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A combined preventive strategy could reduce late sepsis in the premature child

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English key words: premature infant, infection, nosocomial infection, sepsis, catheter-associated infection, prevention, patient care bundles.

Palabras clave en español: recién nacido prematuro, infección nosocomial, sepsis, infección asociada a catéter, prevención, paquetes de atención al paciente.

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A combined preventive strategy could reduce late sepsis in the premature child

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Original article: Sinha AK, Murthy V, Nath P, Morris JK, Millar M. Prevention of late onset sepsis and central-line associated bloodstream infection in preterm infants. *Pediatr Infect Dis J.* 2016;3:401-6.

Abstract

Authors' conclusions: the use of a combined strategy in multiple phases in the management of premature child reduced the incidence of late sepsis to 88% with respect to the pre-intervention values and also the incidence of infections of the central venous catheters.

Reviewers' commentary: this is a well designed and executed study although due to the fact that it was not randomized and the controls were of historical type, we cannot assume the direct applicability of the results.

Key words: premature infant, infection, nosocomial infection, sepsis, catheter-associated infection, prevention, patient care bundles.

Una estrategia preventiva combinada podría reducir las sepsis tardías en el prematuro

Resumen

Conclusiones de los autores del estudio: la aplicación de una estrategia combinada en múltiples etapas en el manejo de los recién nacidos prematuros redujo de manera incremental la incidencia de sepsis tardía hasta un 88%, con respecto a las cifras preintervención y también la incidencia de infecciones de catéteres venosos centrales.

Comentario de los revisores: es un estudio bien diseñado y llevado a cabo, aunque por su diseño, no aleatorizado y con control histórico, no podemos asumir la aplicabilidad de sus resultados directamente.

Palabras clave: recién nacido prematuro, infección nosocomial, sepsis, infección asociada a catéter, prevención, paquetes de atención al paciente.

STRUCTURED ABSTRACT

Objective: to assess the impact of a hospital-wide combined strategy to prevent late-onset neonatal sepsis in preterm newborns delivered at less than 32 weeks' gestation.

Design: non-randomised experimental study with historical controls to assess the efficacy of a series of preventive measures implemented during the study period (lasting 5 years).

Setting: tertiary care level hospital in the United Kingdom.

Study population: 979 patients born at less than 32 weeks of gestational age (GA) admitted to the neonatal care unit between January 2007 and December 2012.

Intervention: the initial intervention consisted of the introduction of audits of central venous catheter practices, the appointment of a specialist hospital vascular device nurse, the change in policy recommendations from 0.5% to 2% chlorhexidine for catheter hub disinfection, the introduction of a venous infusion phlebitis scoring system and a change in the mode of administration of vancomycin to continuous infusion to treat late-onset sepsis (LOS) in newborns with percutaneously-inserted central catheters or surgical catheters; measures implemented later on included the standardisation of skin disinfection policy, a second hospital-wide audit, moving the Neonatal Intensive Care Unit (NICU) to a new building, and the updating and reinforcement of hospital-wide blood culture guidelines.

Outcome assessment: the NICU activity for each month was calculated based on the number of intensive care days, high dependency days and special care days as defined by the British Association of Perinatal Medicine, and the number of central line days was obtained from the retrospective review of the neonatal unit database. In addition, the number of blood cultures taken from peripheral or central venous catheters was obtained from the laboratory database. The authors estimated the risk of central line associated blood stream infection (CLA-BSI) and LOS based on the pre- and post-intervention days of exposure using Poisson regression.

Main results: the percentage of newborns delivered before 32 weeks' gestation that had at least one episode of infection decreased from 38% in 2007 to 12.1% in 2012, with a reduction in the incidence of LOS from 26.1 to 2.9 per 1000 high dependency days and a decrease in CLA-BIS from 31.6 to 4.3 per 1000 catheter days. The authors estimated a reduction in incidence associated to the initial interventions of 55% (95% confidence interval [95 CI]: 40 to 74) for LOS and of 45% (95 CI: 33 to 61) for CLA-BSI. The estimated reduction in LOS associated with the standardization of skin disinfection policy was of 64% (95 CI: 47 to 87), and the reduction associated to moving to a new building was estimated at 54% (95 CI: 34 to 88). The implementation of an aseptic no-touch technique for infusion access was associated with a reduction in CLA-BSI of 53% (95 CI: 37 to 75).

Conclusion: this intervention produced a significant reduction in the rate of LOS in preterm infants, and the most important factors identified were the changes in skin disinfection, the administration of antimicrobials through catheters, the training of nurses responsible for intravascular catheter management and regular surveillance.

Conflicts of interest: none.

Funding source: none reported.

COMMENTARY

Justification: late-onset sepsis (sepsis acquired 48 hours after birth) is a major cause of mortality and disability in preterm infants. Sepsis has a significant negative impact on neurodevelopmental outcomes in children that survive it. Multiple interventions have been tried to reduce its incidence (probiotics, prebiotics, hygiene strategies, and more recently "care bundles" in the NICU).¹ These interventions need to be evaluated.

Scientific rigour or validity: the study under consideration clearly defined the components of the research question. The procedures used in the implementation of the successive interventions and in the measurement of outcomes were correct. There were no documented losses due to death or hospital or unit transfers. The non-randomised design and use of historical controls precluded the establishment of causality.

The analysis of risk reduction by means of Poisson regression allowed to control for seasonal variations, temporal trends and changes that occurred before and after each intervention.^{2,3}

Clinical relevance: during the period in which a series of preventive measures were implemented, there was a substantial decrease in the incidence of LOS (by a factor of 8 to 10), with an estimated risk reduction of nearly 50% for the main interventions. This effect is clinically significant, although due to the lack of randomization in the evaluated interventions, the actual effect size is in question.

A prospective randomised single-centre study (GA < 29 weeks/birth weight < 1000 g) that assessed the use of sterile gloves in the management of preterm infants found a reduction of 53% in LOS caused by gram-positive bacteria and of 64% in CLA-BSI.⁴

Guidelines have been established for the prevention of infection, although dating from 2002, which propose evidence-based interventions similar to those used in this study, such as the training of health professionals responsible for intravenous catheter placement and management.⁵

Applicability to clinical practice: in hospital settings, and especially in intensive care units, health care staff is used to rigorously implement and evaluate sets of interventions aiming at the adequate management of patients, so the strategy seems to be feasible in these settings. Given the importance of the consequences of sepsis, every neonatal unit must strive to reduce its incidence to the extent possible. Given the characteristics of the study, which was conducted in a single centre, was not randomised and used historical controls, it would be risky to assume that its results are applicable to Spain. Nevertheless, taking into account the observed effect size and the importance of the infections that were prevented, the implementation of preventive measures similar to those in this study in Spain seems warranted, along with the introduction of surveillance systems to monitor their efficacy.

Conflicts of interest: the authors of the commentary have no conflicts of interest to declare.

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TREATMENT

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