Pregnant Healthcare Workers and Infection Risk
Sotirios Tsiodras, MD, MSc, PhD, University of Athens Medical School
A Webber Training Teleclass

PREGNANT HCW & INFECTION RISK

- Special concern
  - Certain mild infections
    - May potentially affect fetal development

PREGNANT HCW & INFECTION RISK

- Risk assessment
  - Detection of infectious agent
    - Mode of transmission
  - Type of contact
  - Pregnancy stage
    - Probability of transmission

PREGNANT HCW & INFECTION RISK

- Risk assessment
  - Personal predisposition to infection
    - Access to the medical record
      - Hx of infection
      - Immune status
      - Immunizations

PREGNANT HCW & INFECTION RISK

- Interventions – Response to an incident
  - Hygiene measures
  - Prevention
  - Sharing of info with HCW – discussion
  - Infectious diseases consultation

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PREGNANT HCW & INFECTION RISK
Problems

- Response to an incident
- Laboratory testing
- Immediate management
- F/u
  - Seroconversion
  - Probability of transmission to the fetus

EXAMPLES

<table>
<thead>
<tr>
<th>Rubella</th>
<th>Parovirus</th>
<th>Chickenpox</th>
</tr>
</thead>
<tbody>
<tr>
<td>% young women who are susceptible</td>
<td>1 - 2%</td>
<td>40 - 50%</td>
</tr>
<tr>
<td>Infectivity risk from household contact</td>
<td>High (80%)</td>
<td>Medium (50%)</td>
</tr>
<tr>
<td>Risk of fetal infection</td>
<td>&lt; 11 wks: 90%</td>
<td>11 - 16 wks: 55%</td>
</tr>
<tr>
<td></td>
<td>5 - 16 wks: 15%</td>
<td>&gt;16 wks: 25 - 70%</td>
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<tr>
<td></td>
<td>&lt; 28 wks: 5 - 10%</td>
<td>28-36 wks: 5%</td>
</tr>
<tr>
<td>Risk of fetal harm</td>
<td>&lt; 11 wks: 90%</td>
<td>11-16 wks: 20%</td>
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<tr>
<td></td>
<td>&gt;20 wks: no increase</td>
<td>&gt;20 wks: 9% excess fetal loss, 3% hydrops fetalis, of whom 50% die</td>
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<tr>
<td></td>
<td>Congenital varicella syndrome:</td>
<td>&lt;13 wks: 1%</td>
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<tr>
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<td>13-20 wks: 2%</td>
<td>Neonatal varicella: 4 days before to 2 days after delivery: 20%</td>
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EXPERIENCE

<table>
<thead>
<tr>
<th>Rubella</th>
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<th>Chickenpox</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk to mother</td>
<td>Arthritis</td>
<td>Arthritis</td>
</tr>
<tr>
<td>Interventions and benefits</td>
<td>Termination of pregnancy</td>
<td>Intrauterine transfusion reduces odds of death in hydrops to 0.14</td>
</tr>
<tr>
<td></td>
<td>At end of pregnancy: 2G to mother and neonate attenuates illness. Assist with transfusion within 24 hrs of rash for mother, and for neonates</td>
<td></td>
</tr>
<tr>
<td>Incubation period</td>
<td>14-21 days</td>
<td>13-18 days</td>
</tr>
<tr>
<td>Infectivity period in relation to onset of rash</td>
<td>7 days before to 10 days after</td>
<td>10 days before to day of onset</td>
</tr>
</tbody>
</table>

PREGNANT HCW & INFECTION RISK
Pathogens of special interest

- Cytomegalovirus (CMV)
  - Most common cause of congenital infection worldwide
  - 1 every 1000 children in N America
  - 90-95% asymptomatic at birth
  - Hearing loss, effects on vision, cognitive dysfunction

- Other pathogens

PREGNANT HCW & INFECTION RISK
Pathogens of special interest

- Cytomegalovirus (CMV)
  - Often transmitted between children
    - Asymptomatic
    - 30-60% children aged 1-5 crè÷̧̊ shed virus
    - Urine, saliva

- HCW in contact with children

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PREGNANT HCW & INFECTION RISK
Pathogens of special interest

- Cytomegalovirus (CMV)
  - Risk factors for CMV shedding
    - Previous shedding
    - Multiple hospitalizations
    - Female gender
    - Hispanics


PREGNANT HCW & INFECTION RISK
Pathogens of special interest

- Cytomegalovirus (CMV)
  - NEJM study
    - Shedding in urine/saliva: 1.6%
    - Premature w/hospitalization > 1 month: 13%
    - Community neonates (higher age): 5%
  - Annual attack rate
    - Med. Students: 0.6%
    - MDs: 2.7%
    - RN: 3.3%
    - Young community females: 2.5 - 5.5%

NEJM, 1983;309:950-3

PREGNANT HCW & INFECTION RISK
Pathogens of special interest

- Cytomegalovirus (CMV)
  - in utero infection
    - Primary
      - 25-75% probability of transmission to fetus
    - Reactivation
      - 0.2-2% probability of transmission to fetus

