Letter to the Editor

Health-care associated infections in children after cardiac surgery in a pediatric cardiac intensive care unit (PCICU)

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Health-care associated infection (HAI) represents a major complication in patients undergoing cardiac surgery [1]. In the hospital setting of developing countries, where sub-optimal infection control and resource utilization may adversely affect surgical outcome, HAI rates are predictably higher (e.g 49% in India) than those in developed countries where rates range from 5.5% to 30.8% [2,3,4,5]. We report the frequency of HAIs and the associated case fatality rate among post-cardiac surgery pediatric patients admitted to the cardiac intensive care unit (CICU), at the Aga Khan University (AKU), Karachi, Pakistan between January 2008 and June 2009. Definitions of HAIs were as specified by the Centers for Disease Control and Prevention (CDC) and the National Health Care Safety Network (NHSN) Guidelines 2008 [6].

The HAI frequency in our study cohort was 7.9% (26/329). The low incidence of HAIs in our study, compared to the Indian cohort [5], may reflect strict implementation and adherence to the institutional Infection Control (IC) policy including strict visit regulations (one parent at a time), hand hygiene and an 1:1 nurse-to-patient ratio in high dependency/intensive care areas. An inverse correlation between HAI rates and nursing hours to patient day ratio had been reported in a previous cohort [2].

Table 1 elaborates demographic features, risk factors, and common sites of infection in descending order of frequency for our group of patients [4]. Though Gram-negative bacteria comprised 62.5% of all isolates (25/40), coagulase-negative staphylococci (CoNS) were the most prevalent pathogens overall (9/40) (Table 2).

The case-fatality rate (CFR) for pediatric post-cardiac surgery HAIs was 19.2% (5/26) while the overall mortality rate was only 6.0% (20/329). This four-fold difference reflects the 10-fold difference reported by Grisaru-Soen *et al*. [4]. Though age (< 1 month), complex congenital heart disease, higher complexity score (RACHS->3), and blood-stream infection (BSI) have all been reported as risk factors for mortality among post-cardiac surgery children with HAIs, the small size of our sample may have been responsible for not finding them significant [4].

In conclusion, although the frequency of pediatric post-cardiac surgery HAIs in our cardiac intensive care unit in Karachi, Pakistan, is lower than that reported in prior studies, case-fatality rates are comparable. Large prospective cohort studies may be required to identify population and age specific risk factors for HAI-related mortality in our hospital.

Table 1. Characteristics of post-cardiac surgery pediatric patients who developed HAIs

Variables	Patients with HAIs (n = 16)
Male, n (%)	16 (61.5)
Age, mean (range), y	3.86 (4 days - 19 years)
< 1 month, n (%)	11 (42.3)
1 month-1 year, n (%)	5 (19.2)
1-5 years, n (%)	2 (7.7)
5-19 years, n (%)	8 (30.8)
Weight, mean (range), kg	10.8 (2.1-40)
Height, mean (range), cm	77.8 (42-160)
Type of CHD, n (%)	
Cyanotic	13 (50)
Acyanotic	4 (15.4)
Complex	9 (34.6)
RACHS 1 scoring, n (%)	
<3	20 (76.9)
>3	6 (23.1)
Site of infection n (%)	
VAP	10 (38.5)
BSI	9 (34.6)
BSI+VAP	3 (11.5)
SSI	2 (7.7)
UTI	1 (3.8)
BSI+VAP+UTI	1 (3.8)
Sepsis related diagnosis, n (%)	
Sepsis	22 (84.6)
MOD	4 (15.4)
Pre operative antibiotics, n (%)	23 (88.5)
Pre operative MV, n (%)	3 (11.5)
Length of stay in PCICU, mean (range), days	10.4 (3-41)
Duration of MV, mean (range), days	8.1 (1-40)
Duration of CVC, mean (range), days	10.2 (3-41)
Duration of UC, mean (range), days	9.2 (2-41)
ACC time, mean (range), min	103.7 (40-255)
CBP time, mean (range), min	186.5 (50-420)
Outcome, n (%)	
Discharged from PCICU	21 (80.8)
Expired	5 (19.2)

CHD: congenital heart disease, RACHS: risk associated with congenital heart surgery, VAP: ventilator associated pneumonia, BSI: bloodstream infection, SSI: surgical site infection, UTI: urinary tract infection, MOD: multi organ dysfunction, MV: mechanical ventilation, PCICU: pediatric cardiac intensive care unit, CVC: central venous catheters, UC: urinary catheter, ACC: activated cross clamp time, CBP: cardiopulmonary bypass time.

Table 2. Etiology of HAIs in post-cardiac surgery pediatric patients in Karachi, Pakistan

Microorganism	Number of isolates (n = 40) (%)
Gram-negative bacteria	**25 (62.5)**
Acinetobacter sp.	5 (12.5)
Pseudomonas aeruginosa	5 (12.5)
Klebsiella pneumoniae	4 (10.0)
Haemophilus influenzae	3 (7.5)
Enterobacter sp.	2 (5.0)
Burkholderia cepacia	2 (15.0)
Moraxella catarrhalis	1 (2.5)
Gemella morbilium	1 (2.5)
Serratia liquifacies	1 (2.5)
Escherichia coli	1 (2.5)
Gram-positive bacteria	**12 (30.0**)
Staphylococcus epidermidis	9 (22.5)
Streptococcus pneumoniae	2 (5.0)
Beta-hemolytic streptococci	1 (2.5)
Fungi	**3 (7.5)**
Candida albicans	1 (2.5)
Candida tropicalis	1 (2.5)
Tricosporon bacilli	1 (2.5)

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Conflict of interests: No conflict of interests is declared.