ABSTRACTS

Trend in maternal deaths in the Ekurhuleni district over 7 years: A district clinical specialist team experience

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Background. The district clinical specialist team (DCST) is a key aspect of the primary healthcare (PHC) re-engineering stream instituted in 2012. The primary role of this team is to improve maternal, woman, newborn and child health by reducing morbidity and mortality. This study was done to determine the trend in maternal deaths over a 7-year period in the Ekurhuleni district.

Methods. This study was done in the Ekurhuleni district, Gauteng Province, South Africa. Data were collected from District Health Information System and DCST maternal deaths reports. A retrospective review of all maternal deaths (*n*=740) of women who died from January 2011 to September 2018 was done. Causes of death were compared between the subdistricts.

Results. There were 724 maternal deaths during the 7-year period. Thirteen mothers died in community health clinics, and one in a PHC clinic. There was a significant decrease in total maternal deaths from 2011/2012 (*n*=114) to 2018/2019 (*n*=42). The total maternal deaths in the east subdistrict (*n*=136) were significantly lower than in the north (*n*=271) and south (*n*=317) subdistricts. The majority (*n*=422) died during the postnatal period, and haemorrhage was the most common (*n*=95) cause. Over the years, hypertension-related deaths declined in the north and south, but increased in the east. HIV-related deaths remained much higher in the south than the north and east.

Conclusion. This study showed that maternal deaths in Ekurhuleni district have significantly reduced over the 7-year period. Most deaths occurred at hospitals, and causes of maternal deaths were different between the subdistricts. Haemorrhage remained an important cause of maternal deaths.

Clinical features and outcomes of COVID-19 infection among pregnant women in South Africa

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Background. South Africa (SA) has the highest number of COVID-19-infected people and deaths in Africa. Studies among COVID-positive pregnant women are limited. High rates of symptoms, comorbidities and poor fetal/neonatal outcomes were observed among women of different ethnicities in previous studies. To date, no studies have been reported among pregnant African women. This study was conducted to determine the clinical features and outcomes of COVID-19-positive pregnant women in the Ekurhuleni district, SA.

Methods. A retrospective record review of all (*n*=103) COVID-19-infected pregnant women during the months of April - September 2020 was done. Clinical features, symptoms, comorbidities, laboratory results, maternal outcome, antenatal complications and neonatal outcomes were analysed. Descriptive statistics (mean and standard deviation, number and percentages) and inferential statistics (χ^2 tests) were calculated. Ethical clearance was obtained from the Human Research Ethics Committee of the University of the Witwatersrand.

Results. The majority of participants (90%) were of African ethnicity and symptomatic (53%). The most common symptoms, comorbidities and laboratory abnormalities were cough (62%), hypertension (23%) and high lactate dehydrogenase (20%). Although the association was not significant, symptoms were more common among comorbid HIV-positive women and women with abnormal results. Preterm labour was the most common (8%) complication. Five (5%) mothers died.

Conclusion. COVID-positive pregnant SA women were commonly symptomatic, but the incidence of adverse fetal outcomes was low. The high rate of preterm labour and maternal death is a concern. This study has several strengths. It included all COVID-positive women over a 6-month period at all levels of healthcare facilities, such as clinics, community health centres/midwifery units and district, regional and tertiary hospitals, in an African country. The study might benefit healthcare workers in other African countries.

The use of umbilical artery Doppler to prevent unexplained stillbirths in a low-risk pregnant population in South Africa

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Background. The assessment of fetal blood flow using the Doppler waveform can be used to identify placental insufficiency, and is a tool to identify fetuses at risk of stillbirth due to fetal growth restriction. In South Africa, the largest category of perinatal deaths is 'unexplained intrauterine death'. This study was performed to determine if use of continuous-wave Doppler ultrasound of the umbilical artery to screen a low-risk pregnant population coupled with a standard management protocol for fetuses detected with abnormal values reduces the stillbirth rate.

Methods. Pregnant women attending antenatal care at primary healthcare clinics who were classified as having low-risk pregnancies between 28 and 34 weeks' gestation, and were ≥18 years old, qualified. Women qualifying were screened with Umbiflow (a continuous-wave Doppler device) on specific days of the week, and formed the study group. Those not attending on those days did not

get an Umbiflow screening and served as control group 1. Control group 2 consisted of the same pregnancies as control group 1, but excluding all women detected with antenatal complications at any time. Women with fetuses identified with a high umbilical resistance index (abnormal RI) were referred to a high-risk antenatal clinic and were managed according to a standard protocol. The outcomes of all the deliveries in the catchment areas were recorded. A comparison between the study and control groups was performed.

Results. The study group comprised 7 088 women. Of these, the pregnancy outcome was available in 6 674 (94.1%) fetuses. Of these, 5 787 (86.7%) were regarded as having normal RIs, while 887 (13.3%) fetuses had abnormal RIs. Absent end diastolic flow was found in 87 (1.2%) of fetuses. There were 67 stillbirths in the study group, 208 stillbirths in the 11 920 women attending the same antenatal clinics who did not have an Umbiflow Doppler screening (control group 1) and 168 stillbirths in the 11 003 women with no detected antenatal complications (control group 2). The stillbirth rate for control group 1 was 17.4/1 000, and for control group 2 was 15.3/1 000: both significantly higher than the study group (10/1 000) (risk ratio (RR) 0.57, 95% confidence interval (CI) 0.30 - 0.85, and RR 0.66, 95% CI 0.37 - 0.94, respectively).

Conclusion. Screening a low-risk pregnant population with continuous-wave Doppler ultrasound of the umbilical artery, coupled with a standard protocol for fetuses with abnormal RIs, was associated with a significant reduction in stillbirths.

The prevalence of abnormal Doppler of the umbilical artery in a low-risk pregnant population in South Africa

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Background. The assessment of fetal blood flow using the Doppler waveform can be used to identify placental insufficiency, and hence is a tool to identify fetuses at risk of stillbirth due to fetal growth restriction (FGR). In South Africa (SA), the largest category of perinatal deaths is 'unexplained intrauterine death'. The majority of the mothers are clinically healthy women. This study was performed to determine the prevalence of abnormal umbilical resistance indices (abnormal RI) to see whether screening a low-risk pregnant population is worthwhile.

