

R462

Publication Only

Infection Control: Clinical epidemiology of nosocomial infections

Usefulness of surveillance cultures in reducing extended-spectrum beta-lactamase-producing *Enterobacteriaceae* colonisation in a resource-limited neonatal intensive care unit

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OBJECTIVE

To report six years of surveillance intervention and describe its benefit.

METHODS

This retrospective study was conducted in a NICU of a public community hospital in São Paulo city, Brazil. The NICU comprises 17 beds and accepts only babies born in the hospital: 11 for intermediate care, four for intensive care and two for isolation precautions. In a period of 13 months (from June 2007 to June 2008), three extended-spectrum beta-lactamase-(ESBL) producing *K. pneumoniae* outbreaks occurred in the NICU at our institution. During the outbreak 25/46 (54%) of rectal swabs performed on all patients that had contact with a neonate infected by ESBL-producing *K. pneumoniae* were positive. At the end of this period, long-term continuous active surveillance was added to existing infection control measures.

From July 2008 to June 2013, rectal swabs were performed and cultured on all neonates present in the NICU on Mondays. Neonates identified as ESBL-producing *Enterobacteriaceae* carriers based on surveillance or clinical cultures were managed with full contact precautions either in single rooms or in cohort with other colonized/infected neonates, during the whole hospital stay. The active surveillance was added to 'traditional' infection control measures including hand hygiene; education sessions; cleaning and disinfection protocols and restricting the area to visitors. Empiric antibiotic protocols and microbiological methods were not changed and routine environmental cultures were not performed.

Rectal swabs were plated on MacConkey agar. Identification and susceptibilities were determined by disk diffusion. ESBL production was confirmed by the disk approximation method.

RESULTS

During active surveillance, amongst 1.795 neonate admissions, 711 (39.6%) stayed for  $\geq 7$  days. Surveillance sampling was performed on 1.097 (61%) neonates with a median time from admission to first surveillance culture of 2 [interquartile range (IQR) 1–4] days. Overall, 2.861 cultures were performed (median 2, IQR 1–4 per neonate). The proportion of neonates acquiring ESBL-producing *Enterobacteriaceae* decreased significantly from 54% (from June 2007 to June 2008) to 39/1.097 (2.7%), during the active surveillance. Clinical infection with ESBL-producing *Enterobacteriaceae* was diagnosed in five neonates (one *Enterobacter* sp, four *Serratia marcescens* bacteremias).

CONCLUSION

A continuous long-term surveillance culturing and neonatal cohorting were associated with a marked decrease in the spread of ESBL-producing *Enterobacteriaceae* within the NICU. This low-risk intervention should be considered as a means to decreasing neonatal acquisition of resistant bacteria.

The study has limitations. It is an observational study and lacks a control group in order to prove its effectiveness, a problem inherent in all surveillance studies; however, ethical constraints preclude generation of more valid evidence.

