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

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Background: Respiratory infections are among the most commonly diagnosed medical conditions in US military recruits and trainees. Despite high coverage with the influenza and adenovirus vaccines, influenza-like illnesses (ILI) continue to represent a frequent cause of missed duty and hospitalizations. More 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 course 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 receipt of training, with nasal swabs and symptom diaries (all visits) and blood draws (weeks 6 and 9). Nasal specimens were used to detect clinical and colonizing pathogens using the Diatherix TEM-PCR Respiratory Panel.

Results: A total of 90 recruits were enrolled in the study. Twelve recruits were lost due to training attrition in the first week of the study. The participants were male and the median age was 21 yo (IQR 19-24 yrs). There were 10 (13%) cases of ILI reported among the 78 remaining participants, 6 in week 1, 3 in week 2 and 1 week 9. The most frequently detected pathogens in the 10 ILI symptomatic cases were coronavirus (5, 50%), rhinovirus (4, 40%), other enterovirus (3, 30%), and influenza A (2, 20%). Pathogen co-detections were detected in 5 cases: Human coronavirus 229E + Rhinovirus (5), Human coronavirus 229E + Enterovirus (4), enterovirus + Rhinovirus (2), enterovirus + influenza A (2), and coronavirus + influenza A (1). Human rhinovirus was the only predominant respiratory virus isolated from nasal swabs during the study. Other respiratory viruses detected included human coronavirus, rhinovirus, influenza A, influenza B, and parainfluenza, in addition to adenovirus, enterovirus, and parainfluenza. There were no discernable ILI risk factors.

Conclusions: Symptomatic ILI was associated with coronavirus, rhinovirus, and enterovirus, in addition to influenza in the early weeks of training. These viruses are also estimated to be responsible for 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 their burden in congregated military trainee populations.

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Background

Acute respiratory infections (ARI) remain a significant cause of morbidity and pose an important threat to operational readiness to the US military. ARI are leading cause of outpatient illnesses and are responsible for 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 ARI to reduce their burden in congregated military trainee populations.

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Methods

Design: From Jan to March 2017, we conducted a longitudinal pilot study to: 1) describe ILI distribution and determinants, and 2) determine protective pathogens detected in symptomatic and asymptomatic 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 receipt of training through the 9-week training period, with nasal swabs and surveys (all visits) and blood draws at receipt and weeks 6 and 9. Nasal specimens were 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 as a medically-attended ILI in a recruit enrolled in the study and has either an oral temperature > 38.0°C (100.4°F), or subjective fever/chills, in addition to cough/sore throat, with onset < 7 days.

Results

Characteristics (n = 78)

- Gender: 53 males, 25 females
- Race: 41 Caucasian, 53 African American
- Median age: 21 yrs (IQR 19-24 yrs)
- Current Smoker: 13 recruits
- Exposed to 2nd Hand Smoke: 3 recruits
- Children < 5 yrs in HH: 30 recruits
- Cover mouth/nose with elbow for sneeze/cough: 73 recruits
- Wash hands after sneeze/cough: 57 recruits
- Use hand sanitizer after sneeze/cough: 47 recruits
- Had ILI within 2 wks prior to enrollment: 10 recruits
- Close to ILI case in past 2 wks prior to enrollment: 20 recruits
- Wash hands after sneeze/cough: 67 recruits
- Use hand sanitizer after sneeze/cough: 47 recruits
- Received influenza vaccine in current season: 3 recruits
- Human coronavirus 229E + Rhino
- Enterovirus + Rhino
- Enterovirus + Influenza A
- Human coronavirus 229E + Enterovirus
- Human coronavirus 229E + Influenza A

Results (cont.)

Viral pathogen detection, by follow-up visit

ILI Cases: Viral Pathogen Distribution (n = 10)

Pathogens

- Human coronavirus 229E + Influenza A
- Rhino
- Human coronavirus 229E + Rhinovirus
- Enterovirus + Rhino
- Enterovirus + Influenza A
- Human coronavirus 229E + Enterovirus
- Parainfluenza 3

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