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A clinical audit of the completeness of antenatal card recording in Chris Hani Baragwanath academic hospital

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TITLE: A CLINICAL AUDIT OF THE COMPLETENESS OF ANTENATAL CARD RECORDING IN CHRIS HANI BARAGWANATH ACADEMIC HOSPITAL

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by

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To

THE FACULTY OF HEALTH SCIENCES

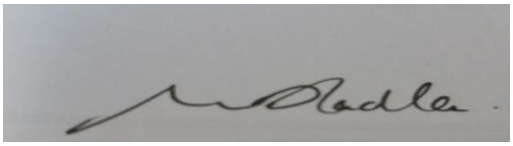
UNIVERSITY OF WITWATERSRAND

Johannesburg

September 2017

DECLARATION:

I, Dr Nonjabulo Sandra Dladla-Ibe, hereby declare that work contained herein is authentic, produced by myself and has not been previously submitted for use by any other publication or institution. I further certify that any information referenced to or adapted from other sources has been cited and duly acknowledged.



Signature:……. **21 September 2017**

DR NONJABULO SANDRA DLADLA-IBE

DEDICATION

I dedicate this work to my husband, Victor Ibe, for his constant encouragement and unwavering belief in me. Thank you for being my rock.

To my mother, Mrs Thandiwe Dladla, who always inspired me to push myself beyond any preconceived limits. You taught me to always dream big and reach for the stars.

To my father, Mr Thembinkosi Dladla, and my sisters who were a constant source of love and support.

To the One who put this dream in my heart, Your grace was indeed sufficient for me. To God be the glory.

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I would like to express my gratitude to my supervisor, Professor Y Adam, for your guidance, motivation and your patience with me. You made a seemingly impossible task look so achievable in the end. Thank you for sacrificing your time and energy to help me accomplish this. I truly appreciate you.

To the staff at Chris Hani Baragwanath Academic hospital in the postnatal wards and Antenatal clinic, I thank you for always going an extra mile in assisting me with my research.

ABSTRACT

BACKGROUND AND OBJECTIVES

The antenatal card is a record keeping tool that can be used to audit the quality of antenatal care given. The recommendations from the national guidelines for maternity care in South Africa are that this card should be fully documented to aid with continuity and improve on the quality of care given in pregnancy. The main aim of the study was to assess documentation of all the variables on the green antenatal card at Chris Hani Baragwanath Academic Hospital.

METHODS

This was a retrospective, cross-sectional study in which 300 antenatal cards were audited for the month of September 2015 at Chris Hani Baragwanath Academic Hospital. The cards were collected from three postnatal wards following discharge of the patients. Information on the card was then transferred to a data sheet and the participant given a code to maintain confidentiality. The information audited included documentation of the demographic details, the past obstetric history, the past medical and surgical history, past social and family history, education given during the pregnancy, ultrasounds done, blood results and a focused clinical examination.

RESULTS

Three hundred antenatal cards were audited. The median age of the patients was 28 years, with a median parity of 1.0 and mean gestational age at booking of 18.9 weeks.

None of the cards had complete documentation of all the variables put together. More than half of the patients [n = 204, (68%)] had 4 or more visits in the current pregnancy. The section of the card that had the most incomplete documentation was the part of contraception that classifies the pregnancy as planned or unplanned with only 1 card (0.3%) being documented.

The past medical and family history had 299 (99.7%) and 296 (98.7%) cards documented respectively. Variables under the past obstetric history had documentation ranging between 75.8% (n = 163) and 100 % (n = 215), with five out of the six variables above 90%.

Social habits were documented in 192 cards (64.0%) with 22 women (11.5%) being alcohol drinkers and 10 (5.2%) being smokers. Half of the patients [n = 157, (52.3%)] had an ultrasound performed in pregnancy with most of them done in the second [n = 77, (49.0%)] and third trimesters [n = 66, (42.1%)]. Most of the blood results had more than 90% recording with the HIV test result being the most frequently documented [n = 289 (96.3%)]. The various aspects of education in pregnancy were incompletely documented with lifestyle modification being the lowest recorded [n = 73 (24.33%)]. Recording of the focused clinical examination was more than 95% for each of the variables audited.

CONCLUSION

We audited the antenatal card in terms of its completeness in this study. It was commendable that the documentation of most of the variables was close to the 100% documentation recommended by the national guidelines. These included the past medical and family history, the past obstetric history, previous contraception used and choice of future contraception, Rhesus and HIV blood tests and the focused clinical examination.

This study showed that there is still much improvement needed in the documentation of some aspects of the antenatal card. These included recording of whether the pregnancy was planned or not, social habits and education given in pregnancy. We need to adhere to the national guidelines of maternal care to have better pregnancy outcomes.

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ABBREVIATIONS

ANC – Antenatal care
ARVs - Antiretrovirals
BANC – Basic antenatal care
BMI – Body Mass Index
BP – Blood pressure
BPD – Biparietal diameter
CARMMA – Campaign for the accelerated reduction of maternal mortality in Africa
CHBAH - Chris Hani Baragwanath Academic Hospital
CRL – Crown to rump length
EDD – Estimated date of delivery
e.g. – for example
etc. – etcetera – and others
HIV – Human Immunodeficiency virus
IMMR – Institutional maternal mortality ratio
LNMP – Last normal menstrual period
MDG - Millennium Development Goal
MUAC – Mid upper arm circumference
NICE – National Institute for Health and Clinical Excellence
PMTCT – Prevention of mother to child transmission
PHRU – Perinatal HIV Research Unit
RCOG – Royal College of Obstetricians and Gynaecologists
Rh - Rhesus
RPR – Rapid Plasma Reagen
SA – South Africa
SDG – Sustainable Development Goals
SFH – Symphysis to fundal height
UNICEF – United Nations Children's Emergency fund
WHO – World Health Organisation

TERMINOLOGY

Maternal death – the death of a woman within 42 days of termination of a pregnancy, irrespective of the site and duration of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.

Live birth – Complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy, which after such expulsion, breathes or shows any other evidence of life whether or not the placenta has been cut or is still attached.

Maternal mortality rate – the number of resident maternal deaths within 42 days of pregnancy termination due to pregnancy complications, childbirth and the pueperium in a specified geographical area, divided by the total resident live births for the same geographic area for a specified time period, multiplied by 100 000.

Neonatal death – a death during the first 28 days of life

Neonatal mortality rate – the number of neonatal deaths per 1000 live births

Under five mortality rate – probability of dying between birth and exactly five years of age expressed per 1000 live births.

Unintended pregnancy - mistimed (i.e. the pregnancy occurred earlier than desired) or unwanted pregnancies (i.e. the pregnancy occurred when no children, no more children were desired).

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

The history of midwifery dates as far back as the 18th century in some developed countries[1]. The focus of interventions was initially on labour and the immediate postpartum period. Great strides were made in decreasing maternal mortality through these interventions[2]. It was not until the 1930s that it was noted that chronic medical conditions and infections could be managed in the antenatal period to prevent adverse sequelae for both mother and fetus[3]. In the latter part of the 20th century it was evident that the antenatal period provides a chance for risk assessment of the pregnancy (the risk approach) and therefore referral to an appropriate level of care[4]. Furthermore, it gives an opportunity to teach the mother about danger signs in pregnancy, good nutrition, birth spacing and to prepare her for the delivery process.

Antenatal care has long been recognised to be an integral part of improving maternal mortality and morbidity and forms one of the four pillars of the Safe Motherhood initiative launched 30 years ago[5]. It is difficult to isolate its direct effect on pregnancy outcomes as maternal mortality and morbidity may have multiple contributing factors prenatally, antenatally, intrapartum and postpartum**.** There is a general consensus that the main aim of antenatal care should be to improve general maternal health, and therefore fetal outcomes[6-7]. Antenatal care aims to target some of the major causes of maternal deaths worldwide namely haemorrhage, infections and hypertensive disorders of pregnancy.

There have been multiple positive developments in antenatal care in South Africa (SA).The dawning of a new political era in 1994 came with the introduction of free antenatal care for all pregnant women[8]. This resulted in the increased utilisation of this service, with more than 97% of pregnant women attending antenatal clinic during their pregnancy[9]. South Africa made maternal health care one of the national priority programmes in 2002.

The Basic antenatal care (BANC) Approach was introduced in 2007 which is the minimum level of antenatal care that all pregnant women should receive[10]. This is a simplified, quality improvement programme that was adapted and modified from the World Health Organisation's (WHO) new antenatal care model[11]. WHO developed a package that sought to accommodate developing countries by outlining recommendations proven to be of benefit in antenatal care and reducing the number of visits. There is special training for all providers of antenatal care at the primary healthcare level.

The use of the green antenatal card in South Africa dates back to the early 1990's. The information documented on this card helps the healthcare worker to classify the patient into normal, intermediate and high risk (*Appendix A)*. Low risk patients attend antenatal care visits and deliver at the midwife obstetric unit (MOU), intermediate risk patients attend antenatally at the clinic but the delivery has to be at the hospital and high risk patients attend and deliver at the hospital (*Appendix B)*. Patients are then treated at the clinic or referred to a regional or tertiary hospital accordingly. The cards are hand-held which facilitates the continuity of care as the patient moves from one facility to another.

A clinical audit is defined as a process that involves identification of deficiencies in the care of patients and evaluation of management outcomes[12]. Specific, measurable criteria are chosen relevant to certain aspects of care and these help to compare between active and best practice. It therefore serves as a diagnostic tool used to improve service delivery and the morbidity and mortality of patients. It is a continuous process that involves on-going follow-up to ensure that change is instituted and the standard of quality maintained.

One of the variables that can be audited in obstetrics is antenatal care. Most studies on antenatal care have a limitation as they assess only the uptake and not the quality of rendered services. The cause of any maternal death or morbidity is usually multifactorial with other confounding factors, which makes it even more difficult to assess the direct role of antenatal care in reducing maternal morbidity and mortality.

The antenatal card can be used as an assessment tool for antenatal care. It can also be audited for patient-related behavioural patterns that may have contributed to adverse maternal or fetal outcomes.

1.2: LITERATURE REVIEW

1.2.1 THE IMPORTANCE OF ANTENATAL CARE

Maternal and child healthcare represents an important aspect of health in any country and is used as a standard to calculate its success. The inception of Millennium Development Goals (MDG) in 2000, in particular MDG 4 and 5, spurred a renewed focus towards improving maternal and child healthcare globally[13]. The main aim of MDG 4 was to reduce under-five mortality rate by two thirds between 1990 and 2015. MDG 5 aimed to improve maternal health by reducing maternal mortality rate by three quarters and achieving universal access to reproductive health by 2015.

The Millennium Development Goals Report 2015 confirms that there has been a significant reduction of 45% in maternal mortality rates globally[14]. However most of the developing regions have failed to meet targets set for 2015, with Sub-Saharan Africa and Southern Asia still accounting for 86% of maternal deaths globally in 2013. Only 52% of women in developing countries received the recommended minimum of four antenatal visits as per World Health Organisation recommendations[14].