Methods. A descriptive study across nine sites in eight provinces of SA was performed to determine the prevalence of abnormal RI of the umbilical artery in women classified as having a low-risk pregnancy. The study was conducted from 1 September 2017 to February 2020. The pregnant women classified were screened using a continuous-wave Doppler ultrasound apparatus (Umbiflow) between 28 and 34 weeks' gestation. Women with fetuses with an abnormal RI were referred to a high-risk clinic, and were managed according to standard protocol. The outcomes of all the deliveries were recorded.

Results. Umbiflow screening of the umbilical artery was performed in 7 088 women across the nine sites. Of these, 919 (13%) fetuses had an abnormal RI. Absent end diastolic flow (AEDF) was found in 87 (1.2%) of fetuses. The prevalence of small-for-gestational age (SGA) babies was 23.1% in the normal RI group, and was significantly higher in the abnormal RI group (32.1%; $p<0.0001$). There was a statistical difference in the perinatal mortality rate between the normal RI (9.8/1 000) and abnormal RI group (21.4/1 000; risk ratio 0.046; 95% confidence interval –0.06 - 0.98).

Conclusion. The prevalence of abnormal RI and AEDF in this screened low-risk population is about 10 times higher than that previously recorded in high-income countries. Umbiflow screening detected previously undiagnosed growth-restricted babies. The prevalence of AEDF warrants Umbiflow screening of the low-risk pregnant population in SA.

Umbiflow device identifies infants at risk of fetal growth restriction and poor growth postnatally

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Background. Identifying a fetus at risk of poor growth is challenging, and is usually based on serial ultrasound measurements. A novel low-cost, portable, locally developed continuous-wave Doppler device (Umbiflow), which can be used by trained healthcare workers at primary healthcare clinics to measure umbilical artery Doppler blood flow, can identify a fetus that is not growing as well as it should owing to placental insufficiency. This study aimed to assess the growth of infants assessed with the Umbiflow device postnatally, and compare this to the usual assessment of birthweight-for-gestational age.

Methods. Eighty-one term-born infants whose mothers were assessed in pregnancy at 28 - 32 weeks' gestational age with the Umbiflow device were assessed for anthropometry (weight, height, head circumference) and body composition (fat mass, fat-free mass) at 6, 10 and 14 weeks and 6 months postnatally. Infant body composition was determined using the deuterium dilution dose-to-infant technique, which involves the infant consuming a small (3 g) dose of deuterium oxide, a stable isotope of water, and measuring the deuterium enrichment in the infant's saliva compared with a pre-dose saliva sample using Fourier transform infrared spectroscopy.

Results. Of the 81 term-born infants, 26 had an abnormal resistance index (RI) and 55 had a normal RI when assessed with the Umbiflow device in pregnancy. More than 75% of the infants who had an

abnormal RI were not small for gestational age (SGA) at birth. The group with an abnormal RI had significantly reduced mean fat-free mass (FFM) at all time points compared with the normal RI group ($p<0.015$). In contrast, the SGA group's FFM did not show this consistent trend, and was significantly lower than the appropriate-for-gestational age infants only at 6 months of age ($p=0.039$).

Conclusion. While measuring size at birth identifies some infants at risk of poor growth postnatally, the Umbiflow device enables identification of further infants, who are not necessarily small at birth, but whose placental function was compromised *in utero* and who were shown to be at risk of continued poor growth postnatally. Inclusion of the Umbiflow assessment would be a useful addition in antenatal care, and would assist in identifying these vulnerable infants.

The ability of Umbiflow to diagnose fetal growth restriction and prevent perinatal mortality

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Background. Few interventions exist to address the high burden of stillbirths in seemingly healthy pregnant women in low- and middle-income countries (LMICs). Half of these stillbirths are thought to be caused by undiagnosed fetal growth restriction (FGR), defined as a fetus not reaching its genetic growth potential, as detection remains a challenge owing to a lack of reliable diagnostic tools. A single Doppler screening of the umbilical artery (UmA) between 28 and 34 weeks' gestation using the low-cost Umbiflow, followed by referral of women with abnormal resistance index (RI), has been shown to drastically reduce the perinatal mortality rate (PNMR). The subsequent Umbiflow International (UFI) study was a prospective cohort study to determine the prevalence of abnormal UmA-RI among low-risk pregnant women in five LMICs, namely Ghana, India, Kenya, Rwanda and South Africa (SA).

Methods. The two primary healthcare sites in SA participating in the UFI study were Laudium Community Health Centre and Pretoria West District Hospital, with Kalafong Provincial Tertiary Hospital (KPTH) as the referral hospital. One trained midwife per facility performed the Umbiflow Doppler for low-risk pregnant women between 28 and 34 weeks' gestation, and women with abnormal UmA-RI were referred to the obstetric services at KPTH. Pregnancy outcomes were collected after delivery.

Results. A total of 7 151 women were screened over 8 months, including 1 399 women in SA. Overall, 495 (6.9%) had an abnormal UmA-RI, including 83 in SA (5.9%). Pregnancy outcomes were available for 1 303 women. There were 10 perinatal deaths at the SA sites, of which 6 were stillbirths. The subsequent PNMR was 7.7/1 000, with a stillbirth rate of 4.6/1000. Abnormal UmA-RI was further associated with lower birthweight across all weight centiles.

Conclusion. A single screening of low-risk pregnant women in LMICs with Umbiflow can detect a large number of fetuses at risk of FGR and consequent adverse perinatal outcomes. The PNMR in this study was much lower than the PNMR in SA (30/1 000) and Tshwane district (29/1 000). Many perinatal deaths could potentially be averted with implementation of routine Umbiflow screening and appropriate referral and intervention.

