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Reducing Maternal and Perinatal Mortality Through Labor and Delivery Practices at a KwaZulu-Natal, South Africa District Hospital

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Abstract

Maternal and perinatal mortality have become main focuses in global health, including in the country of South Africa. Many maternal and perinatal deaths can be prevented just before, during, and directly after the labour and delivery process. This study examines such prevention practices being employed at a district hospital serving a rural population in north-eastern KwaZulu-Natal, South Africa. The study looks at the methods used by the hospital to reduce maternal and perinatal mortality in the labour ward during the intrapartum and immediate postpartum periods, from the start of contractions through three hours post delivery.

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Acknowledgements

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Introduction

In the year 2000, the United Nations, with the goal of promoting equality, empowerment, and health for people worldwide, created a set of ten objectives entitled the Millennium Development Goals. These goals provided a framework for worldwide improvement of living conditions, health status and opportunities. One of the selected millennium development goals is entitled 'Reducing Maternal Mortality', with the target of reducing by three-quarters, between 1990 and 2015, the worldwide maternal mortality ratio (United Nations, 2010). Hand in hand with reducing the maternal mortality ratio is the reduction of perinatal mortality, defined as death in the time period between fetal viability (28 weeks gestation or 1000 g in South Africa) and the end of the seventh day of delivery (Saving Babies Technical Task Team, 2009).

Maternal mortality disproportionately affects developing countries to a great degree. According to the World Health Organization, 99% of maternal deaths occur in developing countries, and more than half of these occur in sub-Saharan Africa (World Health Organization, 2007). Lifetime risk of maternal death, a measure of how likely a woman is to die from pregnancy or childbirth in her lifetime, is also staggeringly varied between developed and developing countries. In developed countries, a woman's lifetime risk is just 1 in 7300, yet in developing countries, the rate is 1 in 75 (ibid). A South African

woman's lifetime risk is 1 in 100, compared to an American woman's 1 in 4800, a British woman's 1 in 8200, and a Swedish woman's 1 in 17,400 (ibid, p. 33)

In alignment with the United Nation's Millennium Development goals, South Africa has made maternal health a national priority. In 1994, shortly after the end of apartheid, a document entitled 'A National Health Plan for South Africa' was released. One of the goals in the document was Maternal and Child Health (MCH), and stated 'a key focus of the MCH policy is improving the health status of women and ensuring that mechanisms are created so that no mother dies because of lack of access to health services' (A National Health Plan for South Africa, 1994). With maternal mortality at the forefront of health provider's minds, statistical data began to be collected to monitor the country's progress in reducing the maternal mortality rate.

Beginning in 1998, the National Committee on Confidential Enquiries into Maternal Deaths (NCCEMD) began releasing the 'Saving Mothers' report, summarizing and analysing the current state of maternal mortality in South Africa. After the first report, 'Saving Mothers' was released in triennia, between 1999-2001, 2002-2004, and 2005-2007. Despite outlining strategies to improve maternal health in the National Health Plan, there was a 20.1% increase in number of maternal deaths from the 2002-2004 triennium to the 2005-2007 period, from 3406 to 4077 (maternal deaths being defined as 'deaths of women while pregnant or within 42 days of termination of

pregnancy from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes') (NCCEMD, 2008, p. 1). The causes were varied, but the top causes of death, referred to as the 'big five' have remained non-pregnancy related infections (the majority HIV/AIDS) at 43.7% of deaths, complication of hypertension at 15.7%, obstetric haemorrhage at 12.4%, pregnancy related sepsis at 9.0% and pre-existing maternal disease at 6.0% (ibid, p. 1).

Although much of the dramatic increase has been attributed to AIDS, the report found that 60% of the maternal deaths were avoidable, and 55% of these avoidable cases could be attributed to health systems failure (Harrison, 2009). With these high rates of health systems failure, it is necessary to look at the practices clinics and hospitals are using to reduce this rate, and improve the deficiencies to save mothers lives.

Just as important as the monitoring and evaluation of maternal deaths is the monitoring and evaluation of perinatal deaths worldwide. In 2006, the World Health Organization released a report analysing worldwide statistics on neonatal, perinatal and infant mortality. Similar to the vast inequalities between the most and least developed country's maternal mortality rates, in the year 2000, the most developed regions perinatal mortality rate was 10 in 1000, while that for the least developed countries was 61 in 1000 (World Health Organization, 2006, p. 18). For that year, South Africa's perinatal

mortality rate was 33 in 1000 (ibid, p. 33). Most recent estimates put South Africa's rate at 43.78 in 1000, a far cry from Angola's 178 in 1000, but still higher than the rates of countries such as Iraq and Zimbabwe (Central Intellegence Agency, 2010).

Along with the 'Saving Mothers' initiative, South Africa established the 'Saving Babies' report in 1999 to track and record statistics on perinatal mortality using the national Perinatal Problem Identification Programme (PPIP). In 2008, a full 40% (659,809) of births in South Africa were being captured by the program, establishing an overview of perinatal mortality in the country (Saving Babies Technical Task Team, 2009, p. 1). From the period of 2006 to 2007, the sixth report was released detailing all aspects of perinatal mortality, including causes of death, factors leading to death, place of death, and avoidable deaths (ibid p.1).

The most recent study reported 25,060 perinatal deaths in two years, mostly attributable to three main causes of death; labour related complications (17%), spontaneous preterm birth (23%) and placental disease (23%) (ibid p.1). Similar to maternal mortality, the report found that a large percentage of perinatal deaths were avoidable, and of these avoidable deaths, 53.2% were caused by health care provider or administrative problems (ibid p. 19).

In looking at how to reduce maternal and perinatal mortality, it is necessary to look at not only how, but where these deaths took place. In 2007, approximately 35.6% of maternal deaths occurred in

district hospitals, and 40.1% of perinatal deaths occurred at the same level (NCCEMD, 2008, p. 7) (Saving Babies Technical Task Team, 2009, p. 3). In addition, many maternal deaths occurred during the labour and delivery process (including problems with recognition/diagnosis, incorrect management, and substandard management), and 17% of perinatal deaths occurred from labour related complications.

The purpose of this study was to examine the labour and delivery practices at a district level hospital in South Africa to observe the strategies used to reduce these high percentages. The author spent three and a half weeks at a district hospital in a semi-rural area of KwaZulu-Natal, primarily in the labour ward. While many policies and procedures are in place to combat the high maternal and perinatal mortality rates country-wide, the author was able to observe whether or not these policies and procedures were being employed at the individual-hospital level.

Note: For the purposes of confidentiality, the hospital will be referred to as 'Hill Hospital' (a pseudonym), doctors and nurses will only be referred to by their first initial, and patients assigned a random letter for identification.

Methodologies

As this study was comprised of both a practicum and social analysis, several different types of methodologies were used. These were divided into primary and secondary source methods.

Primary sources

Participant Observation

The author spent the majority of her time at the hospital as a participant observer in the labour ward. For the most accurate information concerning the reduction of maternal and perinatal mortality, she decided to shadow the nurse midwives closely throughout their day-to-day work.

There were numerous staff levels at the hospital, comprised mostly of doctors, advanced nurses, general nurses, and student nurses. The labour ward consisted of advanced practicing midwives and enrolled student nurses. While doctors came into the ward a few times a day, the labour process was managed mostly by the advanced midwives. The author spent all day with the advanced midwives as they attended to patients, filled out charts, and completed other tasks in the ward and around the hospital.

The author was limited in several ways in participant observation. For patient confidentiality reasons, the author only shadowed the midwife when asked to come along. Although she was invited to the bedside on the majority of occasions, some midwives did

not feel as comfortable as others inviting the author with them. Therefore, some information may have been lost to the author, such as decision making processes and medication dispensing. Also, the midwives primarily spoke Zulu with each other and with the patients. Unless specifically addressing the author in English, the discussion between the nurses and patients was not understood. To overcome this, the author used informal conversations and questions to clarify situations that she did not understand. However, especially concerning conversations between the nurses, a significant amount of information may have been lost.

Besides one day spent in the operating theatre observing Caesarean sections, the author chose not to observe the work of any of the doctors. Advanced midwives made the majority of the decisions regarding patient care, and there was not a doctor specifically responsible for the labour ward. For these reasons, the author decided the most valuable information would come from the midwives, and not the doctors. This lack of different perspective may also have limited the study.

Informal Conversations

For confidentiality reasons, the author did not conduct any formal interviews at the hospital. Instead, informal conversations to clarify observations were used. Most of the midwives were very open and willing to answer any questions the author had concerning the

labour and delivery process, as well as the workings of the hospital. All of the nurses spoke English well, and the author was not concerned about information being lost in translation. While informal conversations certainly did not provide as much information as a formal interview would, the author gained valuable insights into what she was observing in the ward.

Statistics

While at the labour ward, the author had access to the maternity register which documented information concerning each patient and how their delivery went. The author took select information from this maternity register to analyse the state of patients in the maternity ward during the time period she was there (summarized in Appendix B). To protect patient confidentiality, the author did not record any names, and statistics were grouped by category, not linked together to one patient. For example, the author recorded that there were 31 teenage pregnancies, but did not connect these pregnancies with birth outcome.

Secondary sources

Reports

Reports, both worldwide and South African, provided the majority of secondary information the author consulted. Most presented data in raw form, with attached analysis sections, allowing

the author to draw her own conclusions as well as see the conclusions of others. Most of the reports also provided an extensive section on recommendations, which provided a semblance of 'best practices' for South Africa.

While the reports did attempt to analyse as many cases of maternal and perinatal mortality as possible, the author recognizes that the reports do not necessarily reflect the situation in all areas of the country. The author also recognizes that the report's recommendations concern only South Africa, and generalizations cannot be made concerning other countries.

Journal articles

Several journal articles were consulted, especially regarding practices to reduce maternal and perinatal mortality. The author recognizes that the majority of the articles were not specific to South Africa, but took care to only use articles that could pertain to the country (for example, articles reflecting on cultural ties to obstetrics written in other countries were not included, yet general medical practices were used). Articles were only used from peer-reviewed journals, reflecting the high standard of research and limited bias.

Meta-analyses

The author relied heavily on the meta-analyses system *Cochrane Review* to find 'best practices' concerning maternal and

perinatal mortality. Meta-analyses provide information based on a multitude of studies concerning the same topic. For example, all journal articles on the use of medication for inducing labour would be collected and analysed to find which medication worked best. While the author recognizes meta-analyses are not specific to region, they provide a much broader view than individual journal articles, especially in the medical and health field. Meta-analyses provided a strong tool for comparison purposes in looking at the difference between best practice and actual practice.

Internet research

A small number of sources were accessed through websites. The author took care to only use information from reliable sources, such as the World Health Organizations and Central Intelligence Agency. Where available, the author chose to download the original source the webpage cited to reduce bias. However, where the original source wasn't available and the information could not be found in reports or journal articles, the author used these web pages.

Literature Review

Several essential texts were used by the author to provide background knowledge and expanded information on maternal and perinatal mortality, both worldwide and in South Africa.

A. World Health Organization. (2007). Maternal Mortality in 2005. Geneva.

This report analysed the current worldwide statistics on maternal mortality, giving a broad overview of the state of maternal mortality in countries around the world. The report was especially useful for comparison purposes to look at South Africa's rates compared to other nation's maternal mortality rates.