The neonatal mortality rate forms a portion of the under-five mortality rate and is of relevance in obstetrics. The UNICEF report on child mortality 2013 revealed that neonatal deaths formed about 44% of the under-five mortality group[15]. The Millennium Development Goals Report 2015 cites that the worldwide neonatal rate has declined from 33 deaths to 19 deaths per 1000 live births, but progress was not sufficient to achieve the set target of MDG 4[14].

The Sub-Saharan region had a neonatal mortality rate of 29 deaths per 1000 live births in 2015, a decline from the initial 46 deaths per 1000 live births in 1990[14]. The

decline in neonatal mortality from 1990 to 2015 has been slower than that of post-neonatal under-five mortality (1-59 months), 47 % versus 58 % worldwide. There is a concern that neonatal deaths will form a larger portion of under- five deaths between 2016 and 2030. Therefore focus will be on improving the quality of care given through different interventions during pre-pregnancy, antenatal, intrapartum, childbirth and post-natal periods to facilitate progress.

As a follow up to completing the agenda of the Millennium Development Goals post 2015, a set of 17 Sustainable Development Goals (SDGs) was adopted in September 2015[16]. These goals have been in effect from January 2016 with targets set to be reached by 2030. Maternal and child health are addressed by Goal 3. The set target for maternal health is to reduce the global maternal mortality ratio to less than 70 per 100 000 live births by 2030. The target for child health is to end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal death rate to 12 deaths per 1000 live births and under five mortality rate to 25 deaths per 1000 live births.

There are about 2.65 million stillbirths reported globally every year according to the Lancet Stillbirth Series published in April 2011[17].This consisted of six Series written by 69 authors from 18 countries across the world. Most of these (98%) happen in low and middle-income countries. Sadly there seems to be very little auditing of these cases and reporting of avoidable factors. Bhutta *et al.* have made recommendations of interventions at different levels of care in the third paper of this Series[18].

Basic and advanced antenatal care interventions recommended by Bhutta *et al.* are of relevance to this study. These include diagnosis and appropriate intervention in cases of hypertension in pregnancy, diabetes mellitus and fetal growth restriction and induction at 41 weeks of gestation which were recommended to decrease stillbirths. Part of the vision for 2020 is that countries with stillbirth rates of more than 5 per 1000 live births should have decreased this by at least 50%.

According to the “Saving mothers report 2011-2013” the Institutional Maternal Mortality ratio (IMMR) in South Africa has decreased from 176.22/100 000 to 154.06/100 000 in the period mentioned above[19]. A total of 4452 maternal deaths

were audited between 2011 and 2013 in all the provinces of South Africa, at different levels of care. The five biggest causes of maternal mortality included non-pregnancy related infections (30.4%), obstetric haemorrhage (15.8%), hypertension-related complications (14.8%), medical and surgical disorders (11.4%) and pregnancy-related sepsis (9.5%). Human immunodeficiency virus (HIV) infection still accounts for the majority of maternal deaths in South Africa. The assessors concluded that 60% of these maternal deaths were probably preventable, highlighting the substandard care rendered during antenatal, intrapartum and postnatal periods.

The introduction of antiretroviral treatment in 2002 changed the face of HIV[20]. There has been a rapid up-scale in the availability and access of antiretrovirals (ARVs) in all health facilities[21]. The latest report from the South African Prevention-of-mother-to-child-transmission (PMTCT) Evaluation showed a decrease in the Mother-to-child-transmission (MTCT) rate from 20-30% pre-ARVs to 2.7% in 2011[22]. It was further reported that 98.1% of pregnant women received an HIV test during pregnancy, of which 91% of those testing positive were started on ARVs.

Some components of antenatal care have been shown to indirectly contribute to decreasing maternal death and morbidity. These include routine iron supplementation, tetanus immunisation of the mother, screening and treatment of asymptomatic bacteriuria, screening and treatment of syphilis, diagnosis of HIV and treatment, blood pressure measurement and urinalysis for protein to diagnose hypertensive disorders, appropriate treatment and timeous referral to a higher level of care[20].

1.2.2 HAND-HELD VS HOSPITAL-KEPT MATERNITY RECORD

There has been a move from hospital-kept to hand-held records. This follows after a recommendation made by the Royal College of Obstetricians and Gynaecologists (RCOG) in 1995 and endorsed by the National Institute for health and Care Excellence (NICE)[23]. Several studies have looked at the advantages of hand-held maternity records.

In 2001 Williams *et al.* published a pragmatic randomised control study that assessed the utilization of a multidisciplinary hand-held record amongst cancer patients[24]. A total of 501 patients were invited to participate in the study. Only 344

completed the study. These were divided into two groups of 172 patients each. Results showed that patients who kept their own cards expressed a sense of being in control. They also felt the card helped as a memory aid and helped them to prepare for their meeting with the healthcare professionals. Most of the patients who were given the card were in favour of it. Although there was a poor response from the health professionals, the few that answered agreed that the card assisted patients to remember the information discussed in the consults and helped in liaising with other professionals.

1.2.3 TIMING OF BOOKING

WHO has made a recommendation that the first antenatal visit should be before 12 weeks[8]. Our BANC handbook is in accordance with this. Certain important interventions are specific for the first and early second trimesters including confirming gestational age, determining of chorionicity in multiple pregnancy, screening for fetal anomalies and Down's syndrome, lifestyle modification (targeting alcohol, smoking and other substance abuse), screening for infections (especially HIV, rubella, Hepatitis B and syphilis) and medical illnesses.

The American College of Obstetricians and Gynaecologists recommends the use of ultrasound measurement of the fetus in the first trimester (up to and including 13 weeks 6 days) as the most precise method to determine gestational age[25]. Estimating the gestational age through ultrasound in this period seems to have a better predictive value of the estimated date of delivery (EDD) than the last normal menstrual period (LNMP)[26]. A study in Finland with 17 221 pregnant women using transvaginal ultrasound was performed between 8 and 16 weeks[26]. They used crown-to-rump length (CRL) up till 11 weeks 6 days and biparietal diameter (BPD) thereafter. The result showed that ultrasound in this gestation was superior to LNMP by 1.7 days in predicting the EDD. The proportion of post-term deliveries as well was reduced from 10.3% if the LNMP was used to 2.7% if early ultrasound was used, thereby decreasing induction of labour and its complications.

Late booking remains a challenge in developing countries. Two studies in the Hlabisa district, KwaZulu-Natal and Makurdi, Nigeria found similar findings with a mean gestational age at booking ranging between 17 and 20 weeks[27-28].

1.2.4 NUMBER OF VISITS

The new antenatal care model by WHO recommends only 4 antenatal visits for women with uncomplicated pregnancies. This is based on a multicentre trial by WHO in 1998 and a systematic review of seven randomised controlled trials in 2001[11]. The standard model prior to this recommended one visit monthly for the first 6 months, then one every 2-3 weeks for the next 2 months then weekly till delivery. This amounted to about 12 visits in total during pregnancy. In the new model the first visit should be in the first trimester, the second one at 26 weeks, the third one at 32 weeks and the last one at 38 weeks**.** CHBAH is a tertiary facility that attends to high risk patients hence antenatal clinic visits are more frequent. The obstetric unit in this facility has special clinics where some patients follow up weekly (e.g. diabetic, cardiac clinics) and others at least every fortnight (e.g .multiple pregnancy clinic).

A multicentre trial was done by WHO for 18 months between 1996-1998[11]. They selected 53 antenatal care clinics and randomised 27 of them to the new antenatal care model and 26 to the standard model. A total of 24 678 women were involved. They found that the rates of low birth weight babies (less than 2500g), severe post-partum anaemia and urinary tract infection were the same for both groups. Rates for eclampsia and hospital admissions were the same as well. Cost of the new model was either equal to or less than that of the standard model.

In 2001 WHO did a systematic review which included 57 418 pregnant women, of which 30 799 were randomised to the intervention group and 26 619 to the control group[29]. Outcomes were similar for pre-eclampsia, urinary tract infection, post-partum anaemia, maternal mortality, low birth weight and perinatal mortality in both arms. The findings were in agreement with those of the study above.

1.2.5 THE EXAMINATION

1.2.5.1 GENERAL EXAMINATION

A general examination is done on the first visit. This includes screening for anaemia by examining for pallor, screening for malnutrition by calculating a Body Mass Index (BMI) based on the weight and height or mid-upper-arm circumference (MUAC), checking for lymphadenopathy, blood pressure (BP), pulse and temperature measurements. In the subsequent visits only BP, urinalysis, weight and uterine height measurement are done in asymptomatic women.

NICE advocates that weight and height are measured at the first visit only and the BMI worked out from there[23]. They argue that serial weighing on subsequent visits is unnecessary as it will not change the clinical management. The South African BANC Handbook has adopted this principle[10]. It only advises BMI calculation on the first visit to rule out malnutrition or obesity and then refer accordingly. We still do serial weight measurement in our clinic.

The formula for BMI is weight (kgs) /height^2(m^2), where less than 18 is suggestive of malnutrition. The problem with this calculation is that as the weight increases in pregnancy it may mask underlying poor nutrition. Hence our clinics also use MUAC as a calculation since it stays constant in pregnancy. The South African guidelines for maternity care use an MUAC cut off value of equal to or less than 23 cm as suggestion of malnutrition[30].

There is no consensus on the global MUAC cut off value that can be used to assess malnutrition in pregnant women[31]. Medecins San Frontieres Switzerland conducted a literature review from 1 January 1995 to 12 September 2012 to determine the values of anthropometric indicators for acute malnutrition that are associated with adverse birth outcomes including low birth weight (LBW), preterm birth and intra-uterine growth restriction[32].

Most adverse effects were noted at values below 23 cm and a conservative cut off value of less than 23 cm was recommended to include most pregnant women at risk of LBW in both African and Asian populations. The food and nutrition technical assistance (FANTA) meta-analysis in 2016 also identified lower range cut off values for MUAC (19 to 23 cm) to have higher specificity compared to sensitivity[31]. The

limitations included the wide variations of cut off values in the different studies and the different timing of measurement of the MUAC. The recommendation was that each country needs to do their own cost benefit analysis to be able to work out a suitable cut off value for their population.

Hypertension was found to be part of the "big 5"commonest causes of maternal mortality in the '*Saving Mother's report*' 2011-2013, being the third commonest and accounting for 14.8% of all maternal deaths[19]. This makes recording of BP a very important aspect, aiding in early detection, prompt referral and aggressive management of related complications.

Our institution adopts this definition of hypertension in pregnancy: "*A systolic BP of 140mmHg or more, or a diastolic BP of 90 mmHg or more, on 2 occasions at least 4 hours apart"* [33]*.* To measure blood pressure the woman should be sitting or lying on her side and relaxed. The correct size cuff should be used, placed to accommodate two thirds of the arms. The arm should be at the level of the heart. The diastolic BP should be taken at Korotkoff sound V.

1.2.5.3 SYSTEMIC EXAMINATION

A complete systematic exam is performed on the first visit. This includes a chest exam to rule out infections, especially tuberculosis which is common in SA. A cardiac exam is done to exclude cardiac lesions.

