Study to Address Threats of Acute Respiratory Infections among Congregated Military Populations (ATARI)

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Abstract

Background: Respiratory infections are among the most commonly diagnosed medical conditions in US military units and recruits. Despite high coverage with the Influenza and adenovirus vaccines, influenza (FluA) remains a frequent cause of missed duty and hospitalizations. Previous research is needed on the epidemiology and etiology of ILI to reduce the burden of respiratory infections in congregated military settings.

Methods: We conducted a prospective cohort study to assess ILI patterns among US Army recruits in a 9-week Basic Combat Training (BCT) cycle at Ft. Benning, GA. Demographic data, vaccination history, and information on recent illnesses were collected at enrollment in January 2017. Participants were divided into two platoons with staggered biweekly visit schedules. Visits occurred from reception through training, with nasal swabs and symptom surveys (all visits) and blood draws (weeks 8 and 9). Nasal specimens were used to detect clinical and colonizing pathogens using the Diatherix TEM-PCR Respiratory Panel.

Results: A total of 108 recruits were enrolled in the study. Fewer recruits were lost to follow-up due to training attrition in the first week of the study. The participants were male and the median age was 21 yrs (IQR 19-24 yrs). There were 120 (72%) cases of ILI reported among the 78 remaining participants, 6 yrs in week 1, 13 yrs in week 2 and 1 week of the study. The most frequently detected pathogens in the 10 symptomatic cases were coronavirus (5, 50%), rhinovirus (4, 40%), both enterovirus and adenovirus (3, 30%), and influenza A (2, 20%). Pathogen co-detectors were associated with 2 pathogens, representing 7 unique combinations. While rhinovirus and coronavirus were most common among asymptomatic trainees, 10% had detectable influenza A. Detection of multiple pathogens was common in the first two weeks of training (41%, among those who had viral detection). The study is still in progress.

Conclusion: Symptomatic ILI was associated with coronavirus, rhinovirus, and enterovirus, in addition to influenza in the early weeks of training. Multiple pathogens were detected in about 115,000 lost duty days annually. New recruits and advanced trainees are at greatest risk for infection compared to older, experienced service members. Research is needed on the transmission, epidemiology and etiology of ILI to reduce the burden of respiratory infections in congregated military trainee populations.

Methods

Design: From Jan to March 2017, we conducted a longitudinal pilot study to: 1) describe ILI distribution and determinants, and 2) detail respiratory pathogens detected in 5x and Axa participants.

Population: The study comprised US Army recruits beginning a 9-week Basic Combat Training (BCT) cycle at Ft. Benning, GA.

Methods: staggered, bi-weekly visits occurred from reception through the 9 week training period, with nasal swabs and surveys (all visits) and blood draws at reception and weeks 8 and 9. Nasal specimens will be obtained for the detection of viral and bacterial pathogens using the Diatherix TEM-PCR respiratory panel. Blood samples were obtained for future serologic testing.

Influenza-like Illness (ILI) case definition: An ILI case is defined medically-attended ILI in a subject who has enrolled in the study and has had symptoms in the last 7 days. Eight out of 10 cases were associated with 2 pathogens, representing 7 unique combinations. While rhinovirus and coronavirus were most common among asymptomatic trainees, 10% had detectable influenza A. Detection of multiple pathogens was common in the first two weeks of training (41%, among those who had viral detection). The study is still in progress.

Conclusion: Symptomatic ILI was associated with coronavirus, rhinovirus, and enterovirus, in addition to influenza in the early weeks of training. Multiple pathogens were detected in about 115,000 lost duty days annually. New recruits and advanced trainees are at greatest risk for infection compared to older, experienced service members. Research is needed on the transmission, epidemiology and etiology of ILI to reduce the burden of respiratory infections in congregated military trainee populations.

Results (cont.)

Viral pathogen detection, by follow-up visit

<table>
<thead>
<tr>
<th>Pathogens</th>
<th>n (%)</th>
<th>Human coronavirus 229E</th>
<th>Human coronavirus 229E + Rhinovirus</th>
<th>Human coronavirus 229E + Enterovirus</th>
<th>Enterovirus + Influenza A</th>
<th>Enterovirus + Rhinovirus</th>
<th>Human coronavirus 229E + Enterovirus + Influenza A</th>
<th>Enterovirus + Rhinovirus + Influenza A</th>
<th>No detection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidence</td>
<td>10</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Conclusions

- Symptomatic ILI associated with coronavirus, rhinovirus, and enterovirus, in addition to influenza in the early weeks of training.
- Same viral pathogens circulated widely among healthy recruits, along with bacterial pathogens.
- No discernible ILI risk factors.
- Next steps:
  - Describe ILI transmission patterns
  - Summarize operational burden
  - Study ILI dynamics in larger trainee cohort

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