Respiratory Infection In Pediatrics

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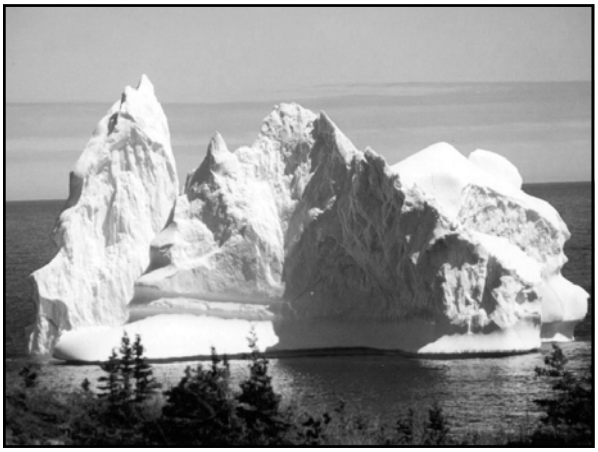


Agenda

- Viral Respiratory Infections
  - Transmission and Placement
- RSV
- Prevention of pneumonia - Neonatal ICU

Viral Respiratory Infections: Transmission and Placement

Laurie Streitenberger RN, BSc, CIC
Infection Control Practitioner

Outline

- Mode of Transmission
- PPE required
- Patient Placement

Mode of Transmission

Droplet

- large droplets (> 5 microns in diameter)
- released during coughing, sneezing, speaking, crying or during procedures such as suctioning or bronchoscopy
- propelled short distances (< 1 m)

Mode of Transmission

Contact

- once expelled, organisms can settle on objects in the person's immediate environment (< 1m) and can be transmitted by unwashed hands to other individuals

Droplet Precautions

Initiated when:

- patients have symptoms of droplet transmitted infections and/or;
- patients have laboratory confirmed droplet transmitted infections

Personal Protective Equipment (PPE)

Donning of PPE

- Hand Hygiene
- Gown
- Fluid resistant procedure mask with eye protection (or mask and then visor/goggles)
- Gloves

Personal Protective Equipment (PPE)

Removal of PPE

- Gloves
- Gown
- Hand hygiene
- Fluid resistant procedure mask with eye protection (or visor/goggles and then mask)
- Hand Hygiene

Patient Placement

Gold standard = private/single room

Cohorting

- practice of grouping patients and staff with the same infection together in order to prevent transmission to other patients and staff
- usually considered when bed or staffing limitations necessitate consideration of alternatives other than the ideal, and often microbiological data are not available

Cohorting

Overriding principles:

- Patients are not infected with other potentially transmissible microbes, and
- It is unlikely that the patients will get reinfected by the same organism, and
- None of the patients are severely immunocompromised

Other Considerations

- Staffing cohort issues
- Dedicated patient equipment
- PPE for family/visitors
- Visiting restrictions
- ?Discontinuing precautions

Respiratory Syncytial Virus

Marion Yetman RN, BN, MN, CIC
Infection Control Nurse Coordinator

Objectives

- Understand the disease process of RSV
  - Epidemiology
  - Pathophysiology
  - S/S
  - Risk Factors, Diagnosis
  - Prevention
    - ICP Role
    - Prophylaxis

Respiratory Syncytial Virus -(RSV)

- RNA Virus
- Identified in 1957
- Organ specific mainly affects the respiratory tract
- Syncytial

Epidemiology

- Seasonal epidemics
- Humans are only source of infection
- Infects all children by age 3
- Incubation period 4-6 days
- Viral shedding – usually 3-8 days
- Peak incidence is 2-6 months of age
- Re-infection may occur, but is less severe

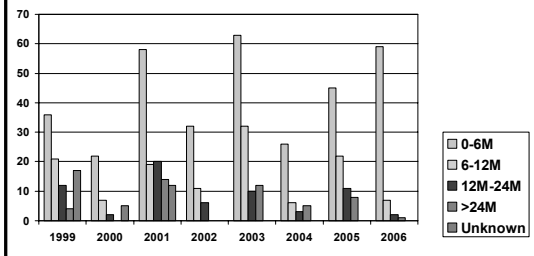
Pathophysiology

- Diffuse airway obstruction in the small bronchi
- Airway swelling, sloughing of necrotic debris, loss of cilia
- Increased mucous production
  - Leads to partial obstruction- hyperinflation
  - complete obstruction- atelectasis

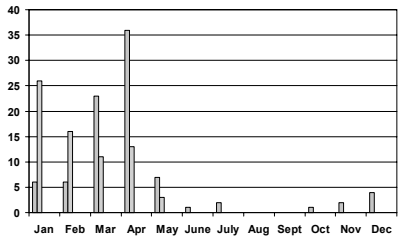
Pathophysiology

- Anatomical features
  - Airway smaller than adults
  - Greater number of mucous glands
  - Fewer pores of Kohn

