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Prehabilitation Impact on Post-operative Risk, Readmission Rates and Patient Satisfaction

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Prehabilitation Impact on Post-operative Risk, Readmission Rates and Patient Satisfaction

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Abstract

Background: Prehabilitation programs may improve 30-day readmission rates, post-operative infections and patient satisfaction in obese total joint replacement (TJR) patients. Joint replacement patients who participate in prehabilitation have improved physical function and patient satisfaction. In an effort to improve TJR patients’ mobility and recovery, a prehabilitation performance improvement project was implemented at a local wellness center.

Method: The Institute of Healthcare Improvement, Triple Aim Initiative (IHI, TAI) and Centers for Medicare and Medicaid (CMS) performance improvement goals provided the project foundation (IHI, 2015; CMS; 2015). The physical exercise routine utilized in this program was identified as appropriate for use with the TJR population (Topp & Page, 2009). The development of an evidence based prehabilitation program for the purpose of reducing post-operative mortality and improving patient satisfaction was supported by the literature.

Results: The project outcomes include a 7% improvement in overall patient satisfaction rates, and a 0.8% reduction in post-operative infection rates.

Conclusion: The prehabilitation Scholarly Project served to inform future efforts of similar sustainable programs fulfilling the IHI and CMS goals of quality, affordable, and accessible health care (IHI, 2015; CMS, 2015). The data supports prehabilitation’s ability to positively impact patient satisfaction and post-operative infection rates among obese TJR patients.

Key Words: obesity, prehabilitation, joint replacement, post-operative complications
Prehabilitation Impact on Post-operative Risk, Readmission Rates and Patient Satisfaction

Introduction and Background

The United States (US) health care system is the most costly in the world, accounting for 17% of the gross domestic product (CMS, 2014). In 2004, there were 1.07 million total joints replaced in the US. As a result of an aging population and increasing prevalence of obesity, this number is predicted to grow to over 4 million by year 2030 (Canale, 2009; Mihalko, 2014).

The Centers for Disease Control and Prevention (CDC) defines obesity as a body mass index (BMI) greater than 30. Over 34% of Americans are obese (CDC, 2013). Statewide, 25% of Idahoans are found to be obese (Idaho Department of Health and Welfare, 2013). Patients with a BMI over 30 and 40 are 8.5 and 32.7 times, respectively, more likely to require a total knee replacement than those with a normal BMI (Mihalko, 2014).

Obese total joint replacement (TJR) patients are 4.79% more likely to have significant complications such as aseptic loosening, venous thromboembolism, all-cause readmissions and, peri-prosthetic infection (Bozic, et al., 2012; Jamsen, et al., 2012). The in-hospital risk of complications for obese TJR patients is nearly eight times higher than the population of TJR patients with normal weight (Bozic, et al., 2012). These complications are costly to treat (Bozic, et al., 2012; Kurtz, et al., 2005).

Research has demonstrated exercise programs have positive physiologic impacts on diabetic patients (Sigal, 2004). In addition, evidence supports that prehabilitation contributes to improved function and enhanced patient satisfaction among orthopedic patients (Brown, Topp, Bronsky, & Scott Lajoie, 2012; Gilbey, et al. 2013; Jaggers, et al., 2007; Rooks, et al., 2006). Therefore, it is reasonable to explore prehabilitation as a potential pre-surgical intervention for obese TJR patients.
The Triple Aim Initiative (TAI) health care improvement plan is an effort to decrease the complexity of health care provision through early identification of problems and solutions that prevent/delay access and implementation of care (IHI, 2014). Merging the TAI goals with the CMS performance improvement program provides a basis to evaluate practice measures impacting the post-operative morbidity measures for TJR patients (IHI, 2015; CMS 2015). Other outcomes were developed to measure patient satisfaction goals set by CMS.

The Scholarly Project outcome measures included program development, prehabilitation participation, patient follow-up rates, post-operative infection rates, 30-day all-cause readmission rates, and patient satisfaction. Data was collected from participant exercise logs, NexGen scheduling program, Press Ganey Patient Satisfaction Tool (PGPST) (see Appendix I), and PowerChart database.

**Problem Statement**

Prehabilitation has been identified as an intervention that may positively impact TJR outcomes among obese patients (Baillot, Mampuya, Comeau, Meziet-Burdin, & Langois, 2013). The inquiry question directing this project was: Do obese (BMI >30) patients undergoing TJR for treatment of degenerative joint disease who participate in a four-week prehabilitation program have decreased post-operative infections, fewer all cause 30-day readmission rates, and improved patient satisfaction rates compared to patients undergoing TJR who do not participate in a prehabilitation program?

**Review of Literature**

The purpose of this review was to identify evidence regarding prehabilitation programs and their impact on TJR outcomes. The key words include: obesity, prehabilitation, joint replacement, and post-operative complication. The search engines CINHAL, MEDLINE,
PUBMED, Sport discus, and Google were utilized to perform the literature search. The professional journals reviewed include a variety of evidence levels, ranging from systematic reviews (II) to expert opinion (VII) (see Appendix A). The professional articles utilized included evaluation of one or more of the following: obesity, prehabilitation, pre- and post-operative function, and pre- and post-operative self-reporting, and diabetic activity recommendations.


Though prehabilitation is a relatively new orthopedic service, with limited high quality studies to draw from, the concept of improved physical health for emotional and physical wellbeing has been amply demonstrated (Nelson, et al., 2007). Leaders in orthopedic services recommend the promotion of physical activity in older adults with an emphasis on moderate intensity aerobic activity, muscle-strengthening activity, reduced sedentary behavior, and risk management (Nelson, et al. 2007). The evidence suggests that the development of a TJR prehabilitation program may positively impact outcomes for obese TJR patients.

