A CHARACTERIZATION OF INJURIES AMONG ACTIVE DUTY PERSONNEL AT FORT RILEY, KANSAS

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Master of Public Health
Capstone Experience
Fall 2011
OUTLINE

- Fort Riley Health Department Student Externship
- Research
  - Background
  - Purpose and objectives
  - Methods
  - Results
  - Discussion
  - Limitations
  - Conclusion and recommendations
- References
- Acknowledgements
U.S. ARMY PUBLIC HEALTH COMMAND

Mission: “To promote health and prevent disease, injury and disability of Soldiers and military retirees, their Families, and Department of the Army civilian employees; and assure the execution of full spectrum veterinary service for Army and Department of Defense Veterinary missions.”

FORT RILEY DEPARTMENT OF PUBLIC HEALTH

- Public Health Nursing
- Occupational Health
- Environmental Health
- Industrial Hygiene
- Veterinary Services
PUBLIC HEALTH NURSING

- Child and Youth Services health inspections
- Health screening and education
- Disease surveillance
- Immunization administration
- Apple Day
ENVIRONMENTAL HEALTH

- Food service sanitation and inspections
- Child Development Center sanitation and inspections
- Water quality surveillance
- Vector surveillance
INDUSTRIAL HYGIENE

- Ventilation assessments
- Radiation exposure reduction
- Noise exposure assessments
- Indoor air quality monitoring
OCCUPATIONAL HEALTH

- Medical surveillance and screening
- Occupational illness and injury
- Work-related immunizations
- Workplace evaluations
- Army Hearing Program
VETERINARY SERVICES

- Clinical assessments
- Food item inspections
- Food facility inspections
CHARACTERIZATION OF INJURIES AMONG ACTIVE DUTY PERSONNEL
BACKGROUND
IMPORTANCE OF PHYSICAL TRAINING

- Physical training important for health
- May reduce risk of:
  - Cardiovascular disease
  - Type 2 diabetes
  - Obesity
  - Anxiety and depression
  - Injuries
IMPORTANCE OF PHYSICAL TRAINING

- Physical training is a necessary component of active duty personnel's overall training\(^1\)
- Active duty personnel must maintain a high level of fitness:
  - To carry out job-related duties\(^1,2\)
  - To be ready for combat at any time\(^1,2\)
RISKS OF PHYSICAL TRAINING

- Physical training often results in injuries\(^3\)
- Injuries: Greatest threat to military readiness and soldier health\(^1,4\)
- 50% of active duty personnel develop a musculoskeletal injury
- 25% of injured personnel develop a second injury
- In Basic Training, 25% of men and 50% of women are injured
- For each death due to unintentional injuries:
  - 33 injury-related hospitalizations
  - 4,000 outpatient medical encounters
RISKS OF PHYSICAL TRAINING

- Injuries often result from:
  - Activities such as long distance running and road marches with heavy ruck sacks\textsuperscript{13}
  - Overtraining caused by repetitive and/or forceful movements associated with strength training, running and other aerobic exercises\textsuperscript{5}
## FIVE LEADING CAUSES OF INJURY HOSPITALIZATIONS AMONG ACTIVE DUTY PERSONNEL, DOD⁴

<table>
<thead>
<tr>
<th>Cause of Injury</th>
<th>Number of Hospitalizations</th>
<th>Rate per 100,000 person-years</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Falls and miscellaneous</td>
<td>1,483</td>
<td>129.5</td>
<td>34.3</td>
</tr>
<tr>
<td>Land transport accidents</td>
<td>824</td>
<td>71.9</td>
<td>19.1</td>
</tr>
<tr>
<td>Athletics and sports</td>
<td>567</td>
<td>49.5</td>
<td>13.1</td>
</tr>
<tr>
<td>Medical and surgical complications</td>
<td>348</td>
<td>30.4</td>
<td>8.0</td>
</tr>
<tr>
<td>Intentional injuries (non-battle)</td>
<td>222</td>
<td>19.4</td>
<td>5.1</td>
</tr>
</tbody>
</table>
INJURIES DEFINED\textsuperscript{4,5}

