Occupational Health Update:
Extended Care Facilities

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Goals

• Understand pre-exposure evaluation and vaccine-preventable disease for healthcare personnel
• Understand TB surveillance for health care providers
• Understand how to manage exposure to blood or potentially infectious material
Disclosures

- No financial relationships to disclose
- No off-label or investigational use of medications and/or devices
- The information and views set out in this presentation are those of the author and do not necessarily reflect the official opinion of the University of North Carolina at Chapel Hill or UNC Hospitals
Pneumococcal Vaccines
Pneumococcal conjugate vaccine (PCV13)

- Routine vaccination of children 2 through 59 months
  - Four doses: 2, 4, 6 months, booster at 12-15 months of age
- One dose of PCV13 is recommended for
  - All adults > 65 years of age unless they have already received the vaccine (*ACIP will downgrad to discussion between patient and provider*)
  - PCV13 and PPSV23 should not be administered simultaneously (the same clinic day) and the minimum acceptable interval between PCV13 and PPSV23 is 8 weeks.
Pneumococcal polysaccharide vaccine (PPSV23)

- One dose of PPSV23 is recommended for all adults aged 65 or older, regardless of previous vaccine history.*
  » Once a dose of PPSV23 has been given at age 65 or older, no additional doses of PPSV23 should be administered.

- One dose of PPSV23 is recommended for adults 19-64 with certain medical conditions.
  » A second PPSV23 vaccine should be given > 5 years after initial vaccine in adults 19-64 with one additional dose given when they turn 65 (if it has been >5 years from first dose)
Indicated to receive 1 dose of PPSV23 at 19 through 64 years

Includes adults with:
- chronic heart or lung disease
- diabetes mellitus
- alcoholism
- chronic liver disease
Also includes adults who smoke cigarettes

For those who have not received any pneumococcal vaccines, or those with unknown vaccination history:
- Administer 1 dose of PPSV23 at 19 through 64 years.
- Administer 1 dose of PCV13 at 65 years or older. This dose should be given at least 1 year after PPSV23.
- Administer 1 final dose of PPSV23 at 65 years or older. This dose should be given at least 1 year after PCV13 and at least 5 years after the most recent dose of PPSV23.

Indicated to receive 1 dose of PCV13 at ≥19 years and 1 or 2 doses of PPSV23 at 19 through 64 years

Includes adults with:
- cerebrospinal fluid (CSF) leaks*
- cochlear implants*
- sickle cell disease or other hemoglobinopathies
- congenital or acquired asplenia
- congenital or acquired immunodeficiencies
- HIV infection
- chronic renal failure
- nephrotic syndrome
- leukemia
- lymphoma
- Hodgkin disease
- generalized malignancy
- iatrogenic immunosuppression
- solid organ transplant
- multiple myeloma

For those who have not received any pneumococcal vaccines, or those with unknown vaccination history:
- Administer 1 dose of PCV13.
- Administer 1 dose of PPSV23 at least 8 weeks later.
- Administer a second dose of PPSV23 at least 5 years after the previous dose (*note: a second dose is not indicated for those with CSF leaks or cochlear implants).
- Administer 1 final dose of PPSV23 at 65 years or older. This dose should be given at least 5 years after the most recent dose of PPSV23.
1. Adults recommended to receive PCV13 at ≥ 19 years who already received 1 dose of PPSV23 at < 65 years

   - PPSV23 (at < 65 years) → PCV13 (at < 65 years) → PPSV23 (at < 65 years) → PPSV23 (at ≥ 65 years)
   - At least 1 year apart
   - At least 8 weeks apart
   - At least 5 years apart

2. Adults recommended to receive PCV13 at ≥ 19 years who already received 2 doses of PPSV23 at < 65 years and 1 dose of PPSV23 at ≥ 65 years

   - PPSV23 (at < 65 years) → PPSV23 (at ≥ 65 years) → PCV13 (at ≥ 65 years)
   - At least 1 year apart

3. Adults recommended to receive PCV13 at ≥ 19 years who already received 2 doses of PPSV23 and 1 dose of PCV13 at < 65 years

