

PARALLELL SESSION 1:

A review of neonatal outcomes to discharge, of perinatal asphyxia and the use of induced hypothermia as a treatment modality, at a tertiary centre in south africa

Presenting Author: Rebecca Simpson, University of the Witwatersrand

Co-Authors: Daynia Ballot (University of the Witwatersrand)

INTRODUCTION: Hypoxic ischemic encephalopathy (HIE) is a significant cause of death and disability.

OBJECTIVES: To review the neonatal clinical, demographic characteristics and outcomes of perinatal asphyxia with induced hypothermia (IH) as a treatment modality in Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) Methods: A descriptive retrospective analysis of an established database. Neonates admitted between January 2013 and July 2017 with a birth weight >1800g and a 5-minute Apgar score ≤ 5 , with/without features of HIE, were included.

Results: N=639 neonates with 399 males (62.4%). The majority of the neonates were inborn (499/639, 84.5%) and by normal vaginal delivery (285/639, 44.6%). 528 neonates (82.6%) had evidence of HIE, with majority classed as grade two, 43.3%. The overall survival rate was 87.1% to discharge. An increased incidence of HIE 7.7 /1000 live births since previous study. 33.3% neonates received IH. IH group had significantly increased presence of seizures, duration of stay and majority grade two ($p < 0.05$). IH side effects and death were not significantly increased. Incidence of death was increased with the presence of seizures, MSL, MAS, PPHN, HIE, and grade 3 HIE classification ($p < 0.05$).

CONCLUSIONS: IH has not increased survival rates significantly but a study to assess the impact on the morbidity is warranted. IH for severe HIE and possible adjunct therapies should be considered to improve survival outcomes. The crude use of an Apgar less than 7 at 10-minutes could be used as a poor prognostic factor. The high incidence rate echoes' the need for a set criterion for HIE to enable the incidence to be recorded consistently and a benchmark set for improvement.

An audit of mother to child hiv transmission rates and neonatal outcomes at a tertiary hospital in south africa.

Presenting Author: Ghad Benali, University of the Witwatersrand

Co-Authors: Tanusha Ramdin (University of the Witwatersrand), Daynia Ballot (University of the Witwatersrand)

BACKGROUND: With nearly half of all HIV infections occurring in women of child bearing age, one of the main challenges surrounding the HIV pandemic is the prevalence of mother to child transmission (MTCT), with the majority of HIV infections in children being as a result of MTCT.

OBJECTIVE: The aim of this study was to explore the prevalence of congenital HIV infection of neonates at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) between 2015 and 2017, as well as compare the HIV PCR positive and HIV PCR negative neonates, using data from the CMJAH neonatal databases. **Methods:** This was a retrospective, cross sectional descriptive study of all neonates admitted to the neonatal unit, between January 2015 and December 2017, at CMJAH. All HIV exposed neonates were included. All neonates who had no HIV PCR test at birth, or, who had indeterminate HIV PCR results, were excluded.

RESULTS: A total number of 1271 HIV exposed neonates was examined for the study period out of a total of 5029 admissions (HIV exposure 25.3%) The study found that the rate of HIV transmission at birth was 2.52%. The majority of infants had low birth weight and were also born prematurely.

CONCLUSION: HIV transmission is high despite the introduction of the extended mother to child transmission programme; however, there is no difference between the two groups of neonates under study, except for maternal syphilis, as the study shows higher in neonate with positive HIV PCR.

Factors associated with neonatal labour ward deaths at a tertiary hospital in Johannesburg, South Africa. a retrospective case control study.

Presenting Author: Nokwanda Mthupha, University of the Witwatersrand

Co-Authors: Daynia Ballot (University of the Witwatersrand)

BACKGROUND: A large portion of the overall under-five mortality rate occurs in the neonatal period. There is a lack of data on neonatal deaths around the time of delivery in South Africa. The aim of this study was therefore to review the causes and factors associated with neonatal labour ward deaths in a tertiary care (academic) academic centre in South Africa.

METHODS: This was a retrospective case control study, a secondary analysis of an existing database of the new-born babies that died in the labour ward at Charlotte Maxeke Johannesburg Academic Hospital between January 2013 to December 2017. A control group of surviving neonates who were admitted to the neonatal unit, was used for comparison to determine significant associations with labour ward deaths. Control and case groups were compared for factors associated with labour ward death. A binary logistic regression was done to calculate adjusted odds ratios for factors associated with labour ward death. The neonatal and obstetric causes of labour ward deaths were obtained from the Perinatal Problem Identification Programme.