Exploring barriers to reporting of babies with birth defects in public hospitals in Tshwane district

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Background. Globally, birth defects increase the infant mortality rate. One in 33 babies is born with a birth defect, and 3 million babies are born yearly with major birth defects, constituting about 3% of all newborns. Birth defects should be reported comprehensively, timeously and accurately. Reporting babies with birth defects in labour wards provides information about the identified birth defects in the hospitals. Under-reporting of such cases has been linked to underestimation of the birth defects burden, and mismanagement of babies with birth defects. Misdiagnosing and under-reporting persist despite the availability in public hospitals of birth defects notification forms, which have to be completed after identifying a baby with a birth defect.

Objective. To explore and describe the barriers to the reporting of babies with birth defects by midwives in two selected public hospitals in Tshwane district, South Africa.

Methods. A qualitative, exploratory and descriptive study was conducted in two selected public hospitals in Tshwane district. The study was based on the responses of midwives who experienced barriers to reporting of babies with birth defects in labour wards. Once informed consent had been obtained with purposively selected participants, 12 midwives in the labour wards of the selected hospital were interviewed. Semi-structured individual interviews were conducted with these midwives until data saturation was reached. The interviews were audio-recorded and transcribed verbatim. The midwives remained anonymous, and the data confidential. A qualitative content analysis approach was followed. The four criteria proposed by Lincoln and Guba were used to ensure trustworthiness, including credibility, dependability, confirmability, transferability and authenticity. The supporting themes were identified, described and discussed.

Results. Two main themes were identified: organisational factors and interactional factors. Organisational factors included lack of knowledge, overcrowding of patients in the ward and late reporting, and interactional factors included poor communication and conflict.

Conclusion. The study showed that barriers experienced by midwives to reporting babies with birth defects could be overcome with continuous training and managerial support. Recommendations were made of ways that barriers could be overcome.

Experiences and perceptions of community health workers working with newborns in Gauteng Province, South Africa

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Background. Neonatal deaths account for approximately 45% of all under-5 deaths globally (2.7 million neonatal deaths). Of all global newborn deaths, 75% take place in sub-Saharan Africa and South-East Asia. South Africa has an official estimated neonatal mortality rate of 12 deaths per 1 000 live births. However, this information is largely facility based, and does not take into account out-of-facility deaths, which could potentially increase the neonatal mortality rate burden significantly. If South Africa is to achieve its Sustainable Development Goals by 2030, there must be strategies put in place to address this high neonatal mortality rate. A systematic review done in 2015 found that community health workers (CHWs) identifying sick newborns had a greater impact than training hospital doctors in neonatal resuscitation.

Objective. To document the experiences and perceptions of CHWs who work with newborns within the ward-based primary healthcare outreach team (WBPHCOT) system.

Methods. This is a qualitative descriptive study design that uses a case study approach. Participants will be CHWs who function within WBPHCOTs in the West Rand health district in Gauteng. Data collection will involve two methods (observations and interviews) to ensure trustworthiness. Observations and interview field notes have been typed, and interview audiotapes transcribed. Data are currently being uploaded onto Maxqda software, and coded.

Results. Although the data analysis is still in progress, strong themes have emerged. (*i*) The security challenges faced by CHWs are much worse than previously documented, and include attempted rape, sexual harassment, exposure to drug users, exposure to corpses due to drug use, and muggings. (*ii*) The data collection tools revealed a significant difference in interview content and data collected during the observation phase. (*iii*) Significant training deficits have been highlighted, especially during the interview phase.

Conclusion. The functioning of CHWs as a tool needs to be better understood to utilise them effectively.

Automated evaluation of weight-for-age growth to predict severe acute malnutrition in children under 5 in Tshwane District

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Background. Children admitted to hospitals in Tshwane district with severe acute malnutrition (SAM) often have a history of growth faltering, which is inadequately identified during routine growth monitoring. With digitisation of the Road-to-Health Booklet in future, automated interpretation of weight-for-age (WFA) growth could potentially improve detection of growth faltering, allowing for earlier intervention and prevention of SAM. This research aimed to develop an automated screening tool to predict SAM risk from WFA growth, and to determine its predictive validity compared with other WFA-based indicators of SAM risk.

Methods. South African child growth experts (n=30) rated SAM risk on 100 WFA growth curves. These curves and ratings were used to train an artificial neural network (ANN) to assess SAM risk from consecutive WFA z-scores. Diagnostic accuracy methodology was used to determine predictive validity, with WFA-based SAM risk classification as exposure and a diagnosis of SAM as outcome. Term-born children (aged <5 years) with SAM (n=63) and without SAM (n=122) were recruited at health facilities in Tshwane district. Three indicators of SAM risk were assessed: (*i*) evaluation of WFA z-score sequences by the ANN; (*ii*) a logistic regression-derived predictive equation (cross-validated using the study sample); and (*iii*) changes in weight (stagnation/decrease) or WFA z-scores (decreases of >0, >0.33, >0.50 or >0.67 z-scores).

Results. Despite considerable disagreement in the experts' SAM risk ratings, the ANN could be trained, with a sensitivity of 73.0% (95% confidence interval (CI) 60.3 - 83.4), specificity 86.1% (95% CI 78.6 - 91.7) and area under the receiver operating characteristic curve (ROC-AUC) 0.795 (95% CI 0.732 - 0.859). The predictive equation had comparable sensitivity (73.0%, 95% CI 60.3 -83.4), but lower specificity (50.8%, 95% CI 41.6 - 60.0%) and ROC-AUC 0.619 (95 CI 0.548 - 0.690). Logistic regression identified age 6 - 24 months and weight loss as important predictors of SAM. Indicators based on changes in weight or z-scores produced ROC-AUCs ranging from 0.634 to 0.677.

Conclusion. Predicting SAM from WFA growth is challenging, even for experts. The ANN could potentially improve detection of children at risk of SAM, although much work remains before routine implementation. In the interim, children aged 6 - 24 months who present with weight loss should be flagged as being at high risk of SAM.

