

BMI Optimization: Referral for Total Knee or Hip Arthroplasty

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### Abstract

**Background:** Incremental increase in body mass index (BMI) above 30 kg/m<sup>2</sup> increases risk for total perioperative complications for total hip and knee arthroplasties. It is generally accepted that patients who are obese or morbidly obese should undergo a weight loss plan prior to undergoing orthopedic surgery. Primary care providers are in position to refer patients to orthopedic surgeons concurrently with a physical therapist and a dietitian to get patients started on BMI optimization.

**Objective:** To influence referral practices of primary care providers for patients with hip or knee osteoarthritis who have BMIs  $\geq 35$  kg/m<sup>2</sup> to dietitians and physical therapists for BMI optimization.

**Methods:** New patients being seen by two knee and hip specialty providers at Idaho Sports and Spine were given a questionnaire asking whether they were referred to a physical therapist and a dietitian for BMI optimization by their referring physician. After six weeks, completed questionnaires were gathered and educational fliers with a listing of local dietitians and physical therapists were mailed to primary care providers within a 25 mile radius of Idaho Sports and Spine. Six weeks later, questionnaires were distributed to new patients at Idaho Sports and Spine.

**Results:** The first set of questionnaires suggested that more patients had been referred to physical therapists (66%) than to dietitians (11%). The second set of questionnaires suggested that more patients had been referred to physical therapists (48%) than to dietitians (4.35%).

**Conclusion:** There was no change in referrals to physical therapists and dietitians by less than one percent after the intervention.

### **Introduction and Background**

Obesity, as defined as having a body mass index (BMI) of greater than or equal to 30 kg/m<sup>2</sup>, has been steadily increasing and has almost tripled worldwide in the last 46 years (World Health Organization {WHO}, 2021). Obesity can cause many adverse health disorders involving the cardiovascular system, endocrine system, musculoskeletal system, and has even been indicated to be involved in the development of some cancers (WHO, 2021). Osteoarthritis is one of the major adverse musculoskeletal health effects of obesity (WHO, 2021). Total hip and knee arthroplasties are surgical procedures that can be done to treat degenerative musculoskeletal disease, like osteoarthritis of the hips and knees, in the end stages of the disease (Abdulla et al., 2020).

End stage osteoarthritis can develop faster in people who are obese (Abdulla et al., 2020). This phenomenon shows a risk for younger people who are obese to develop end stage osteoarthritis of the hips and knees (DeMik et al., 2018). However, obesity itself is considered an independent risk factor for surgical complications. In a retrospective review of 161,785 patients who had undergone either total hip or total knee arthroplasty, obese (BMI  $\geq 30$  kg/m<sup>2</sup>) and morbidly obese (BMI  $\geq 40$  kg/m<sup>2</sup>) patients were found to have higher rates of total complications than those who were not obese (DeMik et al., 2018). Wound complications, such as deep infection, superficial wound infection, organ space surgical site infection, and wound dehiscence, reflected a tendency to increase with incremental BMI category increases above 30 kg/m<sup>2</sup> (DeMik et al., 2018). Mortality rates, pneumonia, unplanned intubation, deep venous thrombosis, pulmonary embolism, renal insufficiency, acute renal failure, urinary tract infection, stroke,

peripheral nerve injury, myocardial infarction, blood transfusions, and sepsis were also increased in patients who underwent total hip and knee arthroplasties who had greater BMIs (DeMik et al., 2018).

Another study examined the risks of developing peri-prosthetic joint infection with a high BMI. After reviewing records of 18,173 patients who underwent primary total hip or primary total knee arthroplasties, it was determined that the risk of peri-prosthetic joint infection 90 days postoperatively in obese and morbidly obese people was equivalent to random chance (Shohat et al., 2018). However, other risks in obese and morbidly obese people remain a consideration, and results such as these make creating a consensus very difficult on appropriate BMI cutoff or threshold among orthopedic surgeons.

Anesthesia predictions of complications are also noted to be high in people who are obese. The American Society of Anesthesiologists (ASA, 2020) have a classification system that helps predict perioperative risks in people undergoing surgery. The classification system ranges from ASA I, a normal healthy patient, and ASA VI, a patient who has been declared brain-dead (ASA, 2020). The ASA classifies people who have a BMI between  $30 \text{ kg/m}^2$  and  $40 \text{ kg/m}^2$  as an ASA II, and those with a BMI of greater than  $40 \text{ kg/m}^2$  as an ASA III (ASA, 2020). Patients who are obese are also more likely to have comorbidities such as type 2 diabetes and obstructive sleep apnea (American Academy of Orthopaedic Surgeons {AAOS}, n.d.). Additional comorbidities increase the ASA risk classification for patients (ASA, 2020). This reflects how perioperative risks to patients undergoing surgery increase with BMI increase.

Bariatric surgery for weight loss is an option for BMI optimization for the treatment of osteoarthritis and for BMI optimization prior to orthopedic surgery. However, bone

demineralization was found to be increased after patients underwent bariatric surgery (Zhang et al., 2017). Risk for falls and fracture up to two years after bariatric surgery was also found to be increased (Zhang et al., 2017). Postmenopausal women are particularly at risk for fracture due to increased bone resorption after bariatric surgery (Schafer et al., 2018). While bariatric surgery is considered one of the most effective treatments for weight loss and BMI optimization prior to orthopedic surgery referral, more conservative and less invasive options should be considered first (Zhang et al., 2017).

### **Problem Statement**

People who have end stage osteoarthritis of the hip or knee can have difficulty maintaining mobility, and therefore, function. Weight loss prior to hip or knee surgery to treat osteoarthritis may prove difficult if mobility is impaired due to increased pain and decreased range of motion from the disease. However, perioperative risks for people who are obese, both during surgery and after surgery, are increased (AAOS, n.d.). Physical therapists and dietitians are specially trained to help patients lose weight and optimize activity. With the help of physical therapists and dietitians, risks can be mitigated, and BMI can be optimized, prior to consideration of an invasive procedure that carries so much risk for people who are obese or morbidly obese (AAOS, n.d.). Diet and exercise plans are non-invasive treatments to help optimize BMIs that can be effectively and safely provided by dietitians and physical therapists (Seward et al., 2020). Referral to a dietitian and a physical therapist, at the same time that orthopedic surgery referral is done, can help expedite a collaborative approach to care for osteoarthritis of the hip or knee for patients who are obese and morbidly obese.

### **Project Purpose**

The purpose of this project is to influence the referral practices of primary care providers for patients with hip and/or knee osteoarthritis who have a BMI of  $\geq 35 \text{ kg/m}^2$  in the Chubbuck and Pocatello, Idaho areas. Encouraging referral practices that support a collaborative approach to care for this patient population may help with a timelier optimization of patients' BMIs for those who elect to undergo total joint arthroplasty. Optimization of BMI will help decrease perioperative risks for complications for those who elect to undergo total joint arthroplasty.

### **Discussion**

The risks that surgery poses in patients who are obese or morbidly obese is higher than that of people who are not obese or morbidly obese. Weight loss can help reduce the risks of surgery and anesthesia for patients who are seeking total joint arthroplasty for the treatment of knee or hip osteoarthritis. A collaborative approach to weight loss is more effective than the approach of one health care provider alone. An early collaborative approach to weight loss may be achieved if primary care providers are encouraged to refer patients to dietitians and physical therapists concurrently with orthopedic surgery referral.