B. NCCEMD. (2008). *Saving Mothers 2005-2007: Fourth Report on Confidential Enquiries into Maternal Deaths in South Africa.*

This report idabsolutely essential to understanding the current state of maternal mortality in South Africa and provides an excellent presentation and discussion on statistics. The report also includes ten recommendations for reducing maternal mortality. This document provided the backbone for the study, and the author highly suggests reading the report for further information on maternal mortality in South Africa.

C. MRC Research Unit for Maternal and Infant Health Care Strategies, PPIP Users and the Saving Babies Technical Task Team. (2009). *Saving Babies 2006-2007: Sixth report on perinatal care in South Africa.* Pretoria: Tshepessa Press

Similar to the Saving Mothers report, Saving Babies gives an overview of perinatal mortality in South Africa. While the report delves into the many aspects concerning perinatal mortality, the author primarily used data concerning labour and delivery practices. For further information on perinatal mortality in South Africa, the author recommends consulting this document.

D. NCCEMD. (2001). *Saving Mothers: Policy and Management Guidelines for Common Causes of Maternal Death.*

This report, released in conjunction with the Saving Mothers confidential enquiries into maternal death, outlined specific policies and procedures health care systems should establish to reduce the maternal mortality rate. Some areas covered in the report included pregnancy-induced hypertension, postpartum haemorrhage, and pregnancy-related sepsis. While the guidelines were written for health care practitioners, it gave a comprehensive checklist of steps clinics and hospitals should be taking.

E. World Health Organization. (2006). *Neonatal and perinatal mortality: country, regional and global estimates.* Geneva: World Health Organization.

Similar to the WHO's 'Maternal Mortality in 2005' report, this report provided statistics and information concerning neonatal, infant, and perinatal mortality around the world. Primarily used for background information and comparison purposes, this report helps to put the South African perinatal mortality situation in a global context.

Commonly Used Acronyms

CPD	Cephalopelvic disproportion
CTG	Cardiotocography machine
ENND	Early neonatal death
FSB	Fresh stillbirth
HIV/AIDS	Human immunodeficiency virus/Acquired immune deficiency syndrome
IPA	Intrapartum asphyxia
MMR	Maternal mortality ratio
MSB	Macerated stillbirth
NCCEMD	National Committee on Confidential Enquiries into Maternal Death
NVD	Natural vaginal delivery
PIH	Pregnancy induced hypertension
PV	Per-vaginal
VBAC	Vaginal birth after caesarean

A.

Findings and Analysis

Overview of normal labour and delivery at Hill Hospital

To fully understand the state of maternal and perinatal mortality in district hospitals and what is being done to prevent these deaths, the author spent three and a half weeks in the labour ward at Hill Hospital, a level 1 district hospital serving a rural population in KwaZulu-Natal. Everyday was spent following and observing the advanced midwives and student nurses as they cared for their patients in labour. The ward was small, with just a main room containing four intrapartum beds and two postpartum beds, a back room with extra supplies and a shower and toilet for the patients, a sluice room for soiled linens and used supplies, and a narrow room for the nurses to fill out charts and sit when not tending to patients.

Patients were admitted to the labour ward in one of two ways- either directly from the antenatal ward adjacent to the labour ward, or from 'home', usually meaning arrival by ambulance or through the obstetric and gynaecology outpatient clinic. The patient was immediately given a gown to change into, shown to an intrapartum bed and asked to wait for a 'sister' (advanced midwife) to perform a per-vaginal (PV) exam. While waiting for the sister, enrolled student nurses took the patient's blood pressure and a urine sample to test for pH and proteinuria (abnormal presence of proteins in the urine). The sister then began the PV exam, which started with the sister opening a

new PV-pack from the storage closet, containing a bowl and cotton swabs, and filling the bowl with an antiseptic solution. After putting on gloves, she would use a small amount of jelly and insert two fingers into the vagina to check for dilation and descent of the presenting part of the baby (in most cases, this would be the head, in some rare instances it may be an elbow or foot, indicating a breech position). She would also check for caput (swelling of the head) and moulding (overlapping of the skull bones) that may occur as the baby's head fit the shape of the mother's pelvis. The sister would also ask the patient if her membranes had ruptured and note if there was a bloody 'show' on the glove after the midwife's fingers were removed from the vagina. After the PV exam, the sister would generally ask one of the students to start the cardiotocography (CTG) machine which recorded fetal heart rate and uterine contractions on a graph. This graph could reveal irregularities in fetal heart rate (indicating fetal distress) and increases or decreases in strength and timing of contractions.

After the initial exam, the midwife would make a decision concerning the patients care. Generally, if she was only 1 or 2 cm dilated without contractions, she was sent home; with contractions she was sent to the antenatal ward (latent stage of labour). If 3 cm or more dilated with contractions (active stage of labour), she was admitted to the labour ward and the sister began to fill out the initial exam pages of the maternity book that all pregnant women had in their file (if the woman had not attended any antenatal care visits, a

maternity booklet was given to her in the labour ward). The booklet is extremely detailed, with spaces to measure all aspects of pregnancy and labour, including the information gathered at the initial PV exam. The midwife also records parity (number of previous live births) and gravity (number of previous pregnancies) and any risk factors the patient might have.

One of the pages of the maternity book was a blank partograph, a tool used to assess the progress of labour (Figure 1). Both dilation and descent of the presenting part (generally the head) are graphed over time, with two lines drawn, called the 'alert' and 'action' line. Any medications or notes are also noted on the partograph. The partograph is an essential tool that allows the midwives to determine if intervention needs to be taken so the labour progresses smoothly. If the plotted dilation line falls below the 'alert' line, the midwife would probably order another CTG, check the patient often, and consult a doctor. When the progress line crosses the 'action' line, action to deliver the baby quickly would be decided upon (most often a Caesarean section).

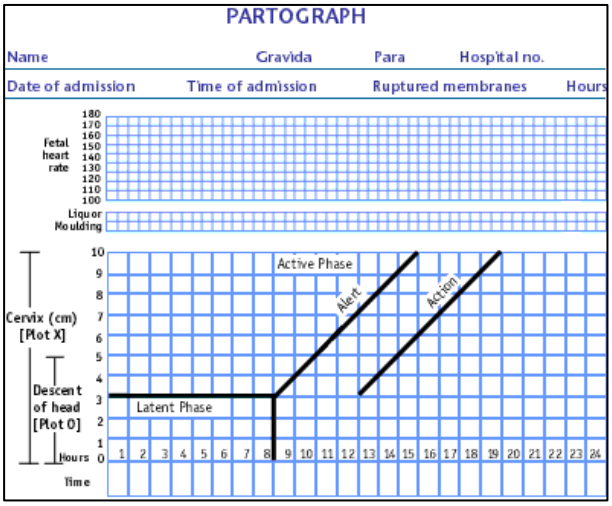


Figure 1: Partograph. Source- http://erc.msh.org/quality/pstools/psprtgrf.cfm

During latent labour, the patient is given a PV exam every 4 hours, and increases to every 2 hours in the active phase. Once the woman reaches 9 cm dilation, she is checked every hour until delivery.

To prepare for delivery, the sister opens a new delivery pack from the closet, containing receiving blankets and extra sheets, larger bowls, scissors and forceps, and cotton swabs. She would arrange these at the end of the bed, and prepare two injections, one containing oxytocin for the mother and one containing Vitamin K for the baby. Once the patient was 10 cm dilated, she is instructed to begin pushing. The sister would aid her in holding her legs back, offering encouragement, and assessing whether the vaginal opening would be adequate enough for the head to pass. If not, a small incision would be cut laterally at an angle away from the vaginal opening, called an episiotomy, to widen the opening and prevent tearing. Once the head was visible, the midwife gently guides the head as it rotates out and help to release the elbows. Once the baby was out, the midwife cleans him and immediately clamps and cuts the placental cord. The baby is then handed off to an enrolled student nurse for further cleaning, weighing, and measuring as the midwife delivers the placenta and cleans up the mother. In the case of an episiotomy, she sutures the incision before moving the mother to the postpartum beds.

The baby is assessed at one minute and five minutes using the Apgar scale in five categories: heart rate, respiratory effort, muscle tone, reflex irritability and color. The baby is rated on a scale of 0 to 2

for each category, giving a maximum score of ten. If the baby had a total Apgar score of 7 or lower, resuscitation was performed.

After the birth of the baby, the mother is moved to a postpartum bed and kept for observation for two to three hours with the infant. In the case of a normal delivery process, after a few hours she is moved over to the postnatal ward where she and her baby would stay for one to two days.

In some instances (described in the following sections), an emergency caesarean section would be performed. While called 'emergency', caesarean sections were relatively routine in the labour ward. Once the determination was made that a patient required a caesarean, she was prepped for surgery and transported to the operating theatre. After receiving a spinal anaesthetic, the surgeon would generally cut laterally across the lower abdomen through the skin and uterus to remove the baby, only taking about five minutes. The baby would be attended to in a similar manner as in the labour ward. The surgeon would then suture the uterus and skin, and the mother would be moved to the recovery room in the postnatal ward.

Out of the 114 total births during the time period the author was at Hill Hospital, very few followed this 'normal' process of labour and delivery. Between risk factors and conditions that developed, almost every case involved some type of complication that required action by the midwives or doctors. These types of complications, when handled incorrectly, could lead to a maternal or perinatal death. The

following sections describe in detail the highest causes of maternal and perinatal mortality and how the Hill Hospital labour staff handled these potentially deadly complications. A table summarizing all births at Hill Hospital during the time period can be found in Appendix B.

State of maternal mortality in South Africa and it's district hospitals

Between 2005 and 2007, 4077 women died in pregnancy or childbirth in South Africa. Although it is difficult to estimate the maternal mortality ratio (as many births occur outside health facilities, they are not able to be officially recorded) roughly 350 deaths occur per 100,000 births (NCCEMD, 2008, p. 5). The "big five" causes, haemorrhage, non-pregnancy related infections, complications of hypertension, pregnancy-related sepsis and pre-existing maternal disease accounted for 87% of maternal deaths (ibid). Figure 2 illustrates the breakdown of maternal death cause. In the year 2007, the province of KwaZulu-Natal reported the highest number of maternal deaths, 340, compared to all of the other South African provinces.

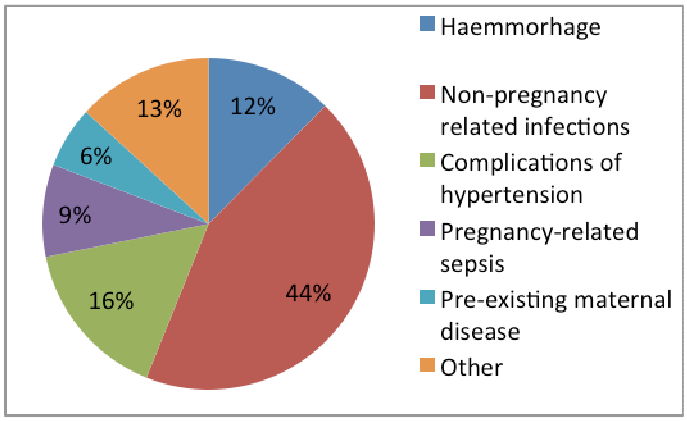
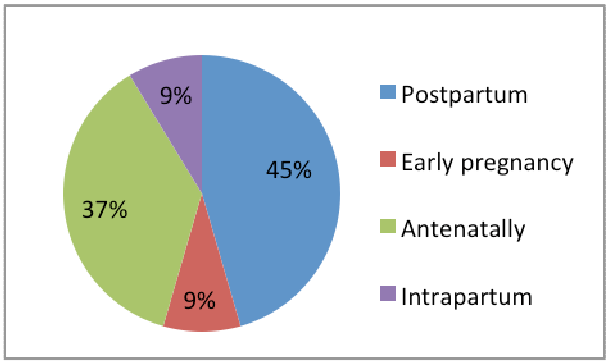


Figure 2: Causes of Maternal Mortality in South Africa

Maternal deaths, as defined by the 'Saving Mothers' report, are 'deaths of women while pregnant or within 42 days of termination of pregnancy from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes' (NCCEMD, 2008). Although maternal death can occur anywhere from conception to shortly after delivery, the majority of deaths (54%) occur during either the intrapartum or immediate postpartum phase (Figure 3).