Maternal healthcare providers' perceptions and experience of service provision during the COVID-19 pandemic

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ABSTRACTS

Background. Many health systems were poorly prepared for the coronavirus pandemic, and found it difficult to protect maternal and reproductive health services. When the first COVID-19 cases were reported in Tshwane district, we were in the process of rolling out and monitoring the effects of the CLEVER Maternity Care programme in all 5 district hospitals and all 10 midwife-led obstetric units (MOUs) in the district. The hard lockdown at the end of March 2020 brought programme activities to a standstill, and to complement the activities of the CLEVER implementation team, the Tshwane district clinical specialist team visited facilities to assess their readiness for the pandemic and identify health systems gaps where strengthening was needed.

Objective. To explore healthcare providers' perceptions of their ability to maintain the positive practices introduced by the CLEVER Maternity Care programme, and the support they needed from district management.

Methods. The mixed-methods study was conducted in MOUs and district hospitals in Tshwane district. It included a survey questionnaire and qualitative observations and reflections by the CLEVER implementation team. Two five-point Likert-scale items were supplemented by open-ended questions to provide suggestions on improving health systems and supporting health workers.

Results. Most (86%) of the 114 respondents were advanced midwives or registered nurses. Participants from MOUs rated the maintenance of quality care practices significantly higher than those from district hospitals (p=0.0130). There was a significant difference in perceptions of support received from district management between designations (p=0.0037), with managers having the most positive perception compared with advanced midwives (p=0.0018) and registered nurses (p=0.0115). Three main themes were identified in the interpretation framework: working environment and health-system readiness; quality of patient care and service provision; and healthcare workers' response to the pandemic. Health facility readiness is described according to three categories: proactive; reactive; or lagging.

Conclusion. The lessons learned from this pandemic should be used to build responsive health systems that will enable primary healthcare workers to continue with quality patient care and services, and maintain communication.

Providing education and support to rural district clinicians in Buffalo City Metro and Amathole district in the Eastern Cape Province, South Africa

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Background. Buffalo City Metro/Amathole Medical Support Initiative (BAMSI) is a collaboration between the medicine department at Frere/Cecelia Makiwane hospitals, the Amathole district clinical specialist team and Global Health Fellows from the National Health Service (Health Education England), supported by a 3-year Discovery grant. BAMSI aims to improve quality of care through medical education and support of district clinicians by consultants at the regional and tertiary referral hospitals. We believe this will improve care to both non-pregnant and pregnant patients. Some district hospitals are up to 180 km away from the regional and tertiary referral hospitals. Prior to COVID-19 (2019), BAMSI conducted an in-reach and outreach programme. As a consequence of COVID-19, BAMSI had to pause its face-to-face education programme, and has adapted to develop electronic resources and teaching sessions.

Methods. One-hour Zoom teaching sessions are held on a weekly basis. Cases for discussion can also be sent via the VULA app. These sessions are CPD-accredited. Each session is peer reviewed, and feedback is encouraged. A fortnightly planning meeting is held to suggest relevant topics.

Results. A total of 107 clinicians from 20 hospitals have attended 19 sessions since commencement on 22 April 2021. The majority of clinicians use mobile phones (69.2%), 15.4% use a laptop and 15.4% share devices. Clinicians either attend on their own, or attend as a group (Butterworth and Fort Beaufort hospitals). A number of lessons have been learned. Several roles are required to produce excellent teaching. These include a link with clinicians, a presenter, a Zoom host, keeping register, editing videos and posting for distribution.

Conclusion. District clinicians often feel unsupported. Consultant-led education and support through interactive video teaching is feasible and effective. Online teaching can easily be scaled up to a wider audience without the need for clinicians to travel. Future plans include the development of a website to share educational resources, the involvement of more specialities and providing sponsored data routers for clinicians to remove the data cost burden.

Cervical cancer screening in HIV-positive women attending primary care clinics in Ekurhuleni, Gauteng Province, South Africa

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Background. Cervical cancer remains a public health problem, ranking as the fourth-most common cause of cancer incidence and mortality in women worldwide. In South Africa, it was the second-most common cancer diagnosed in women in 2012. Evidence shows that cervical cancer progresses slowly in HIV-negative women, and progresses faster owing to the immune suppression in HIV infection. The study aimed to evaluate cervical cancer screening in HIV-positive women attending primary care clinics in Ekurhuleni health district.

Methods. This was a cross-sectional descriptive and retrospective record review. The study was conducted in nine clinics in Ekurhuleni. A review of clinic records of HIV-positive women who had been on antiretroviral therapy (ART) for at least the past 4 years and remained in care was conducted between 1 March and 30 September 2020. Clustered randomised sampling based on clinic size was done.

Clinic names for the 24-hour, 12-hour and 8-hour facilities were selected per subdistrict. Stata version 16.1 was used for analysis.

Results. Of 593 records abstracted, only 550 were included in the final analysis. Of these, 181 records had recorded cervical screening after ART initiation. The median age of participants was 34 years (interquartile range (IQR) 29 - 42 years; range 23 - 68 years). Participants had been on ART for a median of 5 years (range 4 - 8 years; and <1 year, 13 years). Of the 181 who had a recorded cervical screen, 151 had an ART start date and date for first cervical cancer screening. The median time to first screening was 43 weeks from ART start (IQR 16 - 67 weeks). For age and cervical screening adjusted analyses, it was demonstrated that patients aged 35 - 44 and ≥45 years were more likely to be screened than younger patients aged 18 - 24. However, there were no notable differences between younger patients aged 25 - 34 and 18 - 24 years old.

Conclusion. The results show poor adherence to cervical screening guidelines for HIV-positive women in Ekurhuleni. Older women were more likely to be screened for cervical cancer. This highlights the need for health education among health professionals and the community.

Prevalence and factors associated with cervical cancer screening in the last 10 years in Gauteng Province primary healthcare facilities

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Background. Cervical cancer is a significant public health problem and the second-most common cancer among women in South Africa (SA). High uptake of screening promotes its early detection and favourable treatment outcomes. However, the uptake remains suboptimal in SA. The aim of this study was to determine the prevalence and factors associated with cervical cancer screening in the last 10 years in primary healthcare (PHC) clinics in Gauteng Province.