- Injuries are defined as:
  - Intentional or unintentional damage (trauma) to the body caused by an external force or exposure
  - Non-traumatic damage to the body, or inability to function properly as a result of continuous or repetitive movements (as commonly seen with training-related injuries)
  - Excludes casualties resulting from hostile actions in combat
INJURIES DEFINED\textsuperscript{4,5}

- ICD-9-CM Codes
  - 710 to 739 (Musculoskeletal disorders)
  - 800 to 999 (Injuries and poisonings)
- Injuries and poisonings categorized by Barell Injury Diagnosis Matrix
- Musculoskeletal conditions categorized using modified Barell Matrix
<table>
<thead>
<tr>
<th>ICD-9-CM codes</th>
<th>FRACTURE</th>
<th>DISLOCATION</th>
<th>SPRAYS &amp; STRAINS</th>
<th>INTESTINAL</th>
<th>OPEN WOUND</th>
<th>AMPUTATIONS</th>
<th>BLOOD VESSELS</th>
<th>CONSUMPTION</th>
<th>CRUSH</th>
<th>BURNS</th>
<th>NEVRES</th>
<th>UNSPECIFIED</th>
</tr>
</thead>
<tbody>
<tr>
<td>900.00-900.09</td>
<td>900.00-900.09</td>
<td>900.00-900.09</td>
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<td>900.00-900.09</td>
<td>900.00-900.09</td>
<td>900.00-900.09</td>
</tr>
</tbody>
</table>

**Suggested diagnostic codes for framing:**
- **Fracture**:
  - 1st Column: 1st Digit of ICD-9-CM codes
  - 2nd Column: 2nd Digit of ICD-9-CM codes
  - 3rd Column: 3rd Digit of ICD-9-CM codes
  - 4th Column: 4th Digit of ICD-9-CM codes
  - 5th Column: 5th Digit of ICD-9-CM codes
  - 6th Column: 6th Digit of ICD-9-CM codes

**Unspecified:**
- 1st Column: 1st Digit of ICD-9-CM codes
- 2nd Column: 2nd Digit of ICD-9-CM codes
- 3rd Column: 3rd Digit of ICD-9-CM codes
- 4th Column: 4th Digit of ICD-9-CM codes
- 5th Column: 5th Digit of ICD-9-CM codes
- 6th Column: 6th Digit of ICD-9-CM codes

**Type 2 TBI:** Includes injuries with no recorded evidence of intracranial injury, and LOC of less than one hour, or LOC of unknown duration, or unspecified level of consciousness. Type 3 TBI includes patients with no evidence of intracranial injury and no LOC.
<table>
<thead>
<tr>
<th>Body Region</th>
<th>Inflammation and pain (overuse)</th>
<th>Joint derangement</th>
<th>Joint derangement with neurological involvement</th>
<th>Stress fracture</th>
<th>Sprain/strain/rupture</th>
<th>Dislocation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vertebral column</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cervical</td>
<td>723.1</td>
<td>722.0</td>
<td>722.71, 723.4</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Thoracic/dorsal</td>
<td>--</td>
<td>722.11</td>
<td>722.72, 724.4</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Lumbar</td>
<td>724.2</td>
<td>722.10</td>
<td>722.73, 724.3</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Sacrum, coccyx</td>
<td>720.2</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Spine, back unspecified</td>
<td>721.7, 724.5</td>
<td>722.2</td>
<td>722.70, 724.9</td>
<td>733.13</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