RESULTS: A total of 465 neonates were analysed in this study. The median gestational age of all the neonates was 30 weeks (range 24 - 40) with a median birthweight of 1250 grams (range 500 – 4930). More labour ward deaths occurred within the extremely low birth weight (52.3%) group (< 1000 grams). Immaturity, hypoxia and congenital abnormalities were the major causes of neonatal labour ward deaths.

CONCLUSION: This study has identified some factors predisposing to neonatal labour ward deaths. Further research is recommended to determine whether interventions targeted to decreasing preterm birth and perinatal hypoxia will be effective in decreasing labour ward deaths.

Epidemiology of bacterial bloodstream infections in very low birth weight neonates at Charlotte Maxeke Johannesburg Academic Hospital

Presenting Author: Moses Matlhadisa, University of the Witwatersrand

Co-Authors: Vindana Chibabhai (National Health Laboratory Service), Daynia Ballot (University of the Witwatersrand)

INTRODUCTION: Neonatal sepsis remains the important cause of morbidity and mortality in lower-middle income countries (LMIC). The very low birth weight (VLBW) neonates are at a high risk of neonatal sepsis because of multiple factors which include immature immune system and prolonged hospitalisation amongst others. Research has shown that pathogens pattern change with time therefore frequent surveillance of both common bacterial isolates and their antimicrobial susceptibility remains essential.

OBJECTIVES: To review bacterial organisms causing bloodstream infections and their associated antimicrobial susceptibility pattern in our neonatal unit over a twelve-month period.

METHODS: A retrospective observational study over a period of twelve months between 1st January 2016 and 31st December 2016. The study population included all neonates with VLBW who were admitted to the neonatal unit at Charlotte Maxeke Academic Johannesburg Hospital (CMJAH).

RESULTS: A total of 184/479 (38.4%) neonates had culture proven bacterial sepsis accounting for a total of two hundred and six episodes of bloodstream infection (BSI). There were twenty-two episodes in early onset sepsis (EONS) and one hundred and eighty-four in late onset sepsis (LONS) respectively. Gram positive organisms accounted for most isolates with Coagulase negative staphylococci (CoNS) being the commonest pathogen in EONS at 68% and LONS at 35% respectively. There was no GBS in the EONS. The number of multidrug resistant organisms is higher in the LONS with EBSL 20% and MRSA 30%. Accordingly, the overall susceptibility to first line antimicrobials is low. There was 100% susceptibility to colistin. In our study there was no case of vancomycin resistant Enterobacteriaceae.

CONCLUSION: The LONS is more prevalent than EONS. The low antimicrobial susceptibility pattern in our research is similar to the previous findings reported in LMIC, therefore continuous surveillance is warranted.

Growth of extremely low birth weight infants at a tertiary hospital in a middle income country

Presenting Author: Tendai Mabhandi, University of Witwatersrand

Co-Authors: Tanusha Ramdin (University of Witwatersrand), Daynia Elizabeth Ballot (University of Witwatersrand)

BACKGROUND: Survival of extremely low birth weight (ELBW; birth weight less than 1000g) infants has improved significantly since the 1990s. Consequently, growth monitoring in ELBW infants has gained more relevance.

METHODS: We conducted this study to describe the growth of ELBW infants at a tertiary hospital, to audit macronutrient intake and explore the association of prematurity complications with growth. This was a retrospective study on 92 ELBW infants born at Charlotte Maxeke Johannesburg Academic Hospital. An existing database and hospital records were reviewed. The mean number of days to regain birth weight and the mean weight velocity were noted. The association between good growth (regaining birth weight in 21 days or less and subsequent growth velocity > 15g/kg/day) and complications of prematurity was explored. Weight Z-scores were derived using the Fenton's Growth Chart and the Intergrowth 21st Project growth standards. The delta Z-score from birth to 36 weeks was determined for each infant. An audit of macronutrient intake was done for the first 28 days of life.

RESULTS: Eleven infants (13%) had a discharge weight above the 10th centile when the Fenton growth chart was used compared to 20 infants (22.4%) when the Intergrowth 21st Project growth standard was used. This difference was approaching statistical significance. The mean weight velocity was 13.5g/kg/day and the mean number of days to regain birth weight was 18.2 days. Factors associated with poor growth were sepsis after day 3 of life, persistent patent ductus arteriosus, continuous positive airway pressure for more than two days, invasive ventilation, oxygen on day 28 and being kept nil per os. Protein and caloric intake correlate positively with growth velocity. No neonatal factors were associated with neither a weight at 36 weeks above the 10th centile nor a significant difference in delta Z-score when the Fenton Growth Charts were used. However, when the Intergrowth 21st Project growth standards were used, infants receiving oxygen on day 28 of life, those with sepsis after 3 days of life and patent ductus arteriosus had a significantly greater decline in Z-score from birth to 36 weeks. Infants who had sepsis after 3 days of life were less likely to attain a weight above the 10th centile at 36 weeks when the Intergrowth 21st Project growth standards were used.

