Multidrug-Resistant Organisms from Three Pediatric Inpatient Units in the Dominican Republic

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Background. Multidrug-resistant organisms (MDRO) are a major global public health threat. Antimicrobial consumption and resistance in low- and middle-income countries (LMICs) are rising. This trend can be consequential for vulnerable populations such as children who have high rates of febrile illnesses. The aim of our study is to assess the burden of MDRO in hospitalized pediatric patients in the Dominican Republic (DR).

Methods. Retrospective review of all positive cultures in patients ages 0–17 at three tertiary referral centers in Santiago, DR. Culture-positive cases from January 2016 to December 2017 were reviewed. Repeat cultures from the same patient were excluded. Phenotypic susceptibility data were collected from automated susceptibility testing systems using WIT-Qnet interface.

Results. A total of 1,584 cultures were reviewed, of which 1,041 (65%) were Gram-negative and 514 (32%) Gram-positive. The most common microorganisms were E. coli (23%) and S. aureus (11%). Sample were obtained from stool (26.9%), blood (23.5%), urine (16.2%), secretions (5.4%), and central line catheters (7.2%). Phenotypic resistance consistent with extended-spectrum β-lactamase (ESBL) and carbapenem-resistant Enterobacteriaceae (CRE) were found in 524 (50.3%) and 179 (17.2%) of Gram-negatives, respectively. MDRO rates by organism are in Figure 2. A total of 72 (21.0%) S. aureus isolates were methicillin resistant (MRSA) and 62 (18%) showed suspected inducible resistance to clindamycin (Figure 3).

Conclusion. Data from automated culture systems suggests a high prevalence of ESBL and CRE in this city-wide cohort from three pediatric facilities. Prospective confirmatory studies with manual susceptibility testing may help clarify the true prevalence of MDRO. Further studies are needed to understand the epidemiology and risk factors for pediatric patients colonized or infected with MDROs in LMICs and in the DR. Exposure to antimicrobials may be an important risk factor. Understanding antimicrobial use in children and possible exposure to antimicrobials in the environment may help identify antimicrobial stewardship targets and help curb antimicrobial pressure and resistance.

88. Are Poplethial Vein PICCs safe for Neonates?
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Background. Peripherally inserted central catheters (PICCs) have been used as an alternative to central venous catheters ever since first described in 1975. Concerns were raised at our institution about safety of peripherally veined PICCs (P-PICCs) in neonates. There are no published data on the use of P-PICCs in neonates.

Methods. Retrospective review of records of all neonates admitted to an urban, 50-bed, level III Neonatal Intensive Care Unit between January 1, 2016 and December 31, 2018 who had PICCs placed. Records were reviewed for demographic data, number of days with PICC (dwell time), and complications. Complications included infectious such as bacteremia, insertion site infection; and mechanical such as occlusion, leakage, infiltration/edema, inadvertent dislodging, tip malposition, and catheter breakage. Chi-square (C), non-paired independent-samples t test (T), or Mann–Whitney U test (MW) was used for statistical analysis. IRB approval was obtained from University of Florida (teaching institution) and Baptist Health (patient location).

Results. 830 PICCs inserted in 522 neonates were identified. 100 (12.0%) were P-PICCs and 730 (88.0%) were NP-PICCs. Of the NP-PICCs, 700/730 (95.8%) were placed in the upper extremities and 30/730 (4.1%) in the lower extremities. P-PICCs were placed in neonates with an average gestational age of 29 weeks vs. 32 weeks for NP-PICCs (P < 0.01, T) and P-PICCs were placed in neonates with average birthweight of 1,210 g vs. 1,840 g for NP-PICCs (P < 0.01, T). The average dwell time for P-PICCs was 15.4 days (range 2–79 days) compared with 14.2 days (range 0–109 days) for NP-PICCs (P = 0.22, MW). Infectious complications occurred in 5/100 (5.0%) of P-PICCs vs. 9/730 (1.23%) of NP-PICCs (P = 0.02, C) and mechanical complications in 13/100 (13%) of P-PICCs vs. 75/730 (10.3%) in NP-PICCs (P = 0.39, C).

