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Unnecessary use of antibiotics can be reduced in neonatal intensive care units

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English key words: Neonatal Intensive Care Unit, anti-bacterial agents: therapeutic use.

Spanish key words: Unidad de Cuidados Intensivos Neonatales, antibacterianos: uso terapéutico.

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Unnecessary use of antibiotics can be reduced in neonatal intensive care units

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Original article: Cantey JB, Wozniak PS, Pruszynski JE, Sánchez PJ. Reducing unnecessary antibiotic use in the neonatal intensive care unit (SCOUT): a prospective interrupted time-series study. *Lancet Infect Dis.* 2016;16:1178-84.

Abstract

Authors' conclusions: the evaluation of antibiotic consumption in the neonatal intensive care unit can reduce its use by 27%, through personalized interventions, without affecting the safety of patients.

Reviewers' commentary: the use of antibiotics in neonatal intensive care units can be reduced by re-evaluating empirical antibiotics at 48 hours and shortening the treatment of pneumonia and clinical sepsis.

Key words: Neonatal Intensive Care Unit, anti-bacterial agents: therapeutic use.

Se puede reducir el uso innecesario de antibióticos en intensivos neonatales

Resumen

Conclusiones de los autores del estudio: la evaluación del consumo de antibióticos en la Unidad de Cuidados Intensivos Neonatales permite, a través de intervenciones personalizadas, disminuir un 27% su uso sin afectar la seguridad de los pacientes.

Comentario de los revisores: puede reducirse el uso de antibióticos en las Unidades de Cuidados Intensivos Neonatales, mediante la reevaluación de la antibioterapia empírica a las 48 horas y el acortamiento del tratamiento de neumonías y sepsis clínicas.

Palabras clave: Unidad de Cuidados Intensivos Neonatales, antibacterianos: uso terapéutico.

STRUCTURED ABSTRACT

Objective: to inform antibiotic stewardship strategies in a level 3 neonatal intensive care unit by surveillance and assessment of antibiotic use during a 14-month period. To identify scenarios where antibiotic use can be reduced, and implementing interventions while monitoring safety.

Design: pre-post intervention quasi-experimental study. Surveillance and Correction of Unnecessary Antibiotic Therapy (SCOUT) study.

Setting: level 3 Neonatal Intensive Care Unit, Parkland Hospital, Dallas, Texas, United States.

Study sample: 2502 infants admitted to the NICU, 1607 during the baseline period (October 3, 2011 to May 31, 2013) and 895 during the intervention period (October 1, 2013 to June 30, 2014).

Intervention: during the intervention period, all antibiotic treatments were reevaluated systematically at 48 hours, at which point courses of empirical antibiotherapy were discontinued. The duration of therapy in cases of pneumonia and clinical sepsis with negative cultures was limited to five days.

Outcome measurement: the primary outcome was the change in total antibiotic days of therapy per 1000 patient-days between the baseline and intervention periods. The safety outcomes under study were the number of infants that had antibiotic therapy reinstated within 14 days of completion of a course. The authors also documented the number of cases of late-onset sepsis, necrotising enterocolitis or death in infants ≤ 32 weeks' gestational age, the prevalence of colonisation by multidrug-resistant organisms and the length of stay.

Main results: antibiotic use decreased from 343.2 to 252.2 of therapy per 1000 patient-days ($P < .001$), which amounts to an overall reduction of 27%. No differences were observed

in the safety outcomes between the intervention and baseline periods, although there was a significant increase in length of stay from seven to eight days.

Conclusion: a thorough assessment of antibiotic consumption in neonatal intensive care units and the implementation of strategies tailored to each facility can help improve interventions to optimise antibiotic use.

Conflicts of interest: the authors declared no competing interests.

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COMMENTARY

Justification: the excessive use of antibiotics in NICUs is associated with adverse effects, such as increased risk of infection by multidrug-resistant organisms, invasive yeast infections, bronchopulmonary dysplasia, necrotising enterocolitis, late-onset sepsis and even death.¹⁻² Therefore, there is widespread consensus on the need to implement antibiotic surveillance and stewardship strategies. This study analysed antibiotic use in one NICU and the efficacy of three specific interventions for discontinuing antibiotherapy that could be applied in other facilities.

Validity/scientific rigour: this was an open-cohort quasi-experimental study with a historical control group. The population, intervention and outcome measurements were well defined. The sample was representative of NICUs, and only patients that required extracorporeal membrane oxygenation or cardiac surgery were transferred elsewhere. Although the study was not blind, the primary outcome was objective enough, so that selection bias would be unlikely. It is possible that the diagnoses given were intentionally changed (the authors mentioned an increased proportion of infants with a diagnosis of stage I necrotising enterocolitis) to preclude the interruption of antibiotic treatment, which may have diminished the effect of the intervention. The analysis was correct,

with an exhaustive surveillance of potential adverse effects, however, due to the study design ("pre-post"), it is not possible to attribute all observed changes to the intervention that was carried out.

Clinical relevance: a 27% reduction in the use of antibiotics is clinically significant and could have benefits in the middle-to-long term if this reduction was sustained in time. We have no data on the efficacy of similar interventions in NICUs. In different settings, the reduction in antibiotic use has been associated with a decreased length of stay, contrary to what was observed by the authors of this study.³ Still, the benefits may outweigh the cost.

Applicability to clinical practice: although the interventions under study were based on the characteristics of antibiotic prescription of a specific hospital, the simplicity of the measures applied, applicable to other neonatal units, are likely to be efficacious in Spanish NICUs. Although the effect could be smaller, reevaluating empirical antibiotherapy at 48 hours and reducing the duration of treatment in cases of clinical sepsis and pneumonia are sensible and generalisable strategies.

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

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