CONCLUSION: Growth outcome in ELBW infants is poor at 36 weeks post-menstrual age at our institution. Growth outcome at 36 weeks could be improved by adopting a feeds and fluids introduction protocol that is anchored nutritional rather than volume targets. Continuous positive pressure ventilation should be provided early to curtail the need for invasive ventilation which has been associated with poor growth. The Intergrowth 21st Project growth standards may provide better association with neonatal factors associated with poor growth. A large multi-center study is needed before these growth standards can be adopted.

Mortality and outcomes of extremely low birth weight infants in the first year of life: a retrospective cohort study

Presenting Author: Grace Musiime, Tygerberg Hospital

Co-Authors: Lizel Lloyd (Tygerberg Hospital), Michael McCaul (Tygerberg Hospital), Netta Van Zyl (Tygerberg Hospital), Sandi Holgate (Tygerberg Hospital)

BACKGROUND: Neonatal deaths are a leading cause of child mortality worldwide with sub-Saharan Africa bearing the largest burden; extremely low birth weight (ELBW) infants have the highest mortality. There is a lack of data evaluating long and short term outcomes of ELBW neonates in South

Africa and because of regional and temporal variations existing statistics cannot be easily transposed. Given the increased focus on reducing neonatal mortality, data is needed to guide resource allocation and policy development to optimise outcomes.

OBJECTIVE: The purpose of this study was to describe the morbidity, mortality and neurodevelopmental outcomes at one year corrected gestational age (CGA) of ELBW infants treated at a tertiary hospital with limited access to neonatal intensive care due to resource constraints.

METHODS: This was a retrospective cohort study of live born infants treated at Tygerberg Hospital (TBH) between 1st January and 31st December 2016. Eligible infants were identified via the Vermont-Oxford Network database. Data was extrapolated from this database and additional data was obtained from patient records. Follow up data from time of discharge until one year corrected gestational age (CGA) was obtained from high risk clinic case notes. Multiple logistic regression and survival analysis were undertaken to identify risk factors for mortality in STATA. Results: 256 ELBW infants were admitted during the study period, 240 born within TBH and 16 transferred in from surrounding medical facilities. A majority were managed in the neonatal high care wards with only 11.3% admitted to the neonatal intensive care unit (NICU) at any time during their hospitalisation. 83.2% had hyaline membrane disease and 93% required nasal continuous positive airways pressure (NCPAP). 63.3% of infants survived to hospital discharge. The majority of deaths occurred in the first three days of life (19.5%; 95% CI 14.7-24.3%). Cause of death was documented as extreme prematurity in 41% of the inpatient deaths. Birth weight was a significant predictor of mortality (HR 0.99, 95% CI 0.992-0.999). 25.4% of infants survived and attended clinic follow up at one year CGA; 2.6% of these infants had severe neurodevelopmental impairment and 37.3% had normal development. There was a high loss to follow up rate of 57.5%.

CONCLUSIONS: Mortality and morbidity rates remain high amongst extremely preterm infants. In order to improve survival resources need to be allocated to neonatal resuscitation, surfactant therapy, NCPAP and increasing availability of NICU beds. Further research is needed to adequately assess long term neurodevelopmental outcomes of ELBW infants in this setting.

Late preterm infants' outcomes within the first week of life, born at tygerberg hospital

Presenting Author: Magriet Van Niekerk

Co-Authors: Magriet Van Niekerk (Tygerberg Hospital), Haseena Hassan (Tygerberg Hospital)

INTRODUCTION: From WHO statistics it is clear that the number of late-premature babies (34-36.6 weeks) is on the increase. This group are being recognised as having a higher rate of morbidity and mortality as compared to term babies. There is a lack of data in South Africa on the outcome of late-preterm babies, which is important since often weight criteria rather than gestation is used for discharge. Our primary objective was to document morbidity and mortality within the first week of life of these babies born at a tertiary hospital in the Western Cape.

METHODS: This was a prospective descriptive study of late-premature babies born at Tygerberg Hospital from 1 March till 31 May 2018. Babies admitted to both the neonatal and postnatal wards were included. Data was collected on day 1, 3 and 7 of life, with telephonic interview of the mother in

the case of discharge. Obstetric data as well as demographic data, morbidity and mortality data was collected on the neonate. Specific interventions including need for admission, length of stay, respiratory support, surfactant administration, antibiotic prescription, poor feeding and jaundice were recorded. Neonatal data was stratified according to gestation 34.0-34.6 vs 35.0-36.6 weeks, as the former is routinely admitted if neonatal capacity allows.

