PARALLELL SESSION 2:

Infants of diabetic mothers : maternal and infant characteristics and incidence of hypoglycemia

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BACKGROUND: Diabetes mellitus is the most common metabolic disease affecting woman during pregnancy and is associated with adverse outcomes during the neonatal period, common one being hypoglycemia. The characteristics and incidence of hypoglycemia in infants of diabetic mothers (IDM) are not well reported in South Africa.

OBJECTIVES: To describe characteristics of IDM with or without hypoglycemia and to determine prevalence of hypoglycemia in IDM

METHODS: Medical records of mothers, and their infants admitted with a diagnosis of IDM at gestational age of ≥34 weeks and /or birth weight of ≥ 2000g and admitted at CHBAH from January 2012 to December 2013 , were retrieved . Maternal characteristics ,type and treatment of diabetes, infants characteristics and glucose measurement were captured for analysis.

RESULTS: A total of 234 IDM were admitted over this 2 year period and 207 met inclusion criteria. Median maternal age was 33 years. Only 7% of mothers had stillbirths and 14% had miscarriages in previous pregnancies. A total of 56% of mothers had gestational diabetes. Only 54% of babies were born preterm , 19% were large for gestational age(LGA) and 10% were macrosomic.Pre-gestational diabetic mothers had a higher preterm birth than gestational diabetic mothers (64% vs 48%, p =0.037). Hypoglycemia occurred in 39% of the IDM, occurring within the first 3 hours of life in 85% of infants. There were no differences in types of maternal diabetes and its treatment, and other infant anthropometric measurements excluding the LGA between the infants who develop hypoglycemia and those who did not. A total of 22 (57%) out of 38 LGA patients were found to have hypoglycemia with significant p value (0.009).

CONCLUSION: Hypoglycemia is a common finding in IDM . Majority of them develop hypoglycemia within the first 3 hours. association between LGA and hypoglycemia was identified. all IDM should be monitored for hypoglycemia soon after birth

Epidemiology of neonatal bloodstream infection among very low birth weight infants at a south african tertiary neonatal care unit

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BACKGROUND: The epidemiology of bloodstream infections among very low birth weight (VLBW) neonates in South African hospitals is under-researched.

OBJECTIVE: To determine the clinical (patient demographics, outcome) and laboratory profile (bloodstream infection, blood culture sampling, pathogen yield and contamination rates) of VLBW neonates investigated for infection over a 2-year period.

METHODS: We retrospectively reviewed hospital, clinical and laboratory records for all VLBW neonates admitted to Tygerberg Hospital, Cape Town between 1 January 2016 and 31 December 2017.

RESULTS: Of 1530 VLBW neonates, the mean gestational age and birth weight was 30.4 weeks and 1135g. The blood culture sampling rate was 101% (1547 blood cultures/1530 admissions, with nearly equal numbers of early versus late (<72 hours vs ≥ 72 hours of life) blood culture sampling episodes (806/1547 [52%] vs 741/1547 [48%]).The overall bloodstream infection (BSI) rate for VLBW neonates was 4.5/1000 patient days, with hospital-acquired BSI (HA-BSI) episodes predominating (200/209; 96%).The overall pathogen yield was 13.5% (209/1547) but was significantly higher for blood cultures submitted >72 hours of life (9/806 [1.1%] vs 200/741 [27%];p<0.001). The blood culture contamination rate was 4.7% (73/1547) with coagulase negative staphylococci being the most frequent contaminants (56%). Clinically-suspected infection episodes (CRP>10mg/dl, with negative blood culture/s) represented 15.3% of blood culturing episodes (7.7% EOS, 23.8% HA-BSI). Multidrug-resistant (MDR) Gram negative pathogens caused most HA-BSI episodes, including Acinetobacter baumannii (18.8%; 87% MDR), Serratia marcescens (17.4%; 25% MDR) and Klebsiella pneumoniae (15.0%; 77% ESBL-producers). Overall mortality among VLBW infants was 15.8% (241/1530), compared to 1.4% (96/6825) among hospitalised neonates >1500g during 2017. Mortality rates were significantly higher for babies with laboratory-confirmed BSI compared to whose without infection (56/171 [32.7%] vs 157/1192 [13.2%]; p<0.001), but similar for babies with clinically-suspected infection compared to no infection (27/166 [16.2%] vs 157/1192 [13.2%]; p=0.277).