1.2.5.4 FOCUSED EXAMINATION

The abdominal examination is mandatory on every visit. The abdomen is inspected for signs of pregnancy (distension, linea nigra and striae) and scars indicating previous caesarean sections [23]. The first Leopold manoeuvre or fundal grip is done to determine the height of the fundus and exclude a breech presentation in advanced gestation. The second Leopold manoeuvre or lateral grip determines the lie of the fetus, the side where the back is and the amount of liquor palpable. The third manoeuvre or Pawlik's grip determines the presenting part. The fourth manoeuvre determines the level of engagement of the fetal head and the degree of flexion.

The symphysis- to- fundal height (SFH) is plotted on the back part of the antenatal card (*Appendix B)*. South Africa has adopted the Belizan charts. In a study done in

1978 which incorporated 298 healthy pregnant women, Belizan calculated the 10th, 50th and 90th centile using the last menstrual period for dating[34]. The uterine height measurement proved to be useful in screening for IUGR and making early referral for those pregnancies.

RCOG guidelines advocate the use of serial SFH measurements from 24 weeks of gestation onwards as this improves prediction of small-for-gestational-age (SGA) neonate[35]. They also recommend the use of customised growth charts which take into account maternal weight, height, parity and race. Observational studies have shown benefit of these charts but trials need to be done to compare with population-based charts[36].

Belizan growth curve has been shown to be superior to others in our population in that it has a high pick-up rate for SGA babies without over diagnosing many appropriate for gestational age (AGA) babies as SGA babies[37]. A study done in Cape Town in 1988 compared 3 different curves in finding SGA (*see Table 1 below).*

	Belizan	**Quaranta**	**Calvert**
Sensitivity	85.7%	92.9%	92.9%
Specificity	89.2%	50.6%	74.7%
Positive Predictive Value	57.1%	24.1%	38.2%

Table 1: Comparisons of different growth curves in our population

It cannot be refuted that ultrasound remains the most reliable modality of confirming gestational age, especially in the first and early second trimesters[38]. Our challenge is that clinics do not have ultrasound facilities and therefore patients have to be referred to CHBAH for ultrasound imaging. Most of the patients book late and our antenatal policy does not recommend routine ultrasound imaging after 24 weeks unless there is concern. Therefore we find that the measurement of symphysis to fundal height still has a role to play in our setting.

1.2.6 SPECIFIC INTERVENTIONS

In the public sector in Gauteng four routine blood tests are performed in pregnancy namely haemoglobin, an HIV test and CD4 count and Viral load (if HIV positive), Rapid plasma reagen (RPR) for syphilis and Rhesus (Rh) blood group testing. Other tests are not routinely offered because of financial constraints, but patients are referred to private practitioners if they wish to have them done (e.g. rubella screening).

A risk analysis of the patient profile may warrant further tests to be offered to the patient. An example would be an oral glucose tolerance test offered to pregnant patients with positive screening for diabetes mellitus as evidenced by a family history of diabetes mellitus, previous gestational diabetes, previous unexplained stillbirth, previous baby weighing more than 4 kg and two or more consecutive episodes of glucosuria.

1.2.6.1 ANAEMIA

Anaemia in pregnancy is defined as haemoglobin of less than 11 g/dl according to WHO[39]. Iron deficiency anaemia is more common, accounting for more than 90% of cases of anaemia in pregnancy. Its prevalence in developing countries is high, ranging from 52.8% - 61.3% in Africa[40]. It has been classified as a moderate public health problem in Sub-Saharan Africa hence the rationale for testing for it in pregnancy.

Some of the causes specific to developing countries include nutritional deficiencies (e.g. iron, folate), increased phytate content in the diet (therefore decreasing iron absorption) and secondary effects of infections (e.g. malaria, HIV)[41]. Anaemia has been shown to cause decreased work output from the mother, increased risk of haemorrhage during delivery and cardiac failure in its severe form[6]. Effects on the pregnancy include an increased risk of preterm deliveries leading to increased low birth weight babies[42].

There are differing opinions with regard to routine daily administration of iron. NICE guidelines do not advocate for routine administration[23]. A Cochrane review done in 2002 shows that most studies on this subject were done in developed countries

where the problem is not so prevalent[43]. The latest review by Bhutta *et al.* in 2011 looked at 14 studies in both PubMed and Cochrane that showed that routine administration decreases the prevalence of anaemia by 73% at term[44]. They also concurred that more studies needed to be done in developing countries but there was a definite advantage in this practice especially for developing countries.

1.2.6.2 HIV INFECTION

The HIV epidemic presents a huge burden to South Africa, with casualties being mostly women. The latest estimates from Stats SA 2016 population estimates report that 7.03 million people are living with HIV in SA[45]. The prevalence of HIV in pregnant women in SA is 29.7%[46].

South Africa had recently published revised national guidelines for the management of HIV, effective from the 1st of January 2015, at the time of the study[47]. These state that all pregnant HIV positive women will be started on ARVs immediately irrespective of CD4 count in line with WHO recommendations in 2012[48]. The use of ARVs in this group is now lifelong. HIV negative pregnant women should continue to be tested 3 monthly in pregnancy, during labour/delivery and 3 monthly whilst breastfeeding. Efavirenz can now be safely used in pregnancy regardless of the gestation of the pregnancy. A CD4 count is still done to determine the need for prophylaxis for Pneumocystis Jiroveci pneumonia (PJP) and cryptococcal meningitis.

The rationale for this change is that it simplifies delivery of care by using the same regimen for pregnant women and adults in general[49]. Therefore it helps improve the integration of services at the facilities. Secondly, the standardised fixed dose combination tablet (FDC) improves compliance and therefore continuity of care. Studies have shown increased adherence when using single tablet regimens compared to multiple tablet regiment[50-51]. The use of FDC simplifies drug procurement, supply chain management and stock-out monitoring.

1.2.6.3 SYPHILIS

The National Antenatal Sentinel Survey 2011 reports the prevalence for syphilis to be at 1.5%[52]. There has been an improvement as this is the lowest recorded since 1997. Treatment with benzathine penicillin remains highly effective[53].

1.2.6.4 ASYMPTOMATIC BACTERIURIA

The Infectious Diseases Society of America describes asymptomatic bacteriuria as the isolation of a specified quantitative count of bacteria from an appropriately collected urine specimen from a person without symptoms[54]. A bacterial strain must be isolated from two urine specimens and the count must be 10^5 cfu/ml or more. The prevalence of asymptomatic bacteriuria in pregnant women ranges from 2-7%, being highest in women of low socio-economic status and diabetics.

Untreated asymptomatic bacteriuria leads to pyelonephritis in 30% of pregnant women[55]. The Cochrane review in 2007 reported that antibiotic treatment decreases the incidence of pyelonephritis in pregnancy[56]. They made a distinction between low birth weight and preterm deliveries. Antibiotics decreased the risk of low birth weight but not of preterm deliveries.

The gold standard for screening for asymptomatic bacteriuria is a urine culture[54]. A single screening test in the first visit is recommended. The challenge for developing countries is that this test is expensive, and results take 24-48 hours. Therefore our country uses the urine dipstick to screen by testing for nitrites and leucocyte esterase. There are many controversies about its usefulness. A meta-analysis done in 1998 showed that the urine dipstick was of value in eliminating infection if both tests (nitrites and leucocyte esterase) were negative[57]. Their combined sensitivity ranged between 68% and 88% but they had low specificity. Positive tests still needed confirmation. It is our practice that we treat asymptomatic bacteriuria in our institution, confirm a positive result with culture, and perform urinalysis on every antenatal visit.

1.2.6.5 TETANUS IMMUNIZATION

Tetanus is caused by Clostridium Tetani, a bacterium that produces a neurotoxin which impairs nerve function and thus causes muscle stiffness. This bacterium is found in soil, dust and animal faeces[58]. During pregnancy tetanus may be acquired through breach of skin, cutting the cord with an unsterile instrument during delivery and unsafe abortions. Tetanus is accountable for 180 000 neonatal deaths and 30 000 maternal deaths annually in the world. The burden may even be higher

considering that there is underreporting of cases[59]. In 1999 WHO, UNICEF and UNFPA started a global initiative of eliminating neonatal tetanus by the year 2005[60].

The tetanus vaccine is a toxoid and therefore poses no risk in pregnancy. It should be given to mothers who have no history of immunisation or no written record of immunization. The recommended dose is two doses in the pregnancy, on the first visit regardless of gestational age and four weeks thereafter. These provide protection for 1-3 years[59]. A third dose has been recommended after 6 months but this does pose a challenge in developing countries where only 30% of mothers are reported to have received 2 or more doses. Our Expanded Programme on Immunisation (EPI) subscribes to 3 doses in the first pregnancy and 2 doses in the subsequent pregnancy[61]. A total of these 5 doses will then provide protection for 10 years.

1.2.7 THE STUDY PROBLEM

The doctor: patient ratio at Chris Hani Baragwanath Academic hospital (CHBAH) antenatal clinic is about 1:25 considering that about 150- 200 patients are seen daily between 8am and 4pm at the antenatal clinic. A third of these patients are new visits to CHBAH referred from a primary healthcare level for assessment. The other two thirds are follow-up visits who are being monitored. The cards are filled in by the nursing sisters at a primary healthcare level and if referred, the on-going documentation is made by doctors and nurses at CHBAH.

The patients at the antenatal clinic are seen by midwives, interns, medical students, registrars and consultants. Medical students, interns and registrars have to be supervised. All patients seen by the medical students have to be discussed with a doctor. Registrars and interns will discuss the problem with the consultants if they are unsure.

Baseline and follow-up information is important. Information that is incorrectly recorded can be quite disastrous for both mother and fetus. Inadequate fundal growth as a result of underlying intrauterine growth retardation can be missed if not plotted on the gravidograph. Excessive fundal growth can hint to underlying multiple pregnancy, polyhydramnios, fetal macrosomia and uterine leiomyomas. This just

highlights how an omission of just one variable could have negative outcomes for the pregnancy. Moreover this could set reasonable grounds for litigation from patients. Hence the idea for this study was borne to audit the recording of the antenatal card. I will therefore assess missing baseline and follow-up information on the antenatal card so as to identify areas of potential medical negligence in antenatal clinic.

1.2.8 JUSTIFICATION OF THE STUDY

The purpose of the study is to find out if there are deficiencies in recording of the antenatal card and if there are, to conscientise healthcare workers about the importance of complete recording.

1.2.9 OBJECTIVES OF THE STUDY

Main Objective:

The main aim of the study is to assess documentation of all the variables on the green antenatal card at Chris Hani Baragwanath Academic Hospital.

Specific Objectives:

1. To determine the proportion of cards that have incomplete documentation.
2. To determine which aspects; previous pregnancy history, use of contraception medical examination, screening tests or follow-up assessments are more frequently not recorded.
3. To determine what prenatal education is documented as having been given.
4. To determine the gestation at which women book and the number of visits.
5. To determine what the indication for sonar was in those women who have had it and the gestation at which it was performed.

CHAPTER 2: METHODOLOGY

2.1 STUDY SETTING

The study was conducted at Chris Hani Baragwanath Academic Hospital (CHBAH), a tertiary public hospital in Soweto, Johannesburg, South Africa. This is the third largest hospital in the world and largest in the Southern hemisphere covering approximately 173 acres of land. It accommodates 2888 beds of which 300 belong to Obstetrics and Gynaecology. It is affiliated to the University of Witwatersrand and hence provides training for medical doctors, allied professionals and nurses.

