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Occupational Health Nursing – Musculoskeletal Disorders & Stretching

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Eleanor Mann School of Nursing

NURS 498VH Honors Internship/Service Learning

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Table of Contents

Abstract 3

Reflection 4

 Occupational Health Nursing – Musculoskeletal Disorders & Stretching 7

 Conclusion. 17

References 20

Figures..... 22

Time Log..... 24

Abstract

For employees who work in food processing plants, work related injuries can take a serious physical toll because of the continuous repetition of the tasks that they perform. Occupational health nurses work hard to encourage correct body mechanics in the workplace and are often the ones to treat those injuries. An internship at a food manufacturing plant allowed me to step into the shoes of an occupational health nurse and witness the difficulties that come with the position. The purpose of my position was to educate the food processing plant employees on proper ergonomics as well as create a stretching video to help decrease work related injuries. I learned that stretching throughout the workday was helpful, but the best ways to prevent injuries from occurring are proper ergonomics and body mechanics.

Keywords: Occupational Nursing, Musculoskeletal, Stretching, Ergonomics, Body Mechanics, Health, Injury

Reflection

When I was seeking an internship for my honors thesis requirements, I did not know exactly what I wanted to do. I mostly thought about working in a hospital because that is where I was used to being, and I knew that I wanted to start working in a hospital after graduation. Prior to applying for any nursing internships, I went to a resume review hosted by the College of Education and Health Professions. The person who helped me emailed me after our session with a nursing internship opportunity at a food processing plant in Arkansas, and I decided to apply for it because it sounded interesting. After applying, I received a phone call from the human resources department about setting up an interview, and I was excited because the job came with a project that was to be presented to the regional board at the conclusion of my internship. This was the start of my journey toward completing my honors thesis.

The first day of my internship was spent getting to know other interns and learning about what to expect for the duration of the program. We learned about appropriate presentation styles, how to properly communicate with our superiors, as well as team building exercises. The next day we were introduced to the supervisors that we would be spending all of our working hours with and getting a tour of the facilities. My responsibilities as the nurse intern were to observe team members so that I could create a stretching video that would hopefully lead to decreased work-related injuries and learn about occupational health nursing. Though these were my only two objectives for my internship, I learned so much more than I thought I would. The processing facility already had a stretching plan for team members, and my job was to revise it, introduce it to new employees, and determine what was working and what was not.

I wanted to have good results for the stretches that I wanted to start implementing, but I had a problem. I had no idea what it actually felt like to the team members to perform their jobs.

Some were in so much pain because of how strenuous their job was. They would come into the nurse's station often to get ibuprofen or wrist wraps, and some started to develop injuries that required medical attention. I learned that many of the stretches already in place were really good stretches that were targeting most of the right areas, but there were some that needed to be added. During the third week of my internship, I talked to my nursing supervisor about going onto the factory floor to perform most of the jobs. We then spoke with the manager of the facility about this, and my supervisor and I were cleared to do so. We got our ear plugs, long cloth coats, plastic aprons, hair nets, and safety glasses, and spent that week performing four different jobs. When we started performing the jobs that week, we got a lot of funny stares from team members and some of them started to ask questions along the lines of, *are they making you do this?* or *why would you volunteer to do this?* And my response was that I really wanted to help them, and I could not really do that until I felt what they felt. I could tell by their reactions to my response that they felt so appreciated, and that made me feel like I was doing my job correctly.

One of the biggest challenges that I faced while working at this processing facility was the language barrier. A large portion of team members did not speak English as their first language. We had a little book in the nurses' station that had some important English-Spanish translations in it, so that was helpful, but there was still that barrier when trying to connect with some of the team members. Luckily, on day shift there were two people who could interpret for us, but they had their own jobs to do, and it was sometimes difficult to get them for interpreting. I tried my best to learn a little bit of Spanish while I was there, but I was mostly unsuccessful in doing so. If this were my long-term job, I would make it a point to learn a second (or third language in my case; I can get by conversationally with French) so that I could make a connection with the people that I am caring for. As an alternative, I would advocate for the team

members and present information to the board about the benefits of creating an interrupter job position which would most likely be more effective.

One of the things that I enjoyed the most about my internship was how the nursing staff cared for the team members and the trips we took to the health clinic. At least three times a week, my nursing supervisor and I would take the company vehicle and a team member to the health clinic to get assessed or have follow up care. We were there with the team member from the time the injury occurred until they were deemed fit to work. I also had the opportunity to meet nurse practitioners and physician assistants and learn a little bit about why they chose occupational health as their profession. I loved how involved this nurse's role was for this company and the team members expressed many times that they were glad that they did not have to go alone.