CONCLUSIONS: HA-BSI are a frequent adverse event among hospitalised VLBW infants, and a leading cause of death, with crude mortality rates exceeding 32%. Episodes of clinically-suspected (culture-negative) infection were common, but were less frequently fatal.

Microbiological profile of blood culture positive isolates in infants admitted to the neonatal unit over a 5 year period

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BACKGROUND: Neonatal blood stream infections (BSI) are a major cause of morbidity and mortality. Most reports on the burden neonatal BSI are from high-income countries and is under-reported in low-middle income countries. The pathogen profiles also vary, with Gram-positive organisms being the most predominant in high-income countries, while Gram-negatives are more common in low-

middle income countries. There are few studies reporting on causative pathogens in neonates from sub-Saharan Africa. This study aimed to determine the rates, causative pathogens, susceptibilities profiles and trends of BSI in the neonatal unit from a hospital based in a low- middle income country.

METHODS: This was a retrospective review of all positive blood culture isolates in infants admitted in the unit over a period of five years, from January 2013 to December 2017. Data on names of pathogens and their susceptibilities were collected. Rates of infection are presented as number of isolates per 1000 patient-days. Trends over the five- year period were assessed.

RESULTS: Over the study period a total of 3387 organisms (excluding CoNS) were isolated from blood culture, giving a BSI rate of 12/1000 patient-days. The rate of infection increased from 9/1000 patient days in 2013 to 14/1000 patient days in 2017. Gram-negative organisms accounted for 61% of all isolates, followed by Gram-positive organisms (22%) and fungi (17%). The rates of Gram-negative infection gradually increased over the years from 4.9/1000 patient days in 2013 to 9.6/1000 patient days in 2017, while Gram-positive infections increased from 1.7/1000 patient days in 2013 and peaked in 2016 (3.8/1000 patient days) and declined to baseline (1.8/1000 patient days) in 2017. The rate of fungal infection has remained unchanged over the years at approximately 2/1000 patient days. Among the Gram-negative organisms Acinetobacter baumannii and Klebsiella pneumoniae were the most common pathogens, at 48% and 38% respectively. Most of the Acinetobacter baumannii isolates were carbapenem resistant, accounting for 59% of all Acinetobacter baumannii; and increased from 27.3% in 2014 to 68% in 2017. Among the Klebsiella pneumoniae isolates, 94% were ESBL. Carbapenem resistant Klebsiella pneumoniae accounted for 2.9% of all Klebsiella pneumoniae, increasing from 0.8% in 2013 to 8.5% in 2017. Staphylococcus aureus accounted for 70% of all Gram-positive isolates and 89% were methicillin resistant. The most predominant fungi were Candida parapsilosis (48%) and Candida albicans (28%) and their rates remained constant over the five-year period.

CONCLUSION: The neonatal unit at Chris Hani Baragwanath Academic Hospital has a high rate of BSI, with trends showing an overall increase in BSI rates over the years. The most predominant pathogens are the Gram-negative isolates, with Acinetobacter baumannii and Klebsiella pneumoniae being the most common. The rates of multi-drug and carbapenem resistance are worryingly high and are on an upward trend.

Characteristics and outcomes of neonates with blood stream infection due to listeria monocytogenes

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BACKGROUND: Neonatal Listeriosis is a relatively uncommon but serious invasive disease. In 2017 an outbreak of Listeria infection was reported countrywide, with Gauteng being a leading province. The characteristics and outcome of neonates infected with Listeria from developing countries are not well known.

OBJECTIVE: To determine demographic characteristics, clinical and laboratory findings and outcomes of all neonates infected with Listeria monocytogenes.

METHODS: This is a retrospective descriptive study. Clinical and laboratory records of neonates with positive blood and/or cerebrospinal fluid (CSF) culture admitted at Chris Hani Baragwanath Academic Hospital from January 2017 to May 2018 were reviewed for demographic features, clinical presentation, ancillary laboratory test results and outcomes at hospital discharge.

RESULTS: There were 42 neonates with positive culture due to Listeria monocytogenes. Majority (n = 34; 81.0%) of neonates were born preterm. Mode of delivery was vaginal in most cases (n = 33; 78.6%) and (n = 13; 31.0%) were HIV exposed. Most patients (41; 97.6%) presented within the first 3 days of life, as an early-onset disease. Common presentations were respiratory distress (n = 16, 38.1%) and respiratory depression (n = 22; 52.4%); and (n = 29; 69.0%) requiring invasive or non-invasive respiratory support. Abnormal laboratory results included a high C-reactive protein (CRP), where (n=27, 64.3%) of the patients had a CRP > 40. Four patients (11%) had a positive culture in CSF. There were 11 deaths (mortality rate 26.2%).

