

Background

- Healthcare-associated respiratory viral infections are associated with increased morbidity and mortality in the NICU population.
- The optimal strategies to reduce acquisition and transmission of respiratory viruses in this unique setting are unknown.
- We describe the infection prevention and control (IP&C) strategies implemented to reduce respiratory viruses in our NICU.

Methods

Study Design, Subjects, Site: IP&C prospectively tracked healthcare-associated respiratory viruses and possible transmission of respiratory viruses from May 2012-May 2017 in our 58-bed Level IV NICU (~1000 annual admissions) which consists of largely of 2-3 bed pods and has 4 single rooms.

Transmission Event: ≥2 infants geographically (e.g., same pod) and temporally linked (i.e., occurs within 1 relevant incubation period) positive for same virus.

Viral Diagnostic Testing: Multiplex reverse-transcriptase (RT)-PCR assay (FilmArray, Biofire, Inc.) was introduced in our facility in May 2012 and detects 17 viruses: adenovirus; 4 coronavirus types (229E, HKU1, NL63, OC43); human metapneumovirus; rhinovirus/ enterovirus; influenza A, AH1, AH3, B; parainfluenza types 1-4, and RSV, as well as pertussis, mycoplasma, and chlamydia.

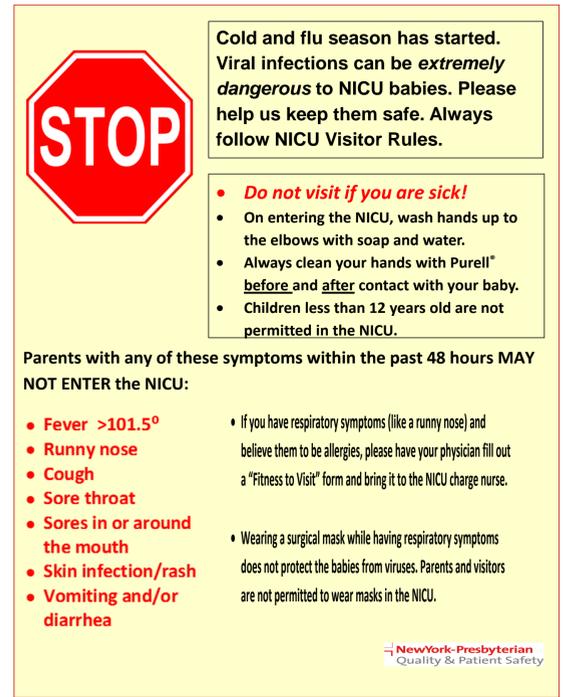
IP&C Strategies:

- **May 2012-December 2014:**
 - RT-PCR testing for symptomatic infants (e.g., fever, cough, increased secretions)
 - Positive infants placed on contact and droplet isolation for duration of hospitalization
 - Potentially exposed infants monitored for signs/symptoms of respiratory infection and tested if symptoms developed
 - Healthcare personnel (HCP) instructed to not work while sick and report to Workforce Health & Safety if became sick at work.
 - Ill visitors prohibited from NICU via written educational material (no formal screening).
- **Starting January 2015:**
 - RT-PCR testing ordered for asymptomatic infants potentially exposed via geographic proximity to positive index patient.**
 - Testing performed at time of potential exposure and end of relevant incubation period (IP) for index case's virus
 - Potentially exposed infants placed on contact and droplet isolation for IP duration
 - Isolation discontinued if:
 - Negative RT-PCR testing
 - Asymptomatic
 - No new cases identified in a geographically-related area
- **Starting December 2015:**
 - Visitors < 12 years old prohibited from visiting NICU year-round**
 - Large signage posted at NICU entry detailing visitor restrictions (Figure 1).