When we were not on trips to the health clinic, I spent most of my day with the new hires that came into the nurse's station periodically to do their stretches. This was when I was able to get to know the team members the best. I would talk to them about their lives and interests, and I tried my best to encourage them to do their stretches before starting the workday. I also wanted to include them in my project as much as much as possible, so I asked some of them to help me with my Spanish translation for the stretching video and they were excited about it (I had the translation on the video checked by multiple sources). After presenting my work to the regional board, the regional manager told me that he wanted the video to be played in all of the processing facilities, and now it is.

An ethical dilemma that the nurses encountered more often than hoped for was when team members were injured on the job and were given simpler tasks until they were fit for duty again. So many times, they would not want to go back to the job they were hired for because the new task was easier, and they were getting paid the same. This is an ethical dilemma because the

team members were injured at work, but even after they seem to have recovered from the original injury, they said that they can no longer perform the job that they were hired for. The company was then left with an employee that cannot be let go, but also cannot do their job.

Overall, this internship experience was great for me. It presented with some challenges that will carry over into my nursing career, as well as some lessons. This patient care experience was unlike any experience that I had in clinical, and I am so glad that I stepped outside of the box for my honors thesis project. The communication skills that I learned while in my internship are going to be so important as I transition to be a professional nurse.

Occupational Health Nursing – Musculoskeletal Disorders & Stretching

Occupational health nurses are important members of corporate businesses, and they contribute greatly to the health of employees. Before completing this internship, I was unaware of the significant contributions of the occupational health nurse to a company. This nursing specialty is more than just giving out ibuprofen or applying an ice pack to a sore leg; it includes thoughtful prevention strategies, advocating for change when change needs to be made, and focusing on wellness for all members of the company. After experiencing the occupational health setting firsthand, I developed the following research question: what are the benefits to employees who have access to onsite occupational healthcare?

In order for positive change related to health outcomes and care for company employees to occur, it is necessary for occupational health nurses to be in leadership positions within the company. According to Marinescu (2007), “when deciding what services to include as part of health benefits packages, occupational health nurses should assume a leadership role in negotiating for increased focus on the areas of promotion, prevention, and restoration of workers’ health” (p. 76). If the employees are not healthy then the company is not healthy.

Marinescu continues to discuss the cost-effectiveness of health programs for employees and companies alike, and some examples are screening programs, vaccinations, and health promotional activities. If the illnesses are caught early enough then more can be done for the employee at a lower cost to the company. Employees at food processing facilities are at a higher risk of developing work-related injuries caused by dangerous equipment and repetition, so it is especially important that health programs are a top priority. Other factors such as age, health status, and racial/ethnic background should also be considered by the occupational health nurse when planning care.

During my internship, I was given opportunities to help with primary, secondary, and tertiary health prevention of company employees. Of all the levels of health prevention activities that I helped with, the most important was primary prevention. Some examples of primary prevention that I participated in were creating the stretching video at the end of my internship, teaching team members about healthy eating, and teaching about lifestyle changes to prevent heart disease. On my first day at the food processing facility, I was able to participate in a secondary prevention activity where I was instructed on how to deliver a pulmonary function test via a spirometer. A spirometer tests how much air a person can breathe out in one breath, and this tool can help identify COPD and other afflictions of the respiratory tract. Another form of secondary prevention that I helped with but did not perform was the hearing tests. Yearly hearing exams for factory employees are essential because factory floors are clamorous. Tertiary prevention activities included taking blood glucose levels and moving team members to temporary jobs that would not exacerbate their work-related condition or injury.

Other than the occupational health nurse, company employees have another advocate called the Occupational Safety and Health Administration (OSHA). The Occupational Safety and

Health Administration sets guidelines for companies to protect employees. Some examples of the guidelines, standards, and laws from the OSHA website that visibly applied to my place of work are as follows:

- “Falls: Provide guardrails and toe-board around every elevated open sided platform, floor or runway” (OSHA, 2020).
- “Hazard communication: All employers with hazardous chemicals in their workplaces must have labels and safety data sheets for their exposed workers, and train them to handle the chemicals appropriately.”
- “Eye/Face protection: The employer shall ensure that each affected employee uses appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.”