   - PPSV23 (at < 65 years) → PPSV23 (at < 65 years) → PCV13 (at < 65 years) → PPSV23 (at ≥ 65 years)
   - At least 8 weeks apart
   - At least 5 years apart

4. Adults recommended to receive PCV13 at ≥ 19 years who already received 2 doses of PPSV23 at < 65 years and 1 dose of PCV13 at ≥ 65 years

   - PPSV23 (at < 65 years) → PPSV23 (at < 65 years) → PCV13 (at ≥ 65 years) → PPSV23 (at ≥ 65 years)
   - At least 8 weeks apart
   - At least 5 years apart

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- For those who have already received 1 or more doses of PPSV23, or those with unclear documentation of the type of pneumococcal vaccine received:
  - Administer 1 dose of PCV13 at least 1 year after the most recent pneumococcal vaccine dose.
  - Administer a second dose of PPSV23 at least 8 weeks after PCV13 and at least 5 years after the previous dose of PPSV23 (note: a second dose is not indicated for those with CSF leaks or cochlear implants).
  - Administer 1 final dose of PPSV23 at 65 years or older. This dose should be given at least 5 years after the most recent dose of PPSV23.

- For those who have already received 1 dose of PCV13, do not administer an additional dose at 65 years or older.
Pneumococcal vaccines

Pneumococcal vaccine timing for adults 65 years or older

For those who have not received any pneumococcal vaccines, or those with unknown vaccination history

- PCV13 (at ≥ 65 years)
- At least 1 year apart for most immunocompetent adults
- At least 8 weeks apart for adults with certain medical conditions
- PPSV23 (at ≥ 65 years)

For those who have previously received 1 dose of PPSV23 at ≥ 65 years and no doses of PCV13

- PPSV23 (at ≥ 65 years)
- At least 1 year apart for all adults
- PCV13 (at ≥ 65 years)

- Administer 1 dose of PCV13 at least 1 year after the dose of PPSV23 for all adults, regardless of medical conditions.

- See Table 1 for specific guidance.

- https://www.cdc.gov/vaccines/vpd/pneumo/hcp/pneumoapp.html
ACIP June 2019 update

- **Human Papillomavirus (HPV) Vaccine**
  - Catch-up vaccination for persons through age 26 years who are not adequately vaccinated.
  - Catch-up vaccinations for persons aged 27 through 45 years who are not adequately vaccinated. HPV vaccines are not licensed for use in adults older than age 45 years.

- **Pneumococcal Vaccines**
  - Adults 65 years or older who do not have an immunocompromising condition and who have not previously received PCV13.
  - All adults 65 years or older should receive a dose of PPSV23.
ACIP June 2019 update

• **Hepatitis A Vaccines**
  » All children and adolescents aged 2 through 18 years who have not previously received Hepatitis A vaccine be vaccinated routinely at any age (i.e., children and adolescents are recommended for catch-up vaccination).
  » All persons with HIV aged ≥1 year be routinely vaccinated with Hepatitis A vaccine
ACIP June 2019 update

• **Serogroup B Meningococcal (MenB) Vaccines**
  » Persons aged ≥10 years with complement deficiency, complement inhibitor use, asplenia, or who are microbiologists:
  » MenB booster dose 1 year following completion of a MenB primary series followed by MenB booster doses every 2-3 years thereafter, for as long as increased risk remains
Pre-exposure prophylaxis
Vaccines for HCP

• There are minimal differences between the adult and HCP schedules, all of which go away when you include recommended childhood vaccinations.
VACCINES AND RECOMMENDATIONS IN BRIEF

**Hepatitis B** – If previously unvaccinated, give a 2-dose (Heplisav-B) or 3-dose (Engerix-B or Recombivax HB) series. Give intramuscularly (IM). For HCP who perform tasks that may involve exposure to blood or body fluids, obtain anti-HBs serologic testing 1–2 months after dose #2 (for Heplisav-B) or dose #3 (for Engerix-B or Recombivax HB).

**Influenza** – Give 1 dose of influenza vaccine annually. Inactivated injectable vaccine is given IM, except when using the intradermal influenza vaccine. Live attenuated influenza vaccine (LAIV) is given intranasally.