**EXTREMITIES**

| Upper                |                                  |                   |                                               |                 |                       |             |
|----------------------|----------------------------------|-------------------|-----------------------------------------------|                 |                       |             |
| Shoulder             | 716.11, 719 (.01, .11, .41), 726 (.01, .1, .2) | 718 (.01, .11, .81, .91) | --                                            | 727 (.61, .62)  | 718.31                |
| Upper arm, elbow     | 716.12, 719 (.02, .12, .42), 726.3 | 718 (.02, .12, .82, .92) | --                                            | 733.11          | 718.32                |
| Forearm, wrist       | 716.13, 719 (.03, .13, .43), 726.4 | 718 (.03, .13, .83, .93) | --                                            | 733.12          | 718.33                |
| Hand                 | 716.14, 719 (.04, .14, .44)       | 718 (.04, .14, .84, .94) | --                                            | 727 (.63, .64)  | 718.34                |

| Lower                |                                  |                   |                                               |                 |                       |             |
|----------------------|----------------------------------|-------------------|-----------------------------------------------|                 |                       |             |
| Pelvis, hip, thigh   | 716.15, 719 (.05, .15, .45), 726.5 | 718 (.05, .15, .85, .95) | --                                            | 733 (.14, .15, .96-98) | 727.65                | 718.35      |
| Knee, lower leg      | 716.16, 717.7, 719 (.06, .16, .46), 726.6 | 717 (.06, .9), 718 (.06, .16, .86, .96) | --                                            | 733 (.16, .93)  | 717.8, 727 (.66-67)  | 718.36      |
| Ankle, foot          | 716.17, 719 (07, .17, .47), 726.7, 728.71, 734 | 718 (.07, .17, .87, .97) | --                                            | 733.94          | 727.68                | 718.37      |

**UNCLASSIFIED BY SITE**
COST TO THE MILITARY

- Annually, injuries result in:
  - $340 million in disability costs, approximately 1/3 of all disability costs (1999 estimate)
  - High medical attrition rates
  - 25 million limited duty days
  - Two million sick call visits
MAGNITUDE OF THE INJURY PROBLEM

- Injuries across DoD in 2006:
  - Affected nearly 1 million (87%) active duty personnel
  - Resulted in 1.95 million medical encounters
  - Caused 11,591 hospitalizations
    - 68,000 hospital bed days
- Injury medical encounter rate for DoD (2006)
  - 1,600 per 1,000 person-years
- Medical encounter rates highest for Army (2006)
  - 2,200 per 1,000 person-years
INJURY MEDICAL ENCOUNTER RATES FOR INJURIES ACTIVE DUTY PERSONNEL, DOD AND SERVICES, 2006

MAGNITUDE OF THE INJURY PROBLEM\textsuperscript{4}

- Most common injury:
  - Lower-extremity overuse
  - Medical encounter rate for DoD
    - 900 per 1,000 person-years
  - Medical encounter rate for Army
    - 1,200 per 1,000 person-years
MEDICAL ENCOUNTER RATES FOR LOWER-EXTREMITY OVERUSE INJURY RATES, ACTIVE DUTY PERSONNEL, DOD AND SERVICES, 2006

RISK FACTORS FOR TRAINING-RELATED INJURIES

- **Intrinsic risk factors**
  - Age (oldest and youngest personnel)\(^1,10\)
  - Gender (female)\(^1\)
  - Anatomy (leg and foot structure and stature)\(^1\)
  - Physical activity level/fitness level (lower level of fitness)\(^1,10\)
  - Weight/body mass index (BMI) (higher weight and BMI)\(^10\)
  - Smoking status\(^1\)

- **Extrinsic risk factors**
  - Time spent in physical training\(^1\)
  - Type and intensity of training\(^1\)
  - Shoe type\(^1\)
  - Training surface\(^1\)
  - Season\(^3,11\)
INJURY PREVENTION

In 2003, the Secretary of Defense issued a directive to reduce injuries by 50%.
Defense Safety Oversight Council (DSOC) was formed to oversee injury prevention.
DoD Military Injury Prevention Priorities Working Group (DMIPPWG) created to evaluate injury prevention efforts already in place and to make recommendations to reduce injuries.
INJURY PREVENTION\textsuperscript{12,15}

DMIPPWG recommendations:

