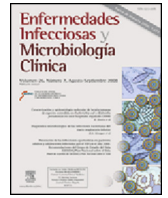




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Original article

Trends in nosocomial infections and multidrug-resistant microorganisms in Spanish pediatric intensive care units



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ABSTRACT

Introduction: Nosocomial infections (NI) are a major healthcare problem. National surveillance systems enable data to be compared and to implement new measures to improve our practice.

Methods: A multicentre, prospective, descriptive and observational study was conducted using the data from surveillance system for nosocomial infections created in 2007 for Spanish pediatric intensive care units. Data were collected for one month, between 01 and 31 March, for every study year (2008–2012). The objective was to report 5-years of NI surveillance data, as well as trends in infections by multidrug resistant organisms in Spanish pediatric intensive care units.

Results: A total of 3667 patients were admitted to the units during the study period. There were 90 (2.45%) patients with nosocomial infections. The mean rates during the 5 years study were: central line-associated bloodstream infection, 3.8/1000 central venous catheter-days, Ventilator-associated pneumonia 7.5/1000 endotracheal tube-days, and catheter-associated urinary tract infections 4.1/1000 urinary catheter-days. The comparison between the 2008 and 2009 rates for nosocomial infections did not show statistically significant differences. All rates homogeneously decreased from 2009 to 2012: central line-associated bloodstream infection 5.83 (95% CI 2.67–11.07) to 0.49 (95% CI 0.0125–2.76), $P=0.0029$; ventilator-associated pneumonia 10.44 (95% CI 5.21–18.67) to 4.04 (95% CI 1.48–8.80), $P=0.0525$; and Catheter-associated urinary tract infections 7.10 (95% CI 3.067–13.999) to 2.56 (95% CI 0.697–6.553), $P=0.0817$; respectively. The microorganism analysis: 63 of the 99 isolated bacteria (63.6%) were Gram-negative bacteria (36.5% were resistant), 19 (19.2%) Gram-positive bacteria, and 17 (17.2%) were *Candida* spp. infections.

Conclusions: The local surveillance systems provide information for dealing with nosocomial infections rates.

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◇ See Appendix A for members of the collaboration.

Tendencia de la infección nosocomial y microorganismos multirresistentes en unidades de cuidados intensivos pediátricas en España

R E S U M E N

Palabras clave:
Nosocomial
Pediátrico
Tasas
Microorganismos multirresistentes
Vigilancia

Introducción: Las infecciones nosocomiales son un problema de salud pública. Los sistemas nacionales de vigilancia permiten comparar datos e implementar medidas para mejorar la práctica asistencial.

Método: Estudio multicéntrico, prospectivo, descriptivo y observacional. En 2007 se creó un sistema de vigilancia para infección nosocomial en las Unidades de Cuidados Intensivos Pediátricas Españolas. Se recogieron datos durante un mes (Marzo) por año (2008–2012). El objetivo fue reportar las tasas de los 5 años de vigilancia de la infección nosocomial y la evolución de las infecciones por microorganismos multirresistentes.

Resultados: Ingresaron 3667 pacientes. Número de pacientes con infección nosocomial: 90 (2.45%). Tasas medias de los 5 años de estudio: Bacteriemia relacionada con catéter 3.8/1000 días de catéter venoso central, Neumonía asociada a la ventilación mecánica 7.5/1000 días de tubo endotraqueal e Infecciones urinarias asociadas a sonda 4.1/1000 días de sonda urinaria. La comparación de tasas entre 2008 y 2009 no mostró diferencias estadísticamente significativas. Todas las tasas se redujeron homogéneamente desde 2009 a 2012: Bacteriemia relacionada con catéter 5.83 (95% CI 2.67–11.07) a 0.49 (95% CI 0.0125–2.76), $P=0.0029$; Neumonía asociada a la ventilación mecánica 10.44 (95% CI 5.21–18.67) a 4.04 (95% CI 1.48–8.80), $P=0.0525$; Infecciones urinarias asociadas a sonda 7.10 (95% CI 3.067–13.999) a 2.56 (95% CI 0.697–6.553), $P=0.0817$; respectivamente. Microorganismos: 63 de 99 (83.6%) microorganismos aislados fueron bacterias gram-negativas (36.5% resistentes), 19 (19.2%) bacterias gram-positivas y 17 (17.2%) infecciones por *Candida* spp.

Conclusiones: Los sistemas de vigilancia local aportan información para mejorar las tasas de infección nosocomial.

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Introduction

Nosocomial infections (NI) are a major healthcare problem. Children admitted to the pediatric intensive care unit (PICU) are particularly vulnerable to NI because of their immunocompromised and the high prevalence of use of invasive devices during their stabilization. The prevalence of NI in PICU patients is approximately 3–23.6%.^{1–4} NI increases mortality, morbidity and costs.^{1,5} Infections with multidrug-resistant microorganisms (MDRO) complicate the treatment and often implicate a worse outcome.^{6,7} The incidence of MDRO varies according to geographical region and type of intensive care unit. International and national surveillance systems allow to compare data and to implement new measures to improve our practice. Several initiatives have been performed in order to reduce the prevalence of NI as a priority to improve the safety of patient care.^{4,8,9} Regarding to MDRO, the local information that these surveillance systems provide is especially useful to prevent and treat these infections.

National surveillance of adult patients has been carried out during the last 20 years, by the ENVIN-HELICS database. The Spanish Society of Pediatric Intensive Care Units developed in 2007 a similar program to report NI rates and information about MDRO infections.³ This program noticed the NI situation in our country and in each unit in order to reach better NI rates. Few current data is available about European PICUs and most of data are about a unique hospital.^{4,10,11} In this article, we aim to report 5-years of NI surveillance data and trends in MDRO infections in Spanish PICUs.

Methods

Design

It was a multicenter, prospective, descriptive and observational study. The institution's ethical review board of each hospital approved the study and waived the need for informed consent because no added risk to patients was involved and patient anonymity was guaranteed.

Setting

Spanish PICU who were part of the group of Infectious Diseases of the Spanish Society of Pediatric Intensive Care. The centers recruitment was progressive from 2007 to 2012. In 2007 a surveillance system for nosocomial infection was created and called VINCIP (“Vigilancia de Infección nosocomial en Cuidados Intensivos Pediátricos”, surveillance of nosocomial infection in Pediatric Intensive Care). The objective of this surveillance system was to collect data about NI and MDRO infections to describe the epidemiology of NI in Spanish PICU.³ The priority of this group was the implementation of the data collection system and its standardization. VINCIP did not performed any intervention in order to decrease NI during this period as a group, but most of PICU implemented measures to decrease NI, especially Center-line associated bloodstream infections (CLABSI) and Ventilator-associated pneumoniae (VAP) and introduced bundles in order to get the zero bacteremia (ZB) and zero VAP (ZVAP) rates. The ZB and ZVAP programs required one or two year to be correctly implemented in most of the units. The protocol differed from the adult one, especially in the NI definitions, regarding the bundles were really near to the adult protocol with low exceptions (subglottic aspiration). In 2008, 9 PICU participated in VINCIP and it increased to 28 PICUs in 2012, which represented around the 80% from all national units.

Study design

Data were collected one month, between 01 and 31 March, for every study year (2008–2012). The same month for each year was selected to avoid a seasonal bias.

Inclusion criteria

We included all children admitted to the PICU more than 24 h, aged 7 days to 18 years who need almost one of the following external devices: central venous catheter (CVC), endotracheal tube (ET) or urinary catheter (UC).

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