

trough level. There was a significant reduction in the number of babies with high trough amikacin levels after the dose was changed from 12 mg/kg/day to 12 mg/kg every 36 hours. We recommend this dose for use in infants less than 32 weeks gestation with continued monitoring of amikacin levels.

REFERENCES

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PS-219 PREDICTORS OF CLINICAL AND MICROBIOLOGICAL TREATMENT FAILURE IN NEONATAL BACTEREMIA

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10.1136/archdischild-2014-307384.518

Aims To identify independent predictors of clinical and microbiological treatment failure and develop a predictive model in neonates with bloodstream infections (BSIs).

Methods A total of 1078 episodes of BSI occurred in 793 neonates in a tertiary-level neonatal intensive care unit (NICU) between 2004 and 2012 were enrolled. Patient demographics, underlying chronic comorbidities, clinical features, antimicrobial treatment and microbiological characteristics were evaluated.

Results Presences of underlying congenital anomalies (odds ratio [OR] 2.22, 95% confidence interval [CI] 1.15–4.29) and pulmonary hypertension (OR 3.57, 95% CI 1.65–7.70), infections caused by multidrug-resistant gram-negative bacteremia (OR 2.84, 95% CI 1.21–6.66), *Group B streptococcus* (OR 3.08, 95% CI 1.31–7.26), and fungus (OR 4.06, 95% CI 1.97–8.38), a NTISS score of ≥ 23 (OR 6.61, 95% CI 2.40–26.47), inappropriate antibiotics (OR 2.01, 95% CI 1.31–3.08), and concomitant meningitis (OR 4.35, 95% CI 2.13–8.89) and ventilator-associated pneumonia (OR 2.82, 95% CI 1.26–6.32) were identified as independent risk factors for 28-day treatment failure in neonatal bacteremia. A risk-score model was created by adding points for each independent risk factor, and had a c-statistic of 0.83. Patients with risk scores of 0, 4, 8, 12 and 15 had estimated 28-day treatment failure rates of approximately 3%, 17%, 52%, 85% and 95%, respectively.

Conclusions This predictive model, calculated after documentation of a BSI, reflects spectrum of BSI severity and is associated with subsequent treatment failure through illness severity score and case-mix variables. This simple score could prove useful in clinical and research settings, and practical in estimating the prognosis.

PS-220 NOSOCOMIAL INFECTIONS DUE TO MULTIDRUG-RESISTANT MICROORGANISMS IN NEONATES

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10.1136/archdischild-2014-307384.519

Aim We aimed to evaluate nosocomial infection (NI) rate and antimicrobial susceptibilities of microorganisms causing NI in our Neonatal Intensive Care Unit (NICU).

Material and method NI afflicting infants admitted to NICU of Bahcesehir University Goztepe Medicalpark Hospital between January 2012 and December 2012 were assessed using Centre For Disease Control And Prevention (CDC) criteria. Only culture-positive infants were enrolled.

Results Of 328 infants, 49.1% were preterm. Thirty-five nosocomial infections occurred in 19 (6.4%) patients. Incidence density was 6.8/1000 patient-days. Attack rate per patient was 1.84. Two infants (10.5%) succumbed to death, one with a liver abscess due to *Staphylococcus epidermidis*, other with *Candida albicans* sepsis. Ventilator associated-pneumonia (VAP) rate (n = 4) 2.3/1000, sepsis rate (n = 19) 5.7/1000, UTI rate (n = 10) 1.5/1000, wound infection rate (n = 1) 0.1/1000, catheter infection rate (n = 2) 4/1000 and meningitis rate were (n = 1) 0.1/1000. Of 35 nosocomial agents 22 (62.8%) were gram negative (10 *Klebsiella* spp, 4 *Enterobacter*, 3 *Acinetobacter*, 3 *E. coli*, 2 *Pseudomonas*), 10 (28.5%) were gram positive and 3 (8.6%) were *Candida* spp. All gram negatives were resistant to cephalosporins. Thirty-one percent of gram negative bacteria were resistant to carbapenems. Carbapenem-resistant gram negative agents were namely *Acinetobacter baumannii* complex, *Pseudomonas aeruginosa* and *Enterobacter cloacae* complex. All bacteria were susceptible to colistin.

Conclusion ESBL positive and carbapenem-resistant gram negative bacteria are threats for NICU. It is of vital importance to implement reasonable antibiotherapy strategies and to propagate standard infection control measures.

PS-221 LOWER MATERNAL/NEONATAL VITAMIN D LEVELS ARE ASSOCIATED WITH INCREASED RISK OF EARLY ONSET NEONATAL SEPSIS IN TERM INFANTS

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10.1136/archdischild-2014-307384.520

Background and aims Besides its well known role in bone metabolism, vitamin D also has immune modulatory effects. Although the link between vitamin D deficiency and various infections has been reported, no study has evaluated the effect of vitamin D levels on neonatal sepsis. The aim of this study was to evaluate the effect of vitamin D levels on early-onset sepsis (EOS) in term infants. The association between the severity of vitamin D deficiency and EOS was also investigated.

Methods Fifty term infants with clinical and laboratory findings of EOS (Study group) and 50 healthy infants with no signs of clinical and laboratory infection (Control group) were enrolled. Infants with high probable sepsis consisted the Study group and the healthy infants with no signs of clinical and laboratory infection were referred to as the Control group. Blood for neonatal and maternal vitamin D levels were obtained from all infants and their mothers at the postpartum period at the time of hospital admission.