1. Prevent overtraining
2. Perform more exercises that develop body movement skills
3. Wear mouthguards during high-risk activities
4. Wear semi-rigid ankle braces for high-risk activities
5. Consume nutritional supplements to restore energy balance within one hour of high-intensity activities
INJURY PREVENTION

Further recommendations:

- Educate leadership about injury prevention
- Enforce policies and programs in place to reduce injuries
CHARACTERIZATION OF INJURIES AMONG ACTIVE DUTY PERSONNEL AT FORT RILEY, KANSAS
PURPOSE

- To determine the incidence of injuries among active duty personnel at Fort Riley through surveillance of existing medical records.
OBJECTIVES

- Determine the incidence of injuries among active duty personnel at Fort Riley, KS, over an 18 month period
- Determine the most common injuries among active duty personnel at Fort Riley, KS, over an 18 month period
- Make recommendations for interventions based on study results
POPULATION

- Non-deployed active duty personnel
- Average monthly population: 12,299 people
METHODS

- Study reviewed and approved by Kansas State University IRB
- Medical records requested from Irwin Army Community Hospital (IACH) for injury diagnoses for all non-deployed active duty personnel stationed at Fort Riley between April 2010 and September 2011
METHODS

- Records included:
  - Medical diagnosis (ICD-9-CM codes)
    - 710 to 739 (Musculoskeletal disorders)
    - 800 to 999 (Injuries and poisonings)
  - Date of medical encounter
    - Medical encounter = emergency room visits, outpatient visits, hospitalizations
  - Demographic data (race, gender, age)
  - Disposition (released with or without work limitations, hospitalized, etc.)
METHODS

- Brigade and body mass index information were obtained from the Office of the Assistant Chief of Staff, G1
- Barell Matrix used to categorize injuries
- Frequencies, percentages, and rates were calculated to determine the most common injuries
RESULTS
RESULTS

- Between April 2010 and September 2011:
  - 12,940 injured active duty personnel
  - 35,128 injury diagnoses
  - 62,318 medical encounters
Descriptive characteristics of Army active duty personnel at Fort Riley, Kansas, with an injury diagnosis between 1 April 2010 and 30 September 2011 (N = 12,940).

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
<th>SD</th>
<th>Characteristic</th>
<th># of people</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>28.07</td>
<td>7.2</td>
<td>White</td>
<td>2,933</td>
<td>22.7</td>
</tr>
<tr>
<td>Mode</td>
<td>21</td>
<td></td>
<td>Black</td>
<td>704</td>
<td>5.4</td>
</tr>
<tr>
<td>Range</td>
<td>17-63</td>
<td></td>
<td>Asian/Pacific Islander</td>
<td>55</td>
<td>0.4</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Native American</td>
<td>26</td>
<td>0.2</td>
</tr>
<tr>
<td>Age Groups</td>
<td># of people</td>
<td>%</td>
<td>Other</td>
<td>975</td>
<td>7.5</td>
</tr>
<tr>
<td>17 to 22</td>
<td>3,293</td>
<td>25.4</td>
<td>Unknown</td>
<td>1,231</td>
<td>9.5</td>
</tr>
<tr>
<td>23 to 25</td>
<td>2,732</td>
<td>21.1</td>
<td>Not available</td>
<td>7,016</td>
<td>54.2</td>
</tr>
<tr>
<td>26 to 29</td>
<td>2,483</td>
<td>19.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 to 35</td>
<td>2,201</td>
<td>17.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36 to 63</td>
<td>2,231</td>
<td>17.2</td>
<td>Below 18.5</td>
<td>548</td>
<td>4.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>18.5 to 24.9</td>
<td>3,851</td>
<td>29.8</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>11,215</td>
<td>86.7</td>
<td>30.0 and higher</td>
<td>1,247</td>
<td>9.6</td>
</tr>
<tr>
<td>Female</td>
<td>1,725</td>
<td>13.3</td>
<td>Not available</td>
<td>4,245</td>
<td>32.8</td>
</tr>
</tbody>
</table>

Body Mass Index

Gender
Number of Injuries by Category
Active Duty Personnel, Fort Riley, KS
April 2010 to September 2011
Total injuries = 35,128

