

RSV in the NICU

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RSV in the NICU Problem Session

Objectives:

This session will help participants recognize and respond to an infection control problem in a special population of children.

At the end of this exercise the participants will be able to:

- 1. Recognize an infection control problem in the NICU.**
- 2. Discuss unique challenge of infection control in a NICU.**
- 3. Describe impact of a common community associated viral respiratory pathogen identified in a NICU.**

January 2008

A call from the NICU attending 9:00 a.m. .

- **“I just got a call from the microbiology lab that one of our babies is positive for RSV”**
- **You are in your clinic in between patients and your clinic is overbooked and all of your colleagues are out of town.**
- **How do you want to respond to the neonatologist?**

Index Case

- **72 day old male 25 wk gestation**
- **Birth weight: 640 gms**
- **RDS/BPD on nasal cannula O2 last 22 days; last intubated 1 month ago**
- **On day 72 had acute respiratory deterioration with increased desaturations and increased secretions requiring re-intubation**

- **Would you consider this situation an outbreak?**

Definition of an Epidemic/Outbreak

- **An increase in the incidence of a disease (or outcome) above what is expected.**
- **There has not been RSV in the NICU in 4 years**

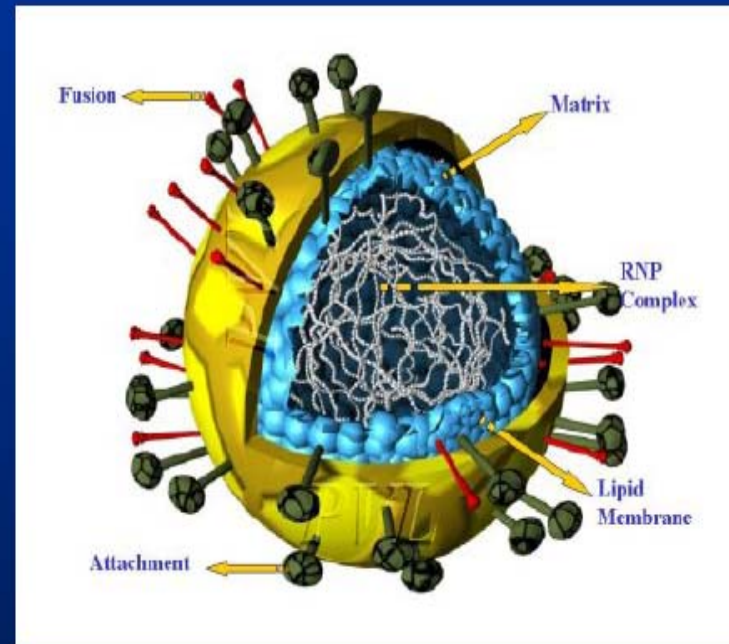
In the meantime. . .

- **Charge nurse in the NICU has called the Infection Preventionist (IP).**
- **The IP calls you in clinic. She knows this may be a problem but works primarily with adults where RSV is not normally a concern.**
- **She wants to know if she should call the children's hospital across town and ask what they advise.**

