

# Nosocomial Respiratory Syncytial Virus Infection in a Newborn Nursery

Respiratory syncytial virus (RSV) has been recognized as a major nosocomial hazard on pediatric wards, but symptomatic RSV infection is uncommon during the first four weeks of life. We report here four cases of neonatal RSV infection in a special-care newborn nursery and two of them probably acquired the infection nosocomially. By rapid diagnosis using immunofluorescent technique and early implementation of infection control measures, we were able to prevent further spread of RSV infection. (*JKMS 1997; 12: 489~91*)

**Key Words :** *Respiratory syncytial virus infections; Cross infection; Infant, Newborn; Fluorescent antibody technique*

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## INTRODUCTION

Respiratory syncytial virus (RSV) is the single most common cause of bronchiolitis and pneumonia in infants and young children worldwide (1, 2). In a temperate climate, annual epidemics of RSV start in the fall, peak in the winter, and return to baseline in spring. These outbreaks are associated with increased rates of hospitalization and death from lower respiratory tract illness in infants and young children (3). During a community outbreak of RSV infection, up to 40% of contact infants on hospital wards may acquire RSV infection nosocomially (4). But the illness is mild or atypical during the first four weeks of life. Though the reasons for this phenomenon are unclear, maternal antibody may be protective or other factors maybe present in the neonatal respiratory tract which tend to limit viral replication (5). RSV also causes serious pulmonary disease and death in adults, particularly in the elderly and those with compromised immune systems (6, 7). With the advent of therapy with antiviral agents such as ribavirin and with the emphasis on reducing nosocomial infection, rapid RSV diagnosis is imperative.

During late September through October, 1996, when respiratory illness due to RSV began in our community, we experienced 4 cases of neonatal RSV infection in the special-care newborn nursery and two of them probably acquired the virus nosocomially.

## REPORT OF CASES

The special-care nursery consists of one medium-sized room with a capacity of 6 beds and is for diseased neonates, admitted usually from the outpatient clinic.

Case 1 was admitted to the special-care nursery on September 26 due to cough and rhinorrhea, and case 2 on September 30 due to the same symptoms with the impression of pneumonia (Table 1). Nasopharyngeal aspirates (NPAs) collected from them on October 1 were positive for RSV by indirect immunofluorescent staining method (Respiratory Panel I Viral Screening & Identification Kit, Light Diagnostics, USA).

Case 3 was admitted to the special-care nursery on October 3 due to diarrhea, while the case 1 and case 2 neonates were in the same room. Cases 2 and 3 stayed together for 6 days. Case 4 was hospitalized on October 11 with the impression of meningitis, and its cubicle was adjacent to that of case 3. Respiratory symptoms developed in case 3 on the 10th hospital day (October 12)

**Table 1.** Clinical features of four newborns with RSV infection

Case No.	Age in days	Admission diagnosis	Hospitalization period	Onset of respiratory symptoms
1	17	Pneumonia	9/26-10/4	9/21
2	14	Pneumonia	9/30-10/8	9/27
3	19	Gastroenteritis	10/3-10/24	10/12
4	30	Meningitis	10/11-10/19	10/16

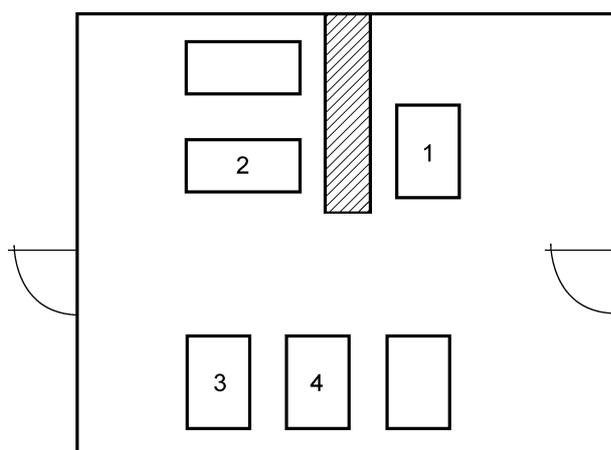


Fig. 1. The special-care newborn nursery and positions of the four cases.

and in case 4 on the 6th hospital day (October 16). NPAs collected from both case 3 and 4 on October 16 were positive for RSV (Fig. 1).

After wearing of disposable gloves and masks for all contact with newborns, no more cases of symptomatic RSV infection occurred in the special-care newborn nursery.

## DISCUSSION

RSV appears to be highly contagious and spreads rapidly among groups of young children (8), in families (9, 10), and on hospital wards (11, 12, 13). The chances of acquisition of the virus seem to be related to the duration of the infant's hospital stay. Of the patients on the pediatric ward for longer than seven days, 45% became infected, and all infants hospitalized for more than four weeks acquired the virus (5). During outbreaks in closed populations, it has been estimated that the incubation period of RSV respiratory disease is 4 to 5 days (14). At the beginning of illness, the virus replicates in the nasopharynx and spreads to the lower respiratory tract. Infected infants can shed the virus for as long as 3 weeks, but viral shedding ends as secretory antibody begins to appear, usually coincident with clinical recovery (15).

RSV is spread by infected respiratory secretions. The major mode of spreading appears to be by large droplets or through fomite contamination rather than through droplet nuclei or small-particle aerosols. Transmission of RSV to an uninfected person could occur without direct contact with an infected person. RSV can survive for up to 6 hours on environmental surfaces and is most infectious when applied directly to the mucosal surface

of the eye or nose by infected hands or objects (16, 17). The study of Hall et al. (5) showed that 10 of the 24 staff members (42%) who worked on a pediatric ward acquired the virus during a community outbreak. Hence, hospital staff appear to play a major role in nosocomial spread of RSV infection by becoming infected themselves, or possibly by spreading contaminated secretions.

Nosocomial RSV infection in our special-care newborn nursery seemed to be spread by the nursery staff with contaminated secretions on objects or hands since direct contact between neonates was limited by the cubicles and their confinement to their cubicles. Although the possibility of spread of the virus by infected staff existed, no apparent respiratory symptoms were reported by our staff during the period. RSV infection in normal adults can be very mild or even asymptomatic (10).

To control the spread of RSV on pediatrics wards or in newborn nurseries during a community outbreak of RSV infection, isolation of all infants with respiratory disease is rarely possible, and would not prevent spread of infection via medical personnel. Utilizing six infection control procedures (isolation of infected infants, hand-washing between infants, change of gowns between caring for infants, cohorting of staff to infants, isolation of high-risk infants, limitation of visitors), the nosocomial RSV infection rate in the contact children decreased from 45% to 19% (18). In our report, the use of the indirect immunofluorescent method enabled us to make early diagnosis of RSV infection in newborns, which in turn helped implementation of infection control measures early at the beginning of the outbreak and prevention of further spread of the virus in our special-care newborn nursery.

In Korea, some pediatricians ignore the necessity of diagnosing RSV infection since specific antiviral drugs are not available or because of the possibility of spontaneous recovery. But nosocomial RSV infection should be prevented since it can be fatal in children with underlying cardiac or pulmonary diseases or in immunocompromised patients. We hope that attention will be drawn to rapid RSV diagnosis and the introduction of infection control policy in all pediatrics wards or in newborn nurseries, especially during community outbreaks of RSV infection.

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