### **Clinical Question**

Will the distribution of an educational pamphlet on the evidence supporting BMI optimization and accompanying resource list increase the frequency of primary care providers' referrals of obese or morbidly obese patients who have hip or knee osteoarthritis to dietitians and physical therapists six weeks post educational pamphlet distribution?

P: Obese or morbidly obese patients ( $\text{BMI} > 35 \text{ kg/m}^2$ ) who have hip or knee osteoarthritis who are seen at the Idaho Sports and Spine Clinic in Pocatello, Idaho.

I: Educational pamphlet outlining evidence supporting BMI optimization with accompanying list of dietitian and physical therapists in the Chubbuck/Pocatello, Idaho area.

C: Dietitian and physical therapy referrals during a six week time period prior to the educational pamphlet distribution at the Idaho Sports and Spine clinic.

O: Increase in percentage of dietitian and physical therapy referrals six weeks post educational pamphlet distribution.

T: The project started November 1, 2021 and ended April 8, 2022.



## **Literature Review**

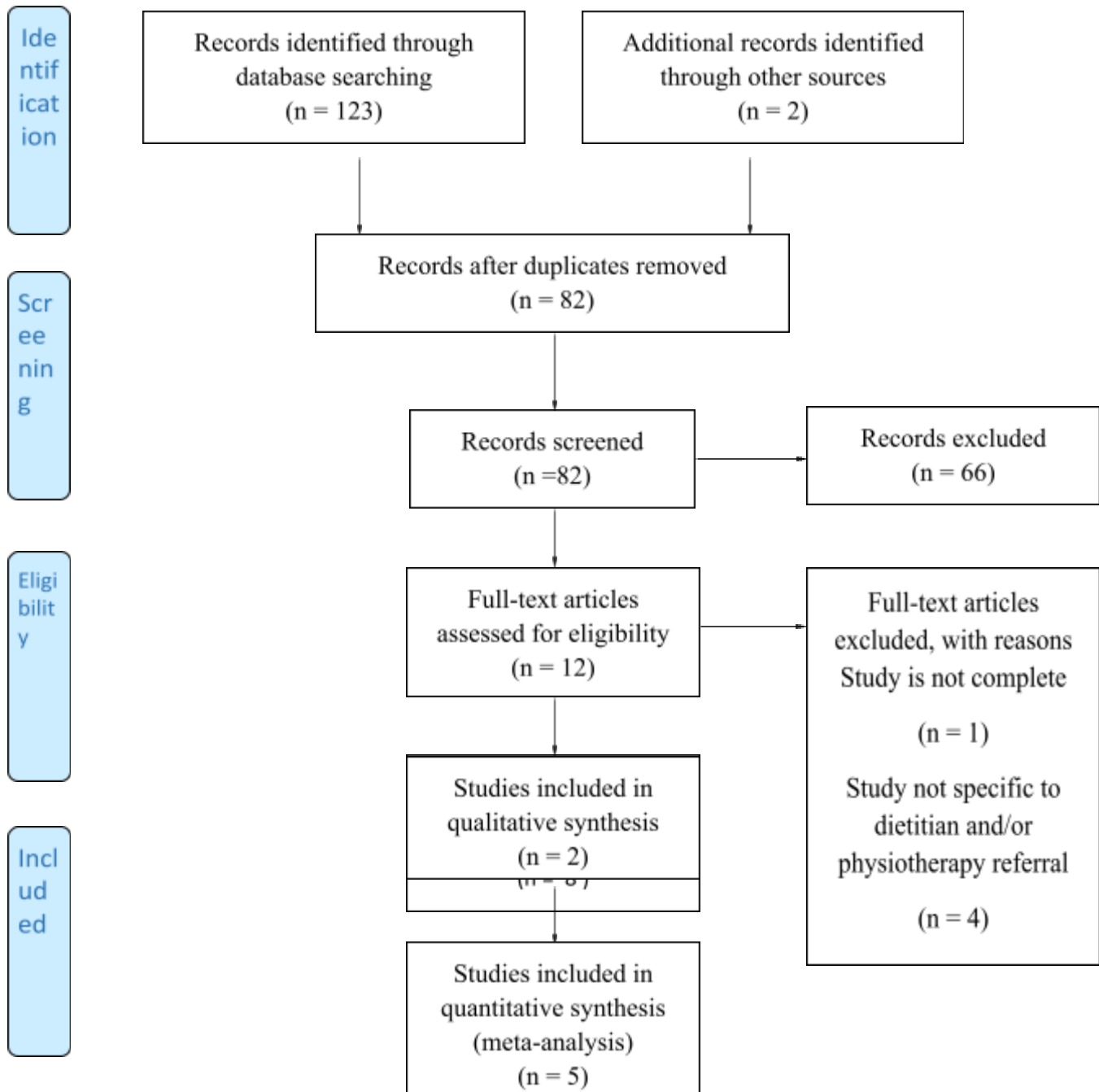
### **Search Strategy**

A search was done in Idaho State University Library's One Search database. The key words used for the search were "bmi dietitian referral knee arthroplasty." The search was refined by "Full Text, Scholarly (Peer Reviewed) Journals, English language, united states, and published since 2017." One hundred and twenty-three articles resulted, and eighty-six articles were reviewed after duplicates were removed. Eighty-six titles were reviewed, fourteen abstracts were reviewed, ten full articles were reviewed, and six articles were ultimately selected. One of the six articles selected is currently an ongoing study, and was therefore not included.

Two additional articles were selected from the references used in the ongoing study "Weight loss before total joint arthroplasty using a remote dietitian and mobile app: Study protocol for a multicenter randomized, controlled trial" (Seward et al., 2020). Both articles were peer reviewed, were written in the English language, and were published in 2019.

Databases are *MEDLINE Complete*, *Academic Search Complete*, *Complementary Index*, *Science Citation Index*, and *CINAHL Complete*.

Figure 1

**PRISMA 2009 Flow Diagram**

## **Primary Care**

Primary care is the optimal setting for patients to be provided or referred to preventative services (Sastre & Van Horn, 2021). Referrals to dietitians by primary care providers is considered beneficial to populations in need of dietary guidance, because dietitians are specifically trained to help modify patients' dietary behaviors (Mitchell et al., 2017). Referrals to lifestyle management programs by primary care providers can improve patients' general and musculoskeletal health, can help them lose weight, and can also help with cost and risk reduction, which in turn helps patients prepare for safe surgery (Law et al., 2018). Collaborative care with other healthcare providers, such as physical therapists and dietitians, has been associated with both weight reduction and improved musculoskeletal function for patients suffering with osteoarthritis of the hips and knees (Dabare et al., 2017; Teoh et al., 2017). However, variable settings and referral considerations can be complex, and referral rates by primary care providers to other healthcare providers like physical therapists and dietitians, can be adversely affected (Law et al., 2018). There is also a paucity in the data regarding nutritional counseling and protocol to help patients reach satisfactory weight loss for risk reduction (Lingamfelter et al., 2019). This indicates a benefit in taking a multidisciplinary approach to weight loss in obese and morbidly obese patients seeking total knee or hip arthroplasty (Lingamfelter et al., 2019).