CONCLUSIONS: Majority of neonates infected with Listeria monocytogenes are born preterm, suggesting that this infection might cause preterm labour. Common presentation is respiratory distress and respiratory depression. It is associated with high mortality.

Neurodevelopmental outcome in neonates with hypoxic ischaemic encephalopathy managed with induced hypothermia

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INTRODUCTION: Hypoxic ischaemic encephalopathy remains a common problem in developing countries. Use of therapeutic hypothermia in neonates with HIE is associated with reduction in moderate to severe neurologic disability. Most of the studies reporting on these outcomes are conducted in developed countries where these neonates are managed under intensive care settings. Studies from developing countries have reported outcomes that are less favourable than those reported from developed countries.

OBJECTIVES: To determine the neurodevelopmental outcomes at 12 months and at 18-24 months in patients managed with therapeutic hypothermia in a setting where their care is often provided outside intensive care unit.

METHODS: This was a retrospective review of records of patients who were managed with therapeutic hypothermia for HIE and had neurodevelopment assessment at 12 and 18-24 months. Therapeutic hypothermia was provided outside intensive care unit according to the Toby criteria. Griffiths Mental Developmental Scale (GMDS) was used to assess neurodevelopment. Findings of neurodevelopmental assessment at 12 months were compared to those at 18-24 months.

RESULTS: Among the 178 patients followed at neonatal neurodevelopmental clinic 155 had documented information on whether they were cooled or not, of which 113 (73%) had received TH. Seventy-six (67%) patients were assessed at 12 months and 56 (49.6%) were assessed at 18-24 months. The mean General Quotient (GQ) at 12 and 18-24 months was 103 ± 16 and 83 ± 24 respectively. At 12 months only four patients (6%) had moderate to severe disability, and at 18-24 months, 18 (32%) had moderate to severe disability. From the 67 patients assessed at 12 months and 56 assessed at 18-24 months, only 40 had assessment in both periods. In assessing the reliability of the assessment at 12 months in predicting the findings at 18-24 months, assessment at 12 months had a sensitivity of 50%, positive and negative predictive value of 100% and 90% respectively and specificity of 100%. There was a high loss to follow up 57(50%) at 18-24 months.

CONCLUSIONS: At 18-24 months assessment about 40% of neonates with HIE managed with therapeutic hypothermia have moderate to severe disability. Assessment at 12 months has poor sensitivity in detecting neonates who develop moderate to severe disability at 18-24 months. More efforts should be placed in reducing loss to follow up so that one can have a better understanding of impact of therapeutic hypothermia in reducing disability in neonates with HIE in developing countries.

Outcomes at hospital discharge amongst neonates with hypoxic ischemic encephalopathy managed with induced hypothermia

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INTRODUCTION: Induced hypothermia has been deemed to be an effective neuroprotective strategy, in neonates with hypoxic ischemic encephalopathy (HIE). In high-income countries induced hypothermia (IH) is combined with optimal tertiary neonatal intensive care (ICU). In low- and middle-income countries, where there are major challenges such as limitation of resources, shortage of adequately trained medical staff and limited number of intensive care unit beds, delivering these strategies is often performed outside of the ICU setting.

OBJECTIVES: To determine characteristics of neonates managed with Induced hypothermia (IH) outside the intensive care setting and their survival rates at hospital discharge.

METHODS: This is a retrospective review of records of neonates with asphyxia over a period of two years (2015-2016), at Chris Hani Baragwanath Academic Hospital where neonates were managed with induced hypothermia according to the TOBY criteria but in a high care nursery. Data collected included infant characteristics, blood gas analyses, neurological examination, "aEEG findings," markers of sepsis and outcome at hospital discharge. Comparison was made between survivors and non- survivors. RESULTS: A total of 322 neonates were recorded to have suffered from intrapartum hypoxia. The ward in which they were managed was stated in 198 (61.5%) patients. This analysis was performed only in those in which the place of management was stated. 132/198 (66.6%) of neonates received IH and of these only one infant was managed in the ICU, the rest were managed in the high care area. Their mean birthweight and gestational age was 3056±521 grams and 38±2 weeks respectively. The median Apgar score at 5 minutes was 5(IQR 4-7) and at ten minutes the

