Adenovirus Overview

- **What are Adenoviruses?**
  - Family of viruses that cause a wide variety of illnesses (some of which can be accompanied by a fever)
  - More than 50 distinct numbered serotypes (e.g., Ad4, Ad7, Ad14, etc)
  - Adenoviruses are type of enterovirus; not related to influenza in any way

- **Common symptoms experienced with infection:**
  - Common cold, sore throat, conjunctivitis, pneumonia, diarrhea
  - Rare presentations: encephalitis, cystitis, respiratory distress

- **Adenovirus Prevalence?**
  - Adenoviruses are found worldwide, causing illness throughout the entire year
  - We have all been exposed to adenoviruses many times in our lives
  - They cause 5-10% of all febrile illnesses in children, and most people have evidence of previous infection by age 10
  - The vast majority recover completely after only 2-3 days of mild illness
  - The very young, very old, or those with a weakened immune system are at greatest risk of complications or serious illness

Adenovirus Prevention

- **Transmission**
  - Adenoviruses are spread via large droplets through coughing or via the fecal-oral route
  - Adenoviruses can live on inanimate surfaces for up to 2 weeks
  - There is no evidence of aerosol (or airborne) transmission

- **Infection Control**
  - Basic hygienic measures are effective
    - Hand washing
    - Use instant hand sanitizer
    - Clean all common contact surfaces (door knobs, hand rails, common use computer equipment, etc) with an antiseptic solution
    - Practiced good cough etiquette (cough into your sleeve)
    - Surgical mask wear

Adenoviruses and the Military

- **Vaccine against Ad4 and Ad7 active until 1996 for DoD recruits**
  - Manufacturer ceased production in 1996, citing escalating costs
  - Sole customer was DoD
  - FRI due to adenoviruses began to rise at DoD recruit training sites
  - Primarily Ad3 and Ad4
  - Vast majority mild disease
  - Ad14 associated with 2 deaths in Lackland Trainees (2007 and 2009)

AF Basic Training

- **Lackland AFB**
  - Only basic training site in AF
  - Training program 8.5 weeks long
  - Processes 800 trainees per week (~40,000/yr)
  - 7 Training Squadrons with 14-16 flights (~ 50/flight)

- **Trainee Health Surveillance**
  - Conduct surveillance on training related injuries and illnesses
    - FRI: Adenovirus, pneumonia, influenza, Group A Strep
    - Heat injuries
    - Stress fractures
  - Design and implement strategic, targeted preventive interventions to mitigate health hazards

- **Medical screenings**
  - HIV
  - TB
  - Hep A / Hep B titers
  - Varicella titers
  - MMR titers
  - Sickle Cell Trait/G6PD
  - GC/Chlamydia (Females)
  - Pregnancy
  - ABO blood group

- **Vaccinations**
  - Flu
  - Polio
  - Meningitis
  - Tdap
  - Adenovirus 4/7
  - Penicillin for Group A Strep prophylaxis
Recruit living conditions enhance respiratory illness spread
- Close quarters living
  - Physically/emotionally stressful environment
- Infection Control
  - Hand washing
  - Cough etiquette
  - Hand washing
  - Common contact surface cleaning
- Trainees with FRI
  - Sent to "Fever Flight" for isolation
  - Regular medical follow up
  - Return to training after fever free ≥24 hrs

Approximately 20% of recruits diagnosed with upper respiratory infection

There have been ZERO outbreaks of upper respiratory disease since the vaccine was started

Pneumonia rate -1.2%/yr
- Rate of complications causing admission -0.1%/yr
- Pathogen primarily Ad4

Is vaccination worth it?
- 4,000+ lost training days per year at cost of $1.1 million
- Accurate estimates of vaccine effectiveness are hard to come by
- Common side effects mild in nature
- One for Ad4 and one for Ad7) (through April 24, 2012)

FY 11 Fever Flight Pathogens (all trainees unvaccinated)
- Ad4
- Rhinovirus
- Strep pneumo
- Paraflu
- Corona Virus
- Metapneumo
- Ad3
- Ad7
- Mycoplasma
- Group A Strep

AF training incidence/complications are low:
- 4,000+ lost training days per year at cost of $1.1 million
- New vaccine developed against serotypes 4 and 7
- Pushed to DoD training sites in fall, 2011
- Lackland AFB vaccination campaign began 9 Nov, 2011
- Live, oral vaccine - 2 pills (one for Ad4 and one for Ad7)
- Most common side effects mild in nature
  - Headache, runny nose, phonophobia, diarrhea

Vaccine Effectiveness
- % of BMT Lab Tests Ad4 positive

% of BMT Lab Tests Ad4 positive
- Nov 9, 2011
- 90, 97, 97, 76, 88, 88
- 22, 106, 110
- 58, 61, 91, 98, 22, 15, 19, 10, 14
- 0, 50, 100, 150, 200

Adenovirus Vaccine
- AF Basic Training
- Warrior Medics – Mission Ready – Patient Focused

On Dec 1, 2011 roughly half the BMT population was protected, corresponding to the sharp drop in fever flight admissions that month
- On January 1, 2012, all BMTs were protected
- There have been ZERO outbreaks of upper respiratory disease since the vaccine was started
Vaccine Effectiveness

• Laboratory evidence of effectiveness

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Pre-Vaccine (% samples positive)</th>
<th>Post-Vaccine (% samples positive)</th>
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<td>Ad4</td>
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<tr>
<td>Group A Strep</td>
<td>1</td>
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</tr>
</tbody>
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Secondary Impact

• Pneumonia
  - Trainee rate ~ 330/year (0.9%/year)
  - No decrease in rate (yet)
  - Other pathogens responsible

• Appendicitis
  - Trainee rate ~ 16/yr (0.04%/)
  - Studies point to Adenovirus link
  - Possible decrease in cases

Future Impact

• Important to note that vaccine will not eliminate threat of URIs
  - Success at Lackland only because Ad4 was primary URI pathogen
  - Vaccine is only protective against 2 of the 50+ serotypes
  - Despite success, outbreaks still possible
    - no vaccine is 100% effective
  - Numerous other pathogens circulating that can/do cause upper respiratory illnesses

• Applications beyond military?
  - Possible benefit in daycare or boarding school environments ONLY if Ad4/Ad7 can be documented to cause significant number of incident URI cases

Questions?

“Warrior Medics–Mission Ready–Patient Focused”