**Theoretical Model**

The Institute for Health Care Improvement TAI goals of improved patient experience, accessibility to care and cost per capita fiscal responsibility, combined with the CMS
performance improvement program provide a framework for the development of the prehabilitation project (IHI, 2015; CMS, 2015). This framework informed outcome measures and data collection tool decisions (see Appendices C, I & K). The goal of the project was to create a prehabilitation program and evaluate its effect on post-operative complications of TJR and, patient satisfaction. This process required a low-cost program, as prehabilitation is not directly reimbursable. The cost savings must be recognized with improved reimbursement through recognition of fewer post-operative readmissions, performance improvement from CMS, and higher volume referral rates due to high patient satisfaction.

**Project Process**

The participants performed a structured cardiovascular and strength training routine (see Appendix K) guided by a certified trainer at the YMCA. This routine was to be completed once weekly with the trainer and twice weekly at home. The data collected from the participants was then compared to the comparison group.

Outcomes were evaluated by the following measures; the number of enrollees (Outcome #1), Institutional Review Board (IRB) approval and submission of final report to stakeholders (Outcomes #2), comparison of patient satisfaction rates (see Appendix I) (Outcome # 3), comparison of readmission rates (Outcome #4), comparison of deep infection rates (Outcome #5), implementation of contract with the YMCA for prehabilitation services (Outcomes #6 & 7), evaluation of the rate of completion of the exercise log (see Appendix J) among participants (Outcome #8), the rate of completion of the exercise program among all participants (Outcome #9), evaluation of the rate of delivery of prehabilitation information (see Appendix J) provided to participants (Outcome #10), evaluation of the rate of follow-up appointments kept by participants (Outcome #11), and evaluation of communication between participants and
providers from Press Ganey patient satisfaction tool (PGPST) (see Appendix I) scores (Outcome #12).

The participant inclusion criteria were: Obese (BMI >30) patients of one hip and knee reconstruction surgeon’s practice, planning a primary TJR (hip or knee) within eight weeks. Patients unable to attend the training, those unable to speak English, and those with a BMI of less than 30 were excluded from participation in this project. The total number of participants desired was 25 participants and 25 comparison participants (Outcome #1).

Readmission and deep joint infection rates (Outcomes # 4 & 5) were collected from the PowerChart electronic medical record database. Readmission and infection rates were compared between the participants and the comparison population.

Once enrolled the participants received an exercise log, pictorial depiction of the exercise routine, and YMCA/home participation instructions (Outcome #10). The log was utilized to record their participation both at home and YMCA (Outcomes # 8 & 9). When the participants completed the program and returned the exercise log they were provided with a $40.00 Visa to reimburse for travel costs.

Follow-up appointment attendance data was collected from the NexGen patient scheduling system. The rate of follow-up attendance was evaluated for each of the participants (Outcome #11).

Patient satisfaction (Outcomes #3 &12) was measured by the PGPST. All participants were provided with a PGPST at the five-six week post-operation follow-up visit.

Settings

The settings for this project included the patient’s home, the hip and knee reconstruction clinic, the participating hospital (operating room and joint replacement unit), and the YMCA
Wellness Center. The Pacific Northwest city population the participating hospital/surgeon serves is approximately 210,000 (United States Census Bureau, 2014). The hospital and participating clinic is located in the state capital city. The city civilian labor force is 68.2% with a median income of $49,209 per household (United States Census Bureau, 2014). This is an urban with two large hospital systems. The participating hospital is a member of the Sisters of the Holy Cross Catholic Health System; a system of health and wellness services that extend into a tri-state area.

**Population**

The participant group included all consenting patients meeting the inclusion criteria that participated in the prehabilitation program. The comparison group did not participate in the prehabilitation intervention. Originally, the comparison group was planned to be obese TJR patients from the same clinic who were unable to attend the prehabilitation training, however, due to lack of participation, the comparison group was change to the same surgeon’s 2015 general TJR population.

**Sources of Data**

The PGPST (see Appendix I) was utilized to capture the patients’ satisfaction. The PGPST is a Likert-type questionnaire that delves into the patient’s perspective of the facility, nursing, surgical and ancillary health care provided (Outcomes # 3 & 12). Each patient completed the PGPST at the five-six week post-operation period.

A query of the PowerChart database identified readmissions to the hospital within the 30-day post-operation time period (Outcome #4). This data was further evaluated to identify any participants with deep joint infection (Outcome #5). Deep joint infection was defined as any identified bacterial growth from joint synovial fluid or capsular tissue.
Data was collected from the exercise log. This tool provided data on participation rates (Outcomes #8, 9 & 10). The NexGen patient scheduling database was utilized to track rate of follow-up appointments kept for participants (Outcome #11).

**Data Collection Procedures**

The sample was purposeful sampling, a non-random method of sampling where information-rich cases are collected for study in-depth (World Health Organization, 2015). This sampling is not the best practice for avoiding bias; however, in a situation where the patient must be willing to participate and must reside in the immediate locale, randomization was not possible.

Due to efficiency constraints in a busy office it was necessary to only use one evaluator in clinic. While this may be interpreted as an area of bias (one evaluator examining patients) it may also be interpreted as providing consistency to the study.

The data collected by the nursing staff included medical record number, surgery to be performed, age, height, weight, and BMI. The PGPST was provided to the patients at the five to six week post-operative visit. The PowerChart database informatics nurse (IN) queried the database for all participants for 30-day post-operative all-cause readmissions and supplied this data to the program leader for analysis. The same IN queried the database for all TJR patient readmissions for the same surgeon for the previous year. The project manager collected the prehabilitation participant’s exercise logs at the first post-operative visit.