- **What do you tell the IP?**
- **How do you respond to the neonatologist?**

RSV

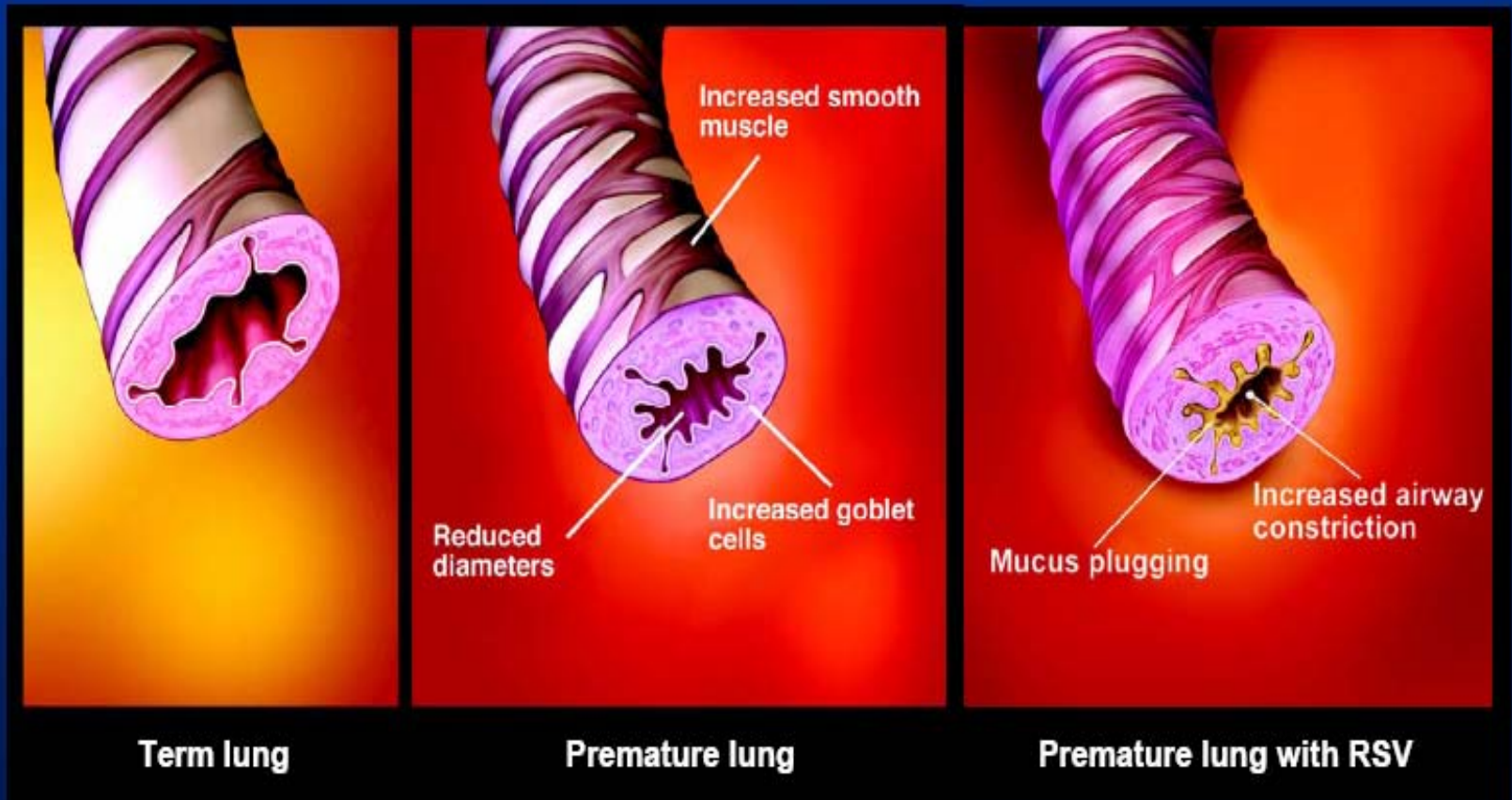
- Single-stranded, nonsegmented RNA virus in the paramyxoviridae family
 - Attachment (G) proteins assist with viral adherence to the host cells
 - Fusion (F) proteins aid with viral penetration



You educate the IC preventionist on RSV infection in premature infants:

- Enveloped RNA paramyxovirus**
- Annual epidemics during winter and early spring**
- Clinical manifestations may be minimal in premature infants**
 - Lethargy**
 - Irritability**
 - Poor feeding**
 - Apnea**
 - Not typical pattern of bronchiolitis or pneumonia or URI**
- Risk of severe or fatal disease**
 - Prematurity**
 - Cyanotic or complicated congenital heart disease (pulmonary hypertension)**
 - Chronic lung disease of prematurity**

Prematurity and RSV Infection



Mortality Associated with RSV

- Birth weight <2,500 g was a key risk factor for bronchiolitis-associated death
- LBW is a measure of poor developmental status
- LBW has been linked to reduced lung function and decreased maternal antibody transfer, independent of gestational age

Birth weight	Odds Ratio (95% CI)
<1,500 g	25.5 (14.6, 44.6)
1,500-2,499 g	4.6 (3.2, 6.8)
≥2,500 g	Referent

RSV

Epidemiology

- **Transmission—spread in households common**
 - **Close contact with contaminated secretions**
 - **Droplets or fomites**
 - **Persists on hard nonporous surfaces for as long as 12 hours**
 - **Persists on hands for ½ hour**
 - **Infection in HCW can occur by self inoculation with contaminated secretions**
- **Viral shedding 3-8 days or longer**
- **Incubation: 2-8 days**

Back to the neonatologist who is waiting for your call . . .