RESULTS: Of the 117 babies enrolled (62 in the 34-34.6 week group and 55 in the 35.0-36.6 weeks group), 69 were born via Caesarean section. The primary obstetric reason for delivery was pre-eclampsia/eclampsia followed by spontaneous preterm labour. The average maternal age was 28.9 years. The average weight of babies delivered in the younger group was 1977g (range 1428- 3695g) vs 2228g (range 1030-5000g) in the older group. A total of 92 babies required admission to the neonatal service, 56/62 babies (90.3%) in the earlier gestation group as compared to 36/55 (65.5%) in the later gestation group. The majority of the babies (51/92) in both groups had respiratory distress, with 80.3% requiring nasal CPAP. By day 3 of life only 15 of these babies could be successfully weaned. 17.6% (9/51) still required respiratory support at day 7. Interestingly none of the babies required surfactant or invasive ventilation. Antibiotics were initiated in 46 of the admitted babies, 29 of them continuing by day 3. 10 babies developed jaundice on day 1 and 11 had documented hypoglycaemia. Of concern is that by day 3, 57% of the babies were not able to satisfactorily breastfeed. By day 3 of life, only 3/117 babies were discharged, 18 admitted due to maternal illness only. By day 7, 89/117 were still admitted, with 83 of these due to neonatal morbidity. None of the babies during the study period demised, however possible late neonatal death was outside the scope of this study.

CONCLUSION: This study emphasises the high burden of morbidity amongst the late-preterm group. While this study was performed in a tertiary setting with high-risk mothers and babies, it is vitally important that similar studies are undertaken at the primary care birthing units where these babies would be discharged within 6 hours after delivery and consequences of late prematurity may not be detected or anticipated so that current discharge policies can be reviewed. Furthermore, resource and financial planning needs to take into account the post-delivery and long term needs of this growing group of babies.

“The association between admission temperature and adverse outcomes in very low birthweight neonates admitted to a tertiary neonatal service in South Africa”.

Presenting Author: Thomas Jones, Tygerberg Hospital

Co-Authors: Gugu Kali (Tygerberg hospital), Sandi Holgate (Tygerberg Hospital)

INTRODUCTION: Neonatal hypothermia is commonly seen in the early neonatal period and has been shown to contribute significantly to both short- and long-term morbidity and mortality. This is particularly true in high-risk neonates including preterm and low birth weight babies. The impact of hypothermia in a resource-limited setting has not been well researched, particularly the impact that admission hypothermia may have on long-term outcomes in these high-risk neonates. While admission hyperthermia is less common than hypothermia, data are lacking on the associations between neonatal admission hyperthermia and outcomes. Understanding these associations will guide the implementation of strategies to ensure that optimal admission temperatures are achieved.

OBJECTIVE: To determine whether there is an association between admission hypo- and hyperthermia and adverse short- and long-term outcomes in very low birth-weight (VLBW) infants admitted to a tertiary neonatal unit in South Africa.

MATERIALS AND METHODS: We retrospectively reviewed the folders of all very low birth weight (VLBW) neonates admitted to the Tygerberg Hospital (TBH) neonatal platform between 1 January 2016 and 31 December 2017. Neonates with birthweights <500g and <1500g were included. Infants with major congenital abnormalities, birthweight <500g, admission after 24 hours of age or with missing critical data were excluded. The primary data source was the Vermont Oxford Network database. Additional clinical data were collected from the patient folders. The one year follow up clinical information was obtained from the high-risk clinic notes. Admission temperatures were classified according to World Health Organization (WHO) definitions as follows: hyperthermia >37.5°C, normothermia 36.5°C-37.5°C, cold stress and mild hypothermia 36°C - 36.4°C, moderate hypothermia 32°C - 35.9°C, severe hypothermia <32°C.