Part of the nurse’s job description is making sure that the company abides by these guidelines and being advocates for company employees.

One important hurdle that the nurses at the processing facility had to overcome were the language barriers between team members and themselves. According to The Northwest Arkansas Council (2020), diversity of the population is at a steady increase as stated below:

Between 1990 and 2010, the region’s racially and ethnically diverse populations increased from less than 5% in 1990 to nearly 24% in 2010. The diversity continues to increase. In 2019, the region was nearly 28% diverse and is expected to grow to almost 31% by 2024. The region’s Hispanic/Latinx population saw the largest gains, accounting for close to 17% of the population in 2019 and forecasted to grow to over 18% by 2024 (para. 12).

With the novel diversity of the population in Northwest Arkansas, a long-term goal should be for companies to employ interpreters so that all employees can be heard and cared for appropriately. There were a few different languages spoken at the processing facility, and there were only two people that could translate for one language during the day shift. The night shift presented more challenges because there was no one to properly translate. A language barrier creates a mutual lack of understanding between the nurse and the team member where understanding can be crucial. Even for the people who are bilingual, according to Ali and Watson (2018) in their article “Language Barriers and Their Impact on Provision of Care to Patients with Limited English Proficiency: Nurses’ Perspective,” “Taking example of the English language, evidence suggests that even bilingual people who speak English fluently, in situations of stress, illness and tiredness, may feel more comfortable communicating in their primary language” (pp. e1152-e1153). This presents more challenges for the nurse in a linguistically diverse environment.

Though most companies have occupational health nurses and organizations such as OSHA advocating for them in the United States, internationally, many workers do not have access to nurses in the workplace. Only about one-third of the participating countries associated with the World Health Organization provide access to occupational health nurses (Rogers et al., 2014). Many of these countries whose companies do not have this access also most likely have jobs where employees would benefit from having an occupational health nurse the most. Nurses in the workplace are not only a benefit, but they are also a necessity.

Of all of the work-related injuries that an occupational health nurse may encounter, musculoskeletal disorders are some of the most prevalent. In order to prevent these injuries from occurring, proper body mechanics, ergonomics, and prevention strategies are necessary. Ergonomics is the study of one’s work environment and conditions so that work becomes safer

and more efficient (Oxford, 2020). For a food processing plant this involves the safety of the equipment itself, proper instruction on how to use the equipment, and proper body mechanics to prevent injuries or unnecessary stress on the body when it comes to using the equipment. After spending time working as the nurse intern for a processing facility, the second research question was developed: among employees who have physically taxing jobs (i.e. processing facilities/factories), does teaching on correct body mechanics and a regular stretching regimen help manage or prevent the development of musculoskeletal disorders?

On my first day of work, my nursing supervisor pointed out the different jobs that were being performed on the factory floor. They asked if I noticed anything that looked as if it needed to be corrected. At this time, my knowledge about proper body mechanics was limited, but I was able to identify some things. At first glance, I noticed the way the factory employees [henceforth referred to as team members] were picking up boxes to send out for delivery. Some people were lifting with their back which can lead to strained muscles or injury. The other bodily movement that stood out to me was the way that some team members were placing the animals on the hooks at the grading table. They would reach across their body with one arm and place animals that were around seven to eight pounds on moving hooks. This, of course, was to keep up with the speed of the line, but it was not the proper way to perform the task. Unfortunately, this is where many chronic injuries such as carpal tunnel and rotator cuff injuries began to develop.

On the other hand, some of the jobs that were being performed could cause injuries even though the team members were using the correct body mechanics. This presented a more difficult task than just instructing the team members to change how they performed their job. My project for my internship was created because of this issue. My task was to observe, understand, and implement changes *before* the team members set foot on the factory floor to perform their job. I

decided to take it a step further and actually perform all of the jobs that I could before deciding on what would work best for them. The processing facility already had some simple stretches that new hires did for the first three weeks of work as required by the company. They had to come into the nurse's station three times during their shifts to perform these stretches, but after three weeks they were on their own. The good thing about this was that it actually did help new hires from getting sore quickly. The downside was that when they stopped coming the soreness and pain often set in.

Though there are many musculoskeletal disorders that occurred during the duration of my internship, I will be heavily concentrating on three main areas of injury which are the hands/wrists, back, and rotator cuff. Musculoskeletal disorders are one of the leading causes of missed work in the United States, and the most common risk factors for musculoskeletal disorders are, "exposure to tasks involving high force demands, tasks involving high rates of repetition, tasks involving awkward postures, and tasks of long duration" (Gallagher & Heberger, 2012, p. 108). With the type of work that the team members were doing on the factory floor, they had all of these risk factors.