- **Isolate the baby**
 - **Contact and/or droplet precautions**
 - **Controversial**
- **Further case ascertainment**
 - **Other symptomatic infants**
 - **Test other infants in the NICU**
- **Call a meeting in NICU at end of clinic to develop a plan**
- **You attempt to finish clinic**

At noon the NICU attending calls you back

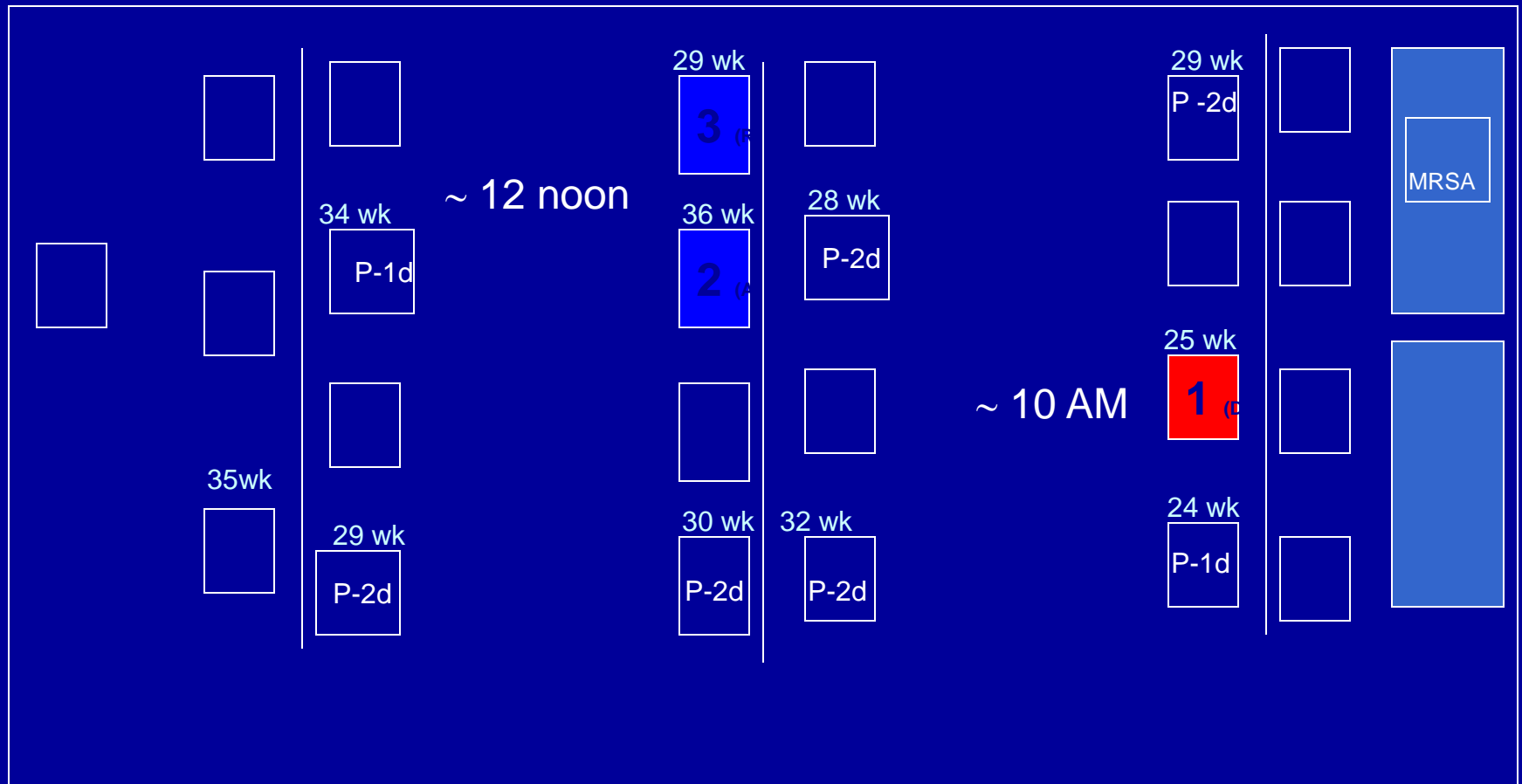
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- Nursing has already sent RSV tests on babies in proximity to index case
- 2 other infants RSV positive but are not symptomatic
- What do you know about the RSV testing in your facility?