<table>
<thead>
<tr>
<th>Injury Categories</th>
<th>Number of Injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Musculoskeletal Disorders (70.7%)</td>
<td>24,846</td>
</tr>
<tr>
<td>Fractures, dislocations, sprains, and strains (13.8%)</td>
<td>4,851</td>
</tr>
<tr>
<td>Contusions/Superficial injuries (4.2%)</td>
<td>1,460</td>
</tr>
<tr>
<td>Open wounds (2.0%)</td>
<td>694</td>
</tr>
<tr>
<td>Internal injuries (1.7%)</td>
<td>604</td>
</tr>
<tr>
<td>All other injuries† (7.6%)</td>
<td>2,673</td>
</tr>
<tr>
<td>Traumatic Brain Injuries (TBI)* (1.7%)</td>
<td>604</td>
</tr>
</tbody>
</table>

† All other injuries include burns (98); poisonings (69); foreign body injuries (66); toxic effects (51); crushing injuries (39); late effects of injuries, poisonings, toxic effects, and other external causes (22); early complications of trauma (16); nerve injuries (11); amputations (2); blood vessel injuries (1); and unspecified injuries (2,298).

* TBI diagnoses also fall under the fractures and internal injuries categories. These injuries are shown separately due to the importance of TBI prevention in the military.
<table>
<thead>
<tr>
<th>Injury Rank</th>
<th>Diagnosis</th>
<th>Number of Injuries</th>
<th>Percent of all Injury Diagnoses&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Incidence Rate per 1,000 Person-Years&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Overuse (Inflammation and Pain)</td>
<td>15,289</td>
<td>43.5</td>
<td>828</td>
</tr>
<tr>
<td>2</td>
<td>Sprains and strains</td>
<td>3,769</td>
<td>10.7</td>
<td>204</td>
</tr>
<tr>
<td>3</td>
<td>Joint Derangements</td>
<td>908</td>
<td>2.6</td>
<td>49</td>
</tr>
<tr>
<td>4</td>
<td>Fractures</td>
<td>785</td>
<td>2.2</td>
<td>43</td>
</tr>
<tr>
<td>5</td>
<td>Open Wounds</td>
<td>694</td>
<td>2.0</td>
<td>38</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>21,445</td>
<td>61.0</td>
<td>1,162</td>
</tr>
</tbody>
</table>

<sup>a</sup> Total injury diagnoses during specified time period = 35,128.

<sup>b</sup> Calculated using average population of non-deployed active duty personnel at Fort Riley (12,299) for April 2010 to September 2011.
## Top Five Injury Diagnoses
Active Duty Personnel, Fort Riley, KS
April 2010 to September 2011

<table>
<thead>
<tr>
<th>Injury Rank</th>
<th>Diagnosis</th>
<th>Number of Injuries</th>
<th>Percent of all injury diagnoses&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Incidence rate per 1,000 person-years&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low back pain</td>
<td>4,082</td>
<td>11.6</td>
<td>221.3</td>
</tr>
<tr>
<td>2</td>
<td>Pain in joint, lower leg</td>
<td>3,445</td>
<td>9.8</td>
<td>186.7</td>
</tr>
<tr>
<td>3</td>
<td>Pain in joint, shoulder region</td>
<td>1,575</td>
<td>4.5</td>
<td>85.4</td>
</tr>
<tr>
<td>4</td>
<td>Pain in limb, not specified</td>
<td>1,486</td>
<td>4.2</td>
<td>80.5</td>
</tr>
<tr>
<td>5</td>
<td>Pain in joint, ankle and foot</td>
<td>1,133</td>
<td>3.2</td>
<td>61.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>Total</strong></td>
<td><strong>11,721</strong></td>
<td><strong>33.4</strong></td>
<td><strong>635.3</strong></td>
</tr>
</tbody>
</table>

<sup>a</sup> Total injury diagnoses during specified time period = 35,128.

