six months working with health workers on a measles vaccination campaign in rural Malawi, I was unaware of the current situation of intrapartum care, and was not familiar with the process of completing a partograph during intrapartum monitoring.

One piece of knowledge that I gained while completing this project was broader understanding of the delicate process of partograph completion and the attention to detail that is required to fill out a partograph correctly. Reading WHO standards of intrapartum care and partograph completion provided me with greater knowledge of the scope of health providers involved in deliveries in low-resource settings. I enjoyed the interactions that I had with health workers in Malawi via phone and Skype conversations in which we discussed barriers to partograph completion and the many challenges faced by health care workers.

From the completion of this thesis project, I learned that implementation and evaluation of intrapartum care in low resource settings are challenging. I found that my ignorance of the barriers faced by health workers in low resource settings was extensive. Additionally, I learned that it is important to consider recent successes in global maternal health. Despite the persistence of this problem, maternal health outcomes are gradually improving, and maternal and neonatal lives are saved every day by the diligent efforts of global health institutions, governments,

private organizations, and health workers – many of whom are operating in some of the most difficult health care settings in the world.

Chapter 5: Thesis References

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