HAND, WRIST, FOREARM AND FINGER OCCUPATIONAL INJURIES IN PORK PROCESSING: COMPARISON BY WORK-SITE AND SOURCE OF INJURY

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HAND, WRIST, FOREARM AND FINGER OCCUPATIONAL INJURIES IN PORK PROCESSING: COMPARISON BY WORK-SITE AND SOURCE OF INJURY

by

Autumn Cummings

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Major: Environmental Studies

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This study looked at injury incident reports from Farmland pork processing plant in Crete, Nebraska. Over a 25-week period in 2012, 300-injury incident reports were analyzed by body part injured. After determining the upper extremities to be the major source of injury, they were then analyzed further with work-sites where injuries occurred, and the source of the injury. Fingers along with hands, wrists and forearms were found to be the majority of the body parts injured. Common among these body parts injured were the location of the incident in the plant. Most of the injuries occurred in the cold work-sites, and the main source of injury was handheld tools.
INTRODUCTION

Occupational injuries are a growing concern in public health, especially among private industries. In 2011 alone, there were approximately 3 million nonfatal injuries and illnesses reported (Bureau of Labor Statistics [BLS], 2012). According to the Department of Health and Human Services (HHS), Nebraska has a higher rate of work-related injuries and illnesses both nonfatal and fatal cases than the United States’ average (Stover, 2013).

Among these injury-prone jobs, meatpacking can be considered one of the most dangerous. The high-risk working conditions of meatpacking plants can be attributed to various factors including: the sharp tools employees work with, the rapid speed of the line, confined work spaces, long hours, slippery floors, heavy lifting, as well as the temperatures of the work area (Midwest Coalition for Human Rights, 2012). With a workforce of approximately 482,070 people in the meatpacking industry in the United States as of 2013, the occupational safety of this workforce is of great concern (BLS, 2014).

Meatpacking is considered one of the most dangerous jobs because of the work-site conditions in addition to the tasks and tools required. Work-site temperatures are classified into two different groups: hot and cold. Hot work-sites are where the animal is stunned, bled, skinned, dehaired, and beheaded. Dehairing processes occur with water as hot as 58 degrees Celsius (136 degrees Fahrenheit). The carcass is then split and rinsed with hot water once again to minimize
contamination. These processes use sharp tools including hooks, knives and powered stationary equipment such as saws (Berkowitz & Fagel, 2011).

The carcass is then cooled for 24 hours before continuing through the processing cycle. Cold work areas are usually kept at a temperature of about 4 degrees Celsius (40 degrees Fahrenheit) to prevent spoiling of the meat. In these cold work-sites, the animal is cut into quarters and further divided by cuts using powered saws, grinders, and other handheld tools. These large pieces of meat lead to heavy lifting and the cutting processes can make work areas slippery and hazardous (Berkowitz & Fagel, 2011).

These dangerous work conditions lead to different types of injuries. The most prevalent injuries include upper extremities such as arms, hands, and fingers (Nebraska Appleseed, 2009). Fingers were found to be the most common body part amputated due to occupational injuries in the meatpacking industry (Lander et al., 2010).

The data used is from a Farmland pork processing plant in Crete, Nebraska. Farmland employs 9,200 people nationwide, 2,050 of these employees are part of the Crete, Nebraska pork processing plant workforce. The Farmland workforce is comprised of 60.8% minorities, and 34.3% women. English was the second language to French, Spanish, Vietnamese and other languages among those belonging to racial/ethnic minorities in the Farmland workforce. The workforce consisted of 39.2% white, 38.7% Hispanic, 12.3% Asian, 9.4% African-American, and 0.4% other ethnicities (Farmland, 2010/2011).
The 2010 OSHA Total Case Rates (TCR), days Away, Restricted, Transferred (dART) and days Away From Work injury and illness (dAFWii) at Farmland have been reported lower than the national averages. The average injury incidence in the same year in United States pork processing industry was 6.9 per 100 full-time equivalent (FTE) workers. The injury rates at Farmland were associated with high turnover rates. To reduce the injuries, the goal of Farmland has been lowering the turnover rates, with a 22% turnover rate compared to the industry average of 50%. In 2010, Farmland received five OSHA violations that resulted in $7,445 penalty (Farmland, 2010/2011).

METHODS

This study focused on 300 non-fatal injury incident reports that occurred in Crete, Nebraska at the Farmland pork processing plant from April 16, 2012 to October 6, 2012. The data were obtained and recorded by the nurse/emergency staff of the meatpacking plant. The study included injuries that happened on the floor, and excluded any office worker or loading doc injuries.

The data were first analyzed by body part injured. The most commonly injured body parts were then analyzed further according to work-site of injury, and source of injury. The work-site was categorized as hot and cold locations. The variables for sources of injury included: transporting an object, struck by an object, slip/trip/fall, rushing, repetitive actions, powered stationary equipment, handheld tools, material handling, machinery maintenance, handling chitts, equipment malfunction and packing.
RESULTS

There was a total of 354 body parts injured in the 300 injury incident reports. Hand, wrist and forearm were categorized in one group due to fewer observations in each body part, and ease of analysis. Of the 354 injured body parts, 91 (25.7%) of the injuries occurred on the hand (except fingers), wrist, or forearm and 108 (30.9%) injuries occurred on the fingers. Other common injury locations were knees, back, and head/face (figure 1).

Of the 91-hand/wrist/forearm injuries, 57 (63%) occurred in the cold work-site, while 34 (37%) occurred at the hot work-sites. Of the 57 injuries occurring in the cold work-site area, the most common source of injury was handheld tools 18 (31.6%). Of the 34 injuries occurring in the hot work-site, 11 (32.4%) were from handheld tools as well (see table 1).