Unlike deaths occurring antenatally or in early pregnancy that most likely occur outside of clinical settings, deaths during birth or immediately afterwards are usually in the presence of a skilled birth

Figure 1: Time of emergency event leading to maternal death

attendant. In KwaZulu-Natal, 77.9% of births occurred in a facility in 2007 (Day & Gray, 2007). Therefore, a significant number of the 340 maternal deaths in KwaZulu-Natal occurred in a health facility during the intrapartum or postpartum period under the care of trained health care attendants.

In South Africa, maternal mortality is split almost equally between direct and indirect causes. Table 1 illustrates, in detail, the specific causes of maternal mortality between the years 2005 and 2007. KwaZulu-Natal percentages are also presented for comparison purposes. In the province, the percentages that vary significantly from national data (hypertension, pregnancy-related sepsis) are both managed primarily in the labour and immediate postpartum phase.

Table 1: Cause of Maternal Death

Cause	% of total maternal death	
	South Africa	*KwaZulu-Natal*
Direct Causes	**45.9%**	
Hypertension	**15.7%**	**21.6%**
Postpartum haemorrhage	**9.7%**	**6.8%**
Antepartum haemorrhage	**2.7%**	**3.7%**
Ectopic pregnancy	**1.4%**	**1.2%**
Abortion	**3.4%**	**5.8%**
Pregnancy related sepsis	**5.6%**	9.6%
Anaesthetic related	**2.7%**	**1.0%**
Embolism	**1.4%**	**1.5%**
Acute collapse	**3.2%**	**4.3%**

	South Africa	***KwaZulu-Natal***
Indirect Causes	**49.7%**	
Non-pregnancy related infections	**43.7%**	**38%**
AIDS	**22.4%**	**Not available**
Pneumonia	**9.6%**	**Not available**
Tuberculosis	**5.6%**	**Not available**
Pre-existing Medical Disease	**6.0%**	**6.2%**

Source: Saving Mothers 2008

District hospitals, such as Hill Hospital, have a notoriously bad record in the area of maternal mortality. The South African health system is commonly categorized into four levels: community health clinics (CHCs), district hospitals (level 1), regional hospitals (level 2), and tertiary hospitals (level 3) (NCCEMD, 2008, p. 17). Tertiary hospitals are generally reserved for complicated pregnancies that need a high level of care, so 'ideally, most deaths should occur in level 3 institutions' (ibid, p. 18). However, some categories of maternal death, such as postpartum haemorrhage and anaesthetic related complications, were highest at level 1 district hospitals (ibid). When looking into the avoidable factors in these maternal deaths, district hospitals rank poorly in the areas of problems with recognition or diagnosis, substandard management, and delay in referring patients (ibid, p. 22).

Pre-existing conditions and non-pregnancy related infections

Pre-existing conditions and non-pregnancy related infections, also called "indirect causes" account for 49.7% of all maternal deaths in South Africa (NCCEMD, 2008). The majority of this large percentage is accounted for by HIV/AIDS, yet other conditions, including pneumonia, tuberculosis, cardiac disease, endocarditis, urinary tract infections, malaria, meningitis, and various other pre-existing conditions contribute to 27.3% of maternal deaths (ibid). By nature of these conditions and infections, death does not usually occur during

the intrapartum period. Therefore, while at the Hill Hospital labour ward, the author observed many cases of HIV/AIDS, but relatively few of other non-pregnancy related infections.

HIV/AIDS

HIV/AIDS alone caused 22.4% of maternal deaths between 2005 and 2007, approximately 913 deaths (NCCEMD, 2008). Although these deaths did not regularly occur during the intrapartum and immediate postpartum period, a woman's HIV status had a great impact on whether or not she developed infections. While other causes of death had relatively equal numbers of HIV positive and negative women (434 positive compared to 409 negative), non-pregnancy related infections and pregnancy-related sepsis rates were unequally distributed, as summarized in Table 2. As HIV/AIDS compromises the immune system, women were more likely to contract, and therefore die of, infections and sepsis during childbirth.

Table 2: Impact of HIV/AIDS on Maternal Death (with known status)

Cause of death	HIV Positive	HIV Negative
Non-pregnancy related infections	**1347**	**55**
Pregnancy-related sepsis	**91**	**38**
Other	**434**	**409**
Total	**1872**	**502**

Source: Saving Mothers 2008

In the case of HIV/AIDS at Hill Hospital, the midwives were careful to note the status of the woman if known, and if she was positive, record what type of treatment she was on, and what her CD4

white blood cell count was. Although this did not directly affect the care of the woman, these indicators were carefully recorded for statistical purposes. In the author's time at the hospital, 33.3% of the patients were recorded as being HIV positive. Although HIV primarily affects maternal mortality before the intrapartum period, the midwives always carefully followed the prevention of mother to child transmission (PMTCT) regimen outlined in the policies and procedures booklet in the ward (Appendix A). The women had been instructed in their antenatal visits to take nevirapine as soon as contractions began (generally outside the hospital), and were given AZT and another medication every three hours during labour to prevent transmission (ibid). Although this treatment did not have an effect on maternal mortality, the PMTCT program was a regular procedure in the labour ward for women with HIV/AIDS.

Although not directly related to maternal mortality, the 2009 Saving Babies report outlined several steps clinics and hospitals should take to normalize HIV infection as a chronic disease, therefore reducing the complications that could be associated with lack of knowledge and skills concerning the condition. These included HIV testing for all women, no coding of HIV status on health documentation (potentially leading to confusion and errors), all health care professionals providing counseling, and all HIV infected women to get dual therapy or HAART (Saving Babies Technical Task Team, 2009, p. 40). While some of these recommendations apply more to antenatal

clinics than the labour ward, in some cases, they also apply to the labour ward.

In the labour ward, a document outlining the hospitals coding system was clearly displayed in the nurses' area. It stated that the status of all patients should be coded by the system, and the coding sheet was not to leave the hospital. While this document is in direct disagreement with the Saving Babies recommendation, the author noted that the nurses did not follow the hospital procedure at all. The status of all women was found uncoded in their maternity record and written clearly in the maternity record book. The nurses seemed open to discuss the status of the patient as long it was in the best interest of the patient's health (Appendix A). However, to maintain confidentiality of the patient, the status was stamped on an inside back page of the maternity register, only visible to the patient and the doctors or nurses treating her. In this way, the nurses were able to keep the patient's status as confidential as possible while still being able to provide the best medical care without risk of confusion or errors.

In many countries, the best practice in delivering babies to HIV positive mothers is through Caesarean section to reduce the risk of transmission. The midwives explained that a lack of resources at most district hospitals prevent routine Caesareans for these mothers. At Hill Hospital, a small staff of doctors and limited operating rooms required all HIV postive mothers to deliver vaginally barring any further complications (Appendix A).

Intrapartum complications

Intrapartum complications were well documented and observed by the author, and were by far the most prevalent of complications seen in the labour ward at Hill Hospital. The three most prominent complications, in concordance with three of the highest maternal mortality causes, were obstructed labour, caesarean section complications and pregnancy induced hypertension.

Obstructed labour

The 'Saving Mothers' 2008 report found that there were a total of 163 total deaths due to prolonged or obstructed labour, accounting for 4.1% of maternal deaths. 80 of these deaths were attributed to a ruptured uterus (NCCEMD, 2008).

In the labour ward at Hill Hospital, multiple instances of obstructed labour were observed and occurred during the three and a half week time period. There were a total of 9 caesarean sections done for the reason of cephalopelvic disproportion, or CPD, (7.9% of total births, 28.12% of caesarean sections), the term used for when the baby is too big to fit through the woman's pelvic opening. If not treated properly, CPD could lead to obstructed labour and potential death. The author was present for several patients suffering from 'poor progress', the term generally used by the midwives in a case of obstructed labour. Patient D was progressing through labour normally but stalled at around 9 cm dilation (Culmo, 11/01/2010). She did eventually reach full dilation, but a full hour passed with no progress

despite pushing almost the entire time. To respond to this, the midwives called in a doctor to assess the patient immediately. After the assessment, it was decided that the patient needed an emergency caesarean section, and was taken quickly to the operating theatre.

A different case that presented with initial obstructed labour had completely different results. Patient AA stalled at 6 cm dilation and did not appear to be progressing as she should. A doctor was called in to assess her, and he made the decision to wait an hour, reassess, and make the decision then. Just an hour later, she was 8 cm and progressed enough quickly to deliver naturally (Culmo, 11/18/2010).

In both cases, the use of the partograph was essential in determining when action needed to be taken with the patients. The World Health Organization, in their 'Maternal Mortality 2005' report, outlined measures practitioners could take to help reduce death due to obstructed labour, mainly the use of the partograph to help practitioners recognize when labour slows before obstruction occurs (World Health Organization, 2007). Partographs were carefully tracked for all of the labour ward patients with the purpose of being able to recognize when the patient was not progressing as she should. If a nurse recognized a problem, she first consulted with the other nurses to make sure a mistake had not been made, and called the doctor whenever the progression line fell below the 'alert' line. The doctor was a second line of defense, and made the final call in whether or not the patient needed a caesarean section. With this double layer of

protection and careful monitoring using the partograph, the labour ward was able to effectively combat the risk of maternal death due to obstructed labour.

Caesarean section and anaesthetic complications

By nature, caesarean sections carry a much higher risk of maternal mortality than natural vaginal deliveries. The maternal mortality ratio (MMR) for the period of 2005-2007 was 198.2 per 100,000 births for caesarean sections, compared to just 77.8 per 100,000 vaginal births, a 2.5 times increased risk of dying (NCCEMD, 2008). Women undergoing caesarean sections 'have an increased likelihood of getting an infection compared with women who give birth vaginally' and 'can become serious, causing… an abscess in the pelvis or infection in the blood and very occasionally can lead to the mother's death' (Alfirevic, Gyte, & Dou, 2010). These infections caused by caesarean sections certainly play into pregnancy-related sepsis maternal deaths.

During the three and a half week period, there were 32 emergency caesarean sections performed at Hill Hospital, accounting for 28.1% of all births in the labour ward. This is significantly higher than the national rate of 18.4% (NCCEMD, 2008, p. 19). Despite this higher risk of caesarean sections at the hospital, every precaution was taken to ensure maternal wellbeing. In the Saving Mothers report, several recommendations were made for operating theatres performing caesarean sections. These included a specially prepared 'difficult

airway' trolley, atropine immediately available, resuscitation drugs and defibrillator readily available and a freely flowing intravenous infusion secured to the patient (NCCEMD, 2001, p. 62). The author was able to observe three caesarean sections in the operating theatre and take note of the precautions the doctors and nurses were taking. Not only were all the Saving Mothers recommendations met, but additional surgical precautions such as keeping track of all materials used to ensure none were left in the patient, proper attire and use of gloves, and sterilization of all equipment were used to prevent infection. In the case of an emergency, the nurses and doctors had all the equipment ready to resuscitate, and precautions were taken to prevent infection post-operation (Appendix A).