PREGNANT HCW & INFECTION RISK
Pathogens of special interest

- Cytomegalovirus (CMV)
  - good hand-washing
    - All pts- ATTENTION small children !!!
  - NO kisses
  - careful manipulation of potentially CMV contaminated material
    - e.g. diapers

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PREGNANT HCW & INFECTION RISK
Pathogens of special interest

- Cytomegalovirus (CMV)
  - 44% ob/gyn USA
  - advice for these simple measures

MMWR 2008;57(3):65-8

PREGNANT HCW & INFECTION RISK
Pathogens of special interest

- Cytomegalovirus (CMV)
  - NO transfer to another unit
  - Susceptible HCW
  - NO limitation in work in case of an acute infection

Seroconversion

PREGNANT HCW & INFECTION RISK
Pathogens of special interest

- HIV

<table>
<thead>
<tr>
<th>TRANSMISSION</th>
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<tbody>
<tr>
<td>Blood &amp; biologic: Standard precaut</td>
<td>Immediate report of ex</td>
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<tr>
<td></td>
<td>No blood donation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No lactation</td>
<td></td>
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</tbody>
</table>

HIV RNA

Exposure

Symptoms

Days

HIV-1 Antibodies

Ab

PREGNANT HCW & INFECTION RISK
Pathogens of special interest

- HIV
  - In theory higher risk of transmission to fetus with 1ry infection
  - In general NO adverse effects of ARV to fetus
    - Most Class B or C

Lancet 1999;354:1084-9

PREGNANT HCW & INFECTION RISK
Pathogens of special interest

- HIV
  - AVOID USING
    - Efavirenz
    - D4T + DDI
    - Amprenavir
      - 2nd - 3rd trimester

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T tolerability of HIV PEP in Health Care Workers


PREGNANT HCW & INFECTION RISK
Pathogens of special interest

- Hepatitis A
  - Standard precautions
  - Available vacc
  - IVIG
  - Complications pregnant if acute
  - PEP in HCW caring for patients during epidemics

Gastroenterology, 2006:1129-34
J Travel Med 2008;15:77-81

PREGNANT HCW & INFECTION RISK
Pathogens of special interest

- Hepatitis A
  - Vaccine over IVIG for age > 40 yrs
  - IVIG over vaccine for age > 40 yrs
  - Also when
    - Immunocompromized
    - Liver dysfunction
    - Contraindications for immunization

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PREGNANT HCW & INFECTION RISK
Pathogens of special interest

- Hepatitis C

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</thead>
<tbody>
<tr>
<td>Blood &amp; biologic secretsions</td>
<td>Standard precau</td>
<td>Immediate report of exposure</td>
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<tr>
<td></td>
<td>No work restriction</td>
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</tbody>
</table>

- Rubella

<table>
<thead>
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<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood &amp; biologic secretsions</td>
<td>Standard precau</td>
<td>Available vaccine</td>
</tr>
<tr>
<td></td>
<td>HBG</td>
<td>Vaccine in all HCW exposed biological fluids</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Immediate report of exposure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transmission possible higher in 3rd trimester</td>
</tr>
</tbody>
</table>

Rubella

- % young women who are susceptible: 1 – 2%
- Infectivity risk from household contact: High (90%)
- Risk of foetal infection
  - <11 wks: 90%
  - 11 – 16 wks: 55%
  - >16 wks: 45%
- Risk of foetal harm
  - <11 wks: 90%
  - 11-16 wks: 20%
  - 16-20 wks: low, mostly deathless
  - >20 wks: no increase
- Risk to mother: Arthritis

- Measles

<table>
<thead>
<tr>
<th>Transmission</th>
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<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>Droplets &amp; Airborne</td>
<td>Standard precau</td>
<td>AIHCW should be immune</td>
</tr>
<tr>
<td></td>
<td>Airborne</td>
<td>Nonimmune-nocare of measles</td>
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<tr>
<td></td>
<td></td>
<td>IVIG</td>
</tr>
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<td></td>
<td>ISOLATION</td>
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<tr>
<td></td>
<td></td>
<td>Immunization if not pregnant</td>
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<td></td>
<td>Work restriction x 21 day</td>
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PREGNANT HCW & INFECTION RISK
Pathogens of special interest

- Human Parvovirus B19

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<th>Comments</th>
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</table>
| Droplets, resp. secretions | Standard droplet precautions | Good hand hygiene | 50% alveolar

Risk of foetal infection:
- <4 wks: 0%
- 5 – 16 wks: 15%
- >16 wks: 25 – 70%

Risk of foetal harm:
- <20 wks: 9%
- Excessive foetal loss
- 3% Hydrops foetalis, of whom 50% die

Risk to mother:
- Arthritis

J Publ Health Med 1999;439-36
Pediatrics 1990;85:131-3
AJOG, 2008:e33-34

Fetal hydrops

PREGNANT HCW & INFECTION RISK
Pathogens of special interest

- Varicella
  - Rare during pregnancy
  - 3-4% women at risk
  - Incidence 0.7-3/1000 births