**MMR** – For healthcare personnel (HCP) born in 1957 or later without serologic evidence of immunity or prior vaccination, give 2 doses of MMR, 4 weeks apart. For HCP born prior to 1957, see below. Give subcutaneously (Subcut).

**Varicella (chickenpox)** – For HCP who have no serologic proof of immunity, prior vaccination, or diagnosis or verification of a history of varicella or herpes zoster (shingles) by a healthcare provider, give 2 doses of varicella vaccine, 4 weeks apart. Give Subcut.

**Tetanus, diphtheria, pertussis** – Give 1 dose of Tdap as soon as feasible to all HCP who have not received Tdap previously and to pregnant HCP with each pregnancy (see below). Give Td boosters every 10 years thereafter. Give IM.

**Meningococcal** – Give both MenACWY and MenB to microbiologists who are routinely exposed to isolates of *Neisseria meningitidis*. Every 5 years boost with MenACWY if risk continues. Give MenACWY and MenB IM.

*Hepatitis A, typhoid, and polio vaccines are not routinely recommended for HCP who may have on-the-job exposure to fecal material.*
Audience participation

- Why are new hires unable to find their vaccination records?
  » Health care provider
  » Health department
  » Kindergarten
  » 7th grade
  » College/university
  » Health care profession school
  » Clinical rotations
Why do I have to get vaccinated?

- **Vaccine-preventable diseases haven’t gone away.**
- **Vaccination can mean the difference between life and death.**
  - In the US, vaccine-preventable infections kill more individuals annually than HIV/AIDS, breast cancer, or traffic accidents. Approximately 50,000 adults die each year from vaccine-preventable diseases in the US.
- **Vaccines are safe and effective.**
- **When you get sick, your children, grandchildren, and parents are at risk, too.**
I’ve heard that vaccines don’t work
So, do I have to get vaccinated?

- **10A NCAC 13D .2209 INFECTION CONTROL**
  - (a) A facility shall establish and maintain an infection control program for the purpose of providing a safe, clean and comfortable environment and preventing the transmission of diseases and infection.
I can’t get vaccinated, I’m ……

- **Pregnant**
  - Live-attenuated vaccines contraindicated (with some exceptions)
- **Immunocompromised**
  - Case-dependent, concern is vaccine efficacy as well as patient safety
- **Allergic to eggs**
  - Vaccine-dependent (may have egg-free formulations available)
- **On blood thinners**
  - “Let me see your arm”
- **Afraid of needles**
  - “Quick, look over there”
I can’t get vaccinated, I’m ……

“Not willing to get vaccinated, despite all the things you have just told me”

<table>
<thead>
<tr>
<th>Disease</th>
<th>Herd Immunity Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diphtheria</td>
<td>85%</td>
</tr>
<tr>
<td>Measles</td>
<td>83-94%</td>
</tr>
<tr>
<td>Mumps</td>
<td>75-86%</td>
</tr>
<tr>
<td>Pertussis</td>
<td>92-94%</td>
</tr>
<tr>
<td>Polio</td>
<td>80-86%</td>
</tr>
<tr>
<td>Rubella</td>
<td>80-85%</td>
</tr>
<tr>
<td>Smallpox</td>
<td>83-85%</td>
</tr>
</tbody>
</table>

“Pick battles that are small enough to win, big enough to be important”
Specific Vaccines
Hepatitis B

• **Indications**
  » Universal; HCP with potential blood exposure (OSHA required OR signed refusal)

• **Administration**
  » Prior to administration do not routinely perform serologic screening for HB unless cost effective
  » After 3rd dose, test for immunity (>10 mIU/mL); if inadequate provide 3 more doses and test again for immunity; if inadequate test consider as “non-responder”
  » If non-immune after 6 (or 3) doses, test for HBsAg
Hepatitis B

- HEPLISAV-B approved in late 2017
- Adults > 18 years of age
- Two doses one month apart
- Not studied in hemodialysis patients