The catchment population that CHBAH serves is 3 640 067 including but not limited to Soweto, Orange farm, Lenasia and the Vaal. Referrals are received from 2 regional hospitals namely Sebokeng and Thelle Mogoerane Hospital. Direct referrals are received from 1 district hospital namely Bheki Mlangeni Hospital and 4 MOUs namely Lillian Ngoyi, Chiawelo Stratford and Lenasia South with 3 other MOUs (Zola, Itireleng and Mofolo) referring to Bheki Mlangeni first and 45 clinics in this complex. Other referrals may be received from private practitioners, the rest of the Gauteng province and even as far as neighbouring countries.

Its inception dates back to 1942 when it was officially opened and named Baragwanath hospital. It was only in 1997 that the name was revised to Chris Hani Baragwanath Academic hospital in commemoration of the political activist who was murdered that year.

CHBAH is classified as a tertiary hospital but often functions at a regional and district level as well due to some logistics. There is one district hospital in Soweto namely Bheki Mlangeni District Hospital which opened in April 2014. However this small hospital does not have the full capacity of staff and resources to be able to singlehandedly manage all the referrals from Soweto at large. On certain days there is no doctor covering Obstetrics and Gynaecology after hours and all cases that need a doctor's assessment are referred to CHBAH by the nursing staff.

Secondly, the location of CHBAH often makes it the preferred choice of referral for most clinics within a radius of 5 km radius, which are closer to CHBAH than they are to Bheki Mlangeni Hospital. This creates a preponderance of low risk patients in

CHBAH. If these patients are seen at the antenatal clinic they are assessed and sent back to either Bheki Mlangeni Hospital or the referring clinic if they are low risk.

MOUs refer patients with intrapartum complications to CHBAH (e.g. breech presentation in labour). These patients most often do not have any comorbid illnesses to classify them as high risk. They will therefore add to the load of low risk patients that are delivered at CHBAH. Bheki Mlangeni District hospital does not have neonatal facilities that are equipped to manage preterm babies less than 34 weeks. Therefore any antenatal complication necessitating delivery before 34 weeks will warrant referral to CHBAH further adding to the higher proportion of low risk patients post-delivery. There is no longer a triage system in place at CHBAH therefore patients referred in labour and assessed to be low risk are not sent back to the MOU.

Our antenatal clinic sees approximately 150 – 200 patients per day, with an average doctor: patient ration of 1:25. This includes an intermediate/high risk clinic and different special clinics. There are usually 3 consultants, 3 registrars (two consulting and another one doing ultrasounds) and 3 interns and consultants supervise the junior staff. Therefore there are 8 doctors consulting in total and 1 doctor doing ultrasounds. This highlights both the patient volume at this hospital and the heavy workload which necessitates for a faster working pace, making the doctors prone to incomplete recording of the antenatal card. The clinic operates on Mondays to Fridays, from 08:00 to 16:00.

Patients come in as early as 6 am. Nurses measure BP, weight, check the urine for protein, leucocytes and glucose using dipstick and record the findings on the card. Enrolled nurses are responsible for taking measurements. They are well-trained in this regard and are supervised by professional nurses. Electronic BP machines and weight scales are used. Different size cuffs are used for BP measurement. Patients referred for the first time usually have existing Rh blood group, Haemoglobin, HIV and RPR results from their referral clinics. They are seen by consultants. CHBAH has about 450 deliveries a week.

2.2 STUDY DESIGN

This was a retrospective, cross-sectional study in which antenatal cards were audited from 300 postnatal patients in the month of September 2015.

2.3 SAMPLE SIZE

This was a descriptive study and a sample size was not calculated. A convenience sample was calculated.

2.4 DATA COLLECTION

The investigator conducted the research in 3 postnatal wards namely ward 64 (high risk postnatal ward), ward 65 (low risk post Caesarean section) and ward 68 (low risk normal delivery ward). Every afternoon the complete batch of all the files of discharged patients was collected by the investigator from the ward clerk. The clerk was not aware what type of study was being conducted and what the study entailed. She was not involved in any special arrangement or selection of the cards needed.

The investigator would then select the top ten files that contained green antenatal cards out of the batch. This was done without opening the files to view the content of the antenatal cards. Each day all ten antenatal cards were retrieved from one ward and the wards were alternated. If there were fewer discharges from one ward the investigator would then collect from the other two wards to complete the daily quota of 10 files per day**.** The chosen antenatal cards were then scanned and the information entered into a data sheet.

Each antenatal card was assigned a participant code to maintain confidentiality and this was transferred to the data sheet. The antenatal card has different sections that include past and current obstetric, medical and family history, past contraception use, planned pregnancy, use of any medication, examination findings at the first visit, an ultrasound examination (if performed) and a Belizan curve for recording serial abdominal examinations. Blood tests performed, the results and vaccinations given are also recorded. These were grouped into different variables and entered on the data sheet as follows *(see Appendix A)*:

2.5 DEMOGRAPHIC AND OBSTETRIC DATA

Information audited included recording of age, parity, marital status, gestational age at booking and method of calculation, number of clinic visits, risk assessment and plan for place of delivery.

Our antenatal referral criteria for age include teenagers less than 16 years, primiparous women more than 35 years and advanced maternal age of more than 37 years. Women with parity of five or more needed to be referred to hospital. The gestational age at booking and number of clinic visits were recorded to allow us to compare the utilization of antenatal care services in our population with national statistics.

Risk assessment is divided into three categories: low risk patients who can be managed at the clinic, intermediate risk patients who have their antenatal visits at the local clinic but should have delivery at the hospital and high risk patients who should attend the antenatal clinic and deliver at the hospital. There is a specific list attached as *Appendix C* that shows which condition belongs under which risk stratification.

A – Past obstetric history

Under this variable the researcher audited the recording of information relating to the previous deliveries. This included the year of delivery, the gestational age at delivery, the mode of delivery, the birth weight, the fetal outcome and maternal complications.

All variables were checked for specificity. For gestational age at delivery in the previous pregnancy, specific meant writing the gestational age in weeks and non-specific referred to ‘term’ and ‘preterm’ being used . For mode of delivery non-specific referred to the terms ‘instrumental’ delivery or ‘operation’ being used. Specific referred to the words vacuum or forceps delivery and caesarean section being used. In the case of history of a previous caesarean section, it was checked if the indication was documented or not.

If the terms ‘big’ or ‘small’ were used in birth weight these were considered non-specific. The birth weight had to be written in kilograms to be accepted as specific. For fetal and maternal complications if a tick or a ‘yes’ only was written under the column this was considered non-specific. The precise diagnosis of the previous

complication had to be written for this to be considered specific. Poor fetal outcome examples included fresh stillbirths, unexplained intrauterine fetal deaths, recurrent miscarriages and early neonatal deaths. Maternal complications included a history of conditions that may recur in the current pregnancy e.g. antepartum and postpartum haemorrhage, pre-eclampsia and its complications.

B – Contraception

The researcher checked if previous and future contraception was documented, and if it was stated whether the pregnancy was planned or not. It was further noted which methods of contraception were used prior to this pregnancy and which ones were preferred for future use.

C – Past medical history

The researcher noted the documentation of pre-existing medical illnesses and previous surgery. This included conditions like chronic hypertension, cardiac disease, epilepsy and others as per risk stratification *(Appendix C).* Previous surgery referred to any surgery that would have an impact in this pregnancy.

D - Family history

It was checked if the relevant family history was recorded. This included a history of twins, diabetes mellitus and congenital abnormalities. Routine referral to exclude twins was not needed and only in conjunction with a clinical suspicion was a referral warranted. This refers to a symphysis fundal height that is higher than expected for dates in a patient with sure dates or early ultrasound dating.

E – Social habits

The researcher checked if smoking, alcohol and substance abuse were documented on the cards.

F – Sonar

The researcher noted whether a sonar was done or not, the indication and the gestation at which the sonar was done.

G – Education

Each card was audited for recording of education on danger signs of pregnancy, lifestyle modification, nutrition, safe sex, contraception, birth plan and infant feeding.

H – Blood results

Each card was audited for recording of haemoglobin at first visit, 28 weeks and 32 weeks, Rh blood group, RPR, HIV and CD4 count result as per national guidelines at the time of collection.

I – Examination

A focused examination was audited where the researcher only looked at the recording of the SFH measurement, BP, weight, urine dipstick and fetal heart. Documentation of SFH could only be assessed as documented if serial SFH measurements were recorded. If only one SFH measurement was recorded out of two or more visits, this was considered as not recorded. The other measurements were accepted as recorded if at least documented once during antenatal visits.

2.6 DATA ANALYSIS

Data collected was entered into the excel spread sheet and analysed using the statistical software Stata 14.1 (StataCorp.College Staion.Texas.USA). Descriptive data techniques were used including means followed by standard deviations, medians followed by interquartile ranges and frequencies with percentages. The Chi-squared or the Fisher's exact tests were used where categorical variables were compared. Probability value (P) less than 0.05 was set as the accepted level of statistical significance.

2.7 ETHICS

The study was submitted to the Human Research Ethics Committee of the University of Witwatersrand and approval was granted with clearance number: M150354. *(See Appendix E).* Permission was obtained from the Chief Executive Officer (CEO) of CHBAH to conduct the study in this hospital. *(See Appendix F).* Confidentiality was assured by making use of participant codes in the data sheet and not using any patient's name or hospital number.

2.8 FUNDING

No major funding was needed for the study. Any costs incurred were settled by the researcher (e.g. printing, photocopying, etc.).

CHAPTER 3: RESULTS

A total of 300 patients were included in this study. This chapter describes the study population and looks at the documentation of the different factors that are recorded on the antenatal card. I will note whether the variable was recorded or not. Some aspects of the card like past obstetric history record more than one parameter and each of them has been audited individually. For some of the variables under past obstetric history I will note whether the recording was specific or not as described in the methodology chapter before.

3.1 DEMOGRAPHICS

Age was recorded in all 300 antenatal cards. The median age was 28.0 years (IQR = 23.0-32.0) with a range of 14 to 47 years. There was one teenage pregnancy less than 16 years, two primigravidas more than 35 years and eleven patients more than 37 years. There was appropriate referral of all these cases.

Parity was recorded in all 300 antenatal cards. The median parity was 1.0 (IQR = 0.0-2.0) with a range of 0 to 5.

Marital status was recorded in 171 cards (57%) and not recorded in 129 cards (43%). The majority of women were single [n =145 (84.8%)] and 26 (15.2%) were married.

The mean number of clinic visits was 4.1 (SD± 1.4) with a range of 1-9 visits. A total of 204 patients (68%) had 4 or more antenatal visits.

The gestational age at booking was recorded in 296 antenatal cards (98.6%) and omitted in 4 cards (1.3%).The mean gestational age at booking was 18.9 weeks (SD± 7.6). Table 2 on page 23 below categorises the gestational age at booking into weeks so as to further demonstrate the behavioural pattern of late booking.