The project manager collected enrollment and prehabilitation education material distribution data at the time of consent (Outcome #1, 2, 8 & 10). Patient satisfaction data was collected from the participants’ PGPST (Outcome #3 & 12). The comparison group satisfaction results were collected from the comparison group PGPST results reported by Press Ganey.
Incorporated (Outcomes #3 & 12). Demographic data collected on the exercise log, PowerChart, and NexGen were utilized to capture the characteristics of the participants and comparison group (Outcomes #4, 5, 8, 9 & 11). Electronic mail was utilized to communicate and secure partnership with the YMCA (Outcomes #6 & 7).

Evaluation

Data Analysis

This performance improvement project was designed to evaluate the development, implementation, and outcomes of a prehabilitation program for obese TJR patients. Data was collected from participants upon entrance, during participation, and at the conclusion of the project. At the beginning of the project patient demographics collected on the exercise log and cardiac risk tool included: gender, height, weight, body mass index, age, past medical history, and anticipated surgery. During the participation phase, each participant entered data on an exercise log that included: dates the exercises were performed, where the exercises were performed (YMCA, home, or other gym), and any additional comments the participants chose to share. The final data collection occurred at five to six week follow up visit when the PGPST (see Appendix I) was completed.

Measurable project outcomes as identified in the Logic Model (see Appendix C) were compared between the participants and the comparison group. The outcomes included rate of participation (Outcome #1), approval from the IRB (short-term Outcome #2), delivery of final project report to Boise State University and participating health system stakeholders (long-term Outcome #2), rate of patient satisfaction (Outcome #3), rate of 30-day all-cause readmission (Outcome #4), rate of deep joint infection (Outcome #5), service contracted with the YMCA and check-in process at the YMCA (Outcome #6 & 7), rate of completion of the exercise log
(Outcome #8), rate of completion of the program (Outcome #9), rate participants received educational data on prehabilitation (Outcome #10), rate of follow-up appointments attended (Outcome #11), and quality of communication as reported on PGPST (Outcome #12).

The original recruitment goal was 25 participants and 25 comparison patients from a single surgeon’s current total joint replacement patient load. The actual number of participants recruited was 6, a 76% reduction from the desired participation numbers. Recruitment difficulties also arose when trying to recruit non-participants. Therefore, the surgeon’s total joint replacement patient population from 2015 was utilized as the comparison group.

Three males and three females consented to participate in the program (Outcome #1; see Appendix L). All recruited participants had BMIs greater than 30. The average BMI of the participants was 41 with a range of 31-50. The average age of participant was 57.7 years with a range of 55-67. Participant numbers 1, 4, 5, and 6 underwent total knee arthroplasty; participant 2 had a total hip arthroplasty. Demographic, medical history, participation rates, and outcomes are detailed in Appendix M.

Outcome #2 had short and long-term measures. Short-term Outcome #2 required IRB approval. The short-term Outcome #2 was met when the IRB granted approval. Long-term Outcome #2 required the completion and submission of the project final report to Boise State University and participating health system stakeholders. Both reports will be presented by May 30, 2016.

Outcome #3 compared PGPST scores (see Appendices I & N). Three participants evaluated their satisfaction (PGPST) at the five-six week follow-up appointment (see Appendix M &N). The participant overall assessment of satisfaction rate was 100%, the comparison group reported a satisfaction rate of 93%; this is a seven percent point improvement (see Appendix N).
Outcome #4 compared all cause 30-day readmission rates. In 2015, the participating surgeon performed 237 primary total joint replacements with a 4.6% readmission rate. This compares to a 25% readmission rate for study participants. The low number of participants may have skewed the rate of readmissions. The literature confirms participation in a prehabilitation program reduces all-cause 30-day readmission rates (Silver & Baima, 2013).

Outcome #5 evaluated the rate of deep joint infections. There were no deep joint infections in the participant group. The comparison group had a 0.8% 30-day deep infection rate.

Outcomes #6 and #7 evaluated the process of completing a contract with the YMCA to provide prehabilitation services and scheduling appointments at the YMCA. The contract was successfully completed through electronic mail communications between the Program Director and the YMCA Wellness Program Director. The original check-in process allowed the participant to contact the wellness center to schedule the first training session. Participant 1 was delayed in contacting the wellness center. The check in process was amended to have the trainer contact the patient to schedule the first session. This change was then applied to participants 2, 3, 4 and 5. Participant 6 did not communicate with the trainer. The rate of successful check-in for initiation of the exercise program was 50% (see Appendix M).

Outcome #8 evaluated completion of the exercise log. Participants 1, 2, 4, and 5 completed and returned the log to the Program Director at the first follow-up visit. The exercise log was completed by of 100% of participants (see Appendix M). The terminology used by the participants in the comment section of the exercise log varied. For example, some utilized check marks, some word descriptors; others used numbers and exercise identifiers. The varying terminology made analysis difficult.
Outcome #9 evaluated the rate of completion of the prehabilitation exercise program. Only participants 2 and 4 performed the program as designed. Participants 1 and 5 reported performing the exercises at home three days weekly; this is a 50% completion rate. Participant 3 had a cardiovascular event prior to beginning the program. Participant 6 consented but did not make contact with the trainer. This resulted in the participant not training at all. Participants 3 and 6 who did not begin the program were not included in the data analysis.

Outcome #10 evaluated the delivery of prehabilitation information to intended participants (see Appendix K). The prehabilitation information was provided to 100% of the participants.

Outcome #11 evaluated attendance of follow up appointments by participants. A review of the scheduling database revealed 100% of participants kept their scheduled follow up appointments.

Outcome #12 evaluated communication between participants and providers. The PGPST (see Appendix I) data analysis demonstrated that 100% of the participants rated communication with providers higher than the comparison group (see Appendix N). The range of percentage improvement for questions regarding communications was from 1-8.9% improvement (see Appendix N).