Carpel Tunnel Syndrome

Carpel tunnel syndrome is typically caused by a pinched nerve in the hand, and it presents with numbness, tingling, and pain. Team members used their hands to perform every task at the facility, but some jobs are more likely to develop carpal tunnel syndrome than others. For example, one section of the line is focused on removing the meat from the animals. This requires quick fine motor movements, and fatigue is inevitable. These team members do this work for eight to ten hours a day, five days a week, and the environment is very cold which causes muscles to contract or cramp. Some treatments that the nurses implemented to help with

muscle cramping in the arms and hands were applying Icy Hot or Biofreeze Gel from the elbow down, wrapping the team members wrists and hands with blue hand wraps, and providing hot wax in which the team members could dip their hands.

Diagnosis for carpal tunnel syndrome can be concluded by, “a positive Tinel’s sign, Phalen test, diagnostic test for [carpal tunnel syndrome], and nerve conduction and electromyography,” and it is typically treated with surgery, cortisone injections, rest, ice, or splinting (Hammond & Harriss, 2012, p. 15). Hammond and Harriss present the case of a twenty-one-year old client named Jodie who suffers from carpal tunnel syndrome. The symptoms she experienced are very similar to those of the team members and include reduced grip strength, wrist pain, and tingling. Jodie had previously worked in a poultry processing plant which further increases the relevance to the plight of the team members. “Three factors indicating that an individual is at a high risk of developing [carpal tunnel syndrome] are the use of vibrating tools, work requiring high hand exertion forces, or heavy manual repetitive tasks,” and all team members working the factory floor had at least one of these risk factors (Hammond & Harriss, 2012, p. 14-15). Once carpal tunnel syndrome has developed the typical treatment is surgery and rehabilitation, which was the case for Jodie and a few of the team members at the processing facility. Prior to the completion of my project, the company had some stretches that did not help the team members as much as other could. In order to help prevent carpal tunnel syndrome from developing, I added four hand stretches to the previous ones that the company was implementing, and they are pictured in *Figures 1-4*.

Lower Back Pain

Lower back pain is a broad term that refers to mild to severe pain and is one of the top complaints when it comes to work-related injuries. At the processing facility, the weight of the

boxes that were being lifted in the packaging and loading dock area was between forty to fifty pounds, and the team members were moving hundreds of boxes each day. Stretching can help to decrease the likelihood of developing lower back pain, but proper body mechanics are essential to prevent injury. “Besides, negative effects for workers, consequences of [lower back pain] include productivity-loss at work, sickness absence, and disability,” so not only does it negatively affect the team member, but it also negatively affects the company (Coenen, 2014, p. 871). Coenen goes on to discuss how lifting while having existing lower back pain creates more adverse effects for the client. Unfortunately, many people that complained of lower back pain at the processing facility felt that they had to continue working despite a worsening condition because they needed to provide for themselves and their family.

According to authors representing the Department of Electrical Engineering and Computing Systems from the University of Cincinnati and the National Institute for Occupational Safety and Health, “Detecting when a worker is lifting incorrectly and at increased risk of back injury presents significant possible benefits” (Snyder et al., 2020, p.1). One suggestion that the authors make in order to increase detection is for employers to have surveillance systems in place so that supervisors can monitor how employees are completing their task, but this is costly to the company. Also, some employees have to move around so much to do their job that installing this expensive equipment would not be worth the cost. Another suggestion by the authors, though potentially more costly, is that employees wear sensors so that their activity and movements could be measured while working. Doing this would combine engineering and the daily work life of these particular employees in a new and unique way. Though there could be some interruptions in the employee’s daily schedule due to new the equipment, “real-time recognition of unsafe lifting would provide immediate feedback to the

users, something currently impractical with traditional methods such as a specialist constantly monitoring the workers” (Snyder et al., 2020, p. 2). After learning about the long-term costs that my employer faced because of lower back injuries, this real time recognition could actually save a company thousands of dollars each year by preventing the injuries from ever occurring and improve the employee’s quality of life. Chronic lower back pain can become more than bothersome; it could lead to poor health outcomes.