## **Weight Loss**

In one study, 43% of patients who underwent dietary counseling by a dietitian, lost weight and achieved their goal BMI of 40 kg/m<sup>2</sup> or less (Lingamfelter et al., 2019). In another study, patients had an average of 2.8 kg/m<sup>2</sup> drop in BMI score after undergoing a diet and exercise program (Losina et al., 2019). In a systematic review, 18 out of 26 studies suggested positive clinical indicators and anthropometric changes with dietary interventions provided by dietitians (Mitchell et al., 2017). However, diet and exercise interventions vary by provider and settings in most of these studies, and therefore, substantial differences in nutritional and exercise practices may exist (Mitchell et al., 2017).

At least a 10% weight loss in patients who were obese or morbidly obese is considered optimal in reducing disability for patients with knee and hip osteoarthritis (Losina et al., 2019). A 20-pound preoperative weight loss is considered optimal in morbidly obese patients to decrease incidence of increased hospital length of stay and lower odds of being discharged to a facility (Keeney et al., 2019). While weight loss has shown to benefit patients considering knee or hip arthroplasty, no specific amount of weight loss has been identified as being clinically important to physical functioning prior to orthopedic surgery (Keeney et al., 2019).

### **Comorbidities**

Comorbidities often occur in conjunction with morbid obesity and can increase risks for surgery (Dabare et al., 2017; Keeney et al., 2019; Losina et al., 2019; Mitchell et al., 2017).

Glycemic control in diabetic patients has consistently shown to be improved in studies that focus specifically on dietetic management and glycemic control (Mitchell et al., 2017).

### **Weight Loss and Pain**

Weight loss, diet, and exercise are effective treatment for knee and hip osteoarthritic pain (Law et al., 2018; Losina et al., 2019; Teoh et al., 2017). One study highlights conservative management, including diet and exercise therapy, effectively treats osteoarthritic hip and knee pain and can extend time to surgical intervention, even in obese patients with radiographic changes that reflect significant disease (Dabare et al., 2017). In this study, a specific level of pain and function did not reflect whether operative intervention or conservative management was superior to the other; this was determined on a case-by-case basis (Dabare et al., 2017).

A multidisciplinary approach for BMI optimization has not only been correlated with weight loss, but has also been correlated with decreasing patients' pain (Teoh et al., 2017). After participation in the multidisciplinary weight loss program, patients' willingness to undergo orthopedic surgery was decreased due to the efficacy of weight loss on reducing pain and increasing function (Teoh et al., 2017). Conservative management through a multidisciplinary diet and exercise program was shown to be effective even in patients with end stages of osteoarthritis (Dabare et al., 2017). Patients with hip osteoarthritis, however, present with more significant pain and symptoms than patients with knee osteoarthritis, and usually need surgical intervention sooner than those with knee osteoarthritis (Dabare et al., 2017). Therefore, a shorter duration for conservative management for patients with hip osteoarthritis should be considered (Dabare et al., 2017).

## **Barriers**

Insurance coverage plays a role in the decision for primary care providers to refer patients to dietitians or physical therapists for diet and exercise counseling. In one study, some insurances covered dietitian visits on a limited basis, whereas other insurances did not offer insurance

coverage for dietitian visits (Lingamfelter et al., 2019). Insurance coverage was consistently perceived as one of the greatest barriers for referrals to dietitians in one study (Sastre & Van Horn, 2021). In some cases, dietitians and/or physical therapists are part of the multidisciplinary team in the office, and therefore, referral and insurance coverage may be variable to the individual setting (Sastre & Van Horn, 2021). Insurance coverage may play a role as a barrier, however, cost-effectiveness of a multidisciplinary approach to knee and hip osteoarthritis treatment proved beneficial and reduced patients' desire to undergo total joint arthroplasty in one study (Losina et al., 2019; Teoh et al., 2017). Cost was also reduced when patients had a reduced length of stay after losing 20 pounds or more prior to undergoing total joint arthroplasty (Keeney et al., 2019). Providers are often aware of the fact, however, that patients will have to pay out-of-pocket for dietetic visits when insurance does not cover dietitian services (Law et al., 2018).

Vagueness of referral criteria and the subjectivity of individual patient presentations also presents barriers for providers in referring patients to dietitians and physical therapists (Law et al., 2018). While some providers base their decision on a patient's specific BMI, other providers may base their decision on a patient's level of pain and dysfunction caused by osteoarthritis (Law et al., 2018). Standardization of the referral process and optimization of the multidisciplinary team has yet to be determined, and contributes to the complexity of the referral process (Dabare et al., 2017).

## **Discussion**

A multidisciplinary approach to BMI optimization for patients with knee and or hip osteoarthritis prior to orthopedic surgery referral is necessary to mitigate risks associated with

surgery for obese and morbidly obese patients. While there are barriers to consider, BMI optimization will help improve surgical outcomes, and reduce costs associated with morbidity and suboptimal surgical outcomes. Improving knowledge and reducing barriers for primary care providers to help facilitate BMI optimization prior to referral for total joint arthroplasty in obese and morbidly obese patients with knee and/or hip osteoarthritis will benefit patients in not only pain and function, but in their overall health.

### **Theoretical Framework**

Exchange theory in the referral process identifies many considerations that the provider undertakes prior to patient referral (Shortell & Anderson, 1971). Not only do providers have to consider cost of treatment for their patients, they have to consider quality of care that can be provided through the referral process (Shortell & Anderson, 1971). Different variables that are relevant to patients' needs can make decisions regarding optimal referral complex, however, the rewards for appropriate referral may outweigh the costs associated with not referring patients to other healthcare providers (Shortell & Anderson, 1971). These associated rewards and costs affect both the providers as well as the patients in most cases.

The transactional approach implied by Exchange Theory benefits consulting physicians' networking style to referrals, however, networking style approaches to healthcare can be affected and guided by programs such as pay-for-performance type Medicare programs (Reschovsky & Rich, 2018). Policy and market forces are major barriers for effective referrals, therefore, information exchange on insurance coverage and conservative care are important for primary care both in prestige as well as in income (Reschovsky & Rich, 2018).

### **Methods**

This project uses a cross-sectional approach using an anonymous patient survey to determine if the percentage of patients who are referred to a dietitian and/or physical therapist increases after the intervention.

Idaho Sports and Spine is an orthopedic clinic in Pocatello, Idaho with multiple providers who specialize in different areas of orthopedics. New patients who presented to the clinic to see three providers who specialize in knees, hips, and shoulders were provided questionnaires pertaining to knee and hip osteoarthritis (Appendix C) between the dates of November 1, 2021 and January 14, 2022. The intervention of mailing education fliers (Appendix D) to primary care providers was implemented on January 14, 2022. There was a six week waiting period to allow for primary care providers to receive and read the questionnaires as well as allow time of referral to time of appointment. On February 28, 2022, the second set of questionnaires (Appendix C) were distributed to new patients who presented to the clinic to see the two providers as before. Six weeks later, on April 8, 2022, the second set of questionnaires were collected. The results of the first set of questionnaires and the results of the second set of questionnaires were compared at the completion of the project.

