

Reducing Burn Injuries Among Student Food Service Employees at Oregon State University

Pemika Kruearat



Oregon State
University



Table of contents

- Major activities
 - Background
 - Methods
- Major findings
- Limitations
- Notable deviations
- Importance of my project for advancing occupational health and safety in Federal Region X (WA, OR, ID, AK)



1. Major activities

1.1 Background



Summary of 2019 injuries

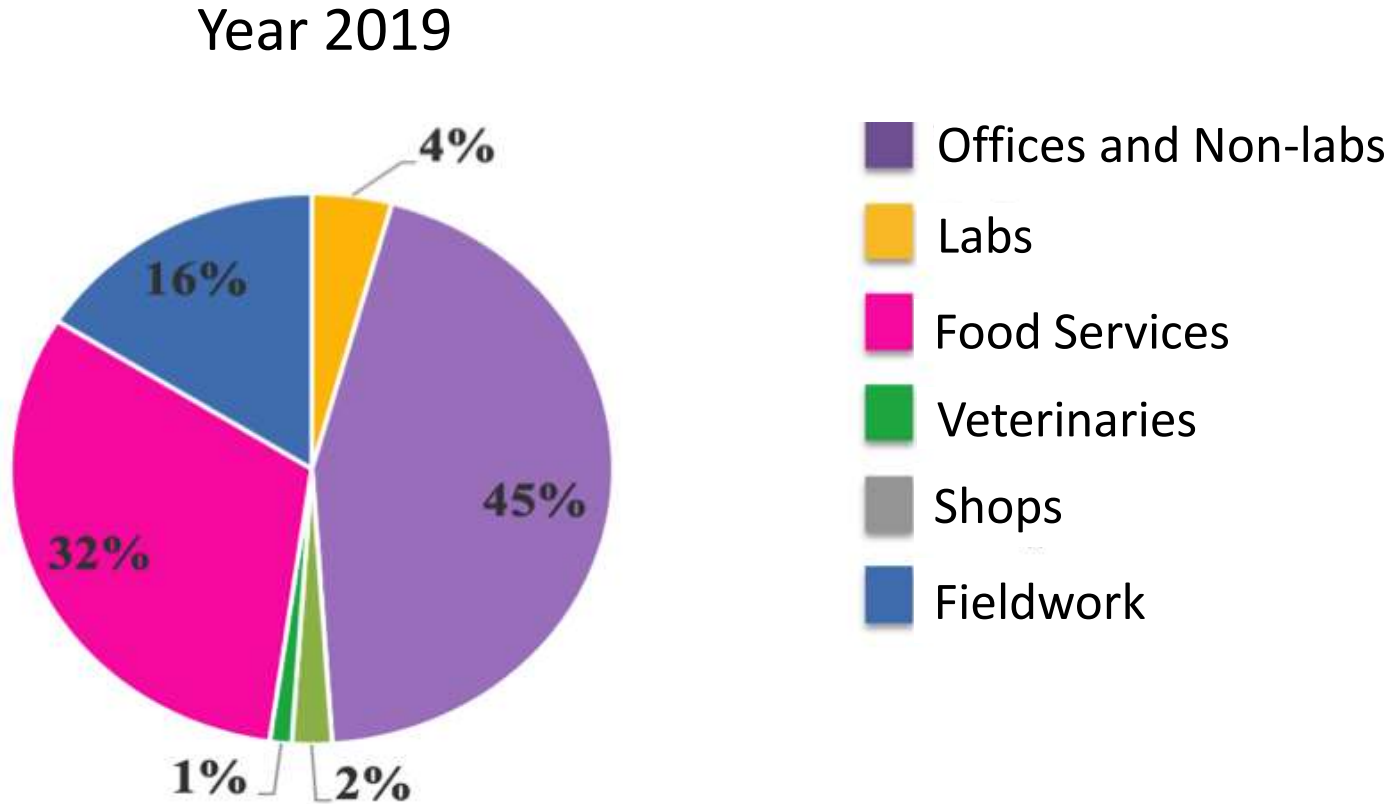


Figure 1. Pie charts showing the percentage of injuries for the six sectors in 2019 (n=2,559)

Table 1. Types of injuries in food services in 2019 (n=163)

| Types of Injuries | Food services N=163 |
|-----------------------|------------------------|
| 1. Abrasion | 5 (3%) |
| 2. Break | 0 (0%) |
| 3. Bruise | 14 (9%) |
| 4. Burn | 64 (39%) |
| 5. Concussion | 1 (<1%) |
| 6. Cut | 31 (19%) |
| 7. Foreign object | 1 (<1%) |
| 8. Headache | 0 (0%) |
| 9. Fainting | 2 (1.2%) |
| 10. Nausea | 0 (0%) |
| 11. No injury | 1 (<1%) |
| 12. Repetitive motion | 8 (4.9%) |
| 13. Sprain/strain | 21 (13%) |
| 14. Other | 12 (7.4%) |



Aim 1: Observation (OSU Dining Center)

- Observing the burn injuries among student employees at OSU's University Housing & Dining Services (McNary Dining Center).
- Shift times in the McNary Dining Center included 7:00 a.m.–10:30 a.m., 11:00 a.m.–2:00 p.m., and 5:00 p.m.–7:30 p.m.
- The jobs or tasks of the student employees that work in the dining center vary as follows:
 - Cashiering
 - Grilling
 - Serving food
 - Stir-frying
 - Stocking food or ingredient
 - Working in the kitchen
(e.g., preparing food, cutting, and cooking)
 - Washing dishes





Aim 1: Observation (OSU Dining Center) cont.