When team members needed to have a hospital visit, it was the nurse’s duty to transport the team member and remain with them during their visit to the local health clinic. It is in a company’s best interest to make sure that team members are ergonomically correct when performing their job so that visits to the clinic can decrease. The stretches that I incorporated into the company’s stretching plan for preventing lower back injuries are toe touches, arching the back while standing up (placing the palm of the hands on the lower back for support), and leaning side stretches. These stretches would need to be done throughout the day for maximum effectiveness.

Rotator Cuff Injury

Rotator cuff injuries most commonly took place at the grading table where the team members hung the animals on the moving hooks as mentioned above. Though “rotator cuff tears (RCTs) are most prevalent in the middle-aged and older adults,” population many of the team members at the processing facility who suffered from an injury were of younger to middle working age (Oh et al., 2018, para. 1). Once a rotator cuff injury has occurred, the best way to repair it is through surgery. At my internship, the team members who were post-rotator cuff surgery worked with a physical therapist twice a week during the duty day, and I was able to

observe some of the exercises that the company physical therapist performed with the team members. According to Prall and Ross (2019):

Participation in ergonomics and on-site physical therapy treatment in the workplace (e.g., education, exercise, manual intervention) has a positive effect on decreasing work-related musculoskeletal disorders, decreasing costs associated with these injuries, increasing work productivity, and decreasing absenteeism and improving presenteeism amongst workers (para. 1).

On site physical therapists are vital to the team members and their recovery just as the nurse is. Both can provide education on correct body mechanics and ergonomics so that the team member can have the best outcome.

A study was done on musculoskeletal disorders in the workplace to determine if participatory training would help prevent workers from developing work related injuries (Yu et al., 2011). 918 randomly selected workers were asked to physically participate for one year, and 1,654 workers were asked to take a didactic course only. The study noted that musculoskeletal disorders are very costly to companies, and this was made clear to me while at my internship as well. The factory setting was very diverse; from toy factories and plastic factories to metal product factories, and the only criteria to be included in the random selection was that they had to be employed with the company for at least twelve months. The study found that,

“In the two control groups, no difference was observed in the change in the prevalence rates of [musculoskeletal disorders] in individual body parts during the past 12 months between the baseline and 1 year after training (Table 4). However, the prevalence rates of lower extremities (including thigh, low leg and ankle) and upper extremities (including wrist and finger) in the intervention group reduced from 16.8 to 9.9 % and from 12.9 to

8.3 %, respectively, after training, with statistically significant difference ($p < 0.001$ and $p = 0.002$, respectively).” (Yu et al., 2011, p. 435).

The researchers proved that intervention by companies to provide a training program for employees decreases cost to the company and significantly decreased musculoskeletal disorders from developing in jobs that are strenuous on the body. The difference in this study is that the training became a requirement for a full year as opposed to just the first three weeks of being hired.

Some shoulder stretches that I added for prevention of rotator cuff injuries were placing one arm across the body and holding it in place with the other arm (repeated on both sides), interlocking the fingers behind the back and extending the chest forward, and placing one arm behind the head while using the other arm to grab the elbow until the elbow is pointing toward the ceiling. These stretches stretch the supraspinatus, infraspinatus, and teres minor. Though these may be good stretches to aid in preventing the rotator cuff injuries from developing, the number one way to prevent it from occurring is proper body mechanics and ergonomics depending on the team members job.

Though stretching and training cannot prevent all work-related injuries, it can significantly help prevent musculoskeletal disorders from developing (Yu et al., 2011). There are other factors that must be considered such as underlying conditions, age, prior history of injuries, and lifestyle factors when determining the likelihood of an employee developing a musculoskeletal disorder or other work-related injuries.

Conclusion.

Occupational health nursing is essential in order to have a quality working environment, and I am glad that I was able to learn more about it through this internship. Due to the diversity

that was in the processing facility, I was able to learn more about various stages of life (teenagers through late adulthood), different ethnic backgrounds, and socioeconomic status'. The day that I arrived at the processing facility, I knew that many of the team members would need teaching on various things. With the pulmonary function tests, many of the men tested were considered borderline for developing COPD or they had significant lung damage related to smoking. Drug abuse was another common issue among team members, so I was able to talk to some of them about it during my time there. When it comes to overall care and musculoskeletal disorders, considering the effects of drugs on body is essential as it can affect healing. There were many other health issues and disparities that this population faced that I was unable to touch on because I was there for such a short time. However, even if I did have more time there, I now know that nurses cannot make people change though we may think we know what is best for them. All we can do is love, support, and encourage the people we care for and hope that one day some of it sticks.