### **Participants**

New patients referred to two providers at Idaho Sports and Spine who specialize in knee, hip, and shoulder pathologies were given an anonymous questionnaire asking if their visit was pertaining to possible knee or hip osteoarthritis. It was anticipated that there would be eight eligible patients in the pre- and eight eligible patients in the post-intervention group for the two six-week periods of survey collection. These numbers were based upon the number of patients



who met criteria seen in the clinic previously over a three month period. The pre-intervention group returned nine questionnaires, the post intervention group returned 23 questionnaires.

A search in DocSpot.com resulted in 217 primary care providers who practice within a 25-mile radius of the Pocatello Idaho area. One hundred sixty four primary care providers were in Pocatello, Idaho; 14 primary care providers were in Chubbuck, Idaho; 30 primary care providers were in Blackfoot, Idaho; and nine primary care providers were in American Falls, Idaho. Primary care providers in these areas can potentially refer obese and morbidly obese patients with knee and/or hip osteoarthritis to the Idaho Sports and Spine clinic for total joint arthroplasty. Educational pamphlets regarding BMI optimization for patients with knee and/or hip osteoarthritis (Appendix D) through referral to a physical therapist and dietitian concurrently with orthopedic referral were sent to the 217 primary care providers by postal mail. A list of physical therapists and dietitians within a 25 mile radius of Pocatello (Appendix D) were also sent along with the education flyers to the 217 primary care providers.

### **Setting and Tools**

The project took place at the Idaho Sports and Spine clinic in Pocatello, Idaho. The pre- and post-intervention questionnaires (Appendix C & Appendix E) are designed to ascertain if the patient's visit is concerning knee or hip osteoarthritis and if the patient was referred to a dietitian and/or physical therapist by his/her referring primary care provider. Both the pre- and post-intervention questionnaires consist of five questions and take approximately five minutes to complete. The intervention of sending an educational flier to primary care providers was sent by regular postal mail. The second set of data collection was done at Idaho Sports and Spine using a similar questionnaire as the first set of data collection (Appendix E).

### **Intervention**

The intervention was mailing an educational flier (Appendix D) developed by the DNP student in collaboration with clinicians at the clinic to local primary care providers. It was a single informational page that provided evidence supporting the positive patient care outcomes of optimizing BMI prior to knee or hip arthroplasty surgery. Included on the opposite side of the flier was a single page list of local dietitians and physical therapists. Contact information for the clinic and project lead person, should the primary care providers have questions, was included on the pamphlet.

Anonymous surveys were distributed to eligible patients and collected by staff who collect new patient paperwork at the clinic.

### **Analysis and Interpretation**

Responses from the patient surveys were entered into an excel spreadsheet. Descriptive statistics were used for analysis. The main project outcome compared the percentage of patients who were referred to a physical therapist and/or a dietitian before and after the educational pamphlet intervention.

A section on the second set of questionnaires included a space for patients to describe their referral experience. Responses given were included in a qualitative analysis in the “Results” and “Interpretation” sections.

### **Ethical Considerations**

The project was reviewed and considered exempt status by the Idaho State University Review Board. Staff at Idaho Sports and Spine reviewed elements of the project, and in conjunction with the Idaho State University Review Board, approved the project (Appendix A).

## Results

Out of 217 fliers sent to primary care providers, forty fliers were returned to the sending address. Some of the fliers were returned because the providers were no longer at the address and some were returned due to the wrong address. Details of why some of them were considered the wrong address is unknown. Not all of the letters returned had a reason written on the letter for the return.

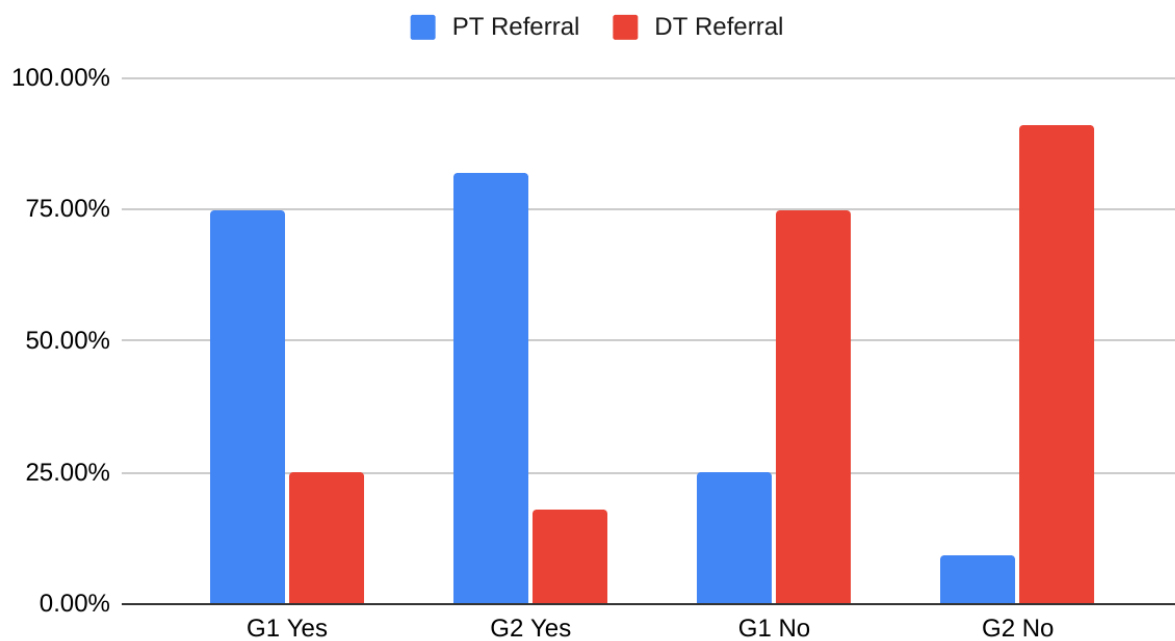
Of the nine participants in Group 1 (G1), four participants (44%) reported that their visit was concerning knee or hip pain possibly caused by arthritis. Three of the four participants who were there for knee or hip pain possibly caused by osteoarthritis suggested they had discussed physical therapy (PT) referrals and one of the four participants suggested they had discussed dietitian referrals (DT) with their primary care provider in Group 1 (Figure 1). Six of all responding participants (67%) responded that their primary care provider discussed PT referral (Figure 2). One of all responding participants (11%) responded that their primary care provider discussed DT referral to help aid in the treatment of hip or knee pain (Figure 2).