Incidence of RSV in NL
RSV Positive Cases 1999-2004, by Age



RSV Positive Cases, by Month 2005-2006



Upper Respiratory Tract Symptoms

- Cough
- Runny nose
- Wheeze
- Decreased feeding
- Breathing difficulties
- Irritable
- Fever (2 4days)
- Listless

Lower Respiratory Tract Symptoms

- Increased coughing
- Dyspnea
- Increased respiratory rate
- Retraction of intercostal muscles
- Hypoxemia
- Cyanosis (rare)
- Apnea – premature babies

Risk Factors for Disease

- Male
- Age < 6 months
- Birth during the first half of the RSV season
- Crowded living quarters/Siblings
- Day Care
- Passive cigarette smoke exposure
- Lack of breast feeding

High Risk Population

- History of prematurity/BPD
- Congenital heart disease
- Immunosuppressed

Transmission

- Direct or indirect contact with the respiratory secretions
- RSV lives on countertops/bedrails for 7 hours, hands/gloves – 1 hour.

Diagnosis

- Clinical symptoms
- N-P swab
- Chest x-ray
  - hyperinflation
  - peribronchial thickening
  - interstitial infiltration

Prevention – ICP Role

- Awareness Campaign
  - Early
    - Media
    - Prenatal Classes
    - Family Doctors/Obs Staff
  - Late
    - Case Room/OBS Unit
    - Neonatal Unit
    - Community Health

Prevention – ICP Role

- Key Messages
  - What is RSV/Transmission/Who is at risk?
  - Parental role in prevention
    - Improve Handwashing
    - Avoid second hand smoke
    - Promote breastfeeding
    - Avoid crowds
    - Focus on respiratory etiquette

RSV Prophylaxis

Palivizumab (Synagis)

- Monoclonal antibody
- Monthly IM injections during RSV season
- Cost - $7,000 - $9,000/per child
- Cost absorbed by Provincial Health Depts

NACI Recommendations 2003

- Premature infants <32 weeks GA
  - Less than 6 months by RSV Season
- Children <24 months with CLD or significant heart disease
- Children 33 – 35 weeks in remote communities who are < 6 mon by RSV Season

NL Experience

- Initially as per NACI guidelines
- Regional re-hospitalization determines cost effectiveness
- Palvizumab discontinued in Health Infants
  29 –32 weeks

Retrospective Cohort Study

- Sample
  - All infants <32 weeks GA June 01, 1999 – December 31, 2004
  - Infants 'High Risk"
    - CLD or CHD
  - Healthy Infants 29 –32 weeks

Outcome of "Healthy" Babies
29-32 weeks GA N=100

Indicator	Palivizumab YES	Palivizumab NO
Number of infants	28	72
Number RSV Deaths	0	0
Readmitted with respiratory disease	3	3
Number RSV⊕	0	0
Number ventilated With respiratory disease	0	0
Total Cost of RSV-RH	43,054	37,183

P=0.310

Cost of Prophylaxis versus Readmission for Respiratory Distress

Cost of Prophylaxis for 100 infants	$700,000.00
Cost of Readmission For 6 Children	80,237
Cost Saving in 5 years	$619,763.00

Conclusions

- Based on local evidence, it is reasonable and safe to withhold Palivizumab for healthy infants 29 – 32 weeks gestational age in NL
- Cost of the prophylaxis for "healthy infants" (29 -32 weeks GA) could be better utilized for Prevention

Prevention of pneumonia - Neonatal ICU

Anne Augustin, MLT, CIC
Infection Prevention & Control Coordinator

Outline

- The Problem
- Risk Factors
- Prevention Recommendations

Pneumonia Prevention – NICU

- Clinical presentation
  - Difficult to diagnosis
    - Non-infectious processes may show same clinical presentation
    - Underlying lung conditions -> difficult to interpret
  - Culture from endotracheal tube may be helpful
    - Often colonized
  - Often treated empirically

CDC pneumonia definition < 1 year old

- Worsening gas exchange

And at least 3 of the following

- Temperature instability
- Leukopenia or leukocytosis
- New onset of purulent sputum, change in character, increased respiratory secretions, increased suctioning requirements
- Apnea, tachypenea, nasal flaring with retraction of chest wall or grunting
- Wheezing, rales or rhonchi
- Cough
- Bradycardia or tachycardia

Pneumonia Prevention – NICU

- Common causative agents
  - Early onset
    - Usually associated with intraparum infection and early-onset sepsis
      - Group B Streptococcus
  - NNIS data from 1986 to 1994
    - *S. aureus* (18.7%)
    - Coag. Negative Staph (16.6%)
    - *Pseudomonas aeruginosa* (12.9%)
    - *Enterobacter* (9.5%)
  - Respiratory Viruses

