Infection Control in Day Care Centres

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Our Goals
- Understand why our population is at risk
- Understand the transmission of nemesis to population
- Understand ways of stopping or preventing this transmission
- Have a bit of fun!

In a Nut Shell
- Keep it clean
- Understand our nemesis - the bugs
  - The environment
  - Our hands
    - which leads to:
  - Don’t eat it!
    - Clean eating areas and high touch surfaces
    - Clean hands before and after eating
    - Clean hands regularly

The Bug: Feces Facts
- 70% of passed feces is water
- 70% dried weight of feces is bacteria
- 1 gram of dried feces contains up to $1 \times 10^{12}$ bacteria ($1,000,000,000,000$)
- 1 microgram contains $1 \times 10^{6}$ bacteria
- Most of these bacteria are anaerobic, non-pathogenic organisms...however...
Saliva

- 1 mL of saliva can contain $1 \times 10^8$ organisms
- Predominantly anaerobic
- Whole spectrum of organisms
  - aerobic
  - anaerobic
  - viruses

The Children - Our Host - The Risk

- Infants and toddlers require assistance with toileting
- Explore the environment with their mouths
- Drool
- Developing immunity
- Hands-on contact with care providers
- Contact with other children

Risk Factors for Transmission

- Organism Characteristics
  - mode of spread
  - infective dose
  - environmental survival
- Presence of carrier state, or asymptomatic infection
- Immunity

Transmission - Fecal-Oral

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Viruses</th>
<th>Parasites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campylobacter</td>
<td>Enterovirus</td>
<td>Cryptosporidium</td>
</tr>
<tr>
<td>E. coli O157:H7</td>
<td>Hepatitis A</td>
<td>G. lamblia</td>
</tr>
<tr>
<td>Salmonella</td>
<td>Rotavirus</td>
<td>Pinworm</td>
</tr>
<tr>
<td>Shigella</td>
<td>Calicivirus</td>
<td></td>
</tr>
</tbody>
</table>

Transmission - Respiratory

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Viruses</th>
<th>More Viruses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hib</td>
<td>Adenovirus</td>
<td>Influenza A&amp;B</td>
</tr>
<tr>
<td>N. mening.</td>
<td>Measles</td>
<td>Parainfluenza</td>
</tr>
<tr>
<td>Pertussis</td>
<td>RSV</td>
<td>Parvovirus B19</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>Rhinoviruses</td>
<td>Varicella-zoster</td>
</tr>
<tr>
<td>Group A Strept.</td>
<td>Mumps</td>
<td>Rubella</td>
</tr>
</tbody>
</table>

Transmission - Person to Person

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Viruses</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A streptococci</td>
<td>Herpes simplex</td>
<td>Pediculosis</td>
</tr>
<tr>
<td>Staph. aureus</td>
<td>Varicella-zoster</td>
<td>Scabies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ringworm</td>
</tr>
</tbody>
</table>
Transmission - Blood, Urine and/or Saliva

<table>
<thead>
<tr>
<th>Viruses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cytomegalovirus</td>
</tr>
<tr>
<td>Herpes simplex</td>
</tr>
<tr>
<td>(Hepatitis B and C)</td>
</tr>
</tbody>
</table>

Standard or Routine Precautions

- Treat all body fluids, excretions, secretions as potentially infectious
- Wash hands well after any inadvertent contact with such fluids
- Have immunizations up to date
- Wear gloves if contact is anticipated
  - this could be controversial for diapering

Standard or Routine Precautions

- Gloves
  - can cause more problems especially if not used properly
  - must be changed or removed immediately after use
    - don’t use same gloves to change a child, then sanitize change area

Are These Bad Places to Be?

- Extensive contact with other children in a day care setting is associated with a reduced risk of acute lymphoblastic leukemia.
- Attending a daycare centre is the most important risk factor for respiratory tract infections in children aged 2-5 years.

Are These Bad Places to Be?

- Young children in child care have averaged 96 days of illness per year.
  - 60-70% are respiratory illnesses

Do We Really Need to Know This?