J Obstet Gynecol 1991;1112-6
J Infect 1998;59-71

Chickenpox

| % young women who are susceptible | 10%
| Infectivity risk from household contact | High (70 – 90%)
| Risk of foetal infection | <28 wks: 5-10%
- 28-36 wks: 25%
- >36 wks: 50%
| Risk of foetal harm | Congenital varicella syndrome
- <13 wks: 1%
- 13-20 wks: 2%
- Neonatal varicella: 4 days before to 2 days after delivery: 20%
| Risk to mother | Pneumonitis, case fatality in pregnancy 1/1000

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Figure 1 Variella-zoster virus infections and their consequences during pregnancy

Congenital Varicella

Algorithm 1
- Medical review essential if chickenpox develops during pregnancy
- No complications
- 24 hours wait period
- Oral antiviral or supportive therapy
- Monitor patient
- Counsel patient on possible effects on fetus

Fetal Neonatal Varicella

PREGNANT HCW & INFECTION RISK
Pathogens of special interest

- Varicella

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<tbody>
<tr>
<td>Contact</td>
<td>Standard</td>
<td>All HCW should be immune</td>
</tr>
<tr>
<td>Airborne</td>
<td>Airborne</td>
<td>Nonimmune-nocare MZVpts</td>
</tr>
<tr>
<td></td>
<td>VZIg</td>
<td>Vaccinate family if nonimmune susceptible</td>
</tr>
<tr>
<td></td>
<td>ISOLATION</td>
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Influenza

"Woe unto Them that are with Child", Johnson, Lancet 1919

- 1,350 cases of influenza in pregnant
  - 1918 pandemic
  - 27% death (Harris, JAMA 1919).

- 86 pregnant women hosp for flu
  - Chicago 1918
  - 45% death (Nuzum. JAMA 1918).

HSV

HSV lesion transmission

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PREGNANT HCW & INFECTION RISK
Pathogens of special interest
- MDR pathogens

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</thead>
<tbody>
<tr>
<td>Airborne</td>
<td>Airborne</td>
<td>Report HCW exposure</td>
</tr>
<tr>
<td>PPD noncontraindicate in pregnant HCW</td>
<td></td>
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<tr>
<td>INH after 3rd trimester</td>
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</tbody>
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PREGNANT HCW & INFECTION RISK
Pathogens of special interest
- Tuberculosis

- RSV
  - Pregnant or nursing HCW should not care
  - for pt treated w aerosolized ribavirin

PREGNANT HCW & INFECTION RISK
Pathogens of special interest
- N. meningitidis
  - Ceftriaxone
    - 250 mg im X 1
    - Only prophylaxis allowed for pregnant HCW

Relevant legislation
- Employment Protection (Consolidation) Act 1978
- Management of Health and Safety at Work Regulations 1999
- The Employment Rights Act 1996
- Ionising Radiations Regulations 1999
- Control of Substances Hazardous to Health Regulations 1994
- Workplace (Health, Safety and Welfare) Regulations 1992

The management of risk of infection associated with employment needs to be a partnership between the employer, occupational health, the employee and the hospital or trust infection control organisation. Advice may be required from the hospital microbiology department or department of infectious diseases. A comprehensive, written policy is recommended to include aspects of risk assessment, educational needs for employees and managers, together with individual case management strategies.

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Conclusions

- Certain immunizations required
  - Mumps, rubella, varicella, HepB, annual flu
- Quick exposure report
- Job restrictions rarely required
  - e.g. Parvovirus B19, varicella, aerosolized ribavirin
- Need for written policy for pregnant HCW

THANK YOU !!!

THE NEXT FEW TELECLASSES

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>29 May</td>
<td>Surgical Site Infections – A 2009 Update</td>
</tr>
<tr>
<td></td>
<td>Speaker: Loretta P. Arruda, Shands Hospital, University of Florida</td>
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<tr>
<td>04 Jun</td>
<td>Portal of Entry: The Missing Link?</td>
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<tr>
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<td>Speaker: Jim Gauthier, Providence Continuing Care, Kingston</td>
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<tr>
<td>24 Jun</td>
<td>(South Pacific Teleclass) Tea Tree Oil and Staphylococcal Septic</td>
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<tr>
<td></td>
<td>Speaker: Prof. Tom Riley, University of Western Australia</td>
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<tr>
<td>16 Jul</td>
<td>(Free Teleclass) PreMED and the Use of Informal Information Sources</td>
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<tr>
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<td>for Emerging Disease Surveillance</td>
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<tr>
<td></td>
<td>Speaker: Dr. Larry Mandoff, PreMED Editor, Harvard Medical School</td>
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<tr>
<td>21 Jul</td>
<td>(Free British Teleclass) Fitness for Purpose in Infection Control</td>
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<tr>
<td></td>
<td>Speaker: Martin Kneen, Southport and Ormewick NHS Trust View</td>
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<tr>
<td>06 Aug</td>
<td>(Free Teleclass) How Professional Associations Can Best Contribute</td>
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<tr>
<td></td>
<td>to Infection Prevention Globally</td>
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<tr>
<td></td>
<td>Speaker: Cathryn Murphy, Bond University</td>
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