Data analysis

- Possible transmission events categorized as Dyads (n=2 infants), Clusters (n= 3) and Outbreaks (n > 3)
- Determined the number of asymptomatic infants with positive RT-PCR identified via post-exposure screening

Figure 1: NICU Visitor Restriction Sign

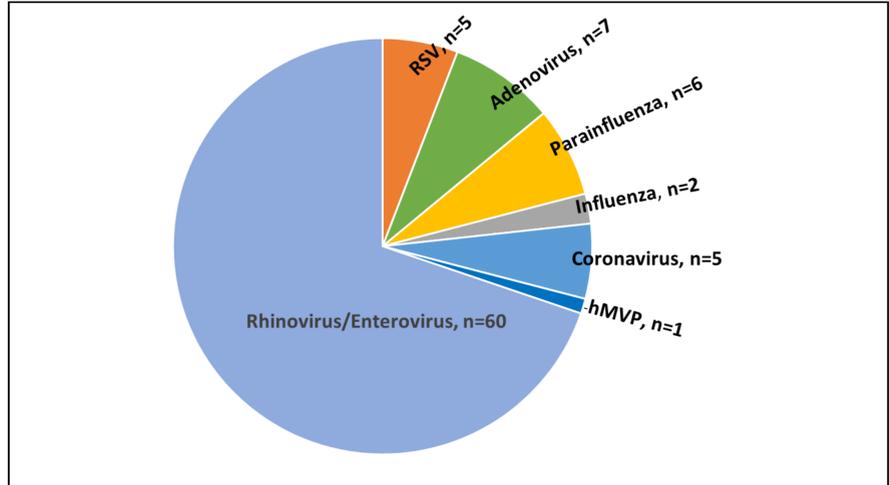


Results

During 60 month observation period 82 infants (~1.6% of admissions) had 86 Viruses detected (Figure 2).

- Rhinovirus/Enterovirus (RV/EV) were most common (n=60, 70%)
- Two outbreaks occurred (Figure 3)
- RV/EV (n=7 infants)
 - Adenovirus (n=5 infants)

Figure 2: Respiratory Viruses Detected (n=86)

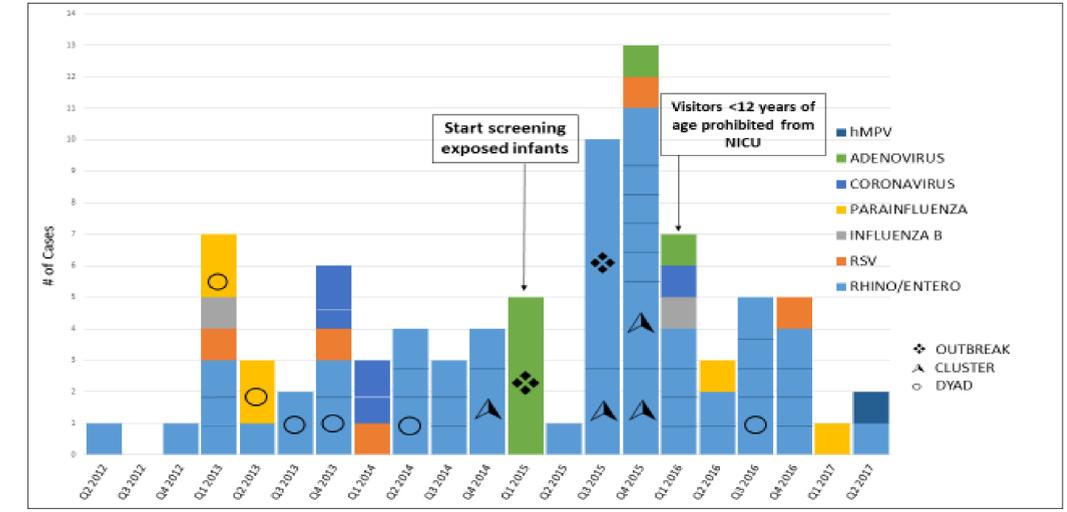


Results

Epidemiologic Observations:

- Ill household contacts were identified for 10 (12%) infant subjects.
- No sick HCP were identified.
- Since January 2015, 8 (15%) of 52 infants with positive RT-PCR were detected by screening and were asymptomatic.
- Since December 2015, only 1 dyad transmission event (RV/EV) has occurred; the remainder of cases are sporadic.

Figure 3: Viral Transmission in the NICU May 2012-May 2017



Limitations

- As RT-PCR detects many RV/EV types, transmission events may be over-estimated.
- It is likely that ill contacts, including HCP, are not always identified.

Summary and Conclusions

- The identification of respiratory pathogens in asymptomatic infants identified through post-exposure screening ensured the implementation of appropriate isolation and IP&C measures.
- Preliminary data suggest that our interventions have reduced the number of transmission events.
- A longer duration of follow-up is needed to confirm these preliminary observations.
- Additional multicenter studies of IP&C strategies to reduce the burden of respiratory viral pathogens in the NICU are needed.