Table 7

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>HEPLISAV-Ba</th>
<th>N</th>
<th>SPR (95% CI)</th>
<th>N</th>
<th>SPR (95% CI)</th>
<th>Difference in SPRs (HEPLISAV-B minus Engerix-B) (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-29</td>
<td>174</td>
<td></td>
<td>100.0% (97.9, 100.0)</td>
<td>99</td>
<td>93.9% (87.3, 97.7)</td>
<td>6.1% (2.8, 12.6)*</td>
</tr>
<tr>
<td>30-39</td>
<td>632</td>
<td></td>
<td>98.9% (97.7, 99.6)</td>
<td>326</td>
<td>92.0% (88.5, 94.7)</td>
<td>6.9% (4.2, 10.4)*</td>
</tr>
<tr>
<td>40-49</td>
<td>974</td>
<td></td>
<td>97.2% (96.0, 98.2)</td>
<td>518</td>
<td>84.2% (80.7, 87.2)</td>
<td>13.1% (9.9, 16.6)*</td>
</tr>
<tr>
<td>50-59</td>
<td>1439</td>
<td></td>
<td>95.2% (94.0, 96.3)</td>
<td>758</td>
<td>79.7% (76.6, 82.5)</td>
<td>15.5% (12.6, 18.7)*</td>
</tr>
<tr>
<td>60-70</td>
<td>1157</td>
<td></td>
<td>91.6% (89.9, 93.1)</td>
<td>588</td>
<td>72.6% (68.8, 76.2)</td>
<td>19.0% (15.2, 23.0)*</td>
</tr>
</tbody>
</table>

# Hepatitis B

<table>
<thead>
<tr>
<th>Vaccination and antibody response status of exposed person</th>
<th>Treatment</th>
<th>Source HBsAg-positive</th>
<th>Source HBsAg-negative</th>
<th>Source not tested or status unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unvaccinated</td>
<td>HBIG x 1; Initiate HB vaccine series</td>
<td>Initiate HB vaccine series</td>
<td>Initiate HB vaccine series</td>
<td></td>
</tr>
<tr>
<td>Previously vaccinated – known responder</td>
<td>No treatment</td>
<td>No treatment</td>
<td>No treatment</td>
<td></td>
</tr>
<tr>
<td>Previously vaccinated – known nonresponder after 3 doses</td>
<td>HBG x 1 and initiate revaccination</td>
<td>No treatment</td>
<td>If known high-risk source, treat as if source were HBsAg-positive.</td>
<td></td>
</tr>
<tr>
<td>Previously vaccinated – known nonresponder after 6 doses</td>
<td>HBG x 2 (separated by 1 month)</td>
<td>No treatment</td>
<td>If known high-risk source, treat as if source were HBsAg-positive.</td>
<td></td>
</tr>
<tr>
<td>Antibody response unknown</td>
<td>Test exposed person for anti-HBs – If adequate,* no treatment, – If inadequate,* HBG x 1 and vaccine booster</td>
<td>No treatment</td>
<td>Test exposed person for anti-HBs – If adequate,* no treatment – If inadequate,* HBG x 1 and vaccine booster</td>
<td></td>
</tr>
</tbody>
</table>

Epidemiology of Hepatitis B Virus Infection in the United States

Bo Hyun Kim, M.D., W. Ray Kim, M.D.

First published: 22 August 2018 | https://doi.org/10.1002/cld.732 | Cited by: 1
Influenza vaccines

• Standard IM inactivated influenza vaccine (IIV3, IIV4)
• Other formulations
  » High-dose influenza vaccine (IIV3) (> 65 years)
  » Cell culture-based influenza vaccine (ccIIV4) (> 4 years) (egg-free)
  » Recombinant influenza vaccine (RIV4) (>18 years)
  » Live attenuated vaccine (LAIV4) (2-49 years)
Influenza vaccines

- **ACIP recommendations**
  - One annual dose for all persons ≥ 6 months of age
  - Required to be offered to residents and HCP in ECFs in NC (1 N.C. Gen. Stat. Ann. § 131E-113(a))
  - Immunize as soon as vaccine becomes available for the current season
Currently Viewing: Influenza vaccination (Nursing Home) >> All Residents >> ≥18 years >> Coverage for 2016-17

