



ORIGINAL ARTICLE

Respiratory syncytial virus outbreak in a tertiary hospital Neonatal Intensive Care Unit^{☆,☆}



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Received 17 July 2015; accepted 6 October 2015

Available online 26 July 2016

KEYWORDS

Respiratory syncytial viruses;
Cross infection;
Disease outbreaks;
Neonatal intensive care unit;
Hand hygiene

Abstract

Introduction: Investigation and control of a respiratory syncytial virus (RSV) outbreak that affected the Neonatal Intensive Care Unit (NICU) of a university hospital from October to December 2012.

Patients and methods: Cohort study of children admitted to the NICU. The infection attack rate was calculated. A descriptive analysis of the cases and a multivariate analysis was performed using the variables that were shown to be risk factors for RSV infection.

Preventive measures taken were: contact isolation; hand hygiene training and observation; exclusivity of a health team of nurses and physicians for positive cases, restrictions on visitor numbers; surveillance RSV testing, and palivizumab prophylaxis.

Results: The outbreak had three epidemic waves and 20 positive cases out of a total of 48 children admitted. The overall attack rate was 42%. Half of positive cases were children, with a median age of 36 days (p25 = 22, p75 = 58). The independent risk factors for RSV infection were birth weight below 1000 g (OR = 23.5; *P* = .002) and to have another nosocomial infection the week before the diagnosis of RSV infection (OR = 19.98; *P* = .016).

Conclusions: It was an outbreak with a high number of cases, due to the delay in notification, prolonged RSV carrier status, and low adherence to hand hygiene practice, which favoured the cross-transmission of infection. The most effective preventive measures were direct observation of hand hygiene and supervision of isolation measures.

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[☆] Please cite this article as: Parejo CM, García AM, Domínguez CL, Ochoa CC, Martín JA, Herrera MC. Brote por virus respiratorio sincitial en la Unidad de Neonatología de un hospital de tercer nivel. An Pediatr (Barc). 2016;85:119–127.

[☆] Previous presentations: This study was presented as an oral communication (*Brote nosocomial de infección por virus respiratorio sincitial en una Unidad de Neonatología*) at the Congreso Iberoamericano de Epidemiología y Salud Pública, XXXI Reunión Científica de la Sociedad Española de Epidemiología; September 4–6, 2013; Granada, Spain.

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PALABRAS CLAVE

Virus respiratorio sincitial;
Infección nosocomial;
Brote epidémico;
Cuidados intensivos neonatales;
Higiene de manos

Brote por virus respiratorio sincitial en la Unidad de Neonatología de un hospital de tercer nivel**Resumen**

Introducción: Investigación y control de un brote por virus respiratorio sincitial (VRS) que afectó a la Unidad de Neonatología (UN) de un hospital universitario de octubre a diciembre del 2012. **Pacientes y métodos:** Estudio de cohortes de los niños ingresados en la UN. Se calculó la tasa de ataque de infección y se realizaron un análisis descriptivo de los casos y un análisis multivariante de aquellas variables que mostraron ser factores de riesgo de infección por VRS.

Las medidas preventivas llevadas a cabo fueron: aislamiento de contacto de casos; formación y observación de higiene de manos; exclusividad del personal sanitario para casos, restricción de visitas; estudio de portadores de VRS y profilaxis con palivizumab.

Resultados: El brote tuvo 3 ondas epidémicas y un total de 20 casos, de 48 niños ingresados. La tasa de ataque global fue del 42%. De los casos, la mitad fueron niños, con una edad mediana de 36 días (p25 = 22, p75 = 58). El peso al nacimiento inferior a 1.000 g (OR = 23,5; p = 0,002) y tener otra infección nosocomial en la semana previa al diagnóstico de infección por VRS (OR = 19,98; p = 0,016), fueron factores de riesgo independientes de infección por VRS.

Conclusiones: Se trató de un brote epidémico con un elevado número de casos, relacionado con el retraso en la notificación, el tiempo prolongado del estado de portador del VRS y los fallos en el cumplimiento de la higiene de manos, que favoreció la transmisión cruzada de la infección. Las medidas preventivas más eficaces fueron la observación directa de higiene de manos y supervisión de las medidas de aislamiento.

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Introduction

Respiratory syncytial virus (RSV) is a single-stranded RNA virus of the Paramyxoviridae family. It is classified into A and B subtypes, which may co-circulate, although subtype A generally dominates.¹

Respiratory syncytial virus is the single most important cause of lower respiratory tract infections² and the leading cause of acute bronchiolitis³ in children. It may cause upper respiratory tract infections, lower respiratory tract infections and pneumonia.⁴ It causes seasonal outbreaks that vary by geographical area, with its incidence peaking between November and February in Spain.⁵ It is one of the main causative agents in nosocomial respiratory tract infections in the paediatric population, and causes outbreaks associated with considerable morbidity and mortality, especially in patients with certain underlying diseases. Prolonged viral shedding and the potential susceptibility of patients and health care staff, since permanent immunity cannot be acquired, make it difficult to control nosocomial spread.⁷

The most frequent mode of transmission is direct contact, as the virus can remain for hours in surfaces and the hands of health care workers.⁸

In this article, we analyse an outbreak of RSV that affected 20 infants hospitalised in a neonatal unit (NU) and the measures taken to control the spread of infection.

Patients and methods

The NU was located in a tertiary care university hospital (referral hospital).⁹ The paediatric department serves a catchment area with a population of 150,619 children.¹⁰

The NU, which is the referral unit for the autonomous community of Andalusia, is divided into General Neonatology (GN), which has 28 beds, 5 doctors and a nurse-patient ratio of one nurse to six or seven patients; the Intermediate Care Nursery (ICN), with 16 beds, 6 doctors and a ratio of one nurse per three or four patients; and the Neonatal Intensive Care Unit (NICU), with 12 beds, 6 doctors and a ratio of one nurse per two patients.

Definitions. We defined a *suspected case* of RSV infection as a neonate admitted to the NU between October 2 and December 6 that exhibited symptoms compatible with one of the following: upper respiratory tract infection (presence of cough, rhinorrhoea and/or fever); lower respiratory tract infection (hypoxaemia, stridor or wheezing on auscultation, or use of accessory muscles for breathing); pneumonia (presence of respiratory symptoms and evidence of lung consolidation in chest X-ray)⁴ and/or bronchiolitis (rhinitis, tachypnoea, wheezing, cough, crepitus and/or nasal flaring).³ A *confirmed case* was defined as a neonate admitted to the NU between October 2 and December 6 with a positive RSV antigen detection test of a nasopharyngeal wash sample and symptoms compatible with upper respiratory tract infection, lower respiratory tract infection, pneumonia and/or bronchiolitis. We defined *asymptomatic carrier* as a neonate admitted to the UN between October 2 and December 6, with a positive RSV antigen detection test of a nasopharyngeal aspirate sample and no apparent symptoms of respiratory infection. We calculated the length of stay in the NU for RSV cases as the number of days elapsed from admission to the day of microbiological diagnosis. For those that did not become ill, length of stay was calculated as the days elapsed from admission to the

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