Methods. This was a cross-sectional study of 668 black women recruited from patients attending cervical cancer screening programmes in PHC clinics between 2017 and 2020. An interviewer-administered questionnaire was used to collect information on sociodemography, HIV status, history of sexually transmitted infections (STIs), sexual behaviours, knowledge on cervical cancer and Pap smear screening behaviours. Data analysis included descriptive statistics, χ^2 tests and logistic regression.

Results. Most (63%) participants were aged 30 - 49 years, had completed at least grade 7 education (84%), were unemployed (64%) and were single (60%). Only 42.5% of participants had been screened for cervical cancer at least once in the last 10 years. On the multivariate analysis, participants who were aged >30 years (odds ratio (OR) 7.94, 95% confidence interval (CI) 3.71 - 17.0), had ever been treated for an STI (OR 1.7, 95% CI 1.12 - 2.58) and reported high knowledge of cervical cancer risks (OR 0.46, 95% CI 0.30 - 0.72) were more likely to have been screened for cervical cancer in the last 10 years. HIV-positive status was not significantly associated with cervical cancer screening (OR 1.43, 95% CI 0.98 - 2.07).

Conclusion. The prevalence of cervical cancer screening in the last 10 years among study participants was low. The counterintuitive relationship between high knowledge of cervical cancer risks and screening uptake underscores the need to further explore the interplay between these variables, with a view to informing the design of the health information messaging strategy for cervical cancer among black women.

Knowledge and perceptions of the district health managers and health professionals (doctors and nurses) regarding the role of the district clinical specialist team in Ekurhuleni district

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Background. Since 1994, several initiatives have been undertaken by the government to improve the maternal health services in South Africa, without producing the desired results. The district clinical specialist team (DCST) is the latest of these initiatives, and probably the most innovative among them. In the DCST policy framework, an ideal clinical governance role set envisages collaboration between the DCST members and various stakeholders working within a district health system as well as the community it serves. These include existing hospital-based specialists, members of the district health management team, maternal, newborn, child and women's health (MNCWH) managers and co-ordinators at a subdistrict level and health professionals, including staff working with other streams of primary healthcare (PHC) re-engineering (ward-based outreach teams (WBOTs) and school health teams). The aim of the study was to explore the knowledge and perceptions of the district managers and health professionals about DCST in the Ekurhuleni district.

Methods. This was a qualitative study conducted during 2019 and 2020 using in-depth semi-structured interviews of the health managers (DD health programme, MNCWH co-ordinator, subdistrict managers, chief executive officers (CEOs) of hospitals, facility managers of PHC clinics and community health clinics) and health professionals (obstetricians, family physicians and nursing sisters

working in antenatal care (ANC)) in Ekurhuleni district. Interviews were focused on topics such as maternal and women's health services in the Ekurhuleni district, the role and function of DCST members working in the Ekurhuleni district and the influence of the DCST on any changes in maternal health indicators in the district. Information obtained from the interviews was analysed by thematic analysis. The project was approved by the Human Research Ethics Committee, University of the Witwatersrand (Medical), the Gauteng Provincial Research Committee and Ekurhuleni Health District Research Committee prior to conducting the study.

Results. Twenty in-depth interviews were performed. Among 20 participants, there were the DD health programme (1.5%), MCWH co-ordinators (2.1%), the CEO (1.5%), clinical managers (1.5%), obstetricians (2.10%), subdistrict managers (1.5%), family physicians (3.15%), operational managers (6.30%) and ANC sisters (3.15%). Participants mentioned various themes such as clinical effectiveness (n=20, 100%), professional development (n=14, 70%), accountability for MCWH (n=9, 95%), clinical work (n=5, 25%), monitoring and evaluation (n=15, 75%) and leadership and governance (n=4, 20%). The participants felt very strongly about the onsite supportive functions of the DCST, followed by training, clinical governance, constant availability and referral assistance. Some participants expressed their concerns about the frequency of support visits by the DCST. The majority of the participants believed that the DCST made a major impact on improving maternal health indicators, particularly the reduction of maternal mortality. Regarding challenges about the services, participants expressed concerns on staff shortages, lack of infrastructure, lack of hospitals and delays in emergency transport services. Finally, participants proposed suggestions such as increased support visits, employing an increased number of DCST members, improving the position of the DCST to a higher level (head of department) and establishing DCSTs in other disciplines.

Conclusion. All participants acknowledged the positive impact of the DCST for improvement of MNCWH services, which reflected on the improvement of MNCWH indicators along with their role as clinicians, communicators, mentors, negotiators, trainers and researchers.

Supporting rural primary healthcare clinics with the VULA app – a pilot in Amathole district, Eastern Cape Province, South Africa

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Background. Amathole district is a rural district in the Eastern Cape Province, South Africa, that has 145 primary healthcare clinics. The majority of the clinics do not have a visiting doctor. We noticed that during the COVID-19 pandemic, it was often difficult for clinic nurses to refer patients who were not emergency cases, as hospitals were trying to reduce the number of patients being seen in their outpatient departments. A number of rural clinic nurses started to use WhatsApp to seek guidance from doctors.

Methods. The VULA app is a recognised referral platform. Nurses from seven clinics were approached to consider using the VULA

app as a platform for seeking advice from clinicians. These nurses were regularly sending WhatsApp messages. Since this was a pilot, all referrals were directed to Dr Nash. We designed a form specifically for primary healthcare nurses, focusing on referrals for non-communicable diseases, HIV-related queries and abnormal laboratory results.

Results. We started the pilot in March 2021. Nine nurses participated from seven different clinics. The VULA team assisted the professional nurses to download the app, and provided technical assistance. A monthly summary was sent by the VULA team, recording the number of referrals and how quickly they were responded to. From 1 March to 31 July 2021, we had 33 referrals. These mostly included queries about antiretroviral medication, hypertension and diabetic medication, raised prostate-specific antigen results and abnormal creatinine results. Photos and results can be attached onto the referral form.