<sup>b</sup> Calculated using average population of non-deployed active duty personnel at Fort Riley (12,299) for April 2010 to September 2011.
### Top Five Injury Diagnoses by Gender, Active Duty Personnel, Fort Riley, KS
April 2010 to September 2011

<table>
<thead>
<tr>
<th>Rank</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Injury</td>
<td>Number of injuries</td>
</tr>
<tr>
<td>1</td>
<td>Low back pain</td>
<td>3,497</td>
</tr>
<tr>
<td>2</td>
<td>Pain in joint, lower leg</td>
<td>2,995</td>
</tr>
<tr>
<td>3</td>
<td>Pain in joint, shoulder region</td>
<td>1,403</td>
</tr>
<tr>
<td>4</td>
<td>Pain in limb, not specified</td>
<td>1,255</td>
</tr>
<tr>
<td>5</td>
<td>Pain in joint, ankle and foot</td>
<td>956</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>10,106</td>
</tr>
</tbody>
</table>

**Percent of all injuries by gender<sup>b</sup>**

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>33.8</td>
<td>32.9</td>
</tr>
</tbody>
</table>

<sup>a</sup> Calculated using average male (n = 10,922) and female (n = 1,377) populations for April 2010 to September 2011.

<sup>b</sup> Percent of injuries among males and percent of injuries among females. Total male injuries (n = 29,916); total female injuries (n = 5,212).
<table>
<thead>
<tr>
<th>Unit</th>
<th>Number of injuries</th>
<th>Percent</th>
<th>Incidence rates* (per 1,000 person-years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Brigade</td>
<td>4,942</td>
<td>14.1</td>
<td>1,259</td>
</tr>
<tr>
<td>2nd Brigade</td>
<td>3,541</td>
<td>10.1</td>
<td>1,254</td>
</tr>
<tr>
<td>4th Brigade</td>
<td>6,229</td>
<td>17.7</td>
<td>1,595</td>
</tr>
<tr>
<td>CAB</td>
<td>3,776</td>
<td>10.7</td>
<td>1,852</td>
</tr>
<tr>
<td>Support Units</td>
<td>7,085</td>
<td>20.2</td>
<td>1,231</td>
</tr>
<tr>
<td>No Unit Designated</td>
<td>9,555</td>
<td>27.2</td>
<td>--</td>
</tr>
<tr>
<td>Fort Riley</td>
<td>35,128</td>
<td>100</td>
<td>1,904</td>
</tr>
</tbody>
</table>

*Incidence rates calculated using average non-deployed population for Fort Riley between April 2010 and September 2011.
Average population for Fort Riley = 12,299; 1st Brigade = 2,618; 2nd Brigade = 1,883; 4th Brigade = 2,603; CAB = 1,359; Support Units = 3,836.
Injury-related medical encounters among active duty personnel by brigade, Fort Riley, KS
April 2010 to September 2011

<table>
<thead>
<tr>
<th>Unit and population</th>
<th>Number of medical encounters</th>
<th>Percent</th>
<th>Incidence rates* (per 1,000 person-years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Brigade</td>
<td>8,187</td>
<td>13.1</td>
<td>2,085</td>
</tr>
<tr>
<td>2nd Brigade</td>
<td>6,110</td>
<td>9.8</td>
<td>2,163</td>
</tr>
<tr>
<td>4th Brigade</td>
<td>10,965</td>
<td>17.6</td>
<td>2,808</td>
</tr>
<tr>
<td>CAB</td>
<td>6,730</td>
<td>10.8</td>
<td>3,301</td>
</tr>
<tr>
<td>Support Units</td>
<td>14,160</td>
<td>22.7</td>
<td>2,461</td>
</tr>
<tr>
<td>No Unit Designated</td>
<td>16,166</td>
<td>26</td>
<td>--</td>
</tr>
<tr>
<td>Fort Riley</td>
<td>62,318</td>
<td>100</td>
<td>3,378</td>
</tr>
</tbody>
</table>