The budget was created and maintained by the project manager (Outcome #13). Due to a low enrollment rate, expenditures were well below the projected amounts (see Appendix E).

**Inferences Relating To Project Outcomes**

Evidence reveals barriers to participation include fear of exercise, increased pain with activity, cost of participation, and travel requirements (Rooks, et al., 2006). These same factors may have contributed to this project’s low enrollment rate (Outcome #1). Those who did
participate in this project (Outcome #1) reported an increased sense of strength and satisfaction with the program. Participants made statements such as “Mark (the trainer) said I did very well!” and “I’m so glad I participated. Even though I thought it was going to hurt, it did not,” “Thank you for including me I felt so much better going into surgery.” These patient statements suggest—and the literature supports—that if patients are able to overcome their negative perceptions regarding physical exercise and participate in prehabilitation, they may develop a sense of improved strength and satisfaction (Mayo, et al., 2011; Topp & Page, 2009; Silver & Baima, 2013).

Short-term Outcome #2 was achieved when IRB approval was obtained. Long-term Outcome #2 will be completed when the final report is presented to Boise State University and to hospital administrative stakeholders. The continued administrative support suggests that the hospital system will continue to support low-cost, accessible, evidence-based health care interventions.

The 7% increase in overall patient satisfaction rates (see Appendix N) infers that patients who participate have better overall satisfaction (Outcome #3) with the TJR process. Patients with higher satisfaction rates may refer others to this program for TJR.

Existing evidence suggests that prehabilitation may lower readmission rates (Santa Mina, et al., 2015). The 25% readmission rate among this program’s participants is thought to be a reflection of the small participation numbers rather than a direct result of the prehabilitation program (Outcome #4). A recent study examining hospital length of stay and readmission rates of surgical prehabilitation participants provided promising findings on prehabilitation’s role in economical and sustainable healthcare models (Santa Mina, et al., 2015). Sustainable healthcare models include those systems with low rates of post-operative
complications and high rates of patient satisfaction. Implementing a prehabilitation program may contribute to the participating hospital system continuing as an economical and sustainable healthcare model.

The TJR surgical service has a low overall deep joint infection rate (0.08%). The outcome desired was to lower the rate of deep infections 1% (Outcome #5). The participant data demonstrates a 0.08% reduction in post-operative deep infections.

Partnering with the YMCA Wellness Program director and trainer was successful (Outcome #6). The two parties shared a similar focus on improving health prior to surgical intervention. This led to an effective initiation process and selection of a practice/training site for the prehabilitation program.

A challenge encountered was TJR patients’ lack of willingness to travel to the site. This suggests that while TJR patients acknowledge the benefit of participation, the hurdle was to get them to participate. Future sites of the prehabilitation program will need to be more accessible.

One patient consented to participate, however, failed to communicate with the trainer. This suggests that restructuring the enrollment process may increase participation.

The exercise log and prehabilitation education materials were provided to each participant immediately after informed consent (Outcomes #8 & 10). Submission of the log was dependent on the participants returning to the first follow-up appointment. This two-stage process had a 100% success rate. The terminology used by the participants on the exercise log varied. Analysis would be enhanced with clarification regarding the type of information that participants enter in the exercise log; a sample log may be of benefit.

The process of initiating and attending the first appointment was initially challenging (Outcome #9). This challenge may be due to the amount of information provided at the
diagnostic/surgery scheduling appointment. Once the process was amended to have the trainer initiate contact with the participant, the process improved.

The participants had a 100% follow-up appointment attendance (Outcome #11). This rate of follow-up could be considered a success as it suggests that participants did not require admission to a rehabilitative facility as they were able to keep their initial follow up appointment.

When measuring patient satisfaction on communication with nursing and providers, participants rated the staff and providers higher than the comparison group (see Appendix N) (Outcome # 12). This data suggests that participants’ questions, concerns, information on medications, diagnosis, and follow up care were better than those of the comparison group. The 6.9% improvement in perception of nursing courtesy, concern, and assistance with medical problem(s) between the participant and general TJR population implies that increased time with the patient improves patient satisfaction (see Appendix N).

The continued support of the program by administrators and surgeons infers that the hospital system is ready to adopt the prehabilitation program and implement it among all TJR patients. Future challenges include ongoing funding, physical site development, and the development of additional education materials. Additional sites may improve participation throughout the communities served by the hospital system. With additional education materials the TJR population may better understand the potential benefits of a pre-operative prehabilitation program, which may further enhance participation.

Gaps and Effectiveness

Low enrollment affected the ability to draw conclusions from the data analysis (Outcome #1). The combination of low enrollment and one readmission created an abnormally elevated 30-day all-cause readmission rate in the participant group (Outcome #4).
Data was not collected from all potential participants. In hindsight, having information from those who declined to participate would have provided data regarding barriers to participation. Such information may have provided insight to recruitment process improvements.

Many of the outcome measures attained positive results including the achievement of IRB approval (Outcome #2), completing YMCA contracting and process of enrollment (Outcomes #6, 7, & 10), and funding of the program through the Saint Alphonsus Foundation grant (Outcome #13). Other successes include; a 0.8% reduction of deep joint infections (Outcome #5), 50% rate of program completion (Outcome #9), 75% completion of the PGPST, a 7% improvement in overall patient satisfaction rates (Outcome #3 & 12), and 100% attendance at post-operative follow-up appointments by participants (Outcome #11).

The positive economic and social impact of the project was demonstrated through the relatively low cost of program development, the reduced rate of post-operative infections, and improved patient satisfaction (Outcomes # 3, 5, 12, and 13). A surgical group reporting lower complication rates with higher patient satisfaction could lead to improved reimbursement and increased community referrals. The social cost savings of one infection could be quantified by patient, family, and community health savings (Hansen & Bozic, 2011).