RESULTS: A total of 1500 VLBW infants were included in the study. Of these infants 1433 (95.5%) were born at Tygerberg hospital (TBH), and 67 (4.5%) were born at surrounding facilities and transferred to TBH within 24 hours of life. The mean gestational age (GA) and birth weight of the cohort was 29.4 weeks (22– 37 weeks), and 1130g (510g – 1500g) respectively. On admission to TBH 466 (31%) neonates were normothermic, 3 (0.2%) were hyperthermic, and 1031 (68.7%) were hypothermic [mild 460 (30.6%), moderate 558 (37.2%) and severe 13 (0.9%)]. Of the 13 severely hypothermic infants 8 (61.5%) were extremely low birth weight (ELBW), 9 (69.2%) were inborn and 4 (30.8%) were outborn. Overall survival to discharge was 84.6%. 85.1% in the normothermic group, 100% in the hyperthermic group, and 84.3% in the hypothermic group survived. There was a statistically significant difference in the in-hospital mortality between the severe (9/13; 69.2%) and moderate (92/558 = 16.6%) hypothermia groups ($P < 0.0001$). The multivariate analysis as well as the long term follow-up statistics are yet to be completed.

CONCLUSIONS: Despite having protocols aimed at temperature control after delivery, admission hypothermia is still a significant problem within the TBH neonatal unit. Time from delivery to admission may play a key role and needs to be more closely analysed. Consideration needs to be given to other strategies of preventing heat loss in these infants, such as skin-to-skin care or more rapid transit to the neonatal wards.

“The burden of early onset sepsis in neonates with neonatal encephalopathy”

Presenting Author: Kathleen Car, Department of Paediatrics, University of Witwatersrand

Co-Authors: Cally Tann (Clinical Research Department, London School of Hygiene & Tropical Medicine), Sithembiso Velaphi (Department of Paediatrics, Chris Hani Baragwaneth Academic Hospital, University of Witwatersrand), Fatima Solomon (Respiratory and Meningeal Pathogens Research Unit), Sanjay Lala (Department of Paediatrics, Chris Hani Baragwaneth Academic Hospital, University of Witwatersrand), Shabir Madhi (Medical Research Council; Respiratory and Meningeal Pathogens Research Unit, University of Witwatersrand, DST / NRF: VPU), Ziyaad Dangor (Department of Paediatrics, Chris Hani Baragwaneth Academic Hospital, University of Witwatersrand), Firdose

Nakwa (Department of Paediatrics, Chris Hani Baragwaneth Academic Hospital, University of Witwatersrand)

BACKGROUND: Neonatal Encephalopathy (NE) contributes to a large burden of deaths and disability worldwide. Studies have shown that early-onset sepsis (EOS) is an independent risk factor for NE, and when both are present, the risk of cerebral palsy is increased. Despite a high burden of NE in South Africa, the prevalence of EOS in neonates with NE is poorly defined. We aimed to describe the burden of EOS among term and near-term neonates born with NE in a large tertiary hospital in Johannesburg, South Africa.

METHODS: We undertook a retrospective study in neonates with NE, born at or referred to Chris Hani Baragwaneth Hospital (CHBAH) between January 2016 and June 2018. Neonates with a birth weight $\geq 2,500$ grams or ≥ 35 weeks gestation with NE were identified through a discharge summary database. EOS was defined as bacterial organisms cultured on blood or cerebrospinal fluid (confirmed EOS), or in the absence of culture confirmation: a CRP $> 10\text{mg/L}$ or WCC $> 30 \times 10^9/\text{L}$ or $< 5 \times 10^9/\text{L}$ or an absolute neutrophil count $< 1.8 \times 10^9/\text{L}$ or an immature to total neutrophil ratio (I:T) > 0.3 or elevated CSF WCC > 21 or CSF glucose $< 1.7\text{mmol}$. We also captured data on the neurodevelopmental assessment using the Griffiths Mental Developmental Scale in survivors at 12 and at 18-24 months of age.

RESULTS: Of 10,916 neonates hospitalized over the study period, 1036 (9.5%) were diagnosed with neonatal encephalopathy. Overall, 414 (40.0%) of NE cases had EOS, 51 (4.9%) were culture confirmed. The incidence (per 1,000 live births) of NE was 13.1 (95%CI: 12.3-14.0), and 5.3 (95%CI 4.8-5.8) in neonates with NE and EOS. The case fatality ratio (CFR) in neonates with NE and EOS was 16.4% (95%CI 13.0-20.4). Neonates with NE and EOS were more likely to be treated with therapeutic hypothermia ($p < 0.001$), Sarnat staging 2 or 3 ($p < 0.001$) and demise ($p < 0.001$) compared to neonates with NE without EOS. Neurodevelopmental assessments were undertaken on 141 neonates at 12 months of age. Twenty-five (17.7%) infants had a delayed developmental quotient (DQ < 86); of which 16 (64%) had NE and EOS at birth.

CONCLUSION: In a setting with a high burden of NE, we report a high incidence and CFR amongst neonates with NE and EOS. Furthermore, a high proportion of infant survivors of NE and EOS had neurological sequelae at one year of age.