GA BOOKING CATEGORY n = 296	FREQUENCY
< 13 weeks	52 (17.6%)
13 – 20 weeks	115 (38.9%)
21 – 30 weeks	116 (38.9%)
> 30 weeks	13 (4.4%)
TOTAL	296 (100%)

Table 2 Gestational age (GA) at booking

The last menstrual period was the commonest method used to calculate the estimated gestational age [n = 195 (65%)]. Other methods used less often included palpation [n=46 (15.3%], sonar [n=54 (18%)] and few in which the method was not specified [n=5 (1.7%)].

3.2 RISK ASSESSMENT

There were 16 antenatal cards (5.3%) where risk assessment was not recorded. Most of the patients were low risk [n = 208 (69.3%)]. The rest of the patients were intermediate risk [n= 53 (17.7%)] and high risk [n=23 (7.7%)]. Refer to Appendix C for the list of prenatal conditions and risk stratification.

3.3 PAST OBSTETRIC HISTORY

The year of the previous delivery was recorded in 215 antenatal cards (71.7%) and not applicable to the rest [n=85 (28.3%)] as they were primigravidas. This actually means in all the cards where it was applicable, this variable was recorded.

The documentation of the gestational age at previous delivery, mode of delivery, birth weight, fetal outcome and maternal complications in the previous pregnancy are all depicted in Table 3 as shown below on page 24. There were 85 primigravidas where all the above mentioned variables were not applicable.

VARIABLE	FREQUENCY
1. GESTATIONAL AGE AT PREVIOUS DELIVERY (n = 215)	
• Recorded	214 (99.5%)
• Not recorded	1 (0.5%)
2. MODE OF DELIVERY (n = 215)	
• Recorded	215 (100%)
3. BIRTH WEIGHT IN THE PREVIOUS PREGNANCY (n = 215)	
• Recorded	205 (95.3%)
• Not recorded	10 (4.7%)
4. FETAL OUTCOME IN THE PREVIOUS PREGNANCY (n = 215)	
• Recorded	201 (93.5%)
• Not recorded	14 (6.5%)
5. MATERNAL COMPLICATIONS IN THE PREVIOUS PREGNANCY (n = 215)	
• Recorded	163 (75.8%)
• Not recorded	52 (24.2%)

Table 3 Documentation of Past Obstetric history

The gestation at previous deliveries was specific in 96 cards (44.9%), non-specific in 118 (55.1%). Specific refers to the actual gestation written in weeks and non-specific if the terms ‘preterm’ and ‘term’ are used. Ten women (4.7%) had previous preterm births (*less than 37 weeks)* and these were early in the pregnancy ranging from 24 weeks to 32 weeks. None of the preterm births were later than 32 weeks. The rest of the patients [n = 204 (95.3%)] had their previous deliveries at term.

The mode of delivery was specific in 213 (99.1%) and non-specific in 2 (0.9%) of them. The words ‘vacuum delivery’, ‘forceps delivery’ and ‘caesarean section’ were considered specific and the terms ‘instrumental delivery’ and ‘operation’ nonspecific. Of the 215 patients, 55 (25.6%) had a previous caesarean section and the indication for it was recorded in 30 cards (54.5%) and not recorded in 25 (45.6%). There were no cards which documented assisted delivery.

Of the 205 cards where birth weight was recorded, 70 (34.15%) were specific and 135 (65.85%) were nonspecific. Specific refers to the actual weight in kilograms being recorded and nonspecific refers to the terms ‘small’ or ‘big’ baby being used.

Significant poor fetal outcomes in a previous pregnancy included fresh stillbirth, unexplained intrauterine deaths, recurrent miscarriages and early neonatal death. It was specific in all 201 cards that were documented.

The recording of maternal complications was specific in 160 of the recorded cards (98.2%), nonspecific in 3 (1.8%). Non-specific refers to only a tick or a yes being written under this column. These included pregnancy-induced hypertension, antepartum and postpartum haemorrhage, complications of pre-eclampsia including HELLP syndrome and eclampsia.

3.4 DOCUMENTATION OF CONTRACEPTION

Previous contraception was documented in 294 cards (98%). Almost half of the patients were not on any form of contraception [n=130 (44.2%)]. The rest of the patients [n = 164 (55.8%)] were on different methods as shown in Table 4 below (Page 26).

METHODS OF CONTRACEPTION n = 164	FREQUENCY
Progestogen injections	110 (67.1%)
Combined oral contraceptive pills	32 (19.5%)
Condoms	20 (12.2%)
Subdermal implants	2 (1.2%)

Table 4 Methods of contraception used prior to pregnancy

Future contraception was documented in 286 cards (95.3%).Table 5 below shows the different methods chosen for future contraception. It was not documented whether the pregnancy was planned or not in 299 of the cards (99.7%) and documented in 1 card (0.3%).

METHOD OF CONTRACEPTION (n = 286)	FREQUENCY
Progestogen injections	175 (61.2%)
Combined oral contraceptive pills	42 (14.7%)
Bilateral tubal ligation	25 (8.7%)
Subdermal Implants	20 (6.9%)
Condoms	10 (3.5%)
Intra-uterine contraceptive device	1 (0.4%)
Transdermal patch	1 (0.4%)
Undecided	12 (4.2%)

Table 5 Choice of future contraception

3.5 DOCUMENTATION OF PAST MEDICAL HISTORY

This was documented in 299 cards (99.7%). Fourteen patients (4.7%) had significant past medical history including chronic hypertension, poorly controlled asthma, poorly controlled epilepsy, previous and current deep vein thrombosis (DVT) on treatment, cardiac disease secondary to rheumatic fever and bipolar mood disorder with psychotic features.

3.6 DOCUMENTATION OF PAST FAMILY HISTORY

This was recorded in 296 cards (98.7%) and not recorded in 4 (1.3%). There was relevant family history in 168 cards (56%) and none in 132 of them (44%). This included a family history of twins, diabetes mellitus and congenital abnormalities. %). Twenty one cards (7%) needed referral and these included 14 patients (66.7%) with two or more risk factors for diabetes mellitus, 5 patients (23.8%) with a family history of babies with congenital abnormalities and 2 (9.5%) with babies with congenital abnormalities in the previous pregnancy

3.7 RECORDING OF SOCIAL HABITS

This was recorded in 192 cards (64%) and not recorded in 108 cards (36%). There were 10 patients (5.2%) who were cigarette smokers. There were 22 patients (11.5%) who were alcohol drinkers. None of the patients were abusing illegal substances.

3.8 DOCUMENTATION OF ULTRASOUND EXAMINATION

An ultrasound examination was done in 157 of patients (52.3%). The commonest indication for it was dating [n = 100 (64.3%)] and other indications as shown in Table 6 below on Page 28.

The majority of ultrasounds were done in the second trimester (n=77, 49.0%), with 66 (42.1%) done in third trimester and 14 (8.9%) done in first trimester.

ULTRASOUND INDICATION (n = 157)	FREQUENCY
DATING	101 (64.3%)
GROWTH	14 (8.9%)
PLACENTATION	15 (9.6%)
EXCLUDE TWINS	6 (3.8%)
FETAL ANOMALY SCAN	13 (8.3%)
PRESENTATION	3 (1.9%)
EXCLUDE FETAL DEATH IN UTERO	5 (3.2%)

Table 6 Indication for ultrasound imaging

3.9 EDUCATION

Education on danger signs was recorded in 180 cards (60%). A discussion on lifestyle modification was documented in 73 cards (24.3%). Advice on nutrition was recorded as having been given in 98 cards (32.7%). In those who were given dietary advice, 2 cards had a separate sheet detailing the specific details discussed regarding the diet. Education on contraception was recorded in 287 cards (95.7%). A discussion about the birth plan was recorded in 277 cards (92.3%). Advice on infant feeding was recorded in 118 cards (39.3%).

3.10 BLOOD RESULTS

The first haemoglobin is done on the first visit, the second haemoglobin at 28 weeks and the third haemoglobin at 36 weeks. The first haemoglobin was the most frequently recorded at 93.7% (281 cards) with a decline in documentation of the second and third haemoglobin *(51.8% and 22.0% respectively)*. The median haemoglobin was 11.8 g/dl with a range of 5.6 g/dl to 16.4 g/dl.

The RPR result was recorded in 267 cards (89.0%).

The Rh blood group was recorded in 282 cards (94.0%).

Women who book in the first trimester in pregnancy are able to have three HIV tests in pregnancy. The first HIV test result (*i.e. done on the first visit)* was recorded in 289 cards (96.3%). The second HIV test is done after 3 months and was not applicable to 116 cases (38.7%) that had booked in second trimester and therefore missed testing in the first trimester. The result was recorded in 133 cards (72.3%).The third HIV test result was not applicable to 258 cards (86.0%) who had booked in late second and third trimester. It was recorded in 17 (40.5%). There were no cases who seroconverted during the pregnancy.

In this sample 80 patients (26.7%) were HIV positive. A CD4 count was documented in 38 patients (52.1%).

3.11 FOCUSED CLINICAL EXAMINATION

The symphysis to fundal height was plotted in 285 cards (95.0%). There were 13 cards where only one SFH was recorded out of 4 or 5 visits and this was considered as not recorded.

The blood pressure was recorded in 293 cards (97.7%) at each visit. Weight was documented in 291 cards (97.0%). Urine dipstick results were recorded in 294 cards (98%). The fetal heart was recorded in 280 cards (93.3%).

CHAPTER 4: DISCUSSION

4.1 PROPORTION OF CARDS WITH INCOMPLETE DOCUMENTATION

The outcome of this study shows that all of the antenatal cards audited *(n = 300)* had incomplete documentation when looking at all the variables put together. This is concerning considering that this card serves as a referral letter should the patient be managed by a different institution or health practitioner in her pregnancy. It is also a legal document that could be used as documentary evidence in a court of law should care be compromised at any point of the pregnancy. It is compulsory to fill all aspects of it in full detail[30]. The subheadings used in this discussion follow the objectives of the study.

4.2 THE VARIABLE WITH THE MOST INCOMPLETE DOCUMENTATION

The least frequently recorded variable was the use of contraception and whether it was a planned pregnancy or not. Only 0.3 % of the cards *(n = 1)* had this documented. Documentation of this variable on the antenatal card provides an opportunity of educating the mother about the importance of family planning and dispelling any myths about using contraception.

Unintended pregnancies are a global epidemic worldwide accounting for 40% of births globally in a meta-analysis done by Sedgh *et al*. in 2012[62]. Unplanned pregnancy is specific to pregnancies occurring whilst the woman was on contraception or when she did not want to become pregnant but did not use any contraception[63].

Unintended pregnancies have been shown to lead to late antenatal booking, induced abortions, preterm births and postnatal depression[63-65]. The bulk of these pregnancies worldwide occur in adolescents, mostly in the age group 17-19 years in South Africa[66]. The proportion of teenagers in our study was 9.7% *(n=29).* The teenage pregnancy rate has been dropping over the years but is still relatively high at 54 per 1000 in the group aged 15 to 19 years[67].