**Data Notes and Footnotes**

**Data Notes:**
- Estimates were obtained from data reported to the Minimum Data Set (MDS) maintained by the Centers for Medicare & Medicaid Services (CMS) collected during assessments of nursing home residents. MDS assessments are conducted by staff of individual nursing homes for all residents admitted to CMS-certified nursing homes and skilled nursing facilities for the purposes of monitoring quality of care, determining Medicare and Medicaid payment, and providing consumer access to nursing home information. Information collected during assessments included data on influenza vaccination status along with data such as functional status, medical conditions, and current medications. Assessments are conducted at admission, discharge, quarterly, annually, and when there is a significant change in the patient’s status. Assessments are conducted by medical record review when possible, or by directly questioning the residents or their caretakers.
Measles, Mumps, Rubella (MMR)

- **Measles**
  - Born before 1957: Consider immune (except during outbreak): Born after 1957: 2 doses
  - Immunity = Appropriate immunizations or positive serology

- **Mumps**
  - Born before 1957: Consider immune (except during outbreak): Born after 1957: 2 doses
  - Immunity = Appropriate immunizations or positive serology

- **Rubella**
  - 1 dose of MMR to susceptible women of childbearing potential
  - Immunity = Appropriate immunizations or positive serology
Varicella

• Special consideration should be given to those who have close contact with
  » persons at high risk for severe disease (e.g., immunocompromised persons)
  » persons are at high risk for exposure or transmission (e.g., teachers of young children, college students, military recruits, international travelers)

• Immunity
  » birth before 1980 (not HCP or pregnant women), history of varicella or zoster by a HCP, positive serology, or laboratory evidence of infection
# Zoster Vaccine

<table>
<thead>
<tr>
<th><strong>Zostavax® (ZVL)</strong></th>
<th><strong>Shingrix® (RZV)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Approved 2006</td>
<td>Approved 2017</td>
</tr>
<tr>
<td>Live, attenuated virus</td>
<td>Recombinant, inactivated varicella antigen</td>
</tr>
<tr>
<td>Adults &gt; 50 years and older</td>
<td>Adults &gt; 50 years and older</td>
</tr>
<tr>
<td>One dose</td>
<td>Two doses, 2-6 months apart</td>
</tr>
<tr>
<td>51% reduction in risk of zoster in subjects &gt; 60 years old (41% in 70-79 yrs, 18% in &gt; 80 yrs)</td>
<td>90% effective, 85% for at least four years after vaccination</td>
</tr>
<tr>
<td>Reduced efficacy if given with PNEUMOVAX 23 (wait 4 weeks)</td>
<td>Should be given even if patient has had shingles, had Zostavax, unsure if they had chickenpox</td>
</tr>
<tr>
<td>Adults over 60 may be given RZV or ZVL (RZV is preferred)</td>
<td>Wait 8 weeks after Zostavax administration. Can give with inactivated flu vaccine</td>
</tr>
</tbody>
</table>
Tetanus-diphtheria-acellular pertussis (/Tdap)

- Substitute 1 dose Tdap for all adults when Td booster due
  - May be used to provide tetanus PEP
  - Provide to all adults with exposure to young children (no delay after Td)
  - Recommended for pregnant women (preferably 27-36 weeks gestational age)
  - Only one dose of Tdap is required, employees who are 10 years out from Tdap should be boosted with Td.
Meningococcal Vaccine

- Recommended for adults had high risk of disease (persistent complement deficiency, functional or anatomic asplenia, or HIV infection (adolescents)). Two vaccines series are needed: MenACWY and Serogroup B (MenB)

- MenACWY
  - Immunosuppressed – 2 doses of MenACWY and boosters every 5 years, 2 or 3-dose MenB
  - Microbiologists – 1 dose, booster every 5 years (MenACWY), 2 or 3-dose MenB
  - Anatomic/functional asplenia patients should be vaccinated against MenACWY/MenB
TB surveillance

TB is the top infectious killer in the world

In 2017

1.6 million TB deaths

Including 0.3 million deaths among people with HIV

10 million people fell ill with TB

TB is the leading killer of people with HIV

And major cause of death due to antimicrobial resistance
TB transmission in health care settings