Of the 23 participants in Group 2 (G2), eleven participants (48%) reported that their visit was possibly concerning knee or hip osteoarthritis. Nine of eleven participants who were there for knee or hip pain possibly caused by osteoarthritis suggested they had discussed PT referrals and one of eleven participants suggested they had discussed DT referrals with their primary care provider in Group 2 (Figure 1). These results suggest a 0.09 percent change in PT referrals and a 0.28 percent change in DT referrals among participants who responded that their visit was concerning hip or knee pain possibly caused by arthritis (Figure 1). Other Group 2 results were eleven of all responding participants were referred to PT and one participant was referred to a

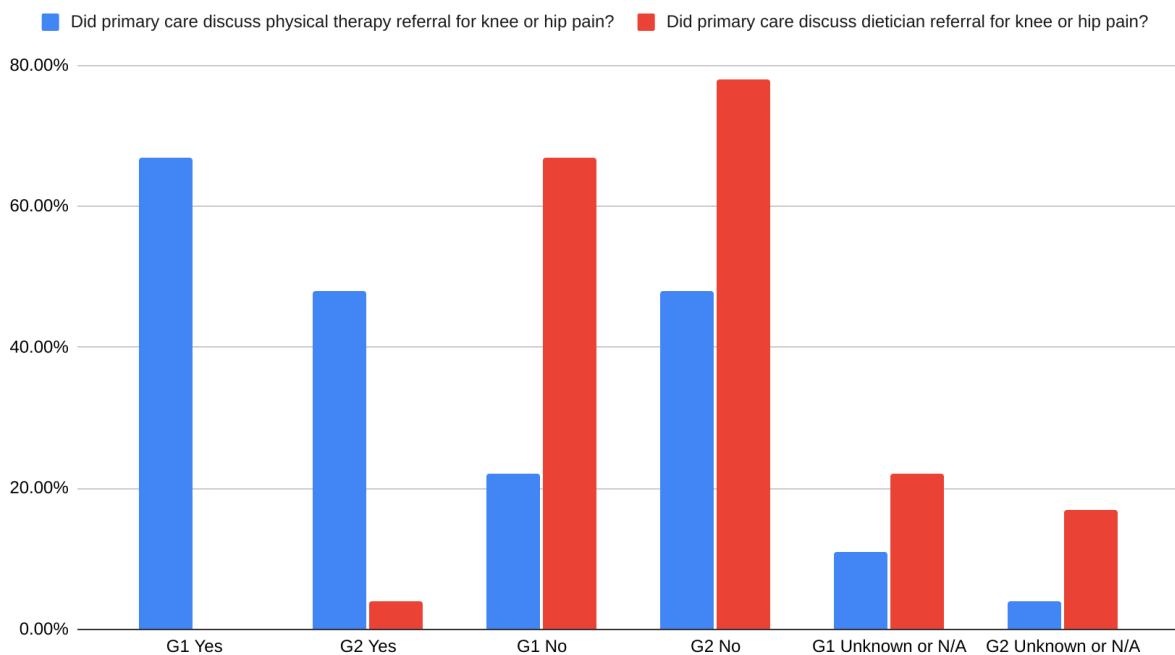
dietitian (Figure 2). The percent change between Group 1 and Group 2 for PT referrals by primary care providers for all responding participants was 0.28 percent. The percent change between Group 1 and Group 2 for DT referral by primary care providers for all responding participants was 0.61 percent.

**Figure 1**

*Hip & Knee Pain Visits*



*Note.* This chart includes only participants whose visit was concerning hip or knee pain possibly caused by osteoarthritis.

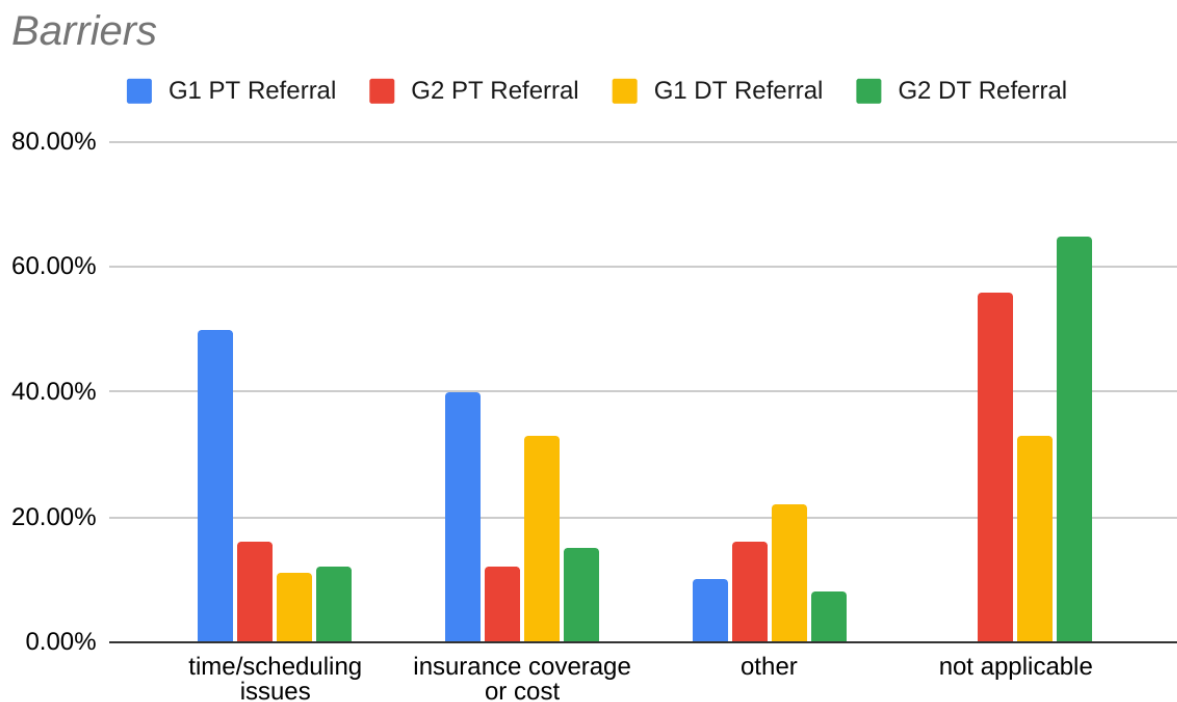
**Figure 2***Group 1 (G1) & Group 2 (G2) results*

*Note.* This chart includes responses from all participants.

The most frequent response in Group 1 for barriers to seeing a physical therapist was time and scheduling issues (Figure 3). Cost and insurance considerations were the most frequently reported barriers to seeing a dietitian in Group 1 (Figure 3). Not applicable was the

most frequent response to both physical therapy and dietitian referral barriers in Group 2 (Figure 3).

**Figure 3**



*Note.* This chart includes responses from all participants.

Handwritten responses by Group 2 participants in the space provided for them to describe barriers for physical therapy referral included; “None,” “I live 2 hrs from nearest P. T.,” “Didn’t

help, ``"I am seeing a PT, ``"Don't like Physical Therapist, ``"none, ``"will go after surgery," "wasn't referred," and "wasn't referred." Handwritten responses by group 2 participants in the space provided for them to describe barriers for dietitian referral included "None," "Same as above - I live 2 hrs from nearest P. T., ``"None," "Wasn't referred," and "wasn't referred."

### **Interpretation**

Percentage reduction of referrals to physical therapists (0.09% and 0.28% respectively) and dietitians (0.28% and 0.61% respectively) indicates no significant change in referral practices by primary care providers after the intervention.

Qualitative data concerning physical therapy include the following:

The response of "None" which was included in two of the questionnaires was interpreted that there were no barriers to a physical therapy referral. The response of "I live 2 hrs from nearest P. T." was interpreted that possibly some patients are coming to the clinic from a rural location, and therefore, distance is a barrier to being able to undergo physical therapy. The response of "Didn't help" was interpreted as the patient has gone to a physical therapist in the past, and the patient did not feel that the intervention was beneficial. The response of "I am seeing a PT" indicates that the intervention was already being undertaken, and therefore, a discussion of physical therapy referral may have taken place prior to referral to the orthopedist. The response of "Don't like Physical Therapist" may indicate that a conversation with a physical therapy referral had been done, but due to an ineffective relationship with a physical therapist

was a perceived barrier to another physical therapy referral. The response of "will go after surgery," may indicate that the patient did not perceive physical therapy as beneficial until after surgery. Finally, the response of "wasn't referred" that had been written on two of the questionnaires indicates that the patients were not referred to physical therapy.