RSV Cases Jan 7, 2008

Layout of the NICU

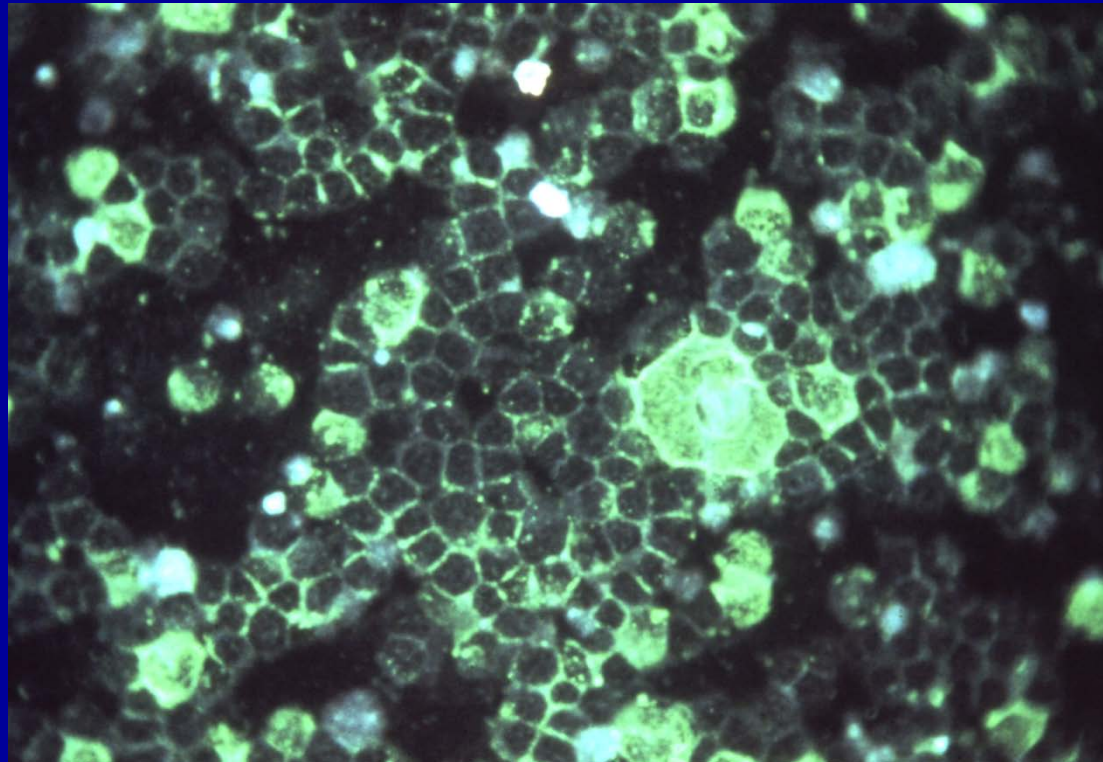


RSV Diagnostic Testing

- **Rapid antigen detection in nasopharyngeal specimens**
- **NOW RSV Test Kit (Inverness Medical, Binax, Inc., Scarborough, ME); immunochromatographic qualitative assay**
- **Enzyme immunoassays**
 - **Sensitivity 80-90% (53%-96%)**
 - **False positives more likely at beginning or end of RSV season when incidence low**
- **Viral isolation takes 3-5 days**
 - **Sensitivity varies among labs**
- **Do you consider this an outbreak now?**
- **What do you advise next?**

RSV

Indirect Immunofluorescence



While finishing your clinic you advise the neonatologist. . .

- **State that this is an outbreak**
- **Isolate all positive babies**
- **Test the rest of the babies in the NICU**
- **Consider all the babies exposed to RSV**
- **Coordinate meeting for 5:00 p.m.**
- **Who should be at the meeting so an effective plan can be implemented?**



Meeting at 5:00 p.m.