East Side Eats

- McNary Dining Center incurred an injury such as, burns. Most student employees got burn injuries from serving food by touching heat lamps.
- The heat lamp produces 700 watts and generates 300°–400°F for heating/warming the food.



Figure 1. The heat lamp is used for heating/warming the food before serving the meals to consumers.



Figure 2. Watts and temperature of heat lamp



Aim 1: Observation (OSU Dining Center) cont.

- McNary Dining Center provides personal protective equipment (PPE) for student employees: vinyl disposable gloves and oven pads (towels)



Figure 3 Oven pads (towels)



Figure 4 Vinyl disposable gloves



1.2 Methods



Methods

- Recruiting 60 student employees who worked in the OSU Dining centers:
 - McNary Dining Center (n=35), Marketplace West Dining Center (n=18), and Arnold Dining Center (n=7)
- Dividing students into two groups by assigning one of two the heat-resistant sleeves
- When recruited, the student employees were asked to fill out the first survey.
- They were asked to complete two additional online surveys after week 4 and week 8 of the research period.



Terry Cloth Sleeve

Prevent high temperature up to 350 °F



Kevlar sleeve

Prevent high temperature up to 500 °F



2. Major findings



2. Major findings

2.1. Number of students (N=60) in the initial survey

- 35 males (58%), 23 females (39%) and 2 others (3%)
- The average age group was 20-29 years old (73%)
- Working 16-20 hours per week (53%)
- Including morning shifts (7:00 am-10:30 am), day shifts (11:00 am-2 pm), evening shifts (5:00 pm-7:30 pm), and other shifts.
- Length of time working, varied hiring from 2016 to 2022.
- 16 students (27%) were burned at work before participating in the study.



2.2. Number of students previously burned

Table 1. Proportion of student employees worked in different locations

| | Have previous no burn injury (n=44) % | Have previous burn injury (n=16) % | Burn information | P-value |
|---|---------------------------------------|------------------------------------|--|---------|
| Previous Burn Injury at the McNary Dining Center, Marketplace West Dining Center, and Arnold Dining Center (n=60) % | | | | 0.36 |
| Burn injuries in McNary Dining (n=35) | 23 (66%) | 12 (34%) | Getting burns from hot pans, fryers, and heat lamps by serving food at East Side Eats. | |
| Burn injuries in Marketplace West Dining Center (n=18) | 15 (83%) | 3 (17%) | Getting burns from serving foods, working in Clubhouse Deli, and working in the kitchen. | |
| Burn injuries in Arnold Dining Center (n=7) | 6 (86%) | 1 (14%) | Getting burns from serving food in Deli shop. | |



2.2. Number of students previously burned at McNary Dining Center

Table 2. Proportion of student employees worked and were previously burned at McNary Dining Center

| | Have previous no burn injury (n=23) % | Have previous burn injury (n=12) % | Burn information | P-value |
|--|---------------------------------------|------------------------------------|--|-----------|
| Previous Burn Injury at the McNary Dining Center | | | | 2.065e-09 |
| Burn injuries in McNary Dining (n=35) | 23 (66%) | 12 (34%) | Getting burns from hot pans, fryers, and heat lamps by serving food at East Side Eats. | |



2.1. Number of students responded vs Number of students did not respond

Table 4. Comparison of characteristics of OSU food service student employees between student employees who completed the 4-week survey and those who did not

| | Student employees who did not respond (n=21) (n%) | Student employees who responded (n=39) (n%) | P-value |
|--|---|---|---------|
| Student Employees Age upon Enrollment (years) | | | 0.59 |
| Age < 20 | 5 (24%) | 7 (18%) | |
| 20 ≤ Age < 30 | 14 (67%) | 30 (76%) | |
| 30 ≤ Age < 45 | 0 | 1 (3%) | |
| Missing | 2 (9%) | 1 (3%) | |
| Gender | | | 0.82 |
| Male | 11 (52%) | 24 (61%) | |
| Female | 9 (43%) | 14 (36%) | |
| Other | 1 (5%) | 1 (3%) | |
| Race | | | 0.45 |
| White | 9 (42%) | 12 (30%) | |
| Hispanic or Latino | 1 (5%) | 2 (6%) | |
| Black or African American | 1 (5%) | 3 (7%) | |
| Native American or American Indian | 0 | 1 (3%) | |
| Asian | 9 (42%) | 19 (48%) | |
| Pacific Islander | 0 | 0 | |
| Other | 1 (5%) | 2 (6%) | |