Qualitative data concerning dietitian referral include the following:

The response of "none" that was written on two of the questionnaires was interpreted as they perceived that there were no barriers to dietitian referrals. The response of "Same as above - I live 2 hrs from nearest P. T." was interpreted as the patient likely lives in a rural area where they have to drive a distance for additional therapy. The response of "wasn't referred" that was written on two of the questionnaires was interpreted as the patients had not been referred to a dietitian.

### **Limitations**

To limit burden for workflow and to allow questionnaires to be completely anonymous, questionnaires were distributed to all new patients for the three specialty providers. A query was done by means of manual chart review, which was supervised by a provider at Idaho Sports and Spine, between July and September of 2021. This query was done to estimate the number of new patients who would be seen by the three providers at Idaho Sports and Spine who had a BMI >35 kg/m<sup>2</sup> and who were presenting for the treatment of knee or hip osteoarthritis. Despite efforts to estimate the number of patients with increased BMI and with knee or hip osteoarthritis in a defined period of time, the unknown BMI of the participants who completed the surveys is still a limitation. While the questionnaires did ascertain if a referral was appropriate within the question of referral, known BMI would have been beneficial.



The time period of six weeks distribution of the first set of questionnaires, the six week wait period in between, and the six weeks distribution for the second set of questionnaires are also limitations to this study. Shorter time lengths can allow for seasonal changes to influence patient responses to treatment (Dabare et al., 2017). A longer time period for primary care providers to read the fliers and for patients to be referred may have been beneficial. Longer time periods for the pre- and post- educational pamphlet distribution would have also provided larger sample sizes.

A larger number of completed questionnaires in Group 1 would have allowed for a better understanding of referral practices of primary care providers prior to the intervention. Group 1 resulted in 9 completed questionnaires, which was less than half of the number of completed questionnaires in Group 2. The difference in number of participants could be due to a staffing change that occurred at the clinic or due to a difference in patient willingness to complete the questionnaires during the first six weeks of the project. Time frame extension of questionnaire distribution for both Group 1 and Group 2 may have given opportunity for more patients to participate in completing the questionnaires.

Elective surgery during the COVID-19 pandemic may have also affected the number of patients who were seeking surgical treatment for knee or hip osteoarthritis. However, after an initial drop in patients undergoing elective surgery in the United States between March and April of 2020, it appeared that elective surgery rates rose back up to pre-pandemic levels in the fall and winter of 2020 (Mattingly et al., 2021). While this project was completed in the fall and winter 2021 and spring of 2022, during the COVID Omicron variant surge, it is perhaps too early to

ascertain a thorough picture of the effects that the Omicron variant had on elective surgery trends.

Finally, it is unknown how many primary care providers read the educational fliers. There was an inaccuracy of primary care providers' addresses found in DocSpot.com and not all fliers made it to addressees. Of the 217 flyers mailed to primary care providers, forty fliers, or 18.43%, of fliers sent were returned due to the wrong address. Of the fliers not returned due to inaccurate addresses, 81.57%, it is unknown if primary care providers received or read the educational fliers.

### **Discussion**

This project was motivated by the complexity of care required for patients who are obese and who are seeking surgical intervention for knee or hip osteoarthritis. Providers have to take into account many factors when considering referrals (Shortell & Anderson, 1971). Among others, comorbidities, cost, and scheduling can affect whether a patient will consider discussing additional therapies for treatment of knee or hip osteoarthritis (Law et al., 2019). Primary care providers generally have a willingness to provide collaborative care to complex patients and generally acknowledge the importance of the role that they play in ongoing patient care (Geramita et al., 2020). A patient who lives two hours away from the nearest physical therapy provider was likely a challenge that their primary care provider was willing to incorporate and consider when managing the patient's care. The response of "Didn't help" may imply that at some point in time, the participant had a discussion concerning physical therapy and had undergone physical therapy in the past. The participant's perception of physical therapy not

being beneficial may also be a barrier that the responding participant's primary care provider was willing to incorporate into the patient's overall plan of care.

The participants who wrote "none" in the section that had been provided to describe barriers may indicate that they perceive no barriers to undergoing physical therapy or dietary therapy. Learning more about patients such as these may uncover additional considerations to referral that were not included in the questionnaires for this project.

The percentage of all participants who reported discussing physical therapy and dietitian referrals both declined by less than one percent after the intervention. While Group 1 had less than half the number of participants that Group 2 (the post intervention respondents) had, this indicates that the intervention had no effect on primary care providers' referral process.

Future projects could incorporate a more interactive approach among the project team and primary care providers in order to help ensure communication. A more interactive intervention would have allowed primary care providers to ask questions and have a discussion with the project team concerning the roles that physical therapists and dietitians play in the treatment of knee or hip osteoarthritis in patients who are obese. Understanding the roles that interprofessional team members play enhances collaborative buy in and patient centered care (Rouch et al., 2022). In a qualitative review concerning incorporating occupational therapists into a collaborative team, it was noted that understanding individual team members' roles enhanced providers' buy in and willingness to collaborate and to refer patients to occupational therapists (Rouch et al., 2022). Misconceptions or questions about physical therapists' and dietitians' roles in treatment of osteoarthritis for patients who are obese could be reduced through

discussion and interactive conversation. An interactive approach would have also allowed more knowledge on how many primary care providers actually received the information.

Future projects could also include a timeline for at least 12 months. A twelve month timeline could help decrease seasonal influences on rates of patients who are seeking surgical intervention (Dabare et al., 2017). An extended timeline could also allow for larger sample sizes that provides a broader view of primary care providers' referral practices.

The willingness of primary care providers to provide optimal care and their knowledge shapes ongoing care for their patients (Geramita et al., 2020). Gathering data on what influences knowledge on referral considerations and the overall referral process may help guide future protocols and referral interventions.

### **Funding**

There was no funding for this project.

### References

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## Appendix A

### Citi Training Certificates

#### COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM) COMPLETION REPORT - PART 1 OF 2 COURSEWORK REQUIREMENTS\*

\* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Elizabeth Combs (ID: 8314398)
- **Institution Affiliation:** Idaho State University (ID: 1264)
- **Institution Email:** dahlietiz@isu.edu
- **Institution Unit:** Student
- **Phone:** 208-705-4630
- **Curriculum Group:** Social and Behavioral Responsible Conduct of Research
- **Course Learner Group:** Same as Curriculum Group
- **Stage:** Stage 1 - RCR
- **Description:** This course is for investigators, staff and students with an interest or focus in Social and Behavioral research. This course contains text, embedded case studies AND quizzes.
- **Record ID:** 33558512
- **Completion Date:** 30-Sep-2019
- **Expiration Date:** 29-Sep-2023
- **Minimum Passing:** 80
- **Reported Score\*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Authorship (RCR-Basic) (ID: 16597)	30-Sep-2019	5/5 (100%)
Collaborative Research (RCR-Basic) (ID: 16598)	30-Sep-2019	5/5 (100%)
Conflicts of Interest (RCR-Basic) (ID: 16599)	30-Sep-2019	5/5 (100%)
Data Management (RCR-Basic) (ID: 16600)	30-Sep-2019	5/5 (100%)
Mentoring (RCR-Basic) (ID: 16602)	30-Sep-2019	5/5 (100%)
Peer Review (RCR-Basic) (ID: 16603)	30-Sep-2019	5/5 (100%)
Research Misconduct (RCR-Basic) (ID: 16604)	30-Sep-2019	5/5 (100%)
Using Animal Subjects in Research (RCR-Basic) (ID: 13301)	30-Sep-2019	5/5 (100%)
Research Involving Human Subjects (RCR-Basic) (ID: 13566)	30-Sep-2019	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

