

Catheter related blood stream infection in Indian PICUs: Several unanswered issues!

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Catheter related blood stream infection (CRBSI) remains the most common nosocomial infection in pediatric ICUs resulting in significant morbidity, mortality, and added health care costs.^[1] The recent literature from the West has shifted focus from incidence data to possible elimination of CRBSI in adult ICUs by applying a multifaceted intervention,^[2,3] and on evaluation of efficacy of preventive 'bundles' in pediatric ICUs.^[4,5] Situation in developing countries including India is far behind; very few studies expressing CRBSI data in terms of device utilization frequencies as denominator are available and, little if any, data exists on preventive measures.^[6-8] In this light, the study by Thomas *et al.*,^[9] in this issue of *Indian Journal Of Critical Care Medicine* is an appreciable addition to information on India-specific incidence and risk factors of CRBSI in children. This prospective observational study conducted over two months included 41 children with a central vascular catheter. The authors observed colonization in 21 children and CRBSI in 2 children, amounting to a CRBSI rate of 6.3/1000 catheter days. This figure is similar to the western data where a recent estimate from USA including 36 PICUs have shown a pooled mean rate of 5.3 catheter-associated bloodstream infections (CA-BSIs) per 1000 catheter days.^[10] However, study by Thomas *et al.*, has several limiting factors that make such outright comparisons inappropriate.

First, the study was carried out over a short period of time with a very small sample size, thus making it inadequately powered to provide incidence data that could be compared to large multicentre longitudinal studies. Second, despite efforts to attain a standard definition for CRBSI or CABS, a consistent definition

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for such infections in pediatric patients has not yet been used in the literature. In the current study, Thomas *et al.*, established CRBSI diagnosis when catheter sample and the peripheral sample grew the same organism along with clinical judgement.^[9] However, this clinical definition also stops short of standard CRBSI definitions proposed by Centers for Disease Control and Prevention (CDC) and Infectious Diseases Society of America (IDSA)^[11] by not including culture criteria for the diagnosis, which requires concordant growth on catheter *tip* culture, and a percutaneously obtained blood sample. Third and most importantly, Thomas *et al.*, did not assess the adherence to maintenance care bundle among health care providers. 'Bundle' care have long been followed and shown to be effective in decreasing CLABSI rate in adult as well as pediatric population.^[4,5] Studies have emphasized that practices related solely to the insertion of central lines can significantly reduce CLABSIs in adult ICUs.^[2,3] In contrast to findings in adult ICUs, maximizing insertion-bundle compliance alone cannot reduce CLABSIs in PICUs. Instead, the main drivers for further reducing pediatric CLABSI rates seem to be the practices related to maintenance care for central lines. A collaborative study from 29 US PICUs demonstrated a 43% reduction in CLABSI rates with the utilization of bundle care. After adjusting for region and PICU demographics, the only significant predictor for

reduction in CLABSI rate was maintenance care bundle compliance.^[5]

The rates of CRBSI among pediatric patients vary greatly due to the numerous patient-related and practice-related risk factors. Higher rates were observed in neonates and younger age, children in surgical ICUs receiving TPN, patients with burns, and those having genetic abnormality, neutropenia, and mechanical ventilation.^[12] The type of catheter, its placement and duration can also influence the risk of developing CRBSI. Percutaneously placed catheters are more often associated with CRBSI than do tunneled devices.^[13] CRBSI rate increases significantly after a catheter dwell time of 7 days.^[14] The site of catheter insertion is a controversial risk factor. While studies in adults reported highest infection risk with femoral insertions, most studies in pediatric patients showed no difference in infection rate based on insertion site.^[15] Study by Thomas *et al.*,^[9] substantiates some of these previous observations. Increased colonization rate was noted in younger patients. Femoral vein was the most common site catheterized in the study children and site of insertion had no association with catheter colonization. However, other factors like duration of catheterization, antibiotic usage, blood products transfusion, and underlying malnutrition did not attain statistically significant difference between colonized and non-colonized groups. Again, the small sample size of the study is a major limitation in interpreting these results. Larger studies on these issues could prove useful in identifying independent risk factors especially those operating in resource limited situations.

Several questions regarding CRBSI remain unanswered with the available pediatric literature. Potential differences in infection rate and risk factors that could occur due to differing population and practices in PICUs from developing world make the situation more complex. Further research is needed to formulate an evidence base that provides measures to effectively reduce CRBSI in children.

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