Pneumonia Prevention – NICU

Birth Weight	NNIS 2001	NNIS 2004
< 1000 g	4.8	3.5
1001 – 1500 g	3.6	2.4
1501 – 2500 g	2.9	1.9
> 2500 g	2.6	1.4

Pneumonia Prevention – NICU

- Risk Factors – innate
  - Immunocompromised
    - Decreased chemotaxis and phagocytosis by macrophages
  - Lack of or abnormal "normal flora"

Pneumonia Prevention – NICU

- Risk factors – device & care related
  - Nasogastric or orogastric feeding tubes
  - Endotracheal tube
    - Quickly colonized
    - Poor fitting -> secretions slide around
  - Decreased level of consciousness
    - Sedation and use of paralytics
  - Aspiration of organisms colonizing the stomach or oropharynx
  - Prior bloodstream infection for those infants that are on ventilator (hematogenous spread)

Recommendations for Prevention

- **No ill** staff, parents, family members or visitors allowed in the NICU
  - Respiratory viruses
  - vomiting & diarrhea
  - "funny" rash
- Influenza vaccine for all staff
  - consider developing vaccine program for parents & family members
- RSV prophylaxis

Recommendations for Prevention

- Hand Hygiene for All
  - point of care hand hygiene
  - parent & family education
  - no false nails, no rings or arm jewelry
  - category 1A

Recommendations for Prevention

- Cleaning, disinfection & sterilization of equipment
  - use sterile water for rinsing reusable semicritical items after chemical disinfection
  - category 1A
- Breathing circuits
  - do not routinely change
  - change when malfunctioning or visibly soiled
  - category 1A

Recommendations for Prevention

- Breathing-circuit-tubing condensate
  - periodically drain and discard condensate
  - do not allow condensate to drain toward patient (category 1B)
- Sterile water for humidifier fluids (category II)
- Change heat-moisture exchanger (HME) when it malfunctions or is visibly soiled (category II)

Recommendations for Prevention

- oxygen humidifier-tubing (for one patient)
  - change when malfunctions or becomes visibly soiled (category II)
- small-volume medication nebulizers – in-line and hand-held nebulizers
  - clean, disinfect, rinse with sterile water and dry between treatments
  - use only sterile fluids
  - category IB

Recommendations for Prevention

- Resuscitation bags
  - sterilize or high level disinfect between use on different patients (category 1B)
- Suctioning of respiratory tract
  - single use open – sterile catheter (category II)
  - multiuse closed- system
    - frequency of changing (unresolved)
  - only sterile fluids (category II)

Recommendations for Prevention

- Temperature Probes
  - high level disinfect (category 1B)
- Aspiration Prevention
  - before deflating cuff of ETT, ensure secretions are cleared from above the cuff (category II)
  - elevate at an angle of 30 – 45 degrees the head of the bed (category II)
  - routinely verify the placement of feeding tube (category 1B)

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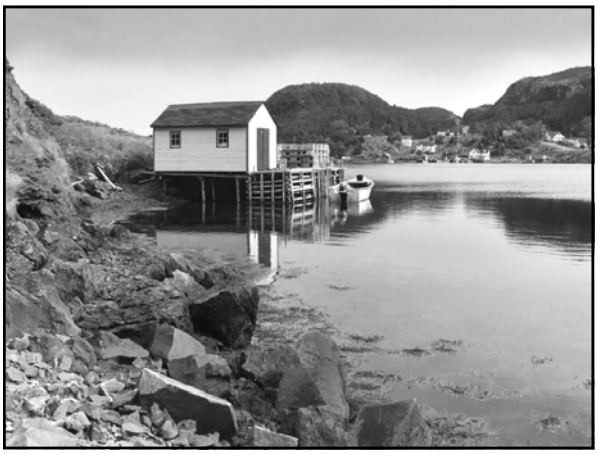

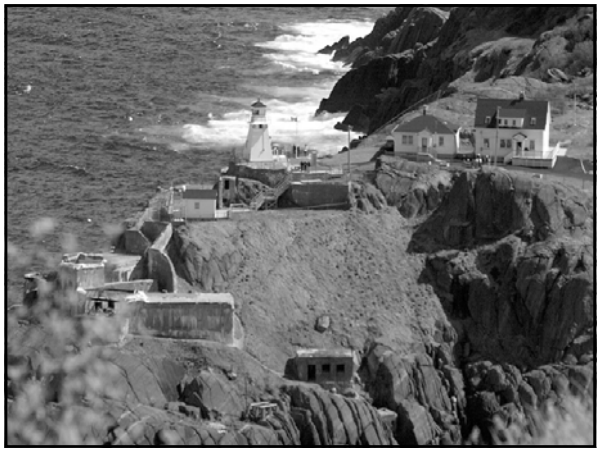

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