Contraception has an invaluable role in reducing maternal mortality. In a meta-analysis by Ahmed *et al.* published in 2012 using data from 172 countries it was

estimated that 44% of maternal deaths could be avoided through family planning[68]. It was further shown that addressing the unmet need of contraception would further reduce maternal mortality by another 29%. In June 2015 Chola *et al.* demonstrated that upscaling family planning in South Africa can help prevent 7000 newborn and child deaths and 300 maternal deaths by 2030[69]**.**

Contraception allows for healthy family spacing which is suggested to be between 18 to 24 month[70]. A study conducted in Utah, North America, concluded that this pregnancy interval resulted in fewer low birth weight and small for gestational age infants, and less preterm births[70].

Discussion of contraception should begin in the antenatal period and extend to the immediate postpartum period. This period most often poses a missed opportunity since patients are only reviewed 6 weeks after delivery in most countries. Lactational amenorrhoea has been shown to confer 98% protection against pregnancy if all the criteria are met as per Bellagio Consensus guidelines[71]. There is a small chance of ovulation which decreases if the mother feeds more often, for longer periods and with less supplementation of feeds[72].

The new comprehensive antenatal card (white in colour) has a block for recording unplanned pregnancy which will hopefully improve recording of this variable.

4.3 RECORDING OF ALL OTHER VARIABLES ON THE ANTENATAL CARD

4.3.1 DEMOGRAPHIC DETAILS

The antenatal referral criteria of age at which referral should occur include teenagers less than 16 years, over 35 years in a primiparous woman and 37 years and more to screen for chromosomal abnormalities as per national guidelines[30]. The ages of the participants in the study ranged from 14 to 47 years but the IQR was 23 to 32 years. The youngest patient in the group was 14 years highlighting the plight of teenage pregnancy in this community, with about 35% of teenagers reporting to ever been pregnant in their lives[66].

Our median parity in this study was 1.0 which is lower than the South African total fertility rate quoted at 2.55 in the 2015 Statistics report[73]. This discrepancy may be accounted for by the fact that our hospital is a tertiary institution only seeing high risk cases. More low risk cases are managed at MOUs and these may have more previous successful deliveries. The majority of the women were single in this study (84.8%). Maternal unmarried status has been shown to pose a higher risk of low birth weight, preterm birth and small for gestational age babies[74].

4.3.2 PAST OBSTETRIC HISTORY

The variables under this section included recording of the year of previous delivery, gestational age of previous delivery, mode of delivery, birth weight of previous baby, fetal outcome and maternal complications in the previous pregnancies. All the cards had some aspects of the past obstetric history recorded but none had complete recording of all the variables. Most variables under this section had more than 90% documentation with the mode of delivery being the highest at 100% documentation. This is comparable to a previous study done by Hoque *et al*. in KwaZulu-Natal (KZN) in 2004 which showed that 95% of the cards had complete recording of the past obstetric history[75]. Hoque's study though looked at the overall past obstetric history and not at the individual aspects that make it up. This is a very important aspect of the card that helps in the risk stratification and dictates further management of the patient. It should therefore be filled in completely as per guidelines.

4.3.3 PAST MEDICAL AND FAMILY HISTORY

The medical and family history was well recorded with 99.7% and 98% of cards documented respectively. This is commendable as it shows that the potential is there to do better even for other aspects of the card. This is comparable to an audit of antenatal care done by Horner *et al*. in 2012 at a Community Health Centre in Tshwane North, Gauteng province, where there was 100% completion of the past medical history in the maternity records assessed[76]. Past medical and family history are important when counselling the patient about the type of care needed in their pregnancy, possible complications that may arise during and after the pregnancy and extra screening tests that may be needed.

4.3.4 SOCIAL HISTORY

There was poor recording of this variable with only 64% of cards being documented. There were more patients who were alcohol drinkers *(n = 11.5%)* than smokers *(n =5.2%)* in the files documented. These were all current drinkers and smokers who reported to still be engaging in these practices in pregnancy.

This is comparable to findings from the Birth to Ten Study in Soweto by Steyn *et al*., where 5.7% of mothers reported cigarette smoking in pregnancy[77]. Poor documentation delays any opportunistic intervention that could have been made to help modify harmful behaviour patterns**.** A Cochrane review in 2013 comprising of 77 trials demonstrated that psychosocial interventions in pregnancy can assist women to cease smoking in pregnancy when used in combination[78]. These included counselling, health education, incentives and feedback. There was also a significant reduction of 18% for both preterm birth and the proportion of babies born with low birthweight, and an increase in the mean birthweight by 41 g.

This information may be poorly recorded because Soweto was previously a community with a low proportion of smokers. Lately there is an increase in the proportion of women smokers which calls for more vigilance when taking a history[79]. Women who drink should also be counselled on the harmful effects of alcohol to the fetus in pregnancy.

Both groups should be referred for Maternal-Fetal assessment because of the risk of growth restriction in smokers and abnormalities associated with alcohol ingestion. Another important factor was that the quantification of these practices was not recorded (e.g. pack years for smokers). In 2013 Ko *et al*. extrapolated data from the Taiwan Cohort Birth study which showed that maternal smoking in pregnancy is associated with more low birth weight, preterm birth and small for gestational age infants especially in mothers who smoked more than 20 cigarettes per day[80].

4.3.5 BLOOD RESULTS

All 300 antenatal cards has some blood result recorded. According to the Guidelines for Maternity Care in South Africa haemoglobin should be tested at the first visit, 28 weeks and 36 weeks gestation[30]. The first haemoglobin was the most frequently recorded at 93.7% with a decline in documentation of the second and third haemoglobin *(51.8% and 22.0% respectively)*. This finding is comparable to a study by Sibiya *et al*. in the EThekwini district, South Africa in 2014 where 97.7% of the maternity case records had documentation of the haemoglobin at the first visit[81].

Anaemia is a risk factor for maternal mortality. In the 2011-2013 Saving Mothers Report it was found to be an underlying factor in 42.7% of maternal deaths[19].The prevalence of anaemia at the first visit, 28 weeks and 36 weeks was 33.1%, 40.7% and 43.8% respectively in our study. The prevalence of anaemia in pregnancy in South Africa is 29.7% as per WHO audit in 2011[82]. There is recent data from local studies to suggest that this value may be even higher (42.7%) which is comparable with other surrounding African countries[83-84].

The RPR result was recorded in 89% of the cards. This is less compared to a study done by Seopela *et al.* comparing documentation at Rahima Moosa Hospital *(96.2%)* and their primary clinics *(85%)* [85]. In all the cards there was a blood form sticker to suggest that the specimen was taken but follow up was not done as the result was not recorded. WHO has made a commitment to eliminating syphilis and two of the four pillars suggested include early access to maternal care and screening for syphilis in pregnancy[86]. This calls for all health workers managing pregnant women to be vigilant about retrieving results and treating accordingly.

The prevalence of syphilis in our study was 0.7% and was lower than South Africa's last recorded prevalence of 1.5% by the National Antenatal HIV and Syphilis Prevalence survey in 2010 [46]. The prevalence of syphilis in HIV positive mothers was much higher at 10% in a study done on intrapartum prevention of HIV transmission by the Perinatal HIV Research Unit (PHRU) in CHBAH [87]. Co-infection was cited as a factor that accounts for this higher prevalence.

The Rh blood group result was recorded in 94% of the cards which is comparable to Seopela's study where they found 96% of the cards having Rh group documented[85]. The prevalence of Rh negative blood group in our study was 2.84% which is comparable with other studies which reported a prevalence of 3% in Black Africans[88]. Even though this is low, there may be severe consequences for the Rh negative mother in pregnancy including stillbirths, miscarriages and haemolytic disease of the newborn[89].

It was encouraging to note that most patients had HIV testing 3 monthly in line with the updated South African guidelines[30]. The first HIV test was documented in 96.33% of the patients which is an improvement from the Rahima Moosa study quoted above where only 87.66% of cards documented that a test was performed[85]. There was less recording of the second and third HIV test in our study but that may be as a result of late booking. All the patients in our study had an HIV test done at the time of delivery which is commendable. The HIV prevalence in our study was 26.4% which is just slightly less than the national estimate of 29.7%[46]. A previous study at CHBAH has found a prevalence of about 32% which might just imply a decreasing trend but more studies would be needed to make a conclusion[90].

Only half of the cards had CD4 counts documented *(52.3%).* The new guidelines do not require a CD4 count to initiate treatment but it still needs to be done to determine which patients will need prophylaxis for Pneumocystis Jiroveci Pneumonia (PJP) and further screening for Cryptococcus. None of the women in this group had low CD4 counts that are below 100 cells/uL. We did not look at viral loads as the green antenatal card does not provide space for recording of this variable**.** It would be interesting to audit if there is improved recording of these variables in the new white maternity record which incorporates the PMTCT programme by having specific blocks for recording CD4 count, creatinine and Viral load.

4.3.6 FOCUSED EXAMINATION

We only looked at few aspects of the examination namely the symphysis to fundal height (SFH), BP, weight and urine dipstick measurement. The SFH was recorded in 95% of the cards. A few of the cards had only the first visit SFH recorded *(n = 13).* In a study done by Buchmann *et al.* in 2012 in Soweto it was found that 25 out of a 100 pairs of twins were discovered at delivery and 27 incidentally in third trimester[91]. This highlighted the undoubted value of using serial SFH for clinical suspicion in an area with limited ultrasound facilities.

Blood pressure and weight were recorded in 97.7% and 97% of the cards respectively. This was comparable to Hoque's study where BP was also recorded in 97% of the cards. We should still aim for 100% as these are very important variables in managing a pregnant mother. Hypertension is the third most common cause of maternal deaths according to Saving Mothers 2011-2013 accounting for 14.8% of deaths[19]. Urine dipstick assessment was recorded in 98% of the cards and fetal heart auscultation in 93.3%.

4.4 DOCUMENTATION OF PRENATAL EDUCATION

Prenatal education prepares the mother for the pregnancy, the delivery period and the postnatal period psychologically and physically[92]. This forms the core of antenatal care. The least frequently recorded aspect of education with only 24.33% cards documented was lifestyle modification. This includes counselling regarding smoking, alcohol and illegal substances in pregnancy, exercise, hygiene and sexually transmitted infections.

Education on nutrition was recorded in only 32.67% of cards. In a country where 7 out of 10 women are reported to be overweight good nutrition should be prioritized[93]. Maternal obesity is associated with increased risk of gestational diabetes, pre-eclampsia, spontaneous miscarriages, anaesthetic and post-operative complications amongst many others[94].

All patients are routinely given a separate sheet detailing the different aspects of nutrition at the beginning of pregnancy. Only 2 of the patients still had the sheet present post-delivery but this is not a true representation as some may have lost it over the course of the pregnancy. The retrospective nature of the study was limiting and this could have been assessed better if this study was prospective**.**
A meta-analysis of 44 randomised control trial in 2012 showed a significant reduction of pre-eclampsia, gestational diabetes, preterm delivery and intra-uterine fetal death where dietary intervention was given in pregnancy[95].