This program serves as an example of a nurse-driven quality improvement project. The success of the project and adoption of a prehabilitation program for all TJR patients may inspire other nurses to develop and implement quality improvement projects. Furthermore, the role of the nurse as an integral participant in the provision of quality health care is illuminated.

Unanticipated Consequences
This performance improvement project had several limitations. Most notably, 24% of the projected enrollment and only 16% of the projected number of participants were met (Outcomes #1 & 9).

Due to lack of interest among potential participants, synchronous enrollment of participants and non-participants was abandoned (Outcome #1). The low recruitment numbers for the comparison group led to general population of TJR patients for the year 2015 becoming the comparison group. This change required the participation group be compared to all TJR patients, rather than only those with similar body habitus.

Another unanticipated limitation involved the data collection from the exercise log (Outcome #8). The variety of terminology participants used on the exercise logs made it difficult to interpret the data (Outcome #8).

Several unanticipated consequences arose in relation to the use of the PGPST (see Appendix I) (Outcome #12). Garnering approval to utilize the tool was a lengthier process than anticipated, which ultimately shortened the time available for participant recruitment. In addition, Press Ganey Associates, Inc., policy required the surgeon and nurse practitioner cease collecting surveys from their non-participant patients for the length of the data collection time period. This resulted in the interval loss of patient satisfaction data from the general patient population (Outcome #12).

The evaluation of the PGPST data was also challenging. The administrative personnel responsible for data assimilation were slow to communicate with the Press Ganey liaison for question weighting data. This lack of communication caused a delay in data interpretation for the project (see Appendix N).
Financial Analysis

The first year of the project had a budget of $6006.25 (see Appendix E). With low participation rates a total of $1690.00 was actually spent. The costs incurred were for IRB, trainer wages, and travel reimbursement for participants (see Appendix E). The funding grant has been approved to allocate residual funds for another performance improvement project.

When evaluating the cost per participant it must be considered that only two participants utilized the trainer. Participant 1 scheduled training sessions three times and did not participate at any time. The trainer was paid for all scheduled hours. Each participant received a $40.00 Visa for travel costs. These were provided without requirement for actual participation with the trainer; therefore, the actual cost per participant was $422.50, $229 over the projected cost of $193 per participant (see Appendix E).

The cost benefit analysis originally reported estimated one readmission cost savings (Outcome # 4). With only four participants and one readmission the cost savings were not realized as predicted.

Barriers to Project Implementation

Low enrollment was the greatest barrier to project implementation (Outcome #1). Several factors may have contributed to the low numbers. There were a greater number of complex patients that did not meet enrollment criteria during the recruitment period. Thus, there were fewer primary joint replacement patients from which to draw participants. Additionally, patients who declined to participate identified travel costs, time requirements, and negative perceptions regarding exercise as factors that influenced their decision. These barriers to participation were supported by the literature (Dorogo, King, & Brickley, 2009; Rooks, et al., 2006).
An unanticipated barrier that affected enrollment came from the surgeon from whose patient population participants were recruited. He was verbally supportive of the project throughout the planning stages. He ultimately was only able to enroll one patient and was absent from the clinic for an extended period of time during the enrollment that further limited recruitment potential.

Recommendations

The project goals included creating a prehabilitation program that improved patient experience, improved access to care for populations, and encouraged cost per capita fiscal responsibility for the TJR community. The following recommendations are derived from data collected during implementation of the performance improvement project.

The project was a success when evaluating the majority of outcomes (see Appendix O). Most notable outcomes include a 7% improvement in overall patient satisfaction rates (Outcome #3) and the 0.8 % reduction in post-operative infection rates (Outcome #5). Despite failure to meet all outcome measures successfully, this prehabilitation project has informed future efforts aimed at the development of a sustainable program that fulfills the IHI and CMS goals identified (IHI, 2015; CMS, 2015).

The PGPST was lengthy and has limits on its availability for future use. Future patient satisfaction evaluation will need to be more streamlined with a more abbreviated patient satisfaction tool (Outcome #3 & 12).

This project demonstrated low participation and compliance rates (Outcomes #1 & 9). Some barriers to participation (Outcomes #3, 1, & 9) reported in the literature and demonstrated in the data collection include travel time and cost (Rooks, et al., 2009).

In the future, it would be beneficial to include more surgeons and their patient
populations. This would increase the available population of potential participants.

The literature suggests that prescribing prehabilitation as an evidence based care practice may encourage participation at a greater rate than simply informing patients of the practice (Leijon, Bendtsen, Nilsen, Ekberg, & Ståhle, 2008). Providing data on the benefits of the program to the surgeon population and encouraging a prescription process may increase the participation rate.

Weekly contact with participants throughout the prehabilitation program, by either a clinic nurse or a transitional care coach, may enhance compliance and effort. Such contact may also serve to more quickly identify patients who have participation barriers.

Improving access to prehabilitation sites and overcoming fear of participation will be necessary to create a successful TJR prehabilitation program. The hospital system could utilize the project results to further develop the program through electronic media, peer-mentoring and increased numbers of prehabilitation practice sites (Dorogo, et al., 2009; Van der Bij, et al., 2002).

Evidence reveals that prehabilitation programs can improve outcomes in other surgical specialty services (Baillot, et al., 2013; Valkenet, et al., 2011). Such a program could be generalized to sister hospitals with joint replacement and other surgical service programs such as, bariatric, oncologic, and spine (Jack, et al., 2011; Mayo, et al., 2011; Santa Mina, et al., 2014).