- **Attendees**

- Neonatologists
- Pediatric infectious disease
- Infection control
- Nurse manager—NICU/mother baby
- Maternal child health director
- VP patient care services
- Head of respiratory therapy
- Environmental services



Goals of Multi-disciplinary Meeting

- **Identify other possible cases**
- **Prevent further risk of RSV transmission from positive babies to exposed babies**
- **Prevent transmission to new admissions**
- **What is the most likely source of the RSV and mode of transmission within the NICU?**

Establishing the Plan

- **How will you identify other possible cases? i.e. case ascertainment**

Case Ascertainment

- **Results of screening**
 - 3 RSV positive infants
 - 1 symptomatic, the index case
- **Re-test at 1st sign of symptoms**
- **Re-test at the end of 1 incubation period of 8 days after last exposure**

What interventions will you put into place to prevent transmission from RSV positive babies to exposed babies?

“How much are all these yellow gowns costing?”

“Radiology never washes their hands when they come in here, I know it came from them and those x-ray plates”



Prevent Further Risk of Transmission to Exposed Infants

- **Strictly enforce hand hygiene and contact precautions**
 - What about droplet spread, i.e. suctioning?
 - Masks? Eye protection?
- **Contact precautions for all babies in NICU**
- **Cohort RSV positive babies with separate staffing**
- **Thoroughly clean NICU**
 - Remove clutter
 - Discard open boxes of gloves used for RSV + babies
 - Clean computer keyboards at least hourly
 - Remove mobile computer from unit

NICU Clutter

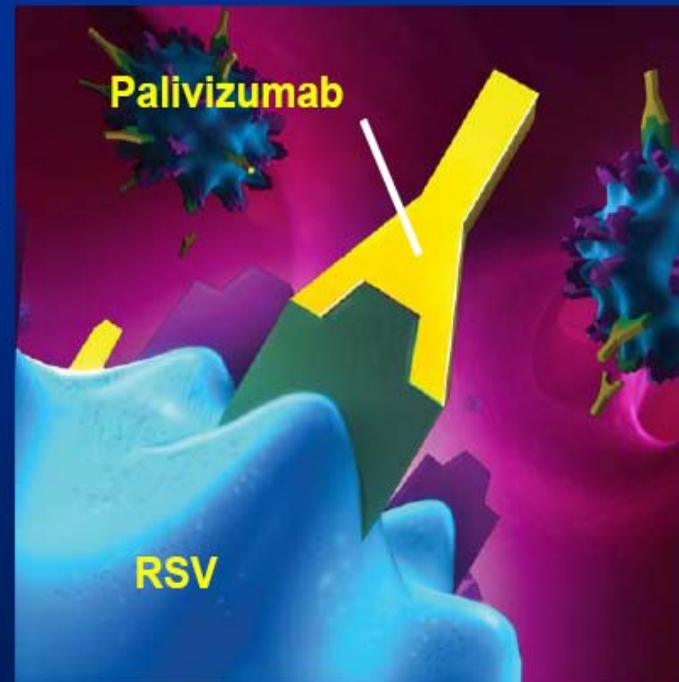


Would you use palivizumab?