- 100 soils and sand samples from 10 daycare sandboxes yielded Toxocara, Ascaris, and hookworm ova
- Only 3 sandboxes were actually positive
Exclusion of Children

- American Academy of Pediatrics - Red Book
  - Cannot participate comfortably
  - Care greater than what can be provided by the centre
  - Any of: fever, lethargy, irritability, persistent crying, difficult breathing, etc.
  - Diarrhea or stools with blood or mucus
  - Shigella infection or E. coli O157:H7

- Vomiting 2 or more times in previous 24 hours, unless non communicable
- Mouth sores associated with excessive drooling
- Rash with fever or behavioral changes
- Purulent conjunctivitis
  - pink or red conjunctiva with white or yellow discharge
  - Impetigo, Streptococcal pharyngitis

- Head lice, scabies
- Varicella
- Pertussis, mumps, measles
- Hepatitis A infection

- Non purulent conjunctivitis
  - pink conjunctiva with clear, watery eye discharge without fever, eye pain, or eyelid redness
- Rash without fever and without behavioral change
- Parvovirus B 19 infection in immuno-competent host
- CMV infection

Sick Children

- Never assume a child does not have an illness because they appear healthy!
- Cohorting of ill children with same symptoms
  - requires cohorting of care worker
- Separate area for ill and well children

Staff

- All staff will be screened as outlined by Provincial or State regulations
  - both criminally and medically
- Need clear guidelines for staff for recognizing illness in themselves
- Food preparation staff separate from “toileting” staff
- Eat same meals as children!
**Disinfection**

- **CLEAN before DISINFECTING!**
  - Soap and water for general cleaning
  - Dilute bleach solutions
  - Accelerated Hydrogen Peroxide
  - Household disinfectants

**Disinfectants**

- **Bleach**
  - 800 ppm - effective against rotavirus
  - 1/64 dilution
    - 1/4 cup in 1 gallon (approx. 50 mL in 4 L)
    - bathrooms, diapering areas (CDC)
  - 1/1000 dilution
    - (1mL in 1L water) - water table
  - 1/10 dilution - body fluid spills
    - 1 Tbsp in 1 gallon (approx. 15 mL in 4 L)
    - toys, clean eating utensils, etc.

- **Accelerated Hydrogen peroxide**
  - Virox, Accel
  - Very effective against non-enveloped and enveloped viruses, and vegetative bacteria with a 5 minute contact time
  - Also works as a cleaner.
  - Can buy concentrate or ready-to-use

- **Lysol spray**
  - Phenylphenol 0.1% (quat) and ethanol 79%
  - Disinfectant effective against poliovirus (small, hydrophobic virus) with 30 second exposure - >3 log reduction
  - >99.9% of rotavirus was inactivated in 10 minutes (1 and 3 minutes were almost as effective
  - 4 log or better reduction of common bacteria

- **Accel**
  - high level disinfectant with prolonged contact
  - No rinsing in food preparation areas - no active residue
  - non toxic
    - www.virox.com

- **Lysol references**
Hand Hygiene
- Recognized as the best way of stopping the spread of organisms in this setting
- Soap and water
  - No indication for antimicrobial soap
  - 10-15 seconds of lathering
- Alcohol
  - More research into concentration required to kill all viruses

Hand Hygiene
- Towelettes
  - Must be alcohol based if used for hand hygiene
- Children
  - After toileting
  - Before and after eating
  - After pets, sand, dirt, art, ....
  - Education on sneezing and coughing
  - Never too early to start!

Toilet Areas
- Handwashing must be observed
- Outbreak of E. coli O157:H7 possibly linked to contaminated surfaces and fomites from poor handwashing by symptomatic children or shedders.
- Need records of attendance, and changes in children, even if mild symptoms.
  - CCDR 29-03 1 Feb 2003

Water Tables
- Add bleach to water (1 mL per litre)
- Have children wash hands before and after use
- Disinfect all toys to be used in the table with dilute bleach solution
- Avoid sponge toys
- Watch straws and bubble pipes

Toys
- No soft or plush toys if "mouthers" are present
- Dishwasher offers good level of sanitation on hard toys if hot water cycle is used-
  - Must be aware of water temperature
- Establish a bin for used, mouthed toys for cleaning in soap and water, then disinfectant rinse

Pregnant Workers
- CMV
  - Highest concentration in urine and saliva
  - High seroconversion rate seen in child care workers working with children under 3 years of age, compared to general population
  - Best protection is standard or routine precautions!
  - Avoid kissing, or eating saliva!
Parent Education

- Hygiene
- Management of minor illness
  - inclusion, exclusion
- Beyond my scope:
  - Child development
  - Appropriate nutrition

Outbreak Management

- Involve the local health unit!
- Have decision flow chart readily available
- Thresholds - what is acceptable
- Day Care staff need to recognize potential outbreaks developing, and also infectious disease exposure that could lead to outbreak.

In Summary:

- Keep it clean
  - The environment
  - Our hands
    - which leads to:
  - Don’t eat it!
    - Clean eating and high touch surfaces, especially where fecal contamination may be
    - Clean hands before and after eating
    - Clean hands regularly

Useful References

- American Academy of Pediatrics- Red Book
  - 2003
- Canadian Pediatric Society
  - http://www.cps.ca
  - http://www.caringforkids.cps.ca
- APIC Text of Infection Control and Epidemiology
  - 2000

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