| | Student employees who did not respond (n=21) (n%) | Student employees who responded (n=39) (n%) | P-value |
|---------------------------------------|---|---|---------|
| Seeking Degree | | | 0.77 |
| Undergraduate Degree | 15 (71%) | 26 (66%) | |
| Master Degree | 5 (24%) | 12 (31%) | |
| Doctoral Degree | 0 | 0 | |
| Non-Degree Seeking Student | 0 | 1 (3%) | |
| Other | 1 (5%) | 0 | |
| Working Hours/ Week | | | 0.09 |
| 6-10 Hours | 2 (9%) | 1 (3%) | |
| 11-15 Hours | 11 (52%) | 12 (30%) | |
| 16-20 Hours | 8 (39%) | 24 (61%) | |
| Working place | | | 0.48 |
| McNary Dining Center | 11 (52%) | 24 (61%) | |
| Marketplace West Dining Center | 7 (33) | 11 (28%) | |
| Arnold Dining Center | 3 (15%) | 4 (11%) | |
| Previous Burn Injury | | | 1 |
| Yes | 5 (24%) | 11 (28%) | |
| No | 16 (76%) | 28 (72%) | |



2.2. Number of students were burned at 4-week survey

Table 5. Burns with Terry cloth sleeves and Kevlar sleeves

| 4-week survey (n=39) included McNary Dining Center, Marketplace West Dining Center, and Arnold Dining Center | Burns | | |
|--|--------------------------------|---|------------|
| | Yes (n=2)% | Had they been previously burned before participating in this study? | No (n=37)% |
| Terry cloth sleeves (n=18) % | 1 (5%) at McNary Dining Center | No | 17 (95%) |
| Kevlar sleeves (n=21) % | 1 (5%) at McNary Dining Center | Yes | 20 (95%) |

- One male student wore the Kevlar sleeves at least half the time, working 11–15 hours per week and other shifts (2:00–5:00 pm).
- A female student wore the Terry Cloth sleeves less than half the time. She worked 16–20 hours weekly and evening shifts (5:00–7:30 pm).



Number of students (n=39) bringing and wearing sleeves at works

Bringing

- 5 (13%) students never brought their sleeves at work time
- 15 (41%) students brought their sleeves at least half the time
- 12 (41%) students brought their sleeves less than half the time
- 7 (18%) students brought their sleeves every at work time.

Wearing

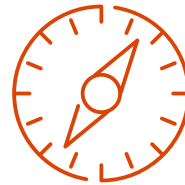
- 3 (8%) students never wore their sleeves at work time
- 16 (41%) students wore their sleeves at least half the time
- 16 (41%) students wore their sleeves less than half the time
- 4 (10%) students wore their sleeves every at work time.



Comparison between Terry cloth and Kevlar sleeves

Table 7. Scores of Terry and Kevlar sleeves

| Do you agree or disagree with the following statements? (use a scale from 1-5, with 1=strongly disagree, and 5=strongly agree) | Terry cloth sleeves (n=18) (Average) Median (Range) | Kevlar sleeves (n=21) (Average) Median (Range) | P-value |
|--|---|--|---------|
| The sleeves were comfortable to wear. | 3.5 3 (0, 5) | 3.1 3 (0, 5) | 0.18 |
| The sleeves made me feel safer while working. | 3.7 4 (0, 5) | 3.8 4 (0, 5) | 0.47 |
| The sleeves helped prevent burn injuries. | 3.6 3.5 (0, 5) | 3.5 3 (0, 5) | 0.45 |
| The sleeves slowed me down at work. | 2.8 2 (0, 5) | 2.2 1 (0, 5) | 0.58 |
| Recommend wearing the sleeves. | 3.8 4 (0, 5) | 3.6 3 (0, 5) | 0.32 |



3. The limitations of the study



3. Limitations of the study

- The project timeline was delayed; the study was intended to begin in the winter term but started in the spring term.
- Not every student employees completed the 4-week survey.
- Student employees who received heat-resistant sleeves only wore one type of heat-resistant sleeves for 8 weeks. By chance, They didn't switch to wearing other kinds of heat-resistant sleeves.



4. Notable deviations from proposal



4. Notable deviations from proposal

- The original proposal would compare between students with wearing sleeves and students without wearing sleeves.
- The IRB noted the differences in terms of risk between these 2 groups.
- My study focus was shifted to determining whether one sleeve was preferred over other sleeves.



**5. Importance for
advancing occupational
health and safety in
Federal Region**



5. Importance for advancing occupational health and safety in Federal Region X (WA, OR, ID, AK)

- If there are widely usage of heat-resistant sleeves in OSU UHDS, food service employees can be more protective against burn injuries.
- The director of OSU UHDS will know which type of heat-resistant sleeves will be suited for OSU food service employees to effectively protect them from burn injuries.

THANK YOU

Questions?



Oregon State
University