Conclusion. The VULA app can be successfully used to support professional nurses working in rural and remote primary healthcare clinics to answer queries about non-urgent cases. Future plans are to roll out the use of the VULA app to more clinics, and to link them to their referral hospital. This has been presented to the IT department, and it is hoped that as connectivity at clinics improves, the data for VULA will be provided by the department.

Routine clinical and laboratory monitoring of HIV-positive pregnant women on antiretroviral therapy

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Background. Developments in South Africa (SA)'s prevention of mother-to-child transmission of HIV (PMTCT) programme show a decline of AIDS-related paediatric deaths and new HIV infections in children. Adherence to antiretroviral therapy (ART) regimens and viral suppression are critical for the reduction of MTCT. In 2015, updated PMTCT guidelines were released, stipulating revised protocols for the routine clinical and laboratory monitoring of HIV-positive patients on ART. This study assessed monitoring of HIV-positive pregnant women on ART at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) in Johannesburg, SA.

Methods. This was a retrospective record review of 187 HIV-positive pregnant women, who were already on ART or initiated during the index pregnancy, and delivered at CMJAH in the period January - June 2017. Data were collected on viral load, CD4 and creatinine monitoring, as well as documentation of clinical screening for opportunistic infections. Information was also collected on timing of ART initiation, regimens used and infant testing.

Results. Of the 187 patients, 64.2% (120) were known to have HIV infection prior to the index pregnancy, and 86% of these patients were already on ART. There were 81/179 (37%) patients who were initiated on ART in the antenatal period. A total of 153/187 (81.8%) patients had a documented CD4 count, and 63/187 (33.4%) had a CD4 count ≤350 cells/dL, with 7/63 (11%) receiving cotrimoxazole. In the patients already on ART, 66/103 (64.1%) had a baseline viral load of <50 copies/mL. Routine repeat viral loads were not done

in patients with baseline viral loads 101 - 1 000. Baseline creatinine tests were done for 141/179 (78.8%) patients, with 61/179 (34%) having routine repeat testing. Clinical tuberculosis screening was documented in 35/179 (19.6%) of patients, with 6/179 (3.4%) receiving isoniazid preventive therapy. Birth polymerase chain reaction tests were done in 175/187 (93.6%) patients, all of which were negative.

Conclusion. There were gaps identified in both laboratory and clinical monitoring. ART initiation was, however, high with no cases of MTCT reported.

A preliminary study on record-keeping of antenatal case records among a cohort of women who had stillbirths in Ekurhuleni district

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Background. The World Health Organization (WHO) global reproductive health strategy identifies antenatal care as an area that needs accelerated progress, particularly in sub-Saharan Africa. Stillbirths are an important marker of the quality of care during the antenatal period of pregnancy and birth. The maternity case record (MCR) is the vehicle of documentation for adequate antenatal care provision, and it provides opportunities for practising preventive medicine. Additionally, the MCR is a tool of opportunity to document and manage all parameters in order to identify and manage complications related to the fetus during pregnancy. The aim was to evaluate whether the parameters on the antenatal cards were documented correctly and completely by health professionals at the referral clinics, community health clinics and the hospital.

Methods. This was a retrospective record review of all postnatal women (*n*=50) who delivered stillborn babies at a regional hospital in the Ekurhuleni district from May 2021 to June 2021. Data were collected from MCRs. Parameters such as demography, last menstrual period (LMP), expected date of delivery, symphysiofundal height plotting (SFH), routine blood results (haemoglobin, Rhesus, rapid plasma reagin (RPR) and HIV) were analysed to determine if they were written, not written, correctly written, incorrectly written, completely written or incompletely written. Descriptive statistics were analysed. The study has been submitted to the National Health Research Database, the Ekurhuleni District Research Committee and the University of the Witwatersrand Health Research Ethics Committee.

Results. The mean (standard deviation) age was 27.88 (5.70) years. Mean parity was 1 (1.24). There were 19 (38%) primigravida and 31 (62%) multigravida. Among 42 eligible MCRs, LMPs were completed correctly in 29 (69%). Among 40 women with confirmed LMP, 20 (50%) were documented correctly. RPR was recorded in 87% of the women. No women had a repeat RPR done during pregnancy. Rhesus was done for 46 (100%) women. Among 46 booked women, haemoglobin at first visit was done on 40 (87%) women, while follow-up haemoglobin was done on 19 (47%). Haemoglobin at last visit was done on 17 (42%) women. HIV testing was done for all (38; 100%) eligible women, while 8 women were known to be HIV-positive. Among 46 women, SFH was plotted in completion for 16 (35%), while it was never plotted on 5 (11%) women.

Conclusion. Recording of the HIV and Rhesus was satisfactory. Although recording of RPR was not especially poor, it was not done for all the women. Although a large proportion of women had haemoglobin testing done at their first visit, this dropped in subsequent visits. SFH plotting was very poor. Poor performance might have caused poor outcomes, which needs to be investigated further.

Feasibility study of the new World Health Organization intrapartum care model and labour-monitoring tool

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Background. Friedman's research in the 1950s on the natural progress of labour led to the partogram with a 1-cm/hour alert line. New evidence has emerged that has re-examined labour progress, on which the World Health Organization (WHO) has based its new intrapartum care (IPC) guideline. The guideline aims to reduce unnecessary interventions, and includes major changes during the first stage of labour: the start of the active phase at 5 cm; reducing vaginal examinations; and abandoning the 1 cm/h dilatation rate as the threshold for slow progress. The WHO subsequently developed a new tool – the labour care guide (LCG) – to allow for guideline implementation. We aimed to determine pre-implementation feasibility of the LCG in Gauteng Province, South Africa, by assessing midwife satisfaction and impact on health systems.

Methods. This case-control study recruited low-risk women in spontaneous labour at Pretoria West District Hospital. In the first phase, 30 participants (controls) were managed according to the 'old' IPC guideline/partogram. Thereafter, midwives were trained on the WHO recommendations/LCG, followed by the second phase, which included 30 participants (cases) managed using the 'new' guideline/ LCG. Outcomes included midwife satisfaction, use of health systems, duration of admission and labour and birth outcomes.