In the first visit patients are advised to watch out for five danger signs in pregnancy namely vaginal bleeding, drainage of liquor, abdominal pain, severe headache and reduced fetal movements. The files only stated that danger signs were discussed and didn't specify each aspect. Patients were handed a separate sheet though detailing the different aspects. In this study only 60% of patients had documentation of being advised about this. Hoque *et al.* showed that only 52% of the pregnant women in his study in KwaZulu Natal knew about some of the danger signs of pregnancy[75]. This highlights the gap in the knowledge and therefore the dire need for pregnant women to be taught about this in their own language they and level of understanding.

Advice on contraception was the most frequently recorded aspect of education with 95.67% of cards having this variable recorded. This is commendable and is in line with prioritising contraception in South Africa. South Africa has pledged a commitment to the Family Planning 2020 initiative in London 2012 to improve family planning services[96]. The national guidelines were updated in 2012 to include the full range of available family methods in all health facilities at different levels of care[97]. There is more emphasis on dual protection, targeting teenagers and using every health consultation to promote contraception.

The birth plan was discussed with 92.3% of the patients. This should ideally include discussion about the expected date of delivery, the place and mode of delivery, the labour process, transport issues and the type of health professional that is to perform the delivery. This should be an ongoing discussion throughout the pregnancy. In this

study we only focused on the place of delivery as that is what is written under birth plan on the file.

The nurses do discuss other aspects and refer high risk patients for the final decision on the mode of delivery to be made by doctors at the referral hospital. The birth plan remains an invaluable tool in the mother's preparation for birth**.** A retrospective cross-sectional study by Afshar *et al*. conducted in Los Angeles between August 2011 and June 2014 showed that women who had a birth plan were more likely to have a successful vaginal delivery[98].

Education on infant feeding choices was only recorded in 39.3%. This is quite disappointing considering that South Africa has a high prevalence of HIV and counselling regarding this should be a priority. The new consolidated HIV guidelines advise that all pregnant women should receive at least 4 counselling sessions on infant feeding during pregnancy[47].

All mothers are advised to exclusively breastfeed in the first 6 months of life as this has been shown to reduce the transmission of HIV. Research shows that the combination of exclusive breastfeeding and antiretroviral treatment (ARVs) markedly reduces mother to child transmission postnatally[99]. In line with these findings, WHO published recommendations in 2010 that HIV positive mothers or their infants should take ARVs during the breastfeeding period until the infant is 12 months old[100]. The new HIV guidelines have adopted this and suggest exclusive breastfeeding for six months, and then other foods with breastfeeding for a year in HIV positive patients and for 2 years in HIV negative patients[47].

4.5 UTILIZATION OF ANTENATAL CARE SERVICES

Antenatal care coverage and visits per patient form part of the indicators used to measure output of maternal care services[9]. There has been increasing use of antenatal care services in South Africa as evidenced by the growing number of women who had at least one antenatal visit in their pregnancy. This was cited to be 97% and the number of women who had more than four visits quoted to be 87%[67]. We did not assess coverage as we only audited booked patients. We found 68% of women in our study to have had 4 or more visits.

WHO has made a recommendation that the first visit should be in the first trimester[101]. Unfortunately most women in developing countries still commence antenatal clinic late, this being defined as booking after 17 weeks of pregnancy[102]. In May 2009 the African union launched the Campaign for the Accelerated Reduction of Maternal Mortality in Africa (CARMMA) with the slogan: "*Africa cares: No woman should die while giving life*"[103]. This was launched in South Africa in 2012 and part of its key components includes promotion of early antenatal care attendance/booking.

South Africa has set a target of more than 60% of women attending antenatal clinic before 20 weeks by 2016[103]. Our study found that half of the patients booked before 20 weeks which is below the target. This is comparable to a study done in inner city Johannesburg by Solarin *et al.* looking at women's antenatal care booking experiences where only 46% of the women booked before 20 weeks[104]. We could not explore the reasons why women book late as we only used antenatal cards and not interviews.

4.6 DOCUMENTATION OF ULTRASOUND FINDINGS

In this study 52.3% of patients had an ultrasound done in pregnancy. Most of the patients had their ultrasounds done later with 49.0% in second trimester and 42.1% in the third trimester. Very few patients had their ultrasounds in the first trimester (8.9%). The challenge is that few patients book in first trimester. Another challenge is the lack of ultrasound facilities at local clinics with ultrasound imaging mainly being done in hospitals. The skill of performing obstetric ultrasounds as well is limited mainly to radiographers and doctors who are a scarce skill in the country. CHBAH has tried to extend its services to the clinics by sending a registrar to clinics to assist in doing sonars on a weekly basis.

CONCLUSION

We audited the antenatal card in terms of its completeness in this study. It was commendable that the documentation of most of the variables was close to the 100% documentation recommended by the national guidelines. These included the past medical and family history, the past obstetric history, previous contraception used and choice of future contraception, Rhesus and HIV blood tests and the focused clinical examination.

This study showed that there is still much improvement needed in the documentation of some aspects of the antenatal card. These included recording of whether the pregnancy was planned or not, social habits and education given in pregnancy. We need to adhere to the national guidelines of maternal care to have better pregnancy outcomes.

LIMITATIONS

The selection of the cards during data collection could have bias. The top ten cards could have better documentation than the bottom cards but no special arrangement of cards was made before selection. We were unable to explore the reasons behind some behaviour patterns due to the retrospective nature of the study. Only completeness of the recording could be audited and not correctness as well. The quality of care given also could not be assessed.

RECOMMENDATIONS

More frequent audits of antenatal care are needed following this one to check if we are improving in areas of concern. There also needs to be ongoing in-service training to both nurses and doctors on documentation of the mother's antenatal card.

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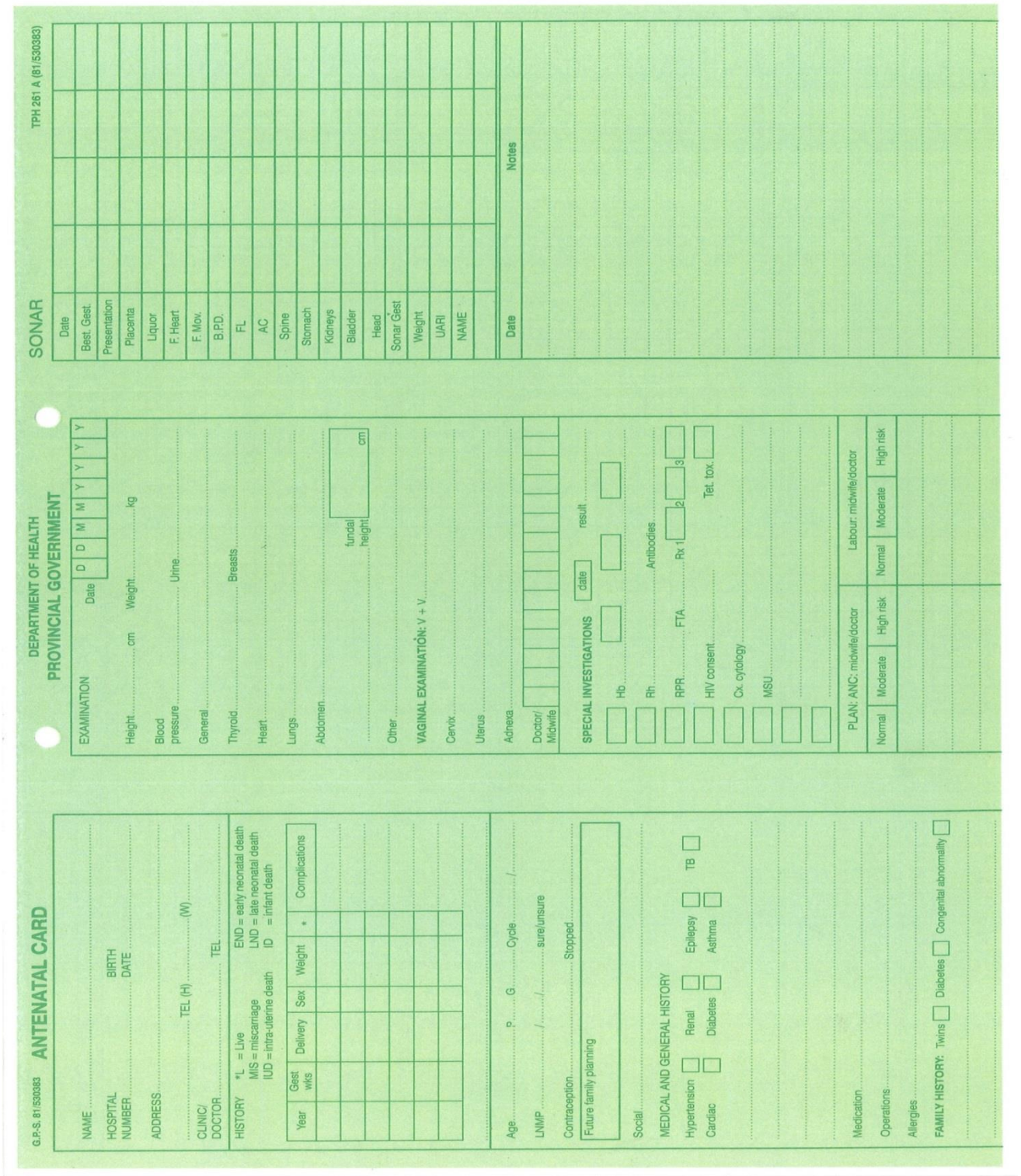
APPENDICES



G.P.-S. 81/530383 **ANTENATAL CARD**

NAME .....

HOSPITAL NUMBER ..... BIRTH DATE .....

ADDRESS .....

..... TEL (H) ..... (W) .....

CLINIC/ DOCTOR ..... TEL .....

HISTORY *L = Live, MIS = miscarriage, IUD = intra-uterine death, END = early neonatal death, LND = late neonatal death, ID = infant death

Year	Gest wks	Delivery	Sex	Weight	*	Complications

Age ..... P ..... G ..... Cycle ..... / .....

LNMP ..... / ..... / ..... sure/unsure

Contraception ..... Stopped .....

Future family planning

Social .....

MEDICAL AND GENERAL HISTORY

Hypertension ☐ Renal ☐ Epilepsy ☐ TB ☐

Cardiac ☐ Diabetes ☐ Asthma ☐

Medication .....

Operations .....

Allergies .....

FAMILY HISTORY: Twins ☐ Diabetes ☐ Congenital abnormality ☐

DEPARTMENT OF HEALTH
PROVINCIAL GOVERNMENT

EXAMINATION Date D D M M Y Y Y Y

Height ..... cm Weight ..... kg

Blood pressure ..... Urine .....

General .....

Thyroid ..... Breasts .....

Heart .....

Lungs .....

Abdomen .....

fundal height ..... cm

Other .....

VAGINAL EXAMINATION: V + V .....

Cervix .....

Uterus .....

Adnexa .....

Doctor/ Midwife

SPECIAL INVESTIGATIONS date result

☐ Hb ..... ☐ ☐

☐ Rh ..... Antibodies .....

☐ RPR ..... FTA ..... Rx 1 ☐ 2 ☐ 3 ☐

☐ HIV consent ..... Tet. tox. ☐

☐ Cx. cytology .....

☐ MSU .....