The controversial practice of vaginal birth after caesarean section (VBAC) was also observed during the author's time at the labour ward. In many other countries, VBACs are performed seldomly, as there is a high risk for ruptured uterus and other serious delivery complications. Although 6 women were given a caesarean section just for the reason of having had a caesarean section in a previous pregnancy (5.3% of total births, 18.8% of caesarean sections), the author was able to observe the decisions made by the midwives and doctors to perform VBAC. Patient B was an at-risk patient not only because she was a teenager, but also because she had a caesarean section previously. The midwives checked her charts and found that her previous caesarean section was due to fetal distress. Because her

previous complications did not involve obstructed labour, pregnancy induced hypertension, or another complication with risk of repetition, the midwives decided that she could carry through with VBAC (Appendix A). To avoid unnecessary risk from performing a caesarean section that was not needed, midwives and doctors only scheduled the operation if the woman had some kind of physical condition that would prevent a natural vaginal delivery (NVD) (ibid). VBACs were also encouraged because resources for operations, such as caesarean sections, were so limited at the hospital.

These decisions made by the midwives and doctors correspond to the recommendations by the Saving Mothers report. VBAC is described as 'a safe and desirable procedure likely to succeed in about 60% of patients attempting it', and uterine rupture only occurs in .5-2% of cases (NCCEMD, 2001, p. 55). Several circumstances must be present for VBAC to be suitable, including an informed, consenting, co-operative patient with just one previous caesarean section, baby of average size, no malpresentation or multiple pregnancy, doctor immediately available and facilities available for emergency caesarean section (ibid, p. 58). In the case of Patient B, all of these circumstances were suitable- her consent was obtained, she had only one previous caesarean, there were no abnormalities and the staff and facilities were adequate. Therefore, to prevent unnecessary risk to the patient in the operating theatre, VBAC was decided on.

Pregnancy induced hypertension

The largest direct cause of maternal death in South Africa, pregnancy induced hypertension (PIH) accounts for 15.7% of maternal death (NCCEMD, 2008). The condition presents in several different forms, and is called pre-eclampsia when proteinuria (proteins present in urine) develops after 20 weeks gestation and eclampsia when it is complicated by convulsions (NCCEMD, 2001, p. 24). PIH can affect many major organ systems, and can have consequences such as poor fetal growth, fetal distress, severe hypertension, edema, jaundice and coma (ibid, p. 25). In a recent study of 264 South African pregnant women before delivery, 30.7% experienced at least one major maternal complication, and 12.9% presented with cases of pre-eclampsia (Kenneth, Hall, Gebhardt, & Grove, 2010). Although no maternal deaths were reported in the study, a large percentage of the women experienced a complication that threatened their lives.

In her time in the labour ward, the author noted three cases of pregnancy-induced hypertension that required caesarean section (2.6% of all births, 9.4% of caesarean sections), but many more women with PIH were able to have an NVD. During her direct observation time, three separate cases presented with PIH that required different lines of decision-making. One case resulted in an NVD, another in an immediate emergency caesarean and one in a delayed emergency caesarean

Patient X came in to the labour ward with multiple risks: teenage pregnancy, primigravida (first pregnancy) and PIH (Culmo, 11/15/2010). Because of her multiple risk factors, the midwives decided to keep her attached to the CTG machine for longer than normal to monitor the fetal heart rate and contractions. They also took her blood pressure on multiple occasions to note any changes. Despite her PIH, there were no indications of fetal distress and she was able to have an NVD.

Patient Q also came into the ward with multiple risk factors: lack of proper antenatal care, prematurity, primigravida and PIH (Culmo, 11/09/2010). She was given a quick initial assessment, but a doctor was called in immediately to decide on an action plan. With just a quick glance at her charts and vital sign, she was immediately scheduled for an emergency caesarean. Although her other risk factors contributed to the decision, the primary reason for caesarean was her uncontrolled PIH (ibid).

Patient O developed PIH late in her pregnancy, as there was not any indication on her charts from her antenatal visits (Culmo, 11/08/2010). However, on the initial assessment, it was found that her blood pressure was high, and the CTG indicated slight fetal distress. A doctor was called in to consult, and it was decided that they would wait an hour, reassess the patient, and then make preparations for theatre if necessary. After he left, the midwives kept a close eye on her

vital signs, and decided to begin preparing her for a caesarean when her blood pressure continued to rise and fetal distress increased.

The three separate decision making processes indicated the variant nature of PIH. As observed in the labour ward, mild cases can go through with an NVD while more advanced cases require emergency caesareans. The Saving Mothers recommends several steps be taken in the intrapartum phase to reduce deaths caused by PIH. There are specific guidelines for the management of PIH, mostly concerning the early detection of the condition before eclampsia develops. Because none of the patients had yet developed eclampsia, the midwives performed the proper measures to prevent further complications.

In the back room of the ward, a specific bed was kept for patients who might present with eclampsia. The bed had railings to prevent falling from convulsions, and medications and equipment needed for management were kept well stocked and close by. Although one of the sisters noted that they rarely had patients with eclampsia, they were well prepared to handle the condition (Culmo, 11/02/2010). A laminated sheet, taken directly from the Saving Mothers report, detailed the specific steps midwives must take to properly manage a patient with eclampsia. Through these steps, the nurses were able to effectively reduce the risk of maternal death from the condition.

Postpartum complications

Although women only remained in the labour ward of Hill Hospital for a few hours post-delivery, steps were taken in the short time frame to prevent maternal death from postpartum complications. These complications comprise a large percentage of total maternal deaths, indicating the importance of procedures and monitoring that must be performed just after delivery.

Haemorrhage

In South Africa, haemorrhage is the second largest direct cause of maternal death, accounting for 12.4% of all maternal deaths, 9.7% being postpartum haemorrhage (NCCEMD, 2008). In a normal birth, womb muscles contract to clamp down blood vessels and limit bleeding after the placenta detaches. If these muscles do not contract sufficiently, postpartum haemorrhage may occur (Mousa & Alfirevic, 2007).

Before the risk of haemorrhage even emerges, there are necessary guidelines to follow in the labour ward, outlined in the Saving Mothers report, that could help to prevent unnecessary death. The first is the use of the partograph to recognize prolonged labour, as longer labours can lead to postpartum haemorrhage (NCCEMD, 2001, p. 49). The time period immediately after delivery is the most critical for reducing risk of haemorrhage. This is called the third stage of labour, when the uterine muscles continue to contract, the placenta is expelled, and blood vessels constrict. Many sources advise active

management of the third stage of labour, involving the use of oxytocin to stimulate contractions and massage of the abdomen to aid uterine contraction (Hofmeyr, Abdel-Aleem, & Abdel-Aleem, 2008) (Pagel, et al., 2009).

Every patient in the labour ward having an NVD was given oxytocin immediately after birth and the midwife always massaged the uterus to stimulate contractions. This common practice greatly reduced postpartum haemorrhage, and the author only witnessed one patient who experienced complications in her time in the labour ward. Patient T was already at high risk for postpartum haemorrhage because of her advanced age (45) and high parity (8 children) (Culmo, 11/12/2010). Risk is increased in all women with a parity over 5 and/or above 35 years old, so Patient T had an extremely high risk (NCCEMD, 2001, p. 48). After delivery, the placenta was expelled incompletely, again increasing her risk. As soon as this was realized, the sister called for assistance and immediately added an extra four doses of oxytocin to be put into her IV fluid and uterine massage continued. After a few minutes, the bleeding lessened, and the patient was eventually moved over to the postnatal bed while the IV continued administering the oxytocin.

According to the Saving Mothers guidelines, the midwives responded exactly as they should. Three steps must always be taken, 'irrespective of cause' in the case of postpartum haemorrhage, including massaging of the uterus, calling for help, and rapid

intravenous infusion of oxytocin (ibid, p. 51). The report stresses that 'careful observation, prompt recognition and the initial emergency management will lead to a rapid reduction in maternal deaths due to postpartum haemorrhage' (ibid, p. 54). In many countries, this would involve the use of ultrasound equipment to detect the cause of haemmorhage. However, with limited resources, the midwife's skill in the case of Patient T in recognizing and treating her dangerous condition may have saved her life.

Pregnancy-related sepsis

Pregnancy-related sepsis accounts for 5.6% of all maternal deaths. According to the World Health Organization, sepsis 'can be eliminated if aseptic techniques are respected and if early signs of infection are recognized and treated in a timely manner (World Health Organization, 2007). While death is often caused by septic abortions and not related to labour and delivery practices, steps must still be taken in the ward to reduce risk of sepsis following delivery.

In the labour ward at Hill Hospital, the nurses were very conscious to keep infection risk at a minimum. All surfaces were sterilized with an antiseptic solution every morning, and a sister or student nurse would put on gloves before tending to any patient. During PV exams, surgical gloves (individually packaged instead of in a large box) were used, sterilized equipment was opened for just one use, and the vaginal area was sterilized using antiseptic solution. During delivery, the midwife would wear three sets of gloves, removing

a layer periodically as they became dirty, and also used sterilized pre-packaged equipment. All materials for incisions and suturing were individually packed and sterilized, and all linens were used just for one patient. Guidelines concerning infection control were also posted on the walls around the ward. For NVDs, these precautions helped to greatly reduce the chance of infection.

Preparations for emergency caesarean required extra care concerning infection control. By nature of surgery, the patient is internally exposed to pathogens that would not be present in any external procedure. Therefore, even more precautions must be taken to prevent sepsis following operations. In the labour ward at Hill Hospital, infection control concerning caesarean sections begins even before the patient is moved to the operating theatre. The amount of antibiotics given to the patient depended on the amount of PVs that had been done. A patient with less PVs (usually a scheduled caesarean), and therefore less chance of an infection being introduced, was given a lower dose of antibiotics than a patient with more PVs (usually an emergency caesarean) with a higher chance of infection (Culmo, 11/02/2010). In the operating theatre, antibiotics were also given following the procedure to reduce infection risk (ibid, 11/05/2010). In these ways, both the labour ward and the operating theatre were able to reduce the risk of maternal death due to pregnancy related sepsis.

Maternal age

While maternal age cannot be considered a cause of maternal death, it is a risk factor that can significantly impact the chances a patient has of contracting other conditions or complications that can lead to death. The Saving Mothers report found that 'women less than 20 years of age were at greater risk of dying due to complications of hypertension whereas women 35 years and older were at greater risk of dying of obstetric haemorrhage, ectopic pregnancies, embolism, acute collapse and pre-existing medical disease' (NCCEMD, 2008, p. 3). In her time at the labour ward, the author recorded 31 patients under the age of 20 (27.2% of patients) and 10 over the age of 35 (8.8% of patients). Therefore, 36% of patients were at risk because of their maternal age.