median was 6(IQR 5-8). The median pH and base deficit was 7.1 (IQR 6.93-7.180) and 19.7 (IQR16.7-25.4). The median Thompson score was 10±3.3 and 113 (85.6%) Sarnat stage 2. C-reactive protein results were abnormal (>20mg/l) in 26 (20%) and 2 (1,5%) had positive blood cultures. Among 81 neonates who had a lumbar puncture 3 (2.27%) had suggestion of meningitis. There were 36 (27.2%) deaths from the IH neonates. The significant differences noted between the survivors and non-survivors were APGAR score at 10 minutes (p-value 0.013), CRP (p-value 0.021) and the Sarnat staging (p-value 0.022). Sixty six neonates did not receive IH, 37 (56%) of these neonates demised, and all these deaths had severe encephalopathy or Sarnat stage 3.

CONCLUSION: Administering IH to neonates with HIE, outside of the intensive care setting is possible, despite the limited resources, and other challenges low- and middle income countries experience on a daily basis. A significant number of neonates with HIE had evidence suggestive of underlying sepsis. There was high mortality at time of discharge nearly a third, and most deaths were due to severe encephalopathy. Therefore we need to be more selective in treating patients with IH.

The profile of ancillary laboratory tests results in neonates with bacterial or candida infection

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BACKGROUND: Diagnosis of neonatal sepsis is often challenging as clinical signs of sepsis in neonates are often non-specific, and yield from blood culture is low. Full blood count (FBC), white cell differential count (Diff count) and c-reactive protein (CRP) are thus often used as proxy to diagnose sepsis. Knowing abnormalities of these tests in those with culture-proven sepsis might assist in their interpretation when used in a neonate with clinical sepsis but negative culture results. We evaluated the profile of FBC with Diff count and CRP results in neonates with culture-proven sepsis.

METHODS: This was a retrospective descriptive study. A computerized microbiological database from NHLS was reviewed for positive blood cultures (BC) with pathogenic organisms from infants admitted to the neonatal unit at Chris Hani Baragwanath Academic Hospital from January to December 2017. FBC with or without Diff count done within 24 hours and CRP within 48 hours of BC were analyzed.

RESULTS: A total of 886 isolates were cultured in blood. Distribution of pathogens were Gram-negatives (62.2%), Gram-positives (23.3%) and Candida (14.5%). Among the 886 with BC, 766 (86.5%) had FBC done within 24h of BC. The common abnormality found in FBC was thrombocytopenia for all pathogens. Fifty-four percent and 56.7% of patients with Gram-negatives and candida species had thrombocytopenia respectively, compared to 29.5% among Gram positives. There were no significant differences in the proportion of patients with thrombocytopenia among Gram-negatives and those with Candida (54.6% vs 56.7%; p = 0.451). Leukopenia was the second common abnormality among Gram-negatives (21.1%). Leucocytosis was common among Gram-positives (25%). Less than 10% for all types of organisms had an abnormal I/T ratio. A total of 710 patients had CRP done, (70.0%) had high CRP (>10mg/L), 60.3% had CRP >20 mg/L.

CONCLUSION: Common FBC abnormality in culture-proven sepsis is thrombocytopenia and occurs at similar rates in both Gram-negatives and candida infection. White cell count abnormalities occurred less commonly than thrombocytopenia. High CRP levels were observed in more than two-thirds of culture-proven sepsis. High CRP and abnormal FBC especially thrombocytopenia should continue being considered as markers of sepsis in neonates.

Pathogens isolated from cerebrospinal fluid (csf) of infants admitted to a neonatal unit in a south african hospital

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BACKGROUND: Performing a lumbar puncture is often challenging and this results in some clinicians limiting lumbar puncture to only those with positive blood cultures. Diagnosis of meningitis includes the use of white cell count in cerebrospinal fluid (CSF), and thus empiric antibiotics are stopped once white cell count is assessed to be normal without waiting for CSF culture results. In this study, we sought to determine pathogens causing meningitis in neonates, concordance between blood and CSF culture results and CSF white cell count in neonates with positive CSF culture results.

METHODS: This was a retrospective descriptive study. A computerized microbiological database from National Laboratory Health Services (NHLS) was reviewed for positive blood and CSF culture results from infants admitted to the neonatal unit at Chris Hani Baragwanath Academic Hospital from January to December 2017. CSF results with positive cultures were retrieved. A comparison was made between pathogens isolated in CSF and those isolated in blood.