- 1994 – CDC publishes guidance for health-care facilities (i.e., hospitals and specific areas in those hospitals), focusing on active TB case management and infection control
- 2005 – updated guidance expanding the locations where screening was recommended – entire facility, laboratories, outpatient facilities, correctional facilities, homeless facilities
- January 2017 – everything you thought you knew about TB changed
Guidelines recommend that persons at low risk for *Mtb* infection and disease progression NOT be tested for *Mtb* infection. We concur with this recommendation. However, we also recognize that such testing may be obliged by law or credentialing bodies. If diagnostic testing for LTBI is performed in individuals who are unlikely to be infected with *Mtb* despite guidelines to the contrary:

- We suggest performing an IGRA instead of a TST in individuals 5 years or older (*conditional recommendation, low-quality evidence*). Remarks: A TST is an acceptable alternative in settings where an IGRA is unavailable, too costly, or too burdensome.

- We suggest a second diagnostic test if the initial test is positive in individuals 5 years or older (*conditional recommendation, very low-quality evidence*). Remarks: The confirmatory test may be either an IGRA or a TST. When such testing is performed, the person is considered infected only if both tests are positive.
Official American Thoracic Society/Infectious Diseases Society of America/Centers for Disease Control and Prevention Clinical Practice Guidelines: Diagnosis of Tuberculosis in Adults and Children

<table>
<thead>
<tr>
<th>Groups with Increased Likelihood of Infection with Mtb</th>
<th>Benefit of Therapy</th>
<th>LTBI Testing Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household contact or recent exposure of an active case</td>
<td>Yes</td>
<td>Likely to be Infected</td>
</tr>
<tr>
<td>Mycobacteriology laboratory personnel</td>
<td>Not demonstrated</td>
<td>Low to Intermediate Risk of Progression (TST ≥ 10mM)</td>
</tr>
<tr>
<td>Immigrants from high burden countries (&gt;20 / 100,000)</td>
<td>Not demonstrated</td>
<td>Likely to be Infected</td>
</tr>
<tr>
<td>Residents and employees of high risk congregate settings</td>
<td>Yes</td>
<td>High Risk of Progression (TST ≥ 5mM)</td>
</tr>
<tr>
<td>None</td>
<td>Not demonstrated</td>
<td>Unlikely to be Infected</td>
</tr>
</tbody>
</table>

(TST > 15mM)

Risk of Developing Tuberculosis if Infected:

- Low
- Intermediate (RR 1.3 - 3)
- High (RR 3-10)

- No risk factors
- Clinical predisposition:
  - Diabetes
  - Chronic renal failure
- Children age less than 5
- HIV infection
<table>
<thead>
<tr>
<th></th>
<th>Progressed</th>
<th>Did not progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>QuantiFERON-TB Gold In-Tube</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test positive</td>
<td>47/1444 (3.3%)</td>
<td>1397/1444 (96.7%)</td>
</tr>
<tr>
<td>Test negative</td>
<td>30/4936 (0.6%)</td>
<td>4906/4936 (99.4%)</td>
</tr>
<tr>
<td>Positive vs negative</td>
<td>..</td>
<td>..</td>
</tr>
<tr>
<td>T-SPOT.TB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test positive</td>
<td>52/1235 (4.2%)</td>
<td>1183/1235 (95.8%)</td>
</tr>
<tr>
<td>Test negative</td>
<td>25/5145 (0.5%)</td>
<td>5120/5145 (99.5%)</td>
</tr>
<tr>
<td>Positive vs negative</td>
<td>..</td>
<td>..</td>
</tr>
<tr>
<td>TST-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test positive</td>
<td>64/2957 (2.2%)</td>
<td>2893/2957 (97.8%)</td>
</tr>
<tr>
<td>Test negative</td>
<td>13/3423 (0.4%)</td>
<td>3410/3423 (99.6%)</td>
</tr>
<tr>
<td>Positive vs negative</td>
<td>..</td>
<td>..</td>
</tr>
<tr>
<td>TST-10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test positive</td>
<td>58/2151 (2.7%)</td>
<td>2093/2151 (97.3%)</td>
</tr>
<tr>
<td>Test negative</td>
<td>19/4229 (0.4%)</td>
<td>4210/4229 (99.6%)</td>
</tr>
<tr>
<td>Positive vs negative</td>
<td>..</td>
<td>..</td>
</tr>
<tr>
<td>TST-15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test positive</td>
<td>52/1485 (3.5%)</td>
<td>1433/1485 (96.5%)</td>
</tr>
<tr>
<td>Test negative</td>
<td>25/4895 (0.5%)</td>
<td>4870/4895 (99.5%)</td>
</tr>
<tr>
<td>Positive vs negative</td>
<td>..</td>
<td>..</td>
</tr>
</tbody>
</table>