Results. Nine midwives completed the questionnaire. Ease of LCG completion was scored as 5/5 by 8 midwives, v. 7 for the partogram, with consensus that the new guideline/LCG benefited the labouring women, with attention to women's needs and natural progress. The main concern was the need for more practice by staff members. The mean daily admission was 15 women during both phases, with an average of 11 and 12 deliveries during phases 1 and

2, respectively. Labour ward bed occupancy never exceeded 100%. The mean duration of labour was 13 hours 46 minutes for controls, and 14 hours 28 minutes for cases, while the admission duration was 50 hours 22 minutes for controls and 42 hours 23 minutes for cases. There were no adverse outcomes.

Conclusion. This study shows that implementation of the WHO IPC recommendations and LCG is feasible in Gauteng Province, without an increased health system load. Future research should focus on maternal satisfaction and maternal and neonatal outcomes.

Centralised monitoring of HIV diagnosis, retention in care and viral load suppression of infants, children and adolescents in South Africa using the National Health Laboratory Service's data warehouse

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Background. In South Africa (SA), loss to follow-up of infants, children and adolescents diagnosed HIV-positive is a known challenge. There is currently no routine method for monitoring these patients from time of HIV diagnosis to retention in care and virological suppression. However, HIV-related test results, and associated patient demographics from the National Health Laboratory Service (NHLS) could potentially be utilised for this purpose. The NHLS provides laboratory services to over 80% of the SA population. Data, routinely collected via the Laboratory Information System (LIS), are stored in a data warehouse (DW). Within the DW, a patient-linking algorithm links multiple HIV test result records to a single patient, with approximately 80% accuracy.

Method. An online 'Results for Action' dashboard (RfAD) was developed as a quality improvement initiative, using NHLS DW HIV test data. The RfAD aims to assist clinicians and managers in the field (RfAD users) with HIV-positive patient care based on their laboratory results. It alerts them to patients aged <19 years who require attention, including linkage to care, routine monitoring of viral load (VL) or intervention for a high VL result. The RfAD allows for secure bidirectional flow of data between RfAD users and the DW (Fig. 1) to facilitate access to HIV test results, enhance DW data quality and improve patient care and programme monitoring.

Results. The dashboard was successfully developed, and is functional. Factors that negatively affected functionality of the RfAD included poor demographic data quality and suboptimal algorithm linking in infants.

Conclusions. Next steps for the RfAD include user acceptability testing, potential dashboard enhancements and continued IT support, data quality improvements and endorsement for

implementation. The RfAD represents a unique and secure method for accessing laboratory patient-identified data, with additional systems to ensure patients are linked to care, on antiretrovirals and virologically suppressed, with real-time analytics to monitor the programme from national to facility level.
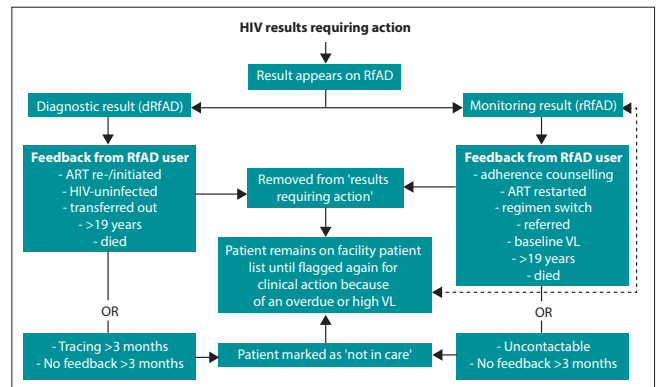

Fig. 1. Data flow between 'Results for Action' dashboard (RfAD) and data warehouse (DW). (ART = antiretroviral therapy; VL = viral load.)

Maternity healthcare providers' perceptions of own wellbeing in the time of COVID-19: A survey in Tshwane health district

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Background. Mental health manifestations such as depression and anxiety disorders became more marked during the COVID-19 pandemic as frontline healthcare workers struggled to maintain high-quality intrapartum care and essential health services. During visits to primary healthcare facilities in Tshwane district as part of the CLEVER Maternity Care programme, midwives expressed fears for their own safety, anxiety about their comorbidities and anger about the increased workload and a shortage of personal protective equipment. The need has been expressed to protect frontline maternity care workers and build resilience in providing quality care.

Objective. To identify maternity healthcare providers' self-perceptions of changes in their feelings of mental wellbeing.

Methods. The study was conducted in 10 midwife obstetric units and the labour wards of four district hospitals in Tshwane health district. We conducted an anonymous, cross-sectional survey among a convenience sample of 114 maternity healthcare workers to gauge the changes in healthcare workers' experience and perceptions of wellbeing during the COVID-19 pandemic. Four

items measured the perceived changes on a scale of 0 - 10 for the periods before and during COVID-19, respectively, namely fear/anxiety, stress, depression and anger.

Results. The majority of participants were professional nurses (37%) and advanced midwives (47%). They reported a significant change in wellbeing from before the pandemic to during the pandemic with regard to all four items (p<0.0001). The biggest 'before-during' difference was in perceptions of fear/anxiety, and the smallest difference was in perceptions of anger. A framework was constructed from the open-ended responses to explain healthcare workers' understanding and perceptions of increased negative feelings regarding their mental wellbeing.

Conclusion. The observed trends in the changes in healthcare workers' self-perceptions of their mental wellbeing highlight the need for planning for future pandemics to build resilient frontline healthcare workers and provide them with ongoing mental health support and improved communication pathways.

Improving access to colposcopy services in the Eastern Cape Province, South Africa, by establishing district cervical cancer units

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Introduction. The health system of the Eastern Cape (EC) Province, South Africa, serves a population of 6 million, with eight districts, four of which have no regional or tertiary hospital. All clients needing colposcopy are referred to East London Frere and Cecilia Makiwane Hospitals, Nelson Mandela Academic Hospital or Dora Nginza Hospital, with 6-month waiting times and approximately 300 patients presenting with stage 3 cervical cancer. Late presentation of cervical cancer clients and high defaulter rates to colposcopy services were a challenge. There was poor integration of cervical cancer screening into the antiretroviral therapy (ART) programme, and poor adherence to screening policy. We needed to decentralise colposcopy to district hospitals in all eight districts, and identified cluster hospitals that had colposcopy machines and diathermy machines.