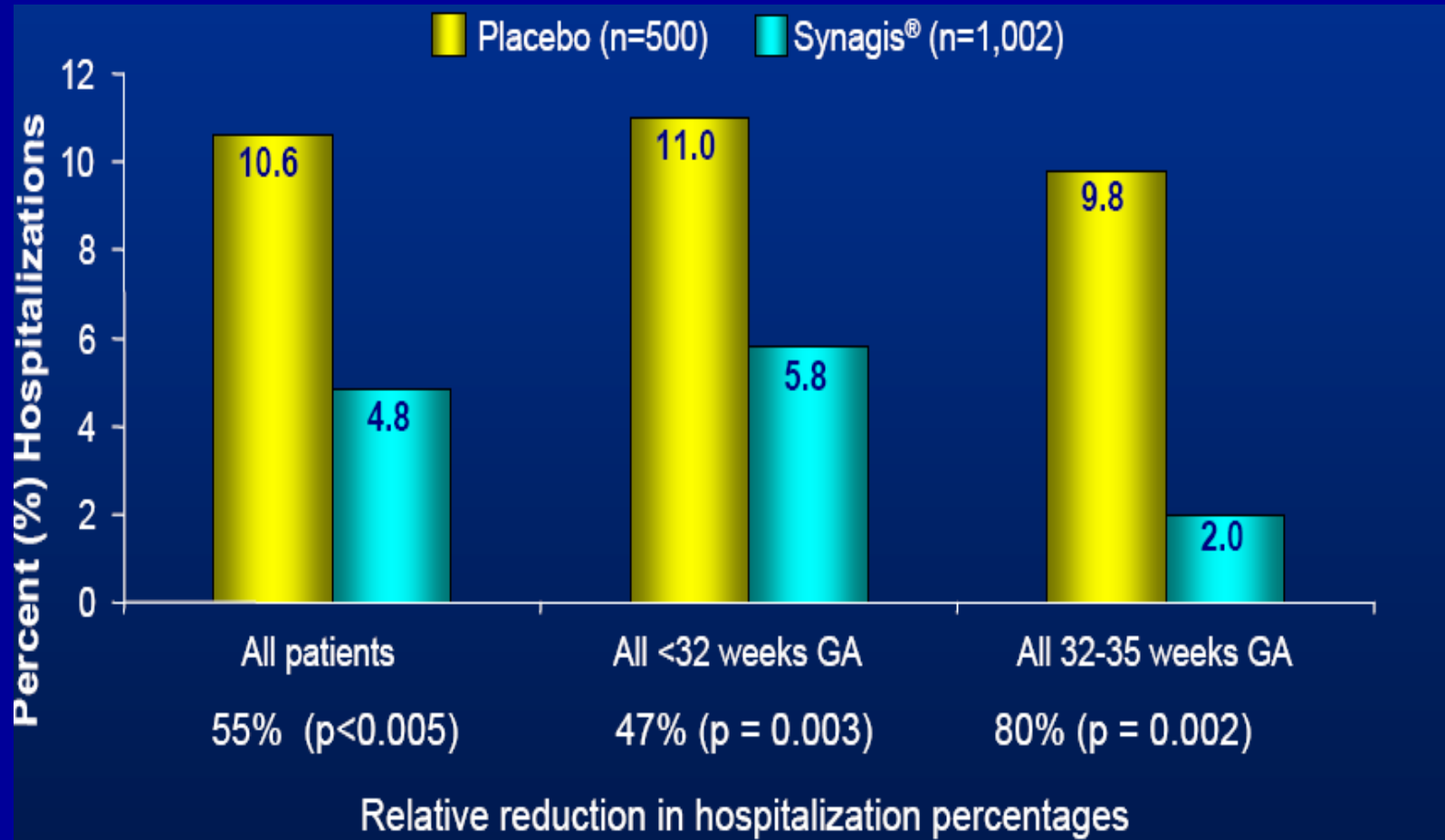


Palivizumab (Synagis)

- Palivizumab is a monoclonal antibody that binds the F (fusion) protein of RSV
- Palivizumab prevents infection of the host cell
- Palivizumab reduces viral replication and spread of RSV to other susceptible cells
- **Protective levels need to be achieved prior to exposure to RSV**



IMpact RSV Trial



Palivizumab

- All babies <32 weeks at time of outbreak in NICU to reduce severity of illness
- Start palivizumab during NICU stay and monthly until end of RSV season even if >32 weeks
- Do you agree?

How will you prevent transmission to new admissions to the NICU?

- “Close the NICU, impossible! I won’t turn mothers away!” Head of OB
- “Don’t let this get into the papers” Head of Marketing.



Prevent Transmission to New Admissions

- **Close NICU to new admissions for 8 days (incubation period)**
- **New admissions placed in treatment room of full term nursery (FTN)**
- **Clean FTN, provide equipment and staff**
- **Communicate to parents that standard of care is same as NICU**
- **If necessary and appropriate, transfer new admissions to PICU to be managed by neonatologists**

**What can be done to prevent additional
introduction of RSV into NICU?**

**What are the potential sources of
Infection?**

**“This hospital prides itself on Family
Centered Care!”**



Prevention of Continued Introduction of RSV into NICU



- **Revisit visitor policy**
 - Enforce screening all visitors for signs and symptoms of illness
 - Retrain assistants who screen visitors
 - Restrict all children <12 years old from visiting NICU until end of RSV and flu season
 - Provide letter to families notifying them of visitor restrictions
- **Restrict hospital personnel; How?**
 - Remove non essential personnel until outbreak contained; What about students?
 - Enforce ill HCW policies

When can you open the NICU to new admissions again?