**Maintaining and Sustaining Change**

This program is sustainable through expansion and stakeholder support. Cyclical evaluation for value and satisfaction among practitioners and participants will be necessary for the expanded program.
Lessons Learned

The evaluation portion of the project would have been more meaningful had a greater number of participants enrolled in a shorter time period. Recruitment and data collection took much longer than anticipated, thus limiting the time available for evaluation. The process for evaluation of the data collected from the PGPST was lengthy (see Appendix I). The PGPST is time consuming for the participants to complete.

Finally, despite cardiovascular screening (see Appendix J), one consenting participant dropped out prior to participation due to an emergent cardiovascular event. Risk assessment tools are utilized as predictors of future events. The knowledge derived from this example is: Despite utilization of evidence based cardiac risk assessment (see Appendix J), cardiac events can occur (Goff, et al., 2013).

Conclusion

The population of obese TJR patients is at greater risk of post-operative complications when compared to non-obese TJR patients (Bozic, et al., 2012; Jamsen, et al., 2012). Post-operative complications have a major impact on finances for the patient, society, and the health care system (Bozic, et al., 2012).

Participation in a prehabilitation program has demonstrated improved patient satisfaction, improved function, and reduced length of stay (Baker & McKeon, 2012; Gilbey, et al., 2002; Jack, et al., 2011; Rooks, et al., 2006; Topp & Page, 2009; Valkenet, et al., 2011). This nurse-driven performance improvement project has successfully informed on the feasibility of providing a community based, affordable, and accessible evidence based health care practice for obese TJR patients.
The high patient satisfaction rate is one of the successes of the project. Participation in prehabilitation improved over all patient satisfaction by 7%. Another notable success includes a 0.8% reduction in the post-operative infection rate. This reduction correlates to fewer lifestyle changes for the patient and their families that avoid post-operative complications. Fewer post-operative deep infections decrease societal health care expenditures.

This fiscally responsible project supports the addition of prehabilitation as a way to reduce post-operative infections and improve patient satisfaction rates in the obese TJR population. This program has also identified potential barriers to prehabilitation participation (Rooks, et al., 2006).

The limitations of the program, specifically low enrollment and focus on a very specific population, tempers the generalizability of the data. Due to the low enrollment rate the evidence requires future studies necessary to assess clinical relevance. Future evaluation plans should explore barriers to participation and readmission rates with a continued focus on the goals of the IHI Triple Aim Initiative in a larger population.

In conclusion, the goals of improved patient satisfaction and reduced post-operative infection rates are supported by this quality improvement project. This program places the patient at the center of care with the goal of optimal pre-surgical health (White & Dudley-Brown, 2012; Topp & Page, 2009). This program demonstrated evidence-based community accessible health care.
References


### Appendix A

#### Evidence Table

<table>
<thead>
<tr>
<th>Article Number</th>
<th>Author/Year</th>
<th>Evidence Type</th>
<th>Sample Characteristics</th>
<th>Results/Recommendations</th>
<th>Limitations</th>
<th>Usefulness</th>
<th>Variable Independent (I)</th>
<th>Variable Dependent (D)</th>
<th>Level of Evidence</th>
<th>Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Baillot, A. (2013)</td>
<td>Controlled without randomization</td>
<td>N=8 males N+ 4 females Awaiting bariatric surgery. 3x/week x12 week’s prehabilitation at home and monitored. Cardiac and resistance exercises were performed.</td>
<td>Prehabilitation is feasible and results in short term benefits, of improved physical fitness, weight loss and improved perception of physical fitness.</td>
<td>Small sample, No post surgical control group Recruitment was not defined, some elected to not participate and some that were not able to physically participate were excluded.</td>
<td>Yes Bariatric patients</td>
<td>I=Prehabilitation program</td>
<td>D=cardiac exercise test, anthropometric variables, body composition, physical fitness, quality of life, physical exercise beliefs</td>
<td>III</td>
<td>Baillot, A., Mampuya, W. M., Comeau, E., Meziat-Burdin, A., &amp; Langois, M. F. (2013). Feasibility and impacts of supervised exercise training in subjects with obesity awaiting bariatric surgery: A pilot study. <em>Obesity Surgery</em>, 23, 882-891. doi: 10.1007/s11695-013-0875-5</td>
</tr>
<tr>
<td>ID</td>
<td>Author(s)</td>
<td>Study Type</td>
<td>Participants</td>
<td>Intervention</td>
<td>Results</td>
<td>I/D</td>
<td>Notes</td>
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<tr>
<td>2</td>
<td>Baker, C.S. &amp; McKeon, J. M. (2012)</td>
<td>Systematic Review of RCT’s</td>
<td>18-65 participants were scheduled for TKA and participated in a lower extremity exercise program pre-operatively compared to a control group. Seven studies met inclusion criteria.</td>
<td>For all outcomes none were consistently favorable toward preoperative rehabilitation in TKA patients except LOS was decreased</td>
<td>One form of Prehabilitation was evaluated</td>
<td>Yes</td>
<td>Addition of Prehabilitation. Subjective and objective outcomes after TKA compared with non participant TKA patients.</td>
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<tr>
<td>3</td>
<td>Brown, K. (2014)</td>
<td>Random Control Trial</td>
<td>TKA N=31 16-prehab 15 control Randomized The exercise program was based on Social Cognitive Theory Exercise 2x/wk. at home 1x/wk. PT for 8</td>
<td>The results of the SEE and OEE scales indicated that the control participants declined and the prehabilitation exercise group essentially was unchanged.</td>
<td>Only TKA patients were studied.</td>
<td>Yes</td>
<td>Addition of prehabilitation program. Self-efficacy exercise (SEE) and outcome expectations for exercise (OEE).</td>
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</table>