**Prognostic value of interferon-γ release assays and tuberculin skin test in predicting the development of active tuberculosis (UK PREDICT TB): a prospective cohort study**

<table>
<thead>
<tr>
<th>Situation</th>
<th>Preferred test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person 2 years or older born outside the U.S.</td>
<td>IGRA</td>
</tr>
<tr>
<td>Person known to have received BCG (vaccine or bladder cancer treatment)</td>
<td>IGRA</td>
</tr>
<tr>
<td>Person unlikely to return for TST reading</td>
<td>IGRA</td>
</tr>
<tr>
<td>Child under 2 years old</td>
<td>TST*</td>
</tr>
<tr>
<td>Person at low risk for TB infection (e.g. administrative screening)</td>
<td>IGRA</td>
</tr>
<tr>
<td>Testing in settings where the TST is infrequently performed</td>
<td>IGRA</td>
</tr>
</tbody>
</table>

The following children and adults are legally required (10A NCAC 41A.0205) to receive a TST:

a. household and other close contacts of active cases of pulmonary and laryngeal tuberculosis
b. persons reasonably suspected of having tuberculosis disease
c. inmates in the custody of, and staff with direct inmate contact, in the Department of Corrections upon incarceration or employment, and annually thereafter
d. patients and staff in long term care facilities upon admission or employment, using the two-step skin test method
e. staff in adult day care centers providing care for persons with HIV infection or AIDS upon employment, using the two-step skin test method
f. persons with HIV infection or AIDS
Tuberculin Skin Test Conversions and Occupational Exposure Risk in US Healthcare Workers

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Background. Healthcare workers (HCWs) undergo occupational tuberculosis screening at regular intervals. However, the risk of contracting tuberculosis at the workplace in a setting with a low background tuberculosis incidence is unclear. We aimed to evaluate the risk of tuberculosis infection among HCWs in such a setting.

Methods. We conducted a retrospective cohort study of employees of a large tertiary medical center in the US Midwest who had undergone TST screening during the study period 1 January 1998 to 31 May 2014.

Results. Among 40,142 HCWs who received a TST, only 123 converted over 16.4 years. Only 9 (7%) of the converters had a suspected tuberculosis exposure at the workplace and none developed active tuberculosis. The majority of TST converters (66%) had a negative QuantiFERON-TB test at the time of the conversion.

Conclusions. In one of the largest cohorts of HCWs in a low-tuberculosis-incidence setting, we demonstrated an extremely low risk of occupational tuberculosis exposure among TST converters and no resulting active tuberculosis cases. In this setting, the approach of testing HCWs at baseline and after tuberculosis exposure, rather than at regular intervals, should be considered.

Keywords. tuberculosis; workplace; screening; transmission.
Baseline (preplacement) screening and testing. All U.S. health care personnel should have baseline TB screening, including an individual risk assessment, which is necessary for interpreting any test result.

Serial screening and testing for health care personnel without LTBI. In the absence of known exposure or evidence of ongoing TB transmission, U.S. health care personnel (as identified in the 2005 guidelines) without LTBI should not undergo routine serial TB screening or testing at any interval after baseline (e.g., annually). Health care personnel with LTBI and no prior treatment should be offered, and strongly encouraged to complete, treatment with a recommended regimen, including short-course treatments, unless a contraindication exists.
Post-exposure prophylaxis
Plague doctor
(Library of Medicine/CDC)

Ebola doctor
(UNC School of Medicine)
Post-exposure prophylaxis

- **Pertussis**
  - Azithromycin (regardless of vaccine status)
- **Meningococcal**
  - Ciprofloxacin
- **Influenza**
  - Antivirals (depends on sensitivities)
- **Human Bite**
  - Augmentin
- **Chickenpox/Shingles**
  - Vaccination
- **Norovirus**
  - Supportive, removal from work until asymptomatic
Bloodborne Pathogens
Bloodborne pathogens

- Approximately 385,000 needle sticks and other sharps-related injuries to hospital-based healthcare personnel each year.