Of the 108 finger injuries, 81 (75%) occurred in the cold work-site and 27 (25%) occurred in the hot work-site. Out of the 81 cold work-site injuries, 17 (20.9%) resulted from exposure to powered stationary equipment and handheld tools lead to 15 (18.5%). Of the 27 hot work-site injuries, 6 (22.2%) were from handheld tools (see table 1).

DISCUSSION

The results of this research showed that more injuries occur in cold work-sites than in hot work-sites. The higher injury rates in cold work-sites can be attributed to homeostasis. When the body is exposed to cold conditions for an
extended period of time, blood flow begins to shift away from the extremities to the core. This can restrict some hand movements; keeping these areas warm can improve the safety in these work conditions (Occupational Safety and Health Administration [OSHA], 2010).

Handheld tools such as knives are also one of the most common tools used in the meatpacking industry. Some of these injuries are a result of “neighbor cuts,” or cuts from a worker nearby. These cuts are due to small workspaces and overlap in the work areas. Giving workers more area when using sharp, dangerous tools may also improve the safety in meatpacking plants (OSHA, 2010).

CONCLUSION

This study had several strengths and weaknesses. Strengths of this research include the large number of incident reports analyzed are representative of the population. With 300 injury incident reports, there are enough data to draw conclusions representative of the whole. The results of the study can benefit Farmland by focusing on areas of greater injury risks, giving them an idea of where they could improve safety. Despite the success of this research, there are some weaknesses of the study. It would have been beneficial to do a statistical analysis using a T-test or perhaps a Fischer test to calculate correlations and prove statistical significance of the results. This would strengthen the results and be more convincing of safety issues in the meatpacking industry.

The data used in this study had other variables that could be analyzed such as injury rates by body part in correlation with demographics, languages spoken,
and shift. It would be interesting to do further studies on this topic with similar data
as used in this study or some of the other variables mentioned previously over a full
year, and perhaps incorporating more pork processing plants or including beef and
poultry processing as well. It would be fascinating to do trial studies where more
extensive training is implemented, and a comprehension test of the safety training.
Then, correlations can be made according to score on the safety comprehension and
injury occurrences.

Also, placing monetary value on the injuries could further improve the meat
processing plant safety. If minimal monetary values were to be assigned to incidents
such as how much it costs per hospital stay of incidents, the cost required to train
and perhaps hire a new employee, OSHA violation charges, and workmen’s
compensation values; a gross cost of injuries could be estimated and reported to the
companies. This may provide them with motivation to improve the work conditions
of their plant. The strict regulations on the meatpacking injury data make these
areas of study difficult, but they are nonetheless important. There is a lot of room for
further research on this topic, and there is always room for improvement in safety.
REFERENCES


Figure 1: Frequency and percentage of occurrences of injuries by location on the body

*Note: not duplicated, if shown on the front body, then not added again on the back. Some injuries included more than one body part (total N=354)
Figure 2: Hand/Wrist/Forearm Injuries by Work-site (N=91)

Figure 3: Finger Injuries N=108

Figure 4: Hand/Wrist/Forearm Injuries by Source of Injury

<table>
<thead>
<tr>
<th>Source of Injury</th>
<th>Hot Work-Site</th>
<th>Cold Work-Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transporting an Object</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Struck by object</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slip/trip/fall</td>
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<td></td>
</tr>
<tr>
<td>Rushing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repetitive Actions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Powered Stationary Equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Packing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handheld Tool</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material Handling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machinery Maintain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handling Chitts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment Malfunction</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Number of Incidents (N=91)
Figure 5: Finger Injuries by Source of Injury

Finger Injuries

Source of Injury

- Transporting an Object
- Struck by object
- Slip/trip/fall
- Rushing
- Repetitive Actions
- Powered Stationary Equipment
- Packing
- Other
- Handheld Tool
- Material Handling
- Machinery Maintain
- Handling Chitts
- Equipment Malfunction

Number of Incidents N= 108

Hot Work-site
Cold Work-site
Table 1: Frequency and Percentage of Injury Location by Work-site and Source of Injury

<table>
<thead>
<tr>
<th>Source of Injury</th>
<th>Hand/Wrist/Forearm</th>
<th>Fingers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cold (%)</td>
<td>Hot (%)</td>
</tr>
<tr>
<td>Equipment Malfunction</td>
<td>8(14)</td>
<td>0(0)</td>
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<tr>
<td>Handling Chitts</td>
<td>0(0)</td>
<td>5(14.7)</td>
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<tr>
<td>Machinery Maintain</td>
<td>2(3.5)</td>
<td>0(0)</td>
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<tr>
<td>Material Handling</td>
<td>2(3.5)</td>
<td>2(5.9)</td>
</tr>
<tr>
<td>Handheld Tool</td>
<td>18(31.6)</td>
<td>11(32.4)</td>
</tr>
<tr>
<td>Other</td>
<td>3(5.2)</td>
<td>4(11.8)</td>
</tr>
<tr>
<td>Powered Stationary Equipment</td>
<td>3(5.2)</td>
<td>1(2.9)</td>
</tr>
<tr>
<td>Repetitive Actions</td>
<td>5(8.8)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Rushing</td>
<td>1(1.8)</td>
<td>1(2.9)</td>
</tr>
<tr>
<td>Slip/trip/fall</td>
<td>1(1.8)</td>
<td>4(11.8)</td>
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<tr>
<td>Struck by object</td>
<td>9(15.8)</td>
<td>5(14.7)</td>
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<tr>
<td>Transporting an Object</td>
<td>2(3.5)</td>
<td>1(2.9)</td>
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<tr>
<td>Totals</td>
<td>57(62.6)</td>
<td>34(37.4)</td>
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