While there are no direct guidelines for managing risk due to maternal age, only recommendations to handle the complications associated with it, the midwives in the labour ward at Hill Hospital had a system in place to monitor these patients closely. Age of the patient was recorded on almost every page of the maternity record, and if the patient was in the under-20 or over-35 age group, it was recorded as 'teenage pregnancy' or 'AMA' (advanced maternal age) in red pen on all relevant pages. In this way, every midwife caring for the patient would be immediately notified of the risky age, and would take care to recognize any complications that may develop.

State of perinatal mortality in South Africa and it's district hospitals

To understand the grave state of perinatal mortality in South Africa, one only needs to look at the numbers. Where 4077 mothers died in a three year period between 2005-2007, 25,060 perinatal deaths were *recorded* in just a two year period (Saving Babies Technical Task Team, 2009, p. 1). With only 40% of births and deaths being represented, the actual estimated number of perinatal deaths is much higher. There are four major causes of perinatal deaths: unexplained stillbirth (24%), spontaneous preterm birth (23%), intrapartum asphyxia and birth trauma (17%) and hypertension (13%). The remaining 23% comprised of antepartum haemorrhage, infections, fetal abnormalities, unexplained intrauterine growth restriction and pre-existing medical conditions (ibid, p. 13).

While many perinatal deaths were avoidable, a large percentage could be attributed to medical personnel and administration of the health care system. 16% of all deaths were medical personnel associated, with the top four avoidable factors being an inadequate neonatal care management plan, fetal distress not detected intrapartum, prolonged 2nd stage of labour with no monitoring and inadequate neonatal resuscitation.

Out of the four levels of care, district hospitals faired much worse in the area of perinatal mortality compared to the other three hospital levels. 59% of births occur in CHCs or district hospitals, and

unfortunately, the majority of perinatal deaths also occur here (ibid, p. 1). At the district hospital level, 'most health care provider probably-avoidable deaths occur' (57%) and 'the avoidable mortality rate for healthcare providers is highest' (7.04/1000 births) (ibid, p. 37).

The Saving Babies report found that '44% of deaths due to labour related complications were probably avoidable had the health care provider acted appropriately', and district hospitals had the highest perinatal mortality rate for labour related problems (ibid, p. 1). They went on to say that this 'indicates the quality of intrapartum care was poorest at the district' (ibid). Clearly, a high number of perinatal deaths are occurring at district hospitals in South Africa because of healthcare provider mistakes. In addition to observing what the labour ward at Hill Hospital did to combat maternal mortality, the author looked at how the midwives handled complications potentially leading to perinatal mortality. While a great percentage of perinatal deaths (especially in the areas of unexplained stillbirth and spontaneous preterm birth) can be attributed to antepartum care, two areas, intrapartum asphyxia and birth trauma and complications of hypertension, are directly managed in the intrapartum phase.

Intrapartum asphyxiation (IPA), or the loss of oxygen to the fetus during labour, and birth trauma make up a large percentage of perinatal deaths that occur in the labour and delivery ward. The perinatal mortality rate for IPA and birth trauma was highest in district hospitals (Saving Babies Technical Task Team, 2009, p. 1). In addition,

'almost half of the deaths due to IPA were thought to have probable avoidable factors' (ibid, p. 15).

Complications of pregnancy induced hypertension (PIH) can have just as devastating consequences on the baby as they do on the mother. The perinatal mortality rate from hypertension is 4.66 per 1000 births, 18% of these deaths being probably avoidable in district hospitals (ibid, p. 11, 20). Although less deaths caused by hypertension were avoidable compared to IPA and birth trauma, there were still a significant number of deaths that could have been avoided in the intrapartum period.

Intrapartum care

While the author was not in the labour ward while any maternal deaths occurred, several perinatal deaths did occur in the recorded time period. In the three and a half weeks, only one occurred, but five had been recorded for the previous month.

Stillbirths delivered in the labour ward are divided into two categories: fresh still births and macerated still births. Fresh stillbirths (FSB) occurred very close to or during the time of labour, and macerated stillbirths (MSB) occurred in the days before delivery (Appendix A). In addition, deaths that occurred in the first 7 days of life were labelled as early neonatal deaths (ENND) (ibid). In the month of October and the first two weeks of November, the labour ward experienced three MSBs, two FSBs and one ENND.

The midwives appeared less concerned about the macerated still births as they had most likely occurred while the woman was not in the hospital. One of the MSBs was labelled as being 'grossly malformed', and one of the sisters noted that he probably would not have lived outside the womb (ibid). Another of the MSBs was one of a set of twins, the other twin surviving and recorded as being healthy.

The fresh stillbirths were more of a concern as they had most likely occurred while the woman was going through labour. However, one of the FSBs recorded was ten weeks premature and significantly underweight (ibid). The other FSB was blamed on the patient, as she had limited antenatal visits and came into the hospital late. Normally, these risks would not be too much of a problem, but the baby was in breech position. Although they sent her straight to caesarean section, it was too late to save the baby.

The one ENND that was recorded was because of extreme prematurity, again outside of the responsibility of the midwives (ibid). After reviewing the statistics for the month, one of the sisters declared, 'I don't care what anyone says, our statistics are excellent', referring to the low rate of perinatal deaths that could be attributed to health care provider error (Appendix A).

These 'excellent' statistics are proof of the effort the midwives in the labour ward put in to avoid unnecessary perinatal deaths. The Saving Babies report gave a comprehensive overview of six strategies

that should be taken to improve intrapartum care, and the labour ward followed through on almost all accounts.

The first strategy is 'the rigorous use of the partograph throughout labour by all medical personnel' (Saving Babies Technical Task Team, 2009, p. 71). In every maternity booklet, two pages are devoted to the partograph to monitor the progress of labour. One of the causes of IPA and birth trauma is lack of progress in labour, so proper use of the partograph to identify when labour is stalling is a key step in reducing risk. The only cases where the partograph was not used in the labour ward were when the woman came in already fully dilated, ready to deliver, or she had delivered at home or in transit.

The second strategy is for 'junior medical officers and midwives [to be] trained more thoroughly in the progress of labour and the detection of abnormal labour and fetal distress' (ibid). At all times the author was in the labour ward, there were several enrolled student nurses in varying levels of their schooling working and learning from the midwives. Each midwife took time to explain procedures, explain the use of the CTG machine and partograph, and made them aware of abnormal labour and fetal distress.

The third strategy is for 'essential monitoring devices such as Doppler [fetal heart rate] monitors and CTG units [to] be available in every delivery room' (ibid). Two CTG units were available for the labour ward to use, allowing multiple patients to be monitored at all times. When more than two patients were in the ward, not all patients

could be monitored at once, but the midwives were able to monitor the high risk patients and rotate among the other patients.

The fourth strategy is to 'ensure that written guidelines and teaching aids exist to guide the active management of labour' (ibid). The labour ward at Hill Hospital was filled with binders of policies and procedure that were regularly updated concerning all aspects of labour and delivery. If the midwives or student nurses ever needed to consult one of these binders, they were readily available.

The fifth suggests 'structured perinatal audit… be mandatory in all district hospitals'. Once per month, the operational manager and one other midwife from the labour ward went to a meeting with the medical manager, other high ranking hospital administrators and nurses from the antenatal and postnatal wards for a perinatal audit meeting. Although they came back slightly frustrated with the workings of the other wards, the midwives recognized the importance of these perinatal audit meetings in reducing perinatal deaths (Appendix A).

The sixth strategy, bolded in the document for emphasis, states 'all maternity supervisors should collaborate to establish pathways to better decision making. Such pathways include telephonic access to consultants, structured ward rounds at regular intervals, etc.' (Saving Babies Technical Task Team, 2009, p. 71). Of all the strategies for improvement of intrapartum care, this was the areas that the midwives had the most difficulty with. There were only three doctors in the hospital that specialized in obstetrics and gynaecology and were often

hard to reach in time of emergency. On more than one occasion, the midwives expressed grief about the doctors not always responding immediately. However, from the other perspective, doctors had their fair share of hardships as well. In the midst of three caesarean sections in a row, one of the doctors received three phone calls to various parts of the hospital that he could not respond to because he was in the operating theatre (Appendix A). Once the doctor did arrive to the labour ward, both sides worked cooperatively to decide what was best for the patient. Every morning, one of the doctors would also take ward rounds to see if there were any complicated cases and to check the maternity register for any disagreements. In this way, the doctors and midwives were able to establish a relatively stable relationship to make decisions regarding patients.

Disregarding minor disruptions in some of the areas, the labour ward excelled in integrating the six strategies outlined by the Saving Babies Report concerning intrapartum care.

Immediate postpartum care

The time period immediately following birth is a critical time for infants born during a complicated delivery, especially concerning IPA, birth trauma, and hypertension complications. The Apgar scale was used for every birth at Hill Hosptial to determine whether or not the neonate needed resuscitation. The table below depicts the Apgar system used to assess newborns.

Sign	0	1	2	1 min	5 min
Heart Rate	*Absent*	*Less than 100*	*Over 100*		
Respiratory Effort	*Absent*	*Slow, Irregular*	*Good cry*		
Muscle Tone	*Limp*	*Some flexion*	*Active Motion*		
Reflex Irritability	*No response*	*Grimace*	*Cry*		
Color	*Pale*	*Body pink, extremities blue*	*All pink*		
				Total= __ /10	Total= __ /10

Figure 2: Apgar system

At Hill Hospital, it was protocol to resuscitate any newborn with an Apgar score of less than 7/10 at 1 minute or 5 minutes (Appendix A). In the three and a half weeks in the labour ward, 8 neonates presented with low Apgar scores (7/10 or below), accounting for 7% of births. The author was present to observe one birth in which a newborn had to be resuscitated.

Patient S was a complicated case in a number of ways, she was 20 years old, primigravida and had been in the labour ward for some time during the night when the observer arrived in the morning (Appendix A). A PV exam was done at ten o'clock, and it was determined that she was fully dilated. However, the membranous sac that surrounds the infant had not yet ruptured, meaning delivery could not progress. Sister S decided to perform a relatively common procedure in this type of situation: use an amniotic hook to gently

break the membrane and allow labour to progress. After the sac was ruptured, the sister waited for an hour and then instructed the patient to begin pushing to begin the second stage of labour. This phase was progressing extremely slowly, so the sister decided to perform an episiotomy in hopes of widening the vaginal opening and speeding up delivery. This also did not work, and another sister was called in to consult.

There was some disagreement over how many centimetres dilated the patient was, and it was eventually determined that the cervix was not dilated enough to continue pushing at that time. However, as the membranes had been ruptured and the patient had already begun to push, there was a worry that severe fetal distress could result. The patient was given oxygen and told to lie on her left side to suppress fetal distress. Eventually, she resumed pushing and eventually delivered a baby boy. However, because of the prolonged second stage of labour, the baby had a low Apgar score, as shown Figure 5.

Sign	0	1	2	1 min	5 min
Heart Rate	*Absent*	*Less than 100*	*Over 100*	**2**	**2**
Respiratory Effort	*Absent*	*Slow, Irregular*	*Good cry*	**1**	**1**
Muscle Tone	*Limp*	*Some flexion*	*Active Motion*	**0**	**1**
Reflex Irritability	*No response*	*Grimace*	*Cry*	**1**	**1**
Color	*Pale*	*Body pink, extremities blue*	*All pink*	**0**	**1**
				Total= **4 /10**	Total= **6 /10**

Figure 5: Apgar scores for Baby S

As soon as the baby was delivered, the midwife in charge took the responsibility of resuscitation of the neonate. The sister brought the infant to the newborn station and began rubbing him vigorously, suctioned out his mouth and nose and supplied oxygen from a tube directly in front of his mouth. After a few minutes of repeating this, he eventually turned somewhat pink and had some muscular movement, but his cries and reactions were still poor. The neonate was kept under close watch by the sisters until being transferred directly to the nursery, where more advanced
action could be taken.