Verify at: [www.citiprogram.org/verify/71d93e954c-8750-445f-b610-d80f865199e5-33558512](http://www.citiprogram.org/verify/71d93e954c-8750-445f-b610-d80f865199e5-33558512)

Collaborative Institutional Training Initiative (CITI Program)  
Email: [support@citiprogram.org](mailto:support@citiprogram.org)  
Phone: 888-529-5929  
Web: <https://www.citiprogram.org>

**COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)****COMPLETION REPORT - PART 1 OF 2  
COURSEWORK REQUIREMENTS\***

\* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- Name: Elizabeth Combs (ID: 8314398)
- Institution Affiliation: Idaho State University (ID: 1264)
- Institution Email: dahlellz@isu.edu
- Institution Unit: Student
- Phone: 208-705-4630
  
- Curriculum Group: CITI Health Information Privacy and Security (HIPS)
- Course Learner Group: CITI Health Information Privacy and Security (HIPS) for Students and Instructors
- Stage: Stage 1 - Basic Course
  
- Record ID: 37096753
- Completion Date: 18-Aug-2020
- Expiration Date: 18-Aug-2021
- Minimum Passing: 80
- Reported Score\*: 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Health Privacy Issues for Students and Instructors (ID: 1420)	18-Aug-2020	5/5 (100%)
Idaho State University (ID: 12693)	18-Aug-2020	No Quiz
Basics of Health Privacy (ID: 1417)	18-Aug-2020	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing Institution identified above or have been a paid Independent Learner.

Verify at: [www.citiprogram.org/verify/71a26a9f18-365f-4cfd-9d27-528de9505808-37096753](http://www.citiprogram.org/verify/71a26a9f18-365f-4cfd-9d27-528de9505808-37096753)

Collaborative Institutional Training Initiative (CITI Program)  
Email: [support@citiiprogram.org](mailto:support@citiiprogram.org)  
Phone: 888-529-5929  
Web: <https://www.citiprogram.org>

**COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)****COMPLETION REPORT - PART 1 OF 2  
COURSEWORK REQUIREMENTS\***

\* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- Name: Elizabeth Combs (ID: 8314398)
- Institution Affiliation: Idaho State University (ID: 1264)
- Institution Email: dahlzell@isu.edu
- Institution Unit: Student
- Phone: 208-705-4630
  
- Curriculum Group: CITI Health Information Privacy and Security (HIPS)
- Course Learner Group: CITI Health Information Privacy and Security (HIPS) for Students and Instructors
- Stage: Stage 1 - Basic Course
  
- Record ID: 37096753
- Completion Date: 18-Aug-2020
- Expiration Date: 18-Aug-2021
- Minimum Passing: 80
- Reported Score\*: 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Health Privacy Issues for Students and Instructors (ID: 1420)	18-Aug-2020	5/5 (100%)
Idaho State University (ID: 12693)	18-Aug-2020	No Quiz
Basics of Health Privacy (ID: 1417)	18-Aug-2020	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

Verify at: [www.citiprogram.org/verify?ka28a9f18-365f-4cfd-9d27-528de9505806-37096753](http://www.citiprogram.org/verify?ka28a9f18-365f-4cfd-9d27-528de9505806-37096753)

Collaborative Institutional Training Initiative (CITI Program)  
Email: [support@citiprogram.org](mailto:support@citiprogram.org)  
Phone: 888-529-5929  
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**COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)****COMPLETION REPORT - PART 1 OF 2  
COURSEWORK REQUIREMENTS\***

\* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- Name: Elizabeth Combs (ID: 8314398)
- Institution Affiliation: Idaho State University (ID: 1264)
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- Phone: 208-705-4630
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- Course Learner Group: CITI Health Information Privacy and Security (HIPS) for Students and Instructors
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- Reported Score\*: 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Health Privacy Issues for Students and Instructors (ID: 1420)	18-Aug-2020	5/5 (100%)
Idaho State University (ID: 12693)	18-Aug-2020	No Quiz
Basics of Health Privacy (ID: 1417)	18-Aug-2020	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

Verify at: [www.citiprogram.org/verify?ka28a9f18-365f-4cfd-9d27-528de9505806-37096753](http://www.citiprogram.org/verify?ka28a9f18-365f-4cfd-9d27-528de9505806-37096753)

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Email: [support@citiprogram.org](mailto:support@citiprogram.org)  
Phone: 888-529-5929  
Web: <https://www.citiprogram.org>

## Appendix B



Idaho State University  
921 S 8th Ave  
Pocatello, ID 83209

To whom it may concern,

This letter is to confirm that Idaho Sports & Spine is allowing Elizabeth Combs DNP FNP student to do her project in accordance with Idaho State University's Nursing Program at their facility. There will be no monetary compensation by any party. Elizabeth Combs DNP FNP student will abide by all rules and considerations of both Idaho Sports & Spine and Idaho State University.

The project will begin in October of 2021 and will finish by May of 2022. Extensions and changes will be done in agreement with all parties. The project will not include any identifying patient information in any way and the content of the project will follow all HIPPA and IRB considerations and rules.

Thank you,

Idaho Sports & Spine



950 Hospital Way, Suite A • Pocatello, ID • 83201  
Phone: 208.478.4522      [www.idahosportsandspine.com](http://www.idahosportsandspine.com)

## Appendix C

### Pre Educational Pamphlet Questionnaire

Idaho State University

Filling out this questionnaire is optional. It is an invitation to take part in a project that is being conducted by Elizabeth Combs DNP FNP student at Idaho State University. All information in this questionnaire is for data collection purposes only. No private information will be collected or retained. This questionnaire will not be retained in your personal chart.

This project is not a part of your medical care and declining to participate will not affect your treatment or your relationships with any medical providers in any way. Completion of this questionnaire should take no longer than 5 minutes. There will be no follow up as there is no private information attached to this questionnaire. Questionnaires will not be kept with any private information, but will be kept separately in a secure area where there will be no way to connect questionnaires with any private information.

This project is being conducted to assess primary care providers referral behavior for body mass index optimization for people with knee or hip osteoarthritis. No private information will be attached to this form. Again, completion of this questionnaire is optional.