*Incidence rates calculated using average non-deployed population for Fort Riley between April 2010 and September 2011. Average population for Fort Riley = 12,299; 1st Brigade = 2,618; 2nd Brigade = 1,883; 4th Brigade = 2,603; CAB = 1,359; Support Units = 3,836.
Injury Disposition
Active Duty Personnel, Fort Riley, KS
April 2010 to September 2011
Total Injuries = 35,128

*Other disposition included: referred for appointment (n = 16), continued stay (n = 14), discharged home (n = 7), left against medical advice (n = 6), transferred to another hospital (n = 4), transferred to another clinical service (n = 1), and expired (n = 1).
## Top Five Injury Diagnoses and Disposition

**Active Duty Personnel, Fort Riley, KS**

**April 2010 to September 2011**

<table>
<thead>
<tr>
<th>Injury Rank</th>
<th>Diagnosis</th>
<th>Number of Injuries</th>
<th>Disposition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Released without limitations</td>
</tr>
<tr>
<td>1</td>
<td>Low back pain</td>
<td>4,082</td>
<td>3,041 (74.5%)</td>
</tr>
<tr>
<td>2</td>
<td>Pain in joint, lower leg</td>
<td>3,445</td>
<td>2,212 (64.2%)</td>
</tr>
<tr>
<td>3</td>
<td>Pain in joint, shoulder region</td>
<td>1,575</td>
<td>1,125 (71.4%)</td>
</tr>
<tr>
<td>4</td>
<td>Pain in limb, not specified</td>
<td>1,486</td>
<td>1,018 (68.5%)</td>
</tr>
<tr>
<td>5</td>
<td>Pain in joint, ankle and foot</td>
<td>1,133</td>
<td>752 (66.4%)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>11,721</td>
<td>8,148 (69.5%)</td>
</tr>
</tbody>
</table>
DISCUSSION

- Types of injuries consistent with Army:
  - Overuse injury diagnoses most common (43.5% of all injuries)
  - Most common injuries were low back pain and lower extremity joint pain (24.6% of all injuries)

- Injury medical encounter rates at Fort Riley higher than Army
  - 3,378 compared to 2,200 per 1,000 person-years
  - Reason for higher rates may be that Fort Riley is an infantry post (training involves more weight-bearing activities and long-distance marches)
DISCUSSION

- Based on observed rates for the top five injuries, females appear to have slightly higher injury incidence rates than males.
- Women in the military more at risk for injuries.
  - Usually less fit when entering Basic Training.
  - Anatomical differences.
DISCUSSION

- 4th Brigade and CAB had highest observed rates of injuries (1,595 and 1,852 injuries per 1,000 person-years, respectively)
- Recent 4th Brigade intervention:
  - Building a Soldier Athlete Program
  - 4th Brigade physical therapist
DISCUSSION

- Most injuries resulted in no prescribed limited-duty
- Pain can still result in limited ability to perform duties
STUDY LIMITATIONS

- Migration bias
- Many unknown variables in data set
  - Brigade and BMI not readily available for approximately 30% of injured personnel
  - Age and BMI for entire population during 18 month period not obtained
  - Smoking status not available
- Causes of injuries not provided for nearly all injury diagnoses
CONCLUSION & RECOMMENDATIONS

- Continued routine surveillance of injuries
- Educate leadership on recommendations for preventing injuries
- Monitor for adherence to injury prevention guidelines
CONCLUSIONS AND RECOMMENDATIONS

- Evaluate effectiveness of Building a Soldier Athlete program and presence of physical therapist in 4th Brigade

- Further analysis of data
REFERENCES


REFERENCES


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- LTC Paul Benne
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- MAJ Timothy Cass
- CPT Brian Stoltenberg
- Dr. Abbey Nutsch
- Dr. Justin Kastner
- Dr. Sandy Procter
- Dr. Mark Haub
- Casey Weber
- James Lattimer
- Greg Tanquary
- Julie Louk
- Dr. Michael Cates
- Barta Stevenson
- Janet Lopez (mom)
QUESTIONS?