Conclusion. There was a significant increase in infectious complication rate between P-PICCs and NP-PICCs that necessitated PICC removal. There was a higher rate of complications overall with use of P-PICCs. This may be related to the increased proportion of lower birth weight and gestational age in the P-PICC group compared with the NP-PICC group. We intend to increase the patient numbers by adding data from 2019. Based on our review of P-PICCs we have increased risk of infectious complication and may not be as safe.
Impact of Parents and the Environment on MRSA Transmission in the Neonatal ICU

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Background. Methicillin-resistant *Staphylococcus aureus* (MRSA) colonization predisposes Neonatal Intensive Care Unit (NICU) infants to subsequent infection. Reservoirs for acquisition remain poorly understood, limiting infection prevention efforts to prevent transmission.

Methods. Infants with known MRSA nasal colonization based on hospital surveillance and controls with negative MRSA screening cultures, and their parents, were enrolled in a prospective cohort study. Weekly cultures were collected from infants (4 sites), parents (3 sites), and NICU environmental surfaces (5 sites). Factors associated with MRSA colonization and infection were identified using generalized linear mixed modeling. Whole-genome sequencing (WGS) and pairwise comparisons were performed across entire genomes on 1041 *S. aureus* isolates using kSNP3. Isolates differing by less than 80 single nucleotide polymorphisms were considered highly related; highly related strains from different sources suggested transmission.

Results. Samples were collected 1–28 (median 7) times from 29 MRSA-colonized infants, 29 controls, 49 mothers, and 21 fathers. Over the study period MRSA colonization was detected in 10 (34%) infants who were not known to be MRSA-colonized based on hospital nasal surveillance cultures. Parent MRSA colonization (OR=11.0; 95% CI: 2.2, 55.0) and environmental MRSA contamination (OR=5.0; 95% CI: 1.6, 15.3) were associated with infant MRSA colonization. Specifically, 87% of infants with an MRSA-colonized parent were MRSA-colonized. MRSA infections occurred in 6 (21%) MRSA-colonized infants and 0 controls (P = 0.05). Infant rectal colonization (OR=15.0; 95% CI 1.6, 140.5) and persistent MRSA colonization (i.e., 3 or more consecutive positive MRSA cultures) (OR=8.4; 95% CI 1.3, 52.5) were associated with MRSA infection. Thirty clusters of highly related isolates were detected, including 12 clusters with highly related isolates from multiple study families (2–6 [median 3] unique families per cluster; Figures 1 and 2).

Conclusion. Our findings suggest MRSA transmission between infants, their parents, and the environment as well as transmission between patients. Future infection prevention efforts should consider parent and environmental reservoirs, as well as the role of extranasal sites of colonization.

Disclosures. All authors: No reported disclosures.

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**Table 1 - 2016-2018 PICC Vein Sites (n=830)**

| Upper Limbs | Left | Right |
|-------------|------|-------|
| Basilic     | 327  | 117   |
| Brachial    | 107  | 50    |
| Cephalic    | 37   | 20    |
| Internal Jugular | 3 | 0.4% |
| Axillary    | 14   | 9     |
| Antecubital | 3    | 0.4%  |
| Upper Extremity | 4 | 0.5%  |
| 6 % 0.7%    | 2    | 0.2%  |
| Forearm     | 1    | 0.1%  |
| Popliteal   | 40   | 60    |
| Saphenous   | 8    | 14    |
| Femoral     | 3    | 2     |
| Lower Extremity | 1 | 0.1%  |
| Scalp       | 1    | 1     |

**Lower Limbs 130 % 15.7%**

| Characteristic | Popliteal (n=100) | Nonpopliteal (n=730) | p-value |
|----------------|------------------|---------------------|---------|
| Gestational Age (w), mean (range; median)2 | 28.53 (23-40.57; 26.79) | 31.96 (22.85-41.57; 31.86) | <0.0001 |
| Birth weight, mean; range; median, kg2 | 1.21 (0.34-3.91; 0.85) | 1.84 (0.31-5.14; 1.55) | <0.0001 |
| Day of life PICC placed (d), mean; range; median2 | 14 (0-140; 6) | 22.81 (0-224; 5) | 0.3289 |
| PICC dwell time (d), mean; range; median2 | 15.4 (2.79; 10.5) | 14.15 (0-109; 10) | 0.2147 |

1 Unpaired t-test 2Mann-Whitney U test

**Table 2 - Complications 2016-20181**

| Characteristic | Popliteal | Nonpopliteal | p-value |
|----------------|-----------|--------------|---------|
| Infectious     | 5/100 = 5% | 9/721 = 1.23% | 0.0198  |
| Mechanical     | 13/100 = 13% | 75/721 = 10.3% | 0.3936  |

1 = X2 2x2 contingency table

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