OB doctors breathing down your neck and hospital administration very nervous

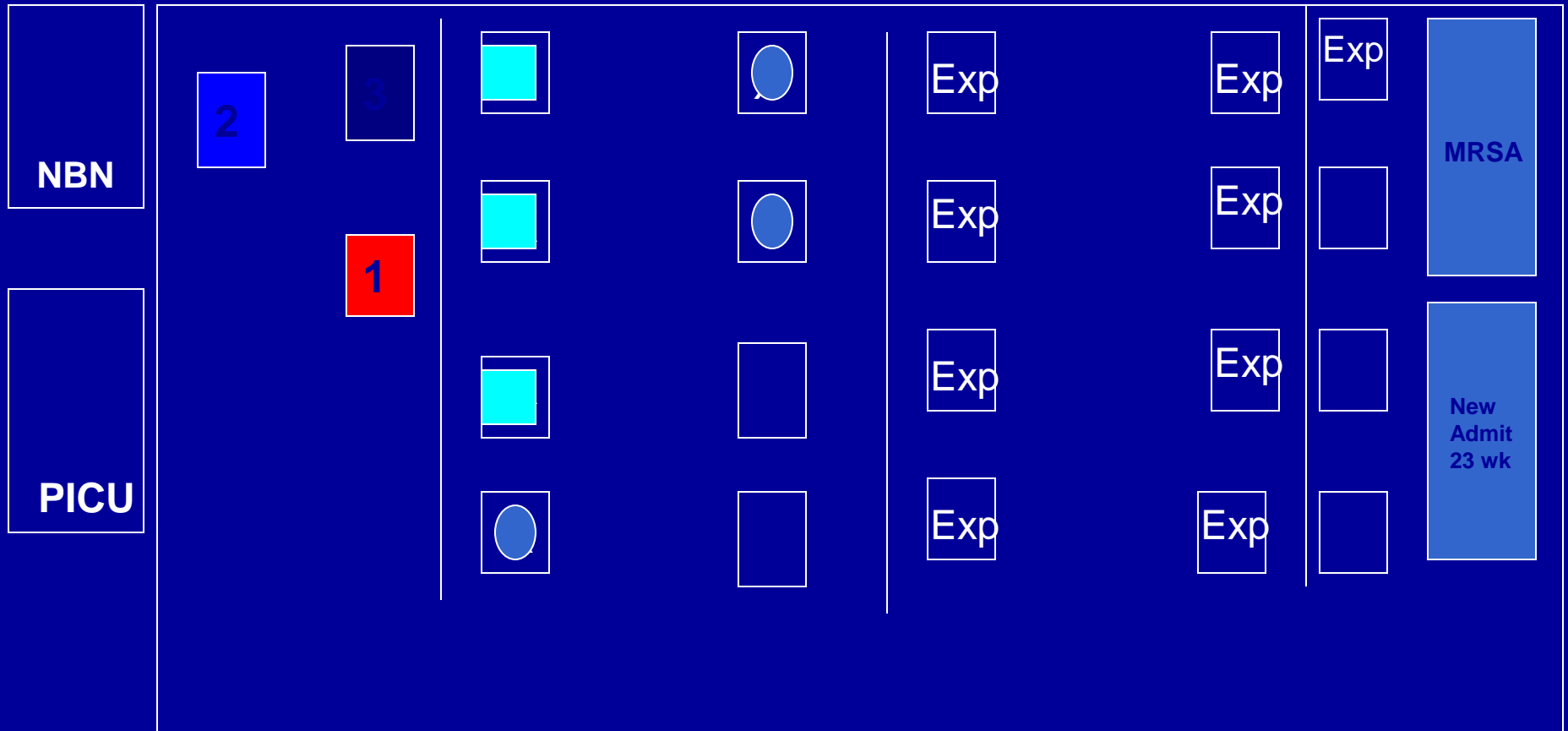


RSV Outbreak in NICU Follow Up

- **Repeat RSV testing done in NICU at 8 days**
 - **None of exposed infants RSV positive**
- **Continue isolation for previously positive babies**
- **Keep exposed infants cohorted**
- **Bring NICU babies located in alternative sites back to NICU and cohort them**
- **Admit new babies to unexposed cohort**

RSV Outbreak in NICU

Layout after NICU Opened to New Admissions JAN 15, 2008



RSV Outbreak in NICU

Communication Essential

- **Team effort**
- **Communication**
 - **Internal**
 - **External**
 - **Consistent messages**



RSV Outbreak in NICU

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