Despite the frenzied atmosphere in the labour ward, the sister resuscitating the neonate performed as she should. In numerous areas of the ward, a flow chart explaining what to do for newborn

resuscitation was posted. The chart involved rubbing, suctioning, giving oxygen and monitoring, and administration of drugs if needed. The sister followed the flow chart perfectly, and the baby was well enough after a few minutes to not require any more care in the labour ward. By following these steps, the midwife was able to combat the high risk of death from intrapartum asphyxia and birth trauma that could have occurred.

Although there was only one observed case of resuscitation, and only 7% of births require it, all of the midwives were aware of the possibility and always kept the resuscitation trolley stocked, organized, and ready to be used when needed. When explaining the cart to some new enrolled student nurses, Sister G stressed its importance by saying, 'If a baby dies or has problems because of something that we did not do, it is very sad. Please sisters, for me, make sure that this cart is always ready for an incident so we don't do this to the babies' (Appendix A). Her sincere request not only reflects on the importance of the resuscitation trolley, but also how seriously the sisters take the matter of perinatal mortality.

Conclusions

The low (and in the case of maternal, nonexistent) mortality rates during the time the author was in the labour ward at Hill Hospital are a credit to the dedication and commitment the midwives and nurses put into their work with patients. Although both the Saving Mothers and Saving Babies reports stress the deficiencies in district hospitals, it is necessary to examine each hospital individually before making a drastic generalization.

The estimated maternal mortality rate for all of South Africa is around 350 in 100,000, and the institutional maternal mortality rate for district hospitals is 135.8 per 100,000 (NCCEMD, 2008, p. 8). Although the author only had access to statistics from the month of October and half of November, no maternal deaths occurred in the seven weeks out of the approximately 300 births that occurred. This can be directly attributed to the high level of care that the midwives and nurses provided at Hill Hospital. Despite lack of resources and staff shortages, the midwives of the labour ward put the maternal outcome of their patients first. In fact, most complications and deaths seemed to be attributable to this lack of resources, such as doctors and equipment, instead of mistakes by the midwives. They successfully followed almost all of the recommendations outlined by authoritative organizations and the government, resulting in overall positive outcomes.

The midwives placed just as much importance in the prevention of perinatal mortality as they did in the prevention of maternal mortality. The perinatal mortality ratio for South Africa is 38 in 1000, about 3.8% (Saving Babies Technical Task Team, 2009, p. 4). In the three and a half weeks the author was present in the labour ward, there was only one perinatal death recorded out of 114 births (0.87%), and in the month of October, the perinatal mortality rate was only 24.7 in 1000. This rate, significantly lower than the national rate, again shows the quality of care that the midwives in labour provide. Not one of the low-Apgar-score neonates (8 in the three week period) lost their life, and all 18 of the high (above 4000 g) and low (2500 g) weight neonates survived.

Although there is certainly room for improvement in the labour ward at Hill Hospital, the midwives are doing a remarkable job combating maternal and perinatal mortality compared to their other district hospital counterparts. While the author was observing at the hospital, their high achievement was even recognized. In a ward-wide quality assurance survey, the labour ward was one of the highest ranked in the entire hospital (Culmo, 11/05/2010). Compared to an average district hospital in South Africa, Hill Hospital excelled in reducing rates of maternal and perinatal mortality.

Recommendations for Further Study

What was observed at Hill Hospital between October 27, 2010 and November 18, 2010 only represents one district hospital's labour ward in a very short period of time. Drastic conclusions cannot possibly be drawn in such a limited scope; the author recognizes that her conclusions only represent what was seen and heard in those few short weeks.

For further study into Hill Hospital, a much longer period of time would need to be spent, and more wards and outpatient clinics would need to be included to form more definitive conclusions on Hill Hospital's maternal and perinatal mortality rates. The author chose to focus just on the measures taken during the intrapartum phase of pregnancy and birth; much more information can be found by examining antenatal clinics and the postnatal ward.

Furthermore, the author only looked at one district hospital in KwaZulu-Natal, and could not make generalizations about all district hospitals in South Africa. Statistics suggest that rates are higher in other district hospitals, but more research would need to be conducted to fully explain why this is. Additionally, nationwide statistics do not include any data from home births. Further knowledge could be gained by examining how home birth relates to maternal and perinatal outcomes.

Finally, this study only analyses patient care concerning maternal and perinatal mortality, and does not involve general patient care, experiences of the nurses and quality of conditions in the labour ward. Further analyses would be needed to comment on these issues.

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Appendices

Appendix A: Daily Log

10/27: 1-4 (3 hours)
We got to the hospital around noon, were told the Medical Manager wasn't back yet, so we left to go grab some lunch before heading back. We met Dr. D in the ARV clinic and she gave us a brief overview of the hospital and what we would be doing there. We spent an hour with her as she finished up seeing patients, and got an idea of how ARV medications are dispensed and regulated. Summary of patients seen:

-Middle aged man, HIV positive, started treatment in March '09, had defaulted numerous times, came in to the ARV clinic for a disability grant. Said he had been seeking treatment with a sangoma originally. Dr. D told us "We said 'Look' to him, 'either you see a traditional healer that's fine, or you just come see us, but you need to make up your mind or you're wasting your own time". She didn't sign off for the grant as defaulting patients must be on ARVs for a significant amount of time before receiving it.

-Numerous mothers came in seeking new prescriptions for their children, but didn't bring the kids with them. Because ARV doses are based on weight, it was necessary for Dr. D to see the kids to prescribe

10/28: 7:30-2 (6.5 hours)
We started off the day at the doctor's meeting that they have at 0730 and then went off to the wards. I started in the labour ward, and walked in right in the middle of a delivery. Although the chaos meant I couldn't directly observe, I did learn a lot from her charts being filled out by Sister M:

-Patient A: 16 year old, P00 G01, went into labour at 0130, delivered a boy at 0805. Baby's head was not flexed enough at birth, widening the head's diameter that had to pass through the birth canal, so the nurse had to perform an episiotomy to allow the head to pass through. She spent about an hour in the labour ward after birth, before being moved to the postnatal ward. A nurse carried her baby while she walked with her belongings down the hallway.

We went to the weekly doctor's seminar series at 1000, and I unfortunately missed another delivery, and she was being moved from the ward when I returned.

At the end of the day, we went down to the pharmacy to ask what days we would be most useful. We're planning to spend a full day in the pharmacy sometime next week.

10/29: 7:30-3 (7.5 hours)
Went to the 7:30 doctors meeting then went straight to labour ward. Within a few minutes of being there, we had 2 patients:

-Patient B: 18 year old, P01G02 (previous C/S x1) came in 3 cm dilated in latent labour (contractions at regular intervals but cervix hadn't started dilating rapidly yet). In latent labour cases, the patient is checked every 4 hours until active starts, when she's checked every 2 (sister mdlovo). The patient didn't enter active labour until early afternoon, and was only 5 cm dilated when I left, so I didn't get to see the birth. Her previous C-section was due to fetal distress, so they didn't automatically schedule another one. C-sections are only scheduled if the woman had some kind of physical condition that would prevent NVD (natural vaginal delivery), HIV positive women do not automatically have c-sections (Sister M).

-Patient C: 18 year old, P0G01, at risk because she was a teenager primigravida. Came in 4 cm dilated in active labour, so she was checked every 2 hours. Progressed relatively quickly, but given a sedative and pain killers around midday. Started delivery around 1400 and delivered a boy. An episiotomy was given because she "was probably too tight" to deliver without one (Sister Z). A lot of fundal pressure was applied, and the nurses were rough with the patient. I had to leave before the baby was given back to the mother (she was still being stitched up after her episiotomy), but he appeared healthy.

I learned a lot about charting, it's a lot more detailed than I originally thought. There is an extensive transferral process from the antenatal ward to the labour ward to the postnatal ward. Charts are done meticulously, but only the advanced midwife can fill them out. The other nurses can help fill out the admission & discharge book and the maternity record book but the actual patient charts are handled by the midwives.

11/1: 7:30-4 (8.5 hours)
Very slow day in labour ward, but had one more complicated case. Three women came in either in early labour or latent labour, and after a quick check were transferred to the antenatal ward. Apparently, this happens a lot, especially women who come in on an ambulance or from home. They want to make sure that the woman isn't going into active labour before moving her down the hall. (Sister G)
I also learned a lot more about admitting patients. Sister G spoke about how if a woman presents with an infection (such as a UTI)

during the day, she is sent down to casualty to be seen by a doctor. If the patient comes after hours, she is immediately admitted and has to be seen by a doctor before being discharged. Nurses are allowed to give treatment but it must be signed off (eventually) by a doctor.

-Patient D: 20 y.o., P0G01, HIV positive. She took Nevarapine when labour first started then was given AZT and another drug every three hours until delivery. Labour progressed quickly at first, but stalled at around 9 cm. She reached full dilation (10 cm) but stalled for one hour with very little progress. After consultation with Dr. K, it was decided that she needed a c-section for "poor progress".

11/2: 7:30-3:30 (8 hours)

Definitely a busy and exciting day in labour ward, the busiest since I started! We also had 4 new student nurses in, and I took full advantage of their orientation session to learn more about the ward. I learned where all of the supplies and medications are kept, and learned a little about the different medicines given during the labour and delivery process. Oxytocin is always given after a NVD to stimulate contraction of the uterus (this pinches off the blood vessels to stop bleeding). If the patient is a scheduled Caesar, she is given 1 mg of a certain antibiotic to prevent infection, this is doubled to 2 mg if it is an unscheduled (if it is known that a Caesar will take place, less PVs are done, so less chance of an infection being introduced). The "crash cart" for the babies is in the center of the room. Sister G stressed the importance of everything being kept in there, "If a baby dies or has problems because of something that we did not do, it is very sad. Please sisters, for me, make sure that this cart is always ready for an incident so we don't do this to the babies". She also went over the procedure for an eclampsia patient, including giving oxygen, an IV, and constant monitoring. A laminated sheet in the room has detailed instructions for an eclampsia patient.

Summary of the patients in the ward today:

-Patient E: 23 y.o., P01 G02, baby born at 33 weeks (7 weeks premature), baby boy, 4.4 lbs but APGAR 9/10, 10/10 so not too worried. Already delivered when I got there, was taken to theatre for D&C, baby brought to nursery for observation because of prematurity

-Patient F: 32 y.o., P04 G05, went into labour at 0800 and delivered at 0850, very quick process. She was only in labour ward for about 5 minutes before delivery. Healthy girl, a little over 7 lbs, 9/10, 10/10 Apgar score. Remained in the ward for about 3 hours before being transferred to antenatal/postnatal ward

-Patient G: 23 y.o., P0 G01, had a normally progressing labour and delivered at 1345. However, she needed an

episiotomy. Confirmed that it is usually first time mothers who need this procedure done (Sister Z). Healthy baby girl, about 6.5 lbs. Was still in the ward when I left this afternoon.