PLAN: ANC: midwife/doctor

Normal	Moderate	High risk

Labour: midwife/doctor

Normal	Moderate	High risk

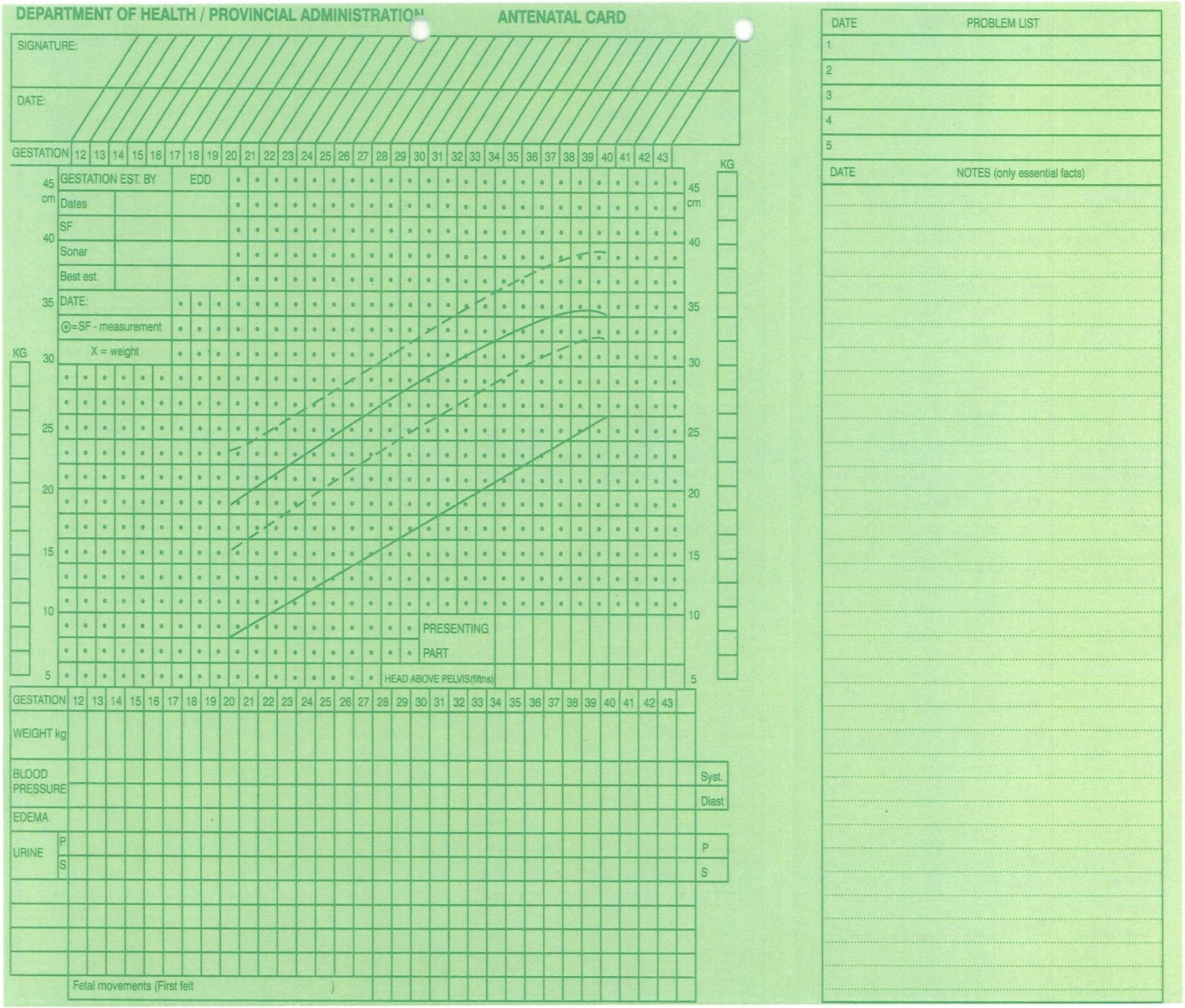
SONAR TPH 261 A (81/530383)

Date				
Best. Gest.				
Presentation				
Placenta				
Liquor				
F. Heart				
F. Mov.				
B.P.D.				
FL				
AC				
Spine				
Stomach				
Kidneys				
Bladder				
Head				
Sonar Gest				
Weight				
UARI				
NAME				

Date	Notes

APPENDIX A

APPENDIX B


DEPARTMENT OF HEALTH / PROVINCIAL ADMINISTRATION
ANTENATAL CARD
SIGNATURE:
DATE:
GESTATION 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43
KG
45 cm
GESTATION EST. BY
EDD
Dates
SF
Sonar
Best est.
DATE:
⊙=SF - measurement
X = weight
40
35
30
25
20
15
10
5
PRESENTING
PART
HEAD ABOVE PELVIS(fifths)
GESTATION 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43
WEIGHT kg
BLOOD PRESSURE
Syst.
Diast
EDEMA
URINE
P
S
Fetal movements (First felt)
DATE
PROBLEM LIST
1
2
3
4
5
DATE
NOTES (only essential facts)

APPENDIX C

LIST OF PRE-EXISTING ANTENATAL RISK FACTORS

High risk (Antenatal care and delivery in hospital)

Primigravida aged 35 years or more
Previous infertility treatment
Previous myomectomy
Previous cervical or vaginal surgery including Cerclage
Previous surgery for urinary incontinence
Previous hysterotomy or classical caesarean section
Previous stillbirth or early neonatal death
Previous baby with obstetric related cerebral palsy
Risk of genetic problems (in women booking <24 weeks)
Last baby preterm delivery at 7 months or less
Last pregnancy severe pre-eclampsia
Three or more previous miscarriages
Two or more mid-trimester miscarriages
Diabetes Mellitus
Chronic Hypertension or renal disease
Currently symptomatic asthma
Epilepsy on treatment
Active tuberculosis
Malignant disease e.g. cervix, breast
Heart disease
Autoimmune disease e.g. lupus
History of venous thromboembolism
Psychiatric illness, including previous postpartum depression or psychosis
Thyroid disease or thyroidectomy
Serious disease or deformity of the spine, pelvis or hip, and paraplegia
Any other serious medical condition

Intermediate risk (antenatal care at local clinic, delivery at hospital)

Previous postpartum haemorrhage requiring blood transfusion
Previous lower segment caesarean section
Short stature (<1.5m)
Parity _>5
[Women with previous Caesarean section should be seen at least one by an obstetric doctor during antenatal care, preferably early in the pregnancy]

Requiring non-urgent referral

Anaemia
Uterus large for dates (>90th centile Symphysis-fundal height)
Uterus small for dates (<10th centile Symphysis-fundal height)
Symphysis- fundal height decreasing
No maternal weight gain in a woman < 60 kg
Known or suspected multiple pregnancy
Breech or transverse lie at 36 weeks or more
Rhesus negative blood group with antibodies
Extensive vaginal warts that may obstruct vaginal delivery
Pregnancy at 41 weeks or more
Abnormal glucose tolerance test
Mild hypertension without proteinuria

Requiring urgent (same day) referral

Reduced fetal movements at 28 weeks or more
Pre-eclampsia
Severe non-proteinuric hypertension (=/>160/110)
Antepartum haemorrhage
Prelabour rupture of membranes
Any obstetric emergency
Any severe illness (e.g. with pyrexia, shortness of breath or abdominal pain)

APPENDIX D:

DATA COLLECTION SHEET

STUDY NUMBER : ……

Age: ☐

Parity: ☐

Marital status: ☐ s – single, m – married d– divorced, w-widowed

Gestational age at booking: ☐ Method of calculation:……

Number of clinic visits: ☐

Risk assessment:……. Plan for place of delivery:……..

A. PAST OBSTETRIC HISTORY

YES (Y) = recorded NO (N) = not recorded

Parameter	**Y/N**	**Specific or not** *(with reference to the recorded variables)*	**Comments**
Year of delivery			
Gestation at delivery			
Mode of delivery			
If caesarean section, reason			
Birth weight			
Fetal outcome			
Maternal complications			

B. CONTRACEPTION

YES (Y) = recorded NO (N) = not recorded

Previous contraception	
Planned pregnancy	
Future contraception	

C. PAST MEDICAL HISTORY

Recorded (Y/N)	

D. FAMILY HISTORY

Recorded (Y/N)	

E. SOCIAL HABITS

Recorded (Y/N)	
Smoking	
Alcohol	
Substance abuse	

F. SONAR

Done (Y/N)	
Gestation at which sonar was done	
Indication for sonar	

G. EDUCATION

Given = Y Not Given = N

Danger signs of pregnancy	
Lifestyle modification	
Nutrition	
Safe sex	
Contraception	
Birth Plan	
Infant feeding	

H. BLOOD RESULTS

TEST	**RECORDED (Y/N)**	**1ST REPEAT**	**2ND REPEAT**	**IN LABOUR**
Haemoglobin				
RPR				
Rh group				
HIV				
If HIV+, CD4 count				

I. EXAMINATION

Parameter	**Y/N**	**Abnormality**
Symphysis-fundal height (SFH)		
Blood Pressure		
Weight (1st visit)		
Urine dipstix		
Fetal heart		

APPENDIX E

R14/49 Dr Nonjabulo Sandra Dladla-Ibe

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M150354

NAME: (Principal Investigator)	Dr Nonjabulo Sandra Dladla-Ibe
DEPARTMENT:	Obstetrics and Gynaecology Chris Hani Baragwanath Academic Hospital
PROJECT TITLE:	A Clinical Audit of the Completeness of Antenatal Card Recording in Chris Hani Baragwanath Academic Hospital
DATE CONSIDERED:	27/03/2015
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Dr Yasmin Adam
APPROVED BY:	Professor P Cleaton-Jones, Chairperson, HREC (Medical)
DATE OF APPROVAL:	27/05/2015

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Secretary in Room 10004, 10th floor, Senate House, University.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report.**

Principal Investigator Signature

Date 30/05/2015

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

CHRIS HANI BARAGWANATH ACADEMIC HOSPITAL
IN THE OFFICE OF THE CEO
Enquiries: Ms. Thabile Ndlovu
Tel : (011) 933- 9145
Fax: (011) 938-1005
Email: Thabile.Ndlovu2@gauteng.gov.za

To : Dr. Nonjabulo Sandra Dladla - Ibe
(M150354)

From : Dr. Sandile Mfenyana
CEO: CHBA hospital

Date : 22 May 2015

Re : The CLINICAL AUDIT OF THE COMPLETENESS OF ANTE NATAL CARD RECORDING IN CHBAH

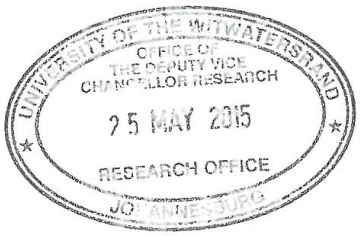
Your application to request permission to conduct the Clinical Audit of the Completeness of Ante Natal Card Recording at Chris Hani Baragwanath Academic Hospital is approved by the CEO: Dr. Sandile Mfenyana

Hoping that the Institution (CHBAH) will meet the requirements of the study concerned.

Wishing you well in your future endeavors

Regards,

DR. SCB Mfenyana
CEO: CHBA Hospital



APPENDIX F