Method. We decentralised colposcopy clinics to district hospitals through task-shifting. Skills to perform large loop excision of the transformation zone (LLETZ) biopsy both diagnostically and therapeutically were transferred to family physicians and medical officers. We trained doctors onsite in district hospitals through outreach by the district clinical specialist team obstetrics and gynaecology oncologist, with the target of establishing 16 units in district hospitals. We implemented the 2017 cervical cancer guidelines and procured colposcopy machines and used women's health services or underutilised second theatres available. After four visits, most doctors were able to conduct LLETZ unsupervised. We engaged partners Right to Care, partnered with the Foundation for Professional Development, to open five colposcopy sites with full equipment and supplies to the value of ZAR300 000. Later, we used EC Department of Health funds to procure equipment, but struggled to procure LLETZ devices, and so used diathermy machines.

Results. In 2020 we partnered with the Clinton Health Access Initiative, who donated 28 LLETZ devices and funded training and onsite mentorship that will end in December 2021, expanding sites from 16 to 28. A challenge was that some sites had only one trained doctor, and when (s)he resigned, services were interrupted. More than 1 000 LLETZ procedures were conducted at district sites, with improved defaulter rates.

Conclusion. There is better integration with the ART programme, and early diagnosis of cervical cancer in stage 1, with good cure rates.

Morbidity from unsafe termination of pregnancy in South Africa

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Background. Annually 68 000 women globally die from unsafe abortions, and 5.3 million experience disabilities. Africa bears the highest burden of unsafe abortion, which is one of the easiest preventable causes of morbidity and mortality. The Choice on Termination of Pregnancy Act in South Africa (SA) allows women to request termination of pregnancy (TOP) for social reasons, up to 20 weeks. About 100 000 terminations are performed in SA annually. The Saving Mothers Report indicates unsafe TOP as an avoidable factor in 25% of maternal deaths due to miscarriage. Studies reporting on morbidity arising particularly from induced TOP for social reasons are very rare in SA.

Methods. This was a descriptive observational study using retrospective record reviews of all women who were admitted to the Charlotte Maxeke Johannesburg Academic Hospital with complications of induced TOP for social reasons over a 1-year period from 1 February 2008 to 31 January 2009. The study included sociodemographic, clinical, health system and biochemical (on admission) variables. The sociodemographic variables were age, gestational age (GA), parity, previous history of TOP, ethnicity and marital status. The clinical variables were presenting complications, duration interval between TOP and admission, duration of stay, management at the hospital and final outcome. The health system variables were method, place and person providing TOP. The biochemical variables were haemoglobin level, white cell count, platelet count, urea level, creatinine level, HIV status and CD4 count. Descriptive statistics (mean (standard deviation) for normally distributed data, median and interquartile range for non-normally distributed data) were calculated. The Human Research Ethics Committee of the University of the Witwatersrand approved the study.

Results. The number of women who presented with complications arising from TOP was 85. The mean age was 27 years, and mean GA was 15 weeks. The majority (47%) of the women were 13 - 20 weeks into gestation, followed by 34% of women in their first trimester, and 15% were 21 - 33 weeks pregnant. The median parity was one. The median duration of hospital stay was 2 days. A large proportion (39%) of women had a blood transfusion. Renal dialysis and intensive care unit admission were required by 1% and

8% of the women, respectively. There were no maternal deaths. About 42% had evacuation of the uterus, along with 24% requiring manual vaccum aspiration, 16% conservative management and 6% required total abdominal hysterectomy. About 2% of women had uterine and bowel injuries. Low platelet and abnormal renal function were found in 10% and 8% of the women, respectively.

Conclusion. Complications from induced TOP have greatly increased in SA. Late presentation, non-medical interference and failure to follow protocols resulted in all morbidities, which could have been preventable. Contraceptive services should be strengthened in the population. All healthcare workers who provide TOP must have proper training in a recognised institution. Finally, a regular audit of complications and a regular monitoring process on TOP providers should be made mandatory.

Outreach home visit support by the district clinical specialist team to the ward-based outreach team in Sedibeng district, Gauteng Province, South Africa

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Background. Much has been documented about the district clinical specialist team (DCST)'s role in improving health outcomes in facilities, but little is known on how they can strengthen community-based health services. We describe and reflect on our experiences of supporting the ward-based outreach team (WBOT) in Sedibeng district, Gauteng.

Methods. These narratives describe three purposefully selected household visits. The DCST support programme was initiated in Sedibeng district in 2015, and comprises a monthly clinical community-based outreach support programme, planned with the clinic WBOT outreach team leaders (OTLs). Prior to the visit, OTLs with community healthcare workers (CHWs) identified 4 - 5 households in their catchment areas that had unresolved clinical problems. The DCST also reviewed the clinic performance on the District Health Information System. On the day of outreach, the DCST met with the clinic manager, OTLs and CHWs to briefly review the clinic health indicator performance and any progress on previously implemented interventions. Afterwards, the team mapped the walk to the identified households where the responsible CHW and OTL presented the demographics, health profile and clinical problems. The DCST then engaged the presentations and household, looking for completeness of information and missed clinical, health promotion and preventive opportunities. Interventions were developed, and included clinical management, referral and onsite and didactic training.

Results. Initially, the WBOT focused on household registrations, home-based care, tuberculosis/HIV loss to follow-up tracing and delivery of medications. Household information was also often incomplete. Several missed clinical, health promotion and preventive opportunities were identified during household visits. However, with training and support, there was improvement in the WBOT performance. Mother, child, woman and mental health services were incorporated. Although CHWs were eager to learn, poor prior education and communication skills made learning difficult.

Conclusion. Regular outreach support to the WBOT provided opportunities for learning to CHWs, boosted their confidence and strengthened their relationships with households. OTLs also gained leadership and managerial skills on how to better support the CHWs. The gaps in competence warrant ongoing clinical support.