If you have questions about this study/project, contact information is:

Elizabeth Combs DNP FNP student, 208-705-4630 or [elizabethcombs@isu.edu](mailto:elizabethcombs@isu.edu)

Idaho State University's Human Subjects Committee, [humsbj@isu.edu](mailto:humsbj@isu.edu)

ISU's HSC Coordinator, Tom Bailey, 208-282-2179

1. Is your visit today concerning knee or hip pain possibly caused by osteoarthritis or arthritis?
  - a. Yes
  - b. No
  - c. Unknown
  - d. Not applicable
2. If applicable, did your primary care provider discuss a referral or treatment with a physical therapist for aid in treatment of knee or hip pain caused by arthritis?
  - a. Yes
  - b. No
  - c. Unknown
  - d. Not applicable
3. If applicable, did your primary care provider discuss a referral or treatment with a dietitian or nutritionist for aid in treatment of knee or hip pain caused by arthritis?
  - a. Yes
  - b. No
  - c. Unknown
  - d. Not applicable
4. What are the barriers that would prevent you from seeing a physical therapist?
  - a. Time/scheduling issues
  - b. Insurance coverage or cost
  - c. Other
  - d. Not applicable.
5. What are the barriers that would prevent you from seeing a dietitian or nutritionist?
  - a. Time/scheduling issues
  - b. Insurance coverage or cost
  - c. Other
  - d. Not applicable.

Thank you so much for your time and help!

## Appendix D

### Educational Pamphlet

#### Help Us Get Started - BMI Optimization

Through the supervision of a primary care provider, ACA dietitians can provide weight loss counseling for obese patients. ICD-10 code 97802 for the first dietitian visit and 97803 can be used for subsequent visits and are covered by Medicare.

Obese and morbidly obese patients are at higher risk for developing hip and knee osteoarthritis at a younger age than patients who are not obese

BMI optimization should be considered in patients with osteoarthritis of the hip or knee who have a BMI of  $>35$  kg/m<sup>2</sup>

In morbidly obese patients, a preoperative weight loss of approximately 20 pounds was associated with a decrease length of stay at a hospital post total joint replacement surgery

- Keeney, B. J., Austin, D. C. & Jevsevar, D. S. (2019). Preoperative Weight Loss for Morbidly Obese Patients Undergoing Total Knee Arthroplasty: Determining the Necessary Amount. *The Journal of Bone and Joint Surgery. American Volume*, 101(16), 1440-1450. <https://doi.org/10.2106/JBJS.18.001136>

Research has shown that patients can be successful in losing weight through a collaborative approach that includes dietitians

- Lingamfelter, M., Orozco, F. R., Beck, C. N., Harrer, M. F., Post, Z. D., Ong, A. C., & Ponzio, D. Y. (2020). Nutritional counseling program for morbidly obese patients enables weight optimization for safe total joint arthroplasty. *Orthopedics*, 43(4), e316-e322
- Mitchell, L. J., Ball, L. E., Ross, L. J., Barnes, K. A., & Williams, L. T. (2017). Effectiveness of Dietetic Consultations in Primary Health Care: A Systematic Review of Randomized Controlled Trials.

Local dietitians may also have more insight to insurance coverage for their services

- Sastre, L. R., & Van Horn, L. T. (2021). Family medicine physicians' report strong support, barriers and preferences for Registered Dietitian Nutritionist care in the primary care setting. *Family Practice*, 38(1), 25-31. <https://doi.org/10.1093/fampra/maa099>

**Dietitians and physiotherapists can help in weight loss, and referrals to a dietitian and physiotherapy will help get the ball rolling for weight loss in patients who may need surgical treatment for their knee or hip osteoarthritis**

This flyer is sent to you by Liz Combs DNP FNP Student (208-705-4630) with Idaho State University.

Thank you to Idaho Sports and Spine for your assistance!

Talk to your local dietitians and physiotherapists for treatment options they can provide



**Local Dietitians and Physical Therapists****Pocatello, Chubbuck, Blackfoot, and American Falls****Dietitians and weight loss management programs Pocatello and surrounding area:**

- **Karen Donaldson MS, RD, LD**
  - o Excel Weight Loss Solutions
  - o 845 West Center #208, Pocatello, ID 83204
  - o 208-406-1084
  - o [excelweightloss@gmail.com](mailto:excelweightloss@gmail.com)
- **Krista Diekemper, RD, LD**
  - o Portneuf Weight Management Institute
  - o 777 Hospital Way Office Bldg, Ste 201, Pocatello, ID 83201
  - o 208-239-2620
- **Inner Connected Wellness**
  - o 330 South 4th Ave., Pocatello, ID 83201
  - o 208-244-4175
  - o [carol@innerconnectedwellness.com](mailto:carol@innerconnectedwellness.com)

**Physical therapists and physical therapy clinics in Pocatello and surrounding area:**

- **Superior Physical Therapy Spine & Sports – 2 locations in Pocatello**
  - o 1800 Flandro Drive, Suite 190
  - or
  - o 128 Vista Drive
  - o 208-233-2248
- **High Desert Physical Therapy**
  - o 820 West Chubbuck Rd, Chubbuck, ID 83202
  - o 208-240-6017
  - o [tonyahdpt@gmail.com](mailto:tonyahdpt@gmail.com)
- **Wright Physical Therapy**
  - o 131 N. Oak St., Blackfoot, ID 83221
  - o 208-684-2444
- **Richard T. Sutton**
  - o 592 Gifford Ave, American Falls, ID 83211
  - o 208-226-2476

## Appendix E

### Post Educational Pamphlet Questionnaire

Idaho State University

Filling out this questionnaire is optional. It is an invitation to take part in a project that is being conducted by Elizabeth Combs DNP FNP student at Idaho State University. All information in this questionnaire is for data collection purposes only. No private information will be collected or retained. This questionnaire will not be retained in your personal chart.

This project is not a part of your medical care and declining to participate will not affect your treatment or your relationships with any medical providers in any way. Completion of this questionnaire should take no longer than 5 minutes. There will be no follow up as there is no private information attached to this questionnaire. Questionnaires will not be kept with any private information, but will be kept separately in a secure area where there will be no way to connect questionnaires with any private information.

This project is being conducted to assess primary care providers referral behavior for body mass index optimization for people with knee or hip osteoarthritis. No private information will be attached to this form. Again, completion of this questionnaire is optional.

If you have questions about this study/project, contact information is:

Elizabeth Combs DNP FNP student, 208-705-4630 or [elizabethcombs@isu.edu](mailto:elizabethcombs@isu.edu)  
Idaho State University's Human Subjects Committee, [humsbj@isu.edu](mailto:humsbj@isu.edu)  
ISU's HSC Coordinator, Tom Bailey, 208-282-2179

1. Is your visit today concerning knee or hip pain possibly caused by osteoarthritis or arthritis?
  - a. Yes
  - b. No
  - c. Unknown
  - d. Not applicable
2. If applicable, did your primary care provider discuss a referral or treatment with a physical therapist for aid in treatment of knee or hip pain caused by arthritis?
  - a. Yes
  - b. No
  - c. Unknown
  - d. Not applicable
3. If applicable, did your primary care provider discuss a referral or treatment with a dietitian or nutritionist for aid in treatment of knee or hip pain caused by arthritis?
  - a. Yes
  - b. No
  - c. Unknown
  - d. Not applicable
4. What are the barriers that would prevent you from seeing a physical therapist?
  - a. Time/scheduling issues
  - b. Insurance coverage or cost
  - c. Other
  - d. Not applicable.

Please describe \_\_\_\_\_
5. What are the barriers that would prevent you from seeing a dietitian or nutritionist?
  - a. Time/scheduling issues
  - b. Insurance coverage or cost
  - c. Other
  - d. Not applicable.

Please describe \_\_\_\_\_

Thank you so much for your time and help!