Though I was hired to create something to help fix a problem, what I did would not make it go away. I believe that I helped this company by creating the stretching video that is playing at the processing facility 24/7, but team members have to want to use that resource to help prevent work related injuries. Something that changed the way that some of the new hires seemed to view coming to the nurse's station to stretch was the way that the nursing team interacted with them. The more that I talked to the them and tried to get to know them, the more they seemed interested in learning about health and wellness. For me, it was all about building a trusting relationship so that they would listen to what I had to say. This patient population has been really important for me. I tried to be an advocate where I could, and I was able to see the nursing staff do the same. Though I do not plan to be an occupational health nurse in the near future, I would

not have chosen a different internship experience because it allowed for me to see beyond what I believed a nurse could achieve.

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Figures

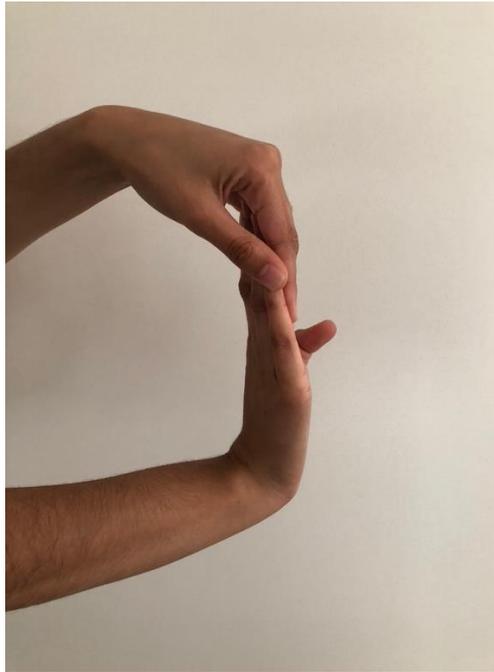


Figure 1. Stretches the brachioradialis, palmaris longus, and flexor carpi radialis muscles.



Figure 2. Stretches extensor carpi radialis longus, and extensor digitorum.



Figure 3. Stretches brachioradialis, abductor pollicis brevis and thumbs.



Figure 4. Stretches wrist, brachioradialis, palmaris longus, and flexor carpi radialis.

Time Log

Date	Hours Spent <i>Total: 400</i>	Description of Activity
05/20/2019	8	Professional development activities. Project presentation workshop. Team building.
05/21/2019	8	Met supervisor and learned about the company.
05/22/2019	8	First day at the processing facility. Performed pulmonary function tests and mask fittings. Toured the factory.
05/23/2019	8	Attended an occupational health conference. Learned about medical marijuana in the workplace.
05/24/2019	8	Went to first clinic visit at the health clinic.
05/27/2019	8	Began learning the current stretching routine for team members and practicing it with them.
05/28/2019- 05/31/2019	32	Attended the second workshop with all interns. Learned about mission statements, and how they can help shape the life that we want to live. We also learned about workplace etiquette, and why it is so important. Performed stretches with new hires led by supervisor.
06/03/2019- 06/07/2019	40	Received approval from the processing plant manager to perform team member job duties for the week. Attended some health clinic visits.
06/10/2019- 06/14/2019	40	Attended health clinic visits. First week that I was able to lead new hires in stretches alone.
06/17/2019- 06/21/2019	40	Attended health clinic visits. Practiced stretches with new hires. Began researching new stretches to start incorporating into the stretching plan. Provided teaching on hypertension and heart disease to team members.
06/24/2019- 06/28/2019	40	Attended health clinic visits. Practiced stretches with new hires. Began implementing new stretches with new hires.
07/01/2019- 07/05/2019	40	Attended health clinic visits. Practiced stretches with new hires. Began speaking with some team members about translation for the stretching video.

07/08/2019- 07/12/2019	40	Attended health clinic visits. Practiced stretches with new hires. Submitted request to work with the company's videographer to make the stretching video.
07/15/2019- 07/19/2019	40	Attended health clinic visits. Practiced stretches with new hires. Worked with the company's videographer to make the stretching video (07/16/2019- <i>1 hour</i>).
07/21/2019- 07/26/2019	40	Attended clinic visits. Presented project to the regional board (07/24/2019 – <i>1 hour</i>). Learned that the video would be playing on a loop at all regional processing facilities with the potential of becoming company wide. Final day of work (07/26/2019).