RESULTS: A total of 106 CSF cultures were positive due to organisms considered pathogens between January and December 2017. Sixty-two (58.5%) patients with positive CSF cultures had positive blood cultures and 44 (41.5%) had negative blood cultures. Of the 62 patients with both positive CSF and blood cultures, 50 (80.6%) had the same pathogen as the blood culture and 12 (19.4%) had different organisms from blood cultures. The overall discordance was observed in 56 cases (52.8%). Among the discordant group, the common pathogen was Acinetobacter baumannii in CSF and Streptococcus viridans, Enterococcus faecium and Klebsiella pneumonia in blood. Gram negatives were the most common type of organism isolated (79.2%) in CSF, with Acinetobacter baumannii (50.9%) and Klebsiella pneumoniae (18.9%) accounting for most pathogens. Among the 106 patients with positive cultures, 101 had white cell count (WCC) results, of which only 27 (26.7%) had a total CSF WCC >20.

CONCLUSION: Gram negatives are common organisms isolated in CSF culture in neonates. About 40% of patients with positive CSF culture have negative blood cultures and less than a third of neonates with positive CSF culture have high CSF WCC. This highlights the importance of not relying on blood culture results before one does a lumbar puncture, and not to rely on normal CSF WCC count to exclude culture proven meningitis.

Infection and all-cause mortality rates due to carbapenem resistant organisms in infants admitted to the neonatal unit.

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Infection and All-cause Mortality Rates due to Carbapenem Resistant Organisms in Infants Admitted to the Neonatal Unit.Reenu Thomas1, Claude Ondongo-Ezhet1, Nini Motsoaledi1, Prenika Jaglal2, Jeannette Wadula2, Firdose Nakwa1, Sithembiso Velaphi11Department of Paediatrics, Chris Hani Baragwanath Academic Hospital and School of Clinical Medicine, University of the Witwatersrand.2Department of Clinical Microbiology and Infectious Diseases, National Health Laboratory Services, Chris Hani Baragwanath Academic Hospital and School of Pathology, University of the Witwatersrand.Introduction: Healthcare-associated multidrug resistant bacterial infections, particularly due to carbapenem resistant organisms (CRO), has been on the rise globally. Most of the studies reporting on the prevalence of CRO are from high-income countries, with very few reported from low-middle income countries. This study aimed to evaluate the rates of infection and all-cause mortality due to CRO in infants admitted in a hospital from a low-middle income country. Methods: Positive bacterial cultures from sterile sites in infants admitted in the neonatal unit in 2018, was retrieved from the microbiology laboratory and reviewed retrospectively. Type of organism, susceptibility results and outcomes were recorded. Among these, the Gram-negative isolates, including the CROs, were extracted. Rates and outcomes were analysed.Results: In 2018, there was a total of 804 positive cultures (excluding CoNS) from sterile sites, giving an infection rate of 12.6/1000 patient days. Of these 539 (67%) were Gram-negative isolates. The common Gram-negatives were Acinetobacter baumannii (225/539; 42%) and Klebsiella pneumoniae (229/539; 42%). Hundred and seventy-six of the Acinetobacter baumannii isolates (78%) and 75 of the Klebsiella pneumoniae isolates (33%) were carbapenem resistant, accounting for 47% of all Gram-negatives. The rate of carbapenem resistant Acinetobacter baumannii (CRAB) was 2.8/1000 patient days and that for carbapenem resistant Klebsiella pneumoniae (CRE) was 1.2/1000 patient days. The rates of CRAB varied from a trough of 0.8/1000 patient days to a peak of 5.8/1000 patient days per month, and those of CRE varied from 0.2/1000 patient days to 2.5/1000 patient days per month, suggesting episodes of outbreaks during a year. The overall all-cause mortality rate in infants with Gram-negative isolates was 20%. The mortality was 26% in infants with CRAB and 40% in infants with CREs. The overall all-cause mortality rate in infants with CRO was 30%. The mortality rate in infants with CRO was higher than those with non-CRO (30% vs 11%; $p < 0.05$). Conclusion: There was a high rate of positive cultures from sterile sites in 2018. Gram-negative organisms predominated, and among these carbapenem resistance was high. Rates of CRO varied over the months, suggesting outbreaks. CROs were associated with high mortality rate.