-Patient H: 24 y.o., P0 G01, came into labour ward without starting in the antenatal ward (most patients come from antenatal/postnatal ward), her membranes had ruptured and she was experiencing contractions. She came in in "early labour" but progressed quickly. The nurses found that the baby was in breech position and scheduled an emergency C-Section. The patient had not returned yet when I left this afternoon.

-Patient I: 33 y.o., began pushing during contractions before the head had descended enough, as evidenced by the fecal matter on the bed (Sister G). Because of this, the cervix wasn't fully dilated and presented along with the head. Despite this, it was a relatively easy delivery but an episiotomy was needed. Healthy baby girl delivered, about 8 lbs at 1430.

-Patient J: 18 y.o., P0 G01, hadn't yet delivered when I left in the afternoon

11/3: 9-4 (7 hours)

We spent the whole day in the pharmacy to help out filling prescriptions. Mondays, Wednesdays and Fridays are the busiest days, Wednesday's especially because it's diabetes day in the clinic. All chronic diabetes patients come in to get their prescriptions renewed on Wednesdays, so literally hundreds of patients come through the pharmacy. We learned quickly, and even though we made a few mistakes, we definitely helped out the pharmacy staff in filling all the prescriptions.

11/4:7:30-1:30 (6 hours)

Went to the doctors meeting in the morning, where we discussed weekend rounds and a particularly difficult morphine-addicted patient. I then headed up to labour ward for the rest of the day.

-Patient K: Although she reached 10 cm quickly, the head hadn't descended beyond 4 cm. Upon further inspection, it was found that the presenting part (the body part closest to the pelvic floor) was the elbow, putting the baby in a breech position. A doctor was consulted and she was sent to theatre for a c-section.

I've found that for every patient that needs a c-section, a doctor is called in to make the final call. This adds an extra layer of protection so that an unnecessary Caesar is not performed. Before the patient

goes in, there is a full checklist of things that must be done before the patient goes to Caesar, including administering antibiotics to prevent infection.
The October stats were compiled by the ward clerk today, and out of 202 births that month, there were only 2 infant deaths, one macerated still birth and one fresh stillbirth. According to Sister G, the two deaths were of no fault to the labour ward. The MSB had occurred before the woman went into labour, and the FSB occurred because the woman didn't enter the ward until she was fully dilated, and the baby was breech but there was not enough time to get her to theatre. She said to the nurses, "I don't care what anyone says, our performance lately has been excellent". Sally confirmed this on Friday: a Quality Service Survey had been conducted in October and labour ward had scored one of the highest.

11/5:7:30-12:30 (5 hours)
I skipped the doctors meeting today to head straight up to labour ward, and I was glad I did! They were just about to transport a patient down to theatre, and I offered to help Sister Young as the rest of the nurses were in a meeting. On the way down, she asked if I wanted to stay and watch the c-section, and I readily agreed. We dropped the patient off to be prepped while we changed into scrubs, booties, caps, and masks. Outside the theatre I spoke with Dr. K, who would be performing the Caesar, and he joked that I should be the one operating! Most of the theatre nurses and assistants were confused why I wasn't assisting during the Caesars, as they all assumed I was a 4th year medical student. It was a little hard to explain in what capacity I was at the hospital in, but I think they understood after a little while.

-Patient L: When we entered the theatre, Dr. B (the anaesthetist) was injecting the patient with a localized anaesthetic to numb her from the chest down. This type of anaesthesia is used during c-sections because general anaesthesia would put the baby at a higher risk, and is only used in extreme emergency situations. The patient was in her 2nd pregnancy, and had a c-section previously. She was also 3 weeks past due, adding to the reasons why she needed a Caesar. The procedure was a little complicated, as the patient was overweight, requiring a longitudinal incision instead of a lateral incision. The actual process of extracting the baby took only about 5 minutes, once the incision was made through the fat and the uterus, it was a simple matter of applying pressure to the fundus while the surgeon pulled out the head, followed by the rest of the body. After the baby was out, the cord was clamped and she was taken by one of the midwives for cleaning and wrapping. After about 10 minutes, the baby is then taken up to the nursery for weighing and measuring. Meanwhile, Dr. K sutured the uterus, followed by the membrane, the layer of fat, and finally the skin. This patient took much longer than usual to suture because of the amount of

fat and the longer incision that was required. As soon as suturing was finished, Dr.B injected antibiotics into her IV line to prevent infection. The uterus was massaged to promote contractions and excess blood was collected. After the patient was cleaned up, she was moved back onto a transport stretcher and brought back upstairs for recovery.

-Patient M: Brought into theatre for a failed induction. She was much thinner than the previous patient, so a lateral incision was made. A healthy baby boy was delivered (Apgar 9/10, 10/10), and she was sutured much in the same way as the last patient. However, when suturing the uterus, Dr. K actually removed the uterus from the abdomen to make a cleaner suture. After the suture was finished, he placed it back inside the mother.

-Patient N: Brought in for fetal distress. Progressed similarly to the previous patient, and delivered a healthy baby boy (Apgar 9/10, 10/10).

11/8: 7:30-12:30 (5 hours)

In the doctors meeting, a complicated labour patient was discussed. At her local clinic, she was fully dilated, and fetal distress was evident, yet it still took her hours to get into the caesarean section. Because of the prolonged labour, there were numerous intrauterine tears that had to be sutured and the baby suffered inhaled meconium. The baby was given antibiotics, and both mother and child were doing well as of that morning. The rest of the day was very slow, but I did get a chance to thoroughly look over the October maternity record and statistics. Although the clerk had reported that there were only 2 infant deaths, but upon further inspection, I found 5. One was an early neonatal death due to extreme prematurity, one was an FSB that was 10 weeks premature, the other FSB was the one that had come in late and was breech, one MSB was because the baby was "grossly malformed" and the last MSB had no additional details.

-Patient O: Admitted early in the morning 3 cm dilated but after being hooked up to the fetal heart rate monitor and blood pressure machine for awhile, it became apparent that there was both fetal distress and high blood pressure. Dr. K was called, and he decided that the patient should be checked again in 45 minutes to see if she was progressing. He did say to start an IV just in case, but didn't want to classify this as an immediate Caesar, saying there was "and epidemic of Caesars downstairs". However, as soon as he left the ward, the nurses began prepping her for theatre, including giving her all the pre-operation medications and filling out her paperwork. She was taken down not too soon after.

11/9: 7:30-2:30 (7 hours)
Today was pretty slow again, but two patients did come through the ward while I was there.

-Patient P: 17 y.o., G0, P01, at risk because she was a teenager and it was her first pregnancy. After a PV, it was found she was only 3 cm dilated and was transferred to antenatal/postnatal ward

-Patient Q: 20 y.o., G0, P01, at risk because of PIH, lack of proper antenatal care, and was approximately 5 weeks premature. After a quick initial assessment, Dr. K was called immediately as her blood pressure was spiking and the fetal heart rate kept dipping. He took just a quick look at her and decided she needed an emergency Caesar. What initially confused the nurses was her fundal height; according to her charts, she was about 35 weeks along, but by measuring her fundal height, she was only 30 weeks. Because she had never had an ultrasound, it was impossible to know exactly how many weeks along she was. I wasn't able to find out the outcome of the delivery, but I hope to check the maternity register on Thursday.

After we returned from the hospital, I went on the KZN Department of Health website to download some PDF documents on maternal and perinatal statistics in the province. Tomorrow we're heading back to the pharmacy to help out again on "diabetes day".

11/10: 9-4 (7 hours)
We spent all day in the pharmacy again helping out with the diabetes prescriptions. Things went a lot quicker and easier this week as we knew where most of the medications were and how the dosage worked. The pharmacy staff was again very friendly and willing to help us. We're planning to go back again for our last Wednesday, and hopefully be of even more use.

11/11: 7:30-3 (7.5 hours)
Another quiet day in labour ward, only one patient came through.

-Patient R: 32 years old, only 4 cm dilated but in active labour. Even though she had progressed to 8 cm when I left, the progression was slow and didn't end up delivering until 1900.

A patient from the day before came into labour ward requesting a death certificate for her baby that was an MSB the day before. She had been pregnant with twins, and delivered one healthy boy and one MSB

boy. She was directed to another area of the hospital to retrieve the certificate.

11/12: 7:30-1:30 (6 hours)

Today was definitely one of the more crazy days I've had in labour ward. At the doctors meeting, there was a brief discussion about upgrades the hospital would need if more specialists were to come through, including a blood gas machine, a better ultrasound, and access to an ICU. I went up to labour ward right after the meeting and we had five patients, more than I had ever seen at one time. 4 were in labour and one was post-delivery.

> -Patient S: 20 y.o., P0, G01, at risk because of primigravida. At 1000, her PV was done by Sister Young who determined that she was fully dilated, although her membranes had not ruptured yet. She tried using an amniotic hook to rupture the membrane, but when this failed, she used a needle. The membranes ruptured, and Sister S waited for an hour or so before beginning the delivery. The second phase was progressing slowly, so Sister S performed an episiotomy. However, she did this not during a contraction and too early, so the incision wasn't complete and caused unnecessary bleeding. At the time, the ward was severely understaffed, and Sister A had to come in from antenatal/postnatal ward to help, as Sister Z had gone home sick, Sister G had left briefly, and there was only one nurse assistant and one student nurse to assist. Sister A examined the patient and determined that she was only 8 cm dilated, and needed to rest before delivery. However, since the membranes had been ruptured and an episiotomy had already been performed, the patient would need to deliver soon. The patient was given oxygen and turned on her side to suppress fetal distress for a short time before she began to push again. In the midst of her pushing, both sisters had to tend to Patient T, and she was left lying on her side until the situation had resolved. When the sisters came back, they began trying to deliver the baby, again with slow progress. Another woman had to come in to apply fundal pressure, and when Sister G returned, she fixed the botched episiotomy. Eventually, a baby boy was delivered (7 ½ lbs), but was very blue, had no muscular movement, and no crying upon birth, suggesting a low Apgar score. He was breathing, but resuscitation had to be used. Sister G (instead of a student nurse who usually performs the newborn assessment), brought him to the newborn station and rubbed him vigorously, suctioned, and supplied oxygen. He eventually turned pink and his breathing improved slightly, but his muscular movement and cries were still poor. The patient was being sutured when I left.

-Patient T: 45 y.o., P08 G09, at high risk because of age and advance maternal age. She was actually progressing slowly at first, but delivered extremely quickly once (I'm assuming) fully dilated. With the complications going on with Patient S, her cries went unanswered, and no one realized how late she was in labour until the baby's head had already been delivered with no assistance. Once Sister S noticed, she quickly moved from Patient S over to Patient T, but the baby boy had already been completely delivered. Apgar was 9/10, 10/10, but the baby presented with a strange yellow mottled discoloration on his face, hands and feet. None of the midwives knew what it was, but didn't seem too worried. Sister A helped Sister S in cleaning up the patient and delivering the placenta, but the placenta was not complete, putting Patient T at risk for PPH. 4 doses of oxytocin were put into her IV fluid to promote uterine contractions to lessen bleeding and expel clots. She was moved over to a post-delivery bed and the IV continued.
-Patient U: 15 y.o., P0, G01, only 2 cm dilated but the CTG showed fetal distress at 0900. However, the patient was not having contractions to explain the dips in heart rate. Dr. M was called to examine her, and saw that the dips were slowly stopping and suggested transferring her to antenatal/postnatal ward to be assessed at 1100. The nurses tried to transfer her, but antenatal/postnatal ward would not accept her with her irregular CTG graph. She stayed in labour ward, but because of the short staffing and the situations with patients S and T, the fetal heart rate was not reassessed, and still had not been done at 1300 when I left the ward.