N=37 Prehabilitation with rehabilitation post-operation.  
N=31 normal activity  
Evaluate 8 weeks pre-operation, 3,12 & 24 weeks post operation | Prehabilitation does decrease stiffness, & improves strength  
Improvements seen in pre and postoperative evaluation | The evaluator of strength and function was not blinded to the participants.  
The patient selection only included fit and motivated patients | Yes | I=additional prehabilitation  

THA N=36 Resurfacing  
N=19  
TKA N=45  
All participants were evaluated on function and BMI pre- operatively and one year postoperatively | The mean post-operative weight gain = 1.2 KG  
Patients with one joint replacement and no other condition interfering with walking gained mean of 2.9kg  
Resurfacing patients gained a mean of 3.2 kg  
THA patients | The surgeries performed were by one surgeon in CA. With weight issues across the US differing this may be seen as difficult to generalize | Yes | I=THA  
<table>
<thead>
<tr>
<th>#</th>
<th>Author(s)</th>
<th>Study Type</th>
<th>N</th>
<th>Outcomes</th>
<th>Methodology</th>
<th>Notes</th>
<th>Key Points</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Mayo, N. E.</td>
<td>Secondary</td>
<td>N=95 completed</td>
<td>Improved functional</td>
<td>High drop-</td>
<td>Yes</td>
<td>I=addition of</td>
<td>Mayo, N. E. Feldman, L., Scott, S., Zavorsky,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Analysis</td>
<td>Prehabilitation</td>
<td>Capacity with Prehabilitation if Able to Participate</td>
<td>Out Rate</td>
<td>Prehabilitation</td>
<td>Prehabilitation</td>
<td>Study Type</td>
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<tr>
<td>9</td>
<td>Mnatzagian, G. (2012)</td>
<td>Retrospective cohort study with controls</td>
<td>1996-9 12,203 men in Perth Western Australia participated in the HIMS study their ht. &amp; Wt. were recorded 2001-04</td>
<td>Of the 857 men 57% had BMI=25-29.9 25% had BMI= &gt;30. The obese statistically were younger and of lower socioeconomic status. There was an increased rate of intra-hospital complications in the over-weight and obese</td>
<td>Only men were studied. The accuracy of the measured wt. vs. ht. may be questioned, as it had to be gathered from two separate sources. Focused population in Australia may not be generalizable</td>
<td>Yes</td>
<td>I=total joint replacement D=Post-operative complications</td>
<td>III</td>
</tr>
<tr>
<td></td>
<td>Authors</td>
<td>Study Type</td>
<td>Participants</td>
<td>Methodology</td>
<td>Findings</td>
<td>Research Question</td>
<td>Notes</td>
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<td>10</td>
<td>Rooks, S. (2006)</td>
<td>Random control trial</td>
<td>108 male and female patients having a THA or TKA were randomized to control vs. 6 weeks of prehabilitation</td>
<td>Participation in prehabilitation improves presurgical functional status and strength in THA patients. Additionally, prehabilitation reduces the likelihood of referral to post hospital rehabilitation hospitalization.</td>
<td>Low recruitment numbers, high drop-out rate pre- and postoperatively</td>
<td>Yes</td>
<td>I= total joint replacement D= pre- and postoperative self evaluations and physical strength and function measurements</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Santa Mina, D., (2015)</td>
<td>Expert Opinion/Technical Review</td>
<td>Review of past and present perspectives on prehabilitation and comment on future opportunities for understanding the practice and benefits</td>
<td>Prehabilitation will likely have significant impacts on positive patient health and health care costs</td>
<td>Not research</td>
<td>Yes</td>
<td>Supports multi-modal prehabilitation on activities</td>
<td></td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>#</th>
<th>Reference</th>
<th>Study Type</th>
<th>Participants</th>
<th>Exercise</th>
<th>Population Characteristics</th>
<th>Safety Data</th>
<th>Research Design</th>
<th>Notes</th>
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<tbody>
<tr>
<td></td>
<td>Authors</td>
<td>Study Method</td>
<td>Study Details</td>
<td>Prehabilitation Effect</td>
<td>Length and Type of Prehabilitation</td>
<td>I &amp; D Description</td>
<td>Reference</td>
<td></td>
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<tr>
<td>14</td>
<td>Vincent, H. K.</td>
<td>Systematic review of controlled trials</td>
<td>N=5 retrospective N= 18 prospective Studies of physical function before and 1</td>
<td>Functional improvement was found in both groups with greater improvement in &lt;30 BMI group</td>
<td>No standardization of intervention. No standardization of surgical</td>
<td>Yes</td>
<td>I=THA D=Long term functional outcomes I</td>
<td>Vincent, H. K., Horodyski, M., Gearen, P., Vlasak, R., Seay, A. N., Conrad, B. P., &amp; Vincent, K. R. (2012, January 1). Obesity and long-term functional outcomes following elective</td>
</tr>
</tbody>
</table>
## Appendix B
### Synthesis of Evidence Table