- 88% (50/57) of the documented cases of occupational HIV transmission from 1985-2004 involved a percutaneous exposure. Of those, 45/57 involved a hollow-borne needle.

- 41% of sharp injuries occur during use; 40% after use/before disposal; 15% during/after disposal
OSHA Bloodborne Pathogens Standard

- Employers must establish a written exposure control plan and provide annual training

- Mandates use of universal precautions (all body fluids assumed contaminated except sweat)

- Employers must utilize engineering and work practice controls to minimize/eliminate exposure
  - Needleless devices, single-hand recapping, handwashing stations, sharps containers, laundry, disposal of contaminated material

(29 CFR 1910.1013)
OSHA Bloodborne Pathogens Standard

- Requires offering hepatitis B vaccine to persons with the potential for exposure
- Testing of exposed employees for Hepatitis B and HIV
- Post-exposure prophylaxis must be immediately available as per CDC guidelines

(29 CFR 1910.1013)
OSHA Bloodborne Pathogens Standard

• All work-related needle stick injuries and cuts from sharp objects that are contaminated with another person's blood or other potentially infectious material are OSHA-reportable regardless of the source patient disease status.
Bloodborne Pathogens

- **Risk (percutaneous exposure)**
  - **HBV**
    - 22.0 – 30.0% (HBeAG⁺)
    - 1.0 – 6.0% (HBeAG⁻)
  - **HCV**
    - 1.8%
  - **HIV**
    - 0.3% (1 in 300)

- **Risk (mucous membrane)**
  - **HBV**
    - Yes (rate unknown)
  - **HCV**
    - Yes (rate unknown but very small)
  - **HIV**
    - 0.1% (1 in 1000)
    - < 0.1% (non-intact skin)

CDC, 2003
Post-exposure pathway

- Test source for hepatitis B (HBsAg), hepatitis C (HCV PCR), HIV (4th gen, HIV antibodies and p24 antigen)
- Provide hepatitis B prophylaxis, if indicated
- Provide follow-up for hepatitis C, if indicated
- If source HIV+ or at “high risk” for HIV, offer employee HIV prophylaxis per CDC protocol
Post-exposure pathway

- 10A NCAC 41A .0202
- CONTROL MEASURES – HIV
  » When the source case is known, the attending physician or occupational health provider responsible for the exposed person shall notify the healthcare provider of the source case that an exposure has occurred.
  » This healthcare provider shall arrange HIV testing of the source person (unless known to be HIV+) and notify the OHS provider of the test results.
  » Source patient consent is not required
Current HIV PEP

• Three-drug regiment
  » Tenofovir-emtricitabine (Truvada) + raltegravir (Isentress) for 4 weeks
  » Other regiments are available for known HIV-source patients with specific drug resistance but these cases are rare.
Hepatitis B

- Universal; HCP with potential blood exposure (OSHA required or HCP may decline)
  - No need to routinely obtain Hep B titers if an employee has documented vaccine series and a positive titer
  - In practice, we usually titer and give a booster if titer is < 10 mIU/mL
  - For known non-responders, they should get Hepatitis B Immune Globulin (HBIG) within 24 hours (up to 7 days after exposure)
Hepatitis C

Source patients should be tested by Hep C PCR

- Test healthcare worker for anti-HCV within 48 hours of exposure
  - Positive
    - Reflex HCV RNA test
      - Positive: Refer to care for pre-existing chronic infection
      - Negative
  - Negative
    - Follow-up testing
      - Test for HCV RNA ≥ 3 weeks after exposure
        - Positive: Refer to care
        - Negative: Stop
Follow-up testing

- **Hepatitis B**
  - Not required if employee has immunity
- **HIV**
  - Dependent on source patient and available testing
- **Hepatitis C**
  - Dependent on source patient, test for HCV antibodies and HCV RNA
Thanks!

Take your son to work day
Contact Information

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