-Patient V: 20 y.o., P0G01, was progressing well, was 6 cm dilated at 0900 but had not been reassessed due to the situation with patients S and T when I had left.

11/15: 7:30-12:30 (5 hours)
In the doctors meeting today, Dr. H discussed a case from Friday in which a 4 month old was brought in to the hospital and shuffled around casualty and POPD. Eventually, the baby stopped breathing and died. Dr. H blamed this on the hospital's poor care, but others argued it could have just as easily been a patient mistake. There was some talk to re-establish the triage color code system used during the World Cup to help the situation. Labour ward was relatively quiet today but we did have 2 patients come through this morning

-Patient W: 23 y.o., P0G01, came in escorted by paramedics in labour. She progressed much faster than anyone had anticipated, and delivered without any of the midwives realizing until the baby was already out. Luckily, one had been tending Patient X right next to her, so she was tended to quickly. Had a

normal vaginal delivery, except for a 1st degree tear which was sutured. Healthy female baby, 7.3 lbs, 19 inches

-Patient X: 15 y.o., P0G01, 38 weeks, transferred from antenatal/postnatal ward 5 cm dilated. At risk because of teenage pregnancy, primigravida, and PIH. She had not delivered by the time I left, but was being closely monitored due to her hypertension.

I also went through the maternity log from the past few weeks I've been here to compile some statistics to get the "bigger picture" of what's going on in labour ward compared to national and international statistics.

11/16: 7:30-4 (8.5 hours)

Another slow day in labour ward with only 2 patients coming through:

-Patient Y: 26 y.o., P0G02, at risk because of previous miscarriage, came in from home by ambulance complaining of labour pains. After examination, it was found that she had a UTI, but was only 1 cm dilated, and was transferred to antenatal/postnatal ward until she was in active labour

-Patient Z: 18 y.o., P0G01, transferred from antenatal/postnatal ward 3 cm dilated at 1230, was experiencing some fetal distress so she was put on a drip and given oxygen. Labour was progressing slower than expected, and still had not delivered at 1600 when we left for the day.

11/17: 9-4 (7 hours)

We spent the day in pharmacy again helping with filling diabetes prescriptions. We were definitely much faster and felt much more confident in the pharmacy, and they thanked us for our help in the past 3 weeks.

11/18: 7:30-1 (5.5 hours)

It was my last day in labour ward, and the morning started off with an argument between labour ward and antenatal/postnatal ward. According to a new policy in the hospital, one antenatal/postnatal ward midwife must go to theatre during a Caesar to "catch the baby" for elective Caesars, and one labour ward midwife must go down for emergency Caesers. On Thursday, one of the midwives from antenatal/postnatal ward wanted one of the labour ward midwives to go down and catch, but the labour ward midwives argued that it wasn't their job. A pretty heated argument ensued, eventually ending with Sister Ante coming in and essentially telling the labour ward never to ask for antenatal/postnatal ward's help ever again. The nurses just laughed as she left, indicating they didn't take her threats very seriously. Twins were born early in the morning and their mother was

just being discharged when I arrived. Although they were premature and one was breech, they appeared healthy. Only one patient actually came in through delivery while I was there.

> -Patient AA: 18 y.o. P0G1, at risk because of teenage primigravida. At first, they were worried about her lack of progress, but she eventually progressed enough to start pushing and delivered a healthy 6.8 lb baby boy. She did require an episiotomy, but had a generally normal delivery.

Total hours: 114 hours

Appendix B: Labour Ward Statistics

Labour Ward Statistics- Oct 28th 2010 to Nov 15th 2010			
	Number	% of total births	% of total Caesarean Sections
Total births	114		
Caesarean Sections	32	28.10%	
Cephalopelvic Disproportion	9	7.90%	28.12%
Fetal distress	10	8.80%	31.25%
Previous Caesarean Section	6	5.30%	18.80%
Pre-eclampsia/Pregnancy-Induced Hypertension	3	2.63%	9.38%
HIV positive	38	33.30%	
Teenage pregnancy (15-19)	31	27.19%	
Age greater than 35	10	8.77%	
Episiotomy performed	25	21.92%	
Vaginal tears	10	8.77%	
Fresh still birth	0	0%	
Macerated still birth	1	0.88%	
Birthweight below 2500 g	14	12.28%	
Birthweight below 2000 g	5	4.38%	
Birthweight above 4000 g	4	3.51%	
Low Apgar score (8/10 or below)	8	7.00%	

Summary

For those lucky enough to live in wealthy nations, the process of childbirth can be a joyous and life changing experience. Mothers-to-be plan their deliveries months in advance, screening obstetricians and hospitals, taking birthing classes, and selecting a birth partner. But for the majority of women worldwide, childbirth can be a terrifying, and potentially deadly, event.

In developing countries, maternal mortality rates (death of a mother either during or immediately following pregnancy) and perinatal mortality rates (death in the time between 28 weeks gestation and the first seven days of life) far exceed those of developed nations (Saving Babies Technical Task Team, 2009). According to the World Health Organization, 99% of maternal deaths occur in developing countries. Similarly, in the year 2000, the most developed region's perinatal mortality rate was 10 in 1000, compared to a rate of 61 in 1000 in the least developed regions. (World Health Organization, 2006, p. 18).

As a student of public health with strong interest in obstetrics and gynaecology, I took full advantage of my time abroad in South Africa to examine how these vast inequalities came to be. Instead of pouring over thousands of documents and statistics, I chose to work

on a more individualized scale. I had the opportunity to spend four weeks observing on a labour and delivery ward at a rural district hospital in the province of KwaZulu-Natal, South Africa. There, I sought to understand how the maternal and perinatal mortality in the country was so high, and how the hospital was prepared to reduce the risk of mortality. Background research revealed a large number of deaths to both mother and child during the intrapartum and immediate postpartum period (the time between the start of the mother's contractions and the three hours post-delivery). I was able to collect data for 114 births from the time period of October 28th 2010 to November 15th 2010. I was able to directly observe the labour and delivery process of 27 mothers to fully understand the efforts in place to reduce maternal and perinatal death. Following data collection, I referenced district and national data on the mortality rates to compare the district hospital's rates to similar hospitals around the county. My project resulted in a full-scale evaluation of the methods in place to reduce the perinatal and maternal death rates at the individual hospital, with recommendations that can be applied to hospitals nation- and worldwide.

Several methodologies were used to provide a broad variety of sources for the project. The primary source of data collecting came from direct observation while on the labour and delivery ward. I spent all day with the advanced midwives and student nurses at they attended to patients and filled out charts. To maintain patient and

nurse confidentiality, no formal interviews were conducted, and questions were only asked to clarify what I was observing. Hospital statistics were collected through access to a handwritten maternity register. Names and any other identifying information were not recorded for patient confidentiality- each patient was identified by a letter with a short summary of her delivery process.

Nationwide reports provided the foundation of secondary analyses, providing detailed information on the state of maternal and perinatal death in South Africa. These documents were vital for comparison purposes, and also provided a recommendation section to form a semblance of South African 'best practices' for labour and delivery. Worldwide best practices were derived from meta-analyses of labour and delivery practices. These meta-analyses combined all research on a certain subject (ex: medication for the mother to increase uterine contractions immediately following birth) to ascertain the best practice currently available (ex: pitocin was shown to be most effective in the majority of studies).

To narrow down the broad range of health issues surrounding labour and delivery, I chose to focus on the primary causes of death for both pregnant women and their babies with a discussion on what the nurses and midwives were doing to reduce the risk of dying from these causes.

Multiple sources identified five major causes of maternal mortality in South Africa (NCCEMD, 2008). The first, haemorrhage, or

excessive bleeding, can occur after birth for a variety of reasons, including insufficient contraction of the uterine muscles. Haemorrhaging accounted for 12% of all maternal death in South Africa. The second major cause, non-pregnancy related infection, was extremely high in the country (44% of all maternal deaths), primarily due to the HIV/AIDS epidemic. The third, complications of hypertension (high blood pressure), accounted for 16% of death, and the fourth, pregnancy-related sepsis (blood poisoning) accounted for 9%. The remaining deaths were caused by pre-existing conditions (NCCEMD, 2008, p. 5). In addition to the five major causes, I also identified two other factors (obstructed labour and Caesarean section and anaesthetic complications) that caused significant maternal death during the labour and delivery process.

The midwives and nurses at the district hospital were remarkably prepared to handle all types of situations that could lead to possible maternal death. For example, extensive charting was done to ensure proper labour management (reducing the risk of obstructed labour), monitoring tracked the mother's blood pressure, and surgeons were on call to handle any cases of emergency Caesarean sections. In fact, the only major cause for concern was the lack of resources and staffing available. In many cases, the ward was severely understaffed, and had difficulty handling multiple complications. One notable afternoon, three separate mothers all needed attention from the lone midwife on the ward, and another nurse had to be pulled from another

area of the hospital to assist. Although no serious complications occurred, the situation could have escalated quickly. The hospital was also hours away from the nearest higher-level birthing center. Extremely serious complications needing expert care could arise, leading to possible maternal death if the mother could not be transported in time. However, while observing, no maternal death occurred, a testament to the high level of nurse preparedness.

My original goal was to look at just maternal mortality, but spending time at the district hospital showed a much larger concern for perinatal mortality. In the few weeks spent at the hospital, one death occurred, and five had been recorded for the previous month.

A study of South African perinatal mortality found four major causes of death: unexplained stillbirth, spontaneous preterm birth (birth occurring before maturity), intrapartum asphyxia and birth trauma (suffocation or other trauma in the womb) and hypertension (the mother's high blood pressure).

While it was difficult to ascertain exactly when and how death occurred, the midwives at the district hospitals had a rough idea about what caused the perinatal death. In the month of October and first two weeks of November, six perinatal deaths occurred: two attributed to prematurity, one to intrapartum asphyxia, one to extreme malformation, and two unexplained. Although there were several deaths, the midwives were quick to note that most were not preventable. Few resources were available to prevent preterm birth,

extreme malformation was clearly not preventable, and the case of intrapartum asphyxia was caused by the mother coming to the hospital too late. This low number of preventable deaths occurring can be attributed to the midwives' and nurse's knowledge and skills. Charting, monitoring, and education all played key roles in reducing the risk of perinatal death at the hospital.

What was observed in the few weeks at the hospital only represents one district hospital's labour ward in a very short period of time. Drastic conclusions cannot possibly be drawn in such a limited scope; and I recognize that her conclusions only represent what was seen and heard in those few short weeks. Therefore, I have several recommendations for further study.

A much longer period of time would need to be spent at the hospital, and more wards and outpatient clinics would need to be included to form more definitive conclusions on the hospital's maternal and perinatal mortality rates. I chose to focus just on the measures taken during the intrapartum phase of pregnancy and birth; much more information can be found by examining antenatal clinics and the postnatal ward.

I also only looked at one district hospital in KwaZulu-Natal, and could not make generalizations about all district hospitals in South Africa. Statistics suggest that rates are higher in other district hospitals, but more research would need to be conducted to fully explain why this is.

Finally, I only analysed patient care concerning maternal and perinatal mortality, and did not involve general patient care, experiences of the nurses and quality of conditions in the labour ward. Further analyses would be needed to comment on these issues.