<table>
<thead>
<tr>
<th>Study/level of evidence</th>
<th>Intervention</th>
<th>Length of Intervention</th>
<th>Population</th>
<th>Results</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Addition of endurance and strength training 3x/wk. (2 on site, 1 at home)</td>
<td>12 weeks</td>
<td>N=8 females, N=4 males, BMI 51.4 mean</td>
<td>Prehabilitation is feasible and results in short term benefits</td>
<td>Before and after intervention anthropometric measurement, body composition, physical fitness, quality of life and physical fitness beliefs</td>
</tr>
<tr>
<td>2</td>
<td>Not defined</td>
<td>Not defined</td>
<td>Varied on each study</td>
<td>For all outcomes none were consistently favorable toward prehabilitation, except LOS was reduced for TKA patients</td>
<td>Self reporting of pain, function, motion and independence. WOMAC, KOOS</td>
</tr>
<tr>
<td>3</td>
<td>Addition of resistance, strength and stretching exercises 45 minutes 3x/wk. (2 on site, 1 at home)</td>
<td>8 weeks</td>
<td>N=18, BMI 38.8 mean</td>
<td>Supports improved quality of life 3 months post-operatively</td>
<td>SF-36 (self reporting) Calculating both physical and mental score separately</td>
</tr>
<tr>
<td>4</td>
<td>Addition of aerobic, strength, mobility and gait training 1 hr. 2x/wk.</td>
<td>8 wks. pre-operative, returning at 3 wks. post-operative to participate in rehabilitation</td>
<td>N=76, N=31 control/BMI 28.2, N= 37 exercise/BMI 27.7</td>
<td>Supports prehabilitation for reduction of stiffness, &amp; improved strength</td>
<td>WOMAC &amp; length of stay</td>
</tr>
<tr>
<td></td>
<td>Activity</td>
<td>Description</td>
<td>Frequency</td>
<td>Participants</td>
<td>Outcomes</td>
</tr>
<tr>
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<tr>
<td>5</td>
<td>V</td>
<td>Addition of education &amp; acupuncture, upper and lower extremity strengthening</td>
<td>Varied from 3x/wk. for 8 weeks to 1x/wk. for 6 weeks</td>
<td>12 Studies N=20 AAA surgical patients N=632 CABG patients N=593 Total joint patients from 7 studies</td>
<td>Supports prehabilitation for improving measured fitness prior to surgery</td>
</tr>
<tr>
<td>6</td>
<td>I</td>
<td>Activity not specified</td>
<td>4 weeks</td>
<td>N=2 Exercise BMI 33 Control BMI 23</td>
<td>Supports prehabilitation for improved function, proprioception pre-operatively. Post-operatively subjects had consistently higher function and improved pain control</td>
</tr>
<tr>
<td>7</td>
<td>II</td>
<td>Cycling daily</td>
<td>Median 38 days</td>
<td>N=95 BMI not reported</td>
<td>Supports prehabilitation for improved functional capacity</td>
</tr>
<tr>
<td>8</td>
<td>NA</td>
<td>Addition of aerobic, resistance and flexibility exercise</td>
<td>150 minutes/ wk.</td>
<td>Not research</td>
<td>Exercise: 1. Reduces incidence of progression from impaired glucose tolerance to DM 2. Reduces HA1c 3. Improved glycemic control with resistance training 4. Improved safety data for</td>
</tr>
<tr>
<td>Populations at Risk for CVD</td>
<td>Prehabilitation Quality Improvement Project</td>
<td>6MWT</td>
<td>Prehabilitation, Length of Stay</td>
<td></td>
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<tr>
<td>-----------------------------</td>
<td>--------------------------------------------</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
| 9  | Addition of resistance strength and stretching exercise 3x/wk. (1 monitor, 2 at home) | 4-8 wks. | 6MWT | Sit to stand in 30 seconds  
Time it takes to ascend 2 flights of stairs  
Time it takes to descend 2 flights of stairs |
| 10 | 1. Acupuncture & circuit training 1x/wkx6 weeks  
2. Knee strength and mobility (not specified) 3x/wkx4 wks.  
3. Stretch and strengthening (not specified) 3x/wkx8wks  
4. Strength training 30 minutes (length and type not specified)  
5. Bicycling and strength (not specified) 3x/wk. x 6 wks. | Varied | 12 studies | Supports use of prehabilitation for reduction in LOS and post-operative complications for cardiac, abdominal and total joint patients  
Prehabilitation, length of stay |
| 11 | No prehabilitation intervention | Obese patients with THA | Supports prehabilitation for improvement with greater improvement seen in <30 BMI group | Long term functional outcomes in Obese THA patients  
Oxford hip score  
WOMAC, walk test, chair rise and body transfers |
### Appendix C

#### Logic Model 2015

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Activities</th>
<th>Outputs</th>
<th>Objectives</th>
<th>Outcomes</th>
<th>Impact</th>
</tr>
</thead>
</table>
| Prehabilitation program design and implementation pre-surgery | 1. Set up enrollment criteria and develop process to enroll 25 prehabilitation patients (PP) and 25 control group patients (CGP).  
2. Apply for IRB approval from St. Alphonsus  
3. Query Database to compare satisfaction ratings among PP to CGP.  
4. Query PowerChart for readmissions data | 1. Enrollment process criteria and process developed (including age, gender, and BMI)  
2. IRB application completed and sent to St. Alphonsus IRB  
3. Implementing patient satisfaction tool for pilot program use. | 1. Enroll 25 PP and 25 CGP in Prehabilitation Program. | 1. 50% PP and 50% CGP enrolled in Prehabilitation Program. | Prehabilitation Program demonstrates reduction in readmission and infection rates when compared to patients who did not participate in the Prehabilitation Program. |
| What we invest | Action | What we do | Measurable | Short-term | Long-term |
| What we do | Measurable | Short-term | Long-term |

1. Enrollment process criteria and process developed (including age, gender, and BMI)  
2. IRB application completed and sent to St. Alphonsus IRB  
3. Implementing patient satisfaction tool for pilot program use. | 1. Enroll 25 PP and 25 CGP in Prehabilitation Program. | 1. 50% PP and 50% CGP enrolled in Prehabilitation Program. | 1. 100% PP and 100% CGP enrolled in Prehabilitation Program. | Prehabilitation Program demonstrates reduction in readmission and infection rates when compared to patients who did not participate in the Prehabilitation Program. |

1. 50% PP and 50% CGP enrolled in Prehabilitation Program. | 1. 100% PP and 100% CGP enrolled in Prehabilitation Program. | 1. 100% PP and 100% CGP enrolled in Prehabilitation Program. | Prehabilitation Program demonstrates reduction in