Results Both maternal and neonatal 25-hydroxyvitamin D (25-OHD) levels in the Study group were significantly lower compared with those of the Control group (p < 0.001). A positive correlation was detected between maternal and neonatal 25-OHD levels. Both maternal and neonatal 25-OHD levels were significantly higher in summer and with regular vitamin D supplementation during pregnancy. Severe vitamin D deficiency was significantly more common in the sepsis group.

Conclusions EOS in term infants is associated with significantly lower maternal and neonatal 25-OHD levels. We also found that levels of 25-OHD in neonates were positively correlated with those in mothers. These data suggest that adequate vitamin D supplementation during pregnancy may be helpful to prevent EOS in term neonates.

PS-222 STAPHYLOCOCCUS CAPITIS IN NEONATAL LATE-ONSET SEPSIS: UNEXPECTED WORLDWIDE DISSEMINATION OF AN ENDEMIC MULTI-RESISTANT CLONE

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10.1136/archdischild-2014-307384.521

Background Multi-resistant *Staphylococcus capitis* NRCS-A is involved in late-onset sepsis (LOS) in French NICUs.

Aims To investigate the geographical distribution of NRCS-A, and to precise its susceptibility profile.

Methods Twelve *S. capitis* isolates from distant NICUs (Australia, Belgium, France, United Kingdom, n = 3 each) and 2 *S. capitis* isolates from adult patients were analysed using PFGE, SCCmec typing, dru-typing, a MLST-like analysis, and antimicrobial susceptibility testing. To explore impact of vancomycin selective pressure, after 15 daily subcultures with vancomycin, we determined vancomycin, daptomycin and linezolid minimal inhibitory concentrations (MICs).

Results All NICU *S. capitis* (i) shared >80% similarity of PFGE profile and were similar to NRCS-A profile, (ii) harboured a type V-related SCCmec element, (iii) exhibited the same dru-type, (iv) formed a monophyletic group, (v) harboured a same antimicrobial susceptibility profile including aminoglycosides and methicillin resistance, and vancomycin heteroresistance. These molecular and antimicrobial susceptibility profiles differed from those of adult isolates. An increase of vancomycin and daptomycin (but not linezolid) MICs was observed, significantly faster ($p < 0.05$) for NRCS-A isolates than other tested strains.

Conclusion Our analysis demonstrates an unexpected worldwide distribution of *S. capitis* NRCS-A, specifically in NICUs. Recently, we collected complementary NICU isolates belonging to NRCS-A from Norway, Denmark, the Netherlands, USA, Brazil, New Zealand and Canada, confirming the worrisome dissemination of NRCS-A. Its multi-resistant profile and its ability to rapidly adapt to vancomycin selective pressure, constitute a selective advantage to NRCS-A in NICUs, and raise the issue of potential therapeutic failure and the need for alternative antimicrobial regimens.

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PS-223 IMPROVING STAFF COMPETENCE AND CONFIDENCE FOR NEONATAL RESUSCITATION, A QUALITY IMPROVEMENT INITIATIVE

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10.1136/archdischild-2014-307384.522

Aims To introduce a Quality Improvement Initiative aimed at instilling confidence and competence with Neonatal Resuscitation in Labour Ward (LW) and Neonatal Unit (NICU) staff.

Methods A Neonatal Resuscitation Initiative Team (NRIT) consisted of LW and NICU midwives, an Advanced Nurse Practitioner (ANP) and a Paediatric Consultant. LW, NICU and paediatric staff were invited to attend a presentation to outline the aims and methodology of the initiative. Emphasis was placed on teamwork with effective leadership and communication. This was followed by a demonstration of 2 low fidelity simulated neonatal resuscitations performed by the NRIT.

Midwifery and NICU staff were then invited to partake in a Simulated Team Response (STR) to 2 simulated resuscitations.

A random selection of participants completed a closed questionnaire before and after the NRIT demonstration and before and after their STR. Levels of confidence in all aspects of neonatal resuscitation, including teamwork and leadership skills were evaluated using a Likert Scale.

Results One hundred and thirteen staff participated in the quality initiative from January 2013 to August 2013. Seventy four staff participated in the NRIT demonstrations and 39 in the STR. Forty three questionnaires were completed following the NRIT and 13 following the STR. Using a Wilcoxon test the pre-post gain in confidence score was statistically significant ($p = 0.0020$) for doctors and midwives.

Conclusion Simulation training is a valuable means of maintaining skills and enhancing confidence for neonatal resuscitation. This study quantifies the positive impact of a Quality Improvement Initiative aimed at improving performance at neonatal resuscitation.

PS-224 VIDEO EDUCATION TO IMPROVE BAG MASK VENTILATION DURING SIMULATED NEWBORN RESUSCITATION

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10.1136/archdischild-2014-307384.523

Aim To evaluate if video based education could improve quality of positive pressure ventilation (PPV) performed by novice health care providers during neonatal resuscitation.

Methods Twenty-eight 4th year medical students were randomly paired and instructed to give PPV to a modified manikin as single-person resuscitators, then as two-person paired resuscitators using either an anatomical shaped neonatal face mask with an air cushion rim (IS) or a Laerdal round face mask (LM). After watching a video-tutorial they randomly repeated each mask ventilation performance. Airway pressure, gas flow, tidal volume, and mask leak were recorded. PPV performance quality was analysed using video recording.

Results Mask leak was lower during one-person ventilation when using IS ($56 \pm 16\%$) compared to LM ($71 \pm 19\%$). LM mask leak during one-person ventilation was significantly lower when using the two point top hold in contrast to the ok rim hold (before training: $63 \pm 22\%$ vs. $72 \pm 18\%$, after training: $57 \pm 17\%$ vs. $77 \pm 12\%$, respectively). Watching a video-tutorial improved correct head position (score: 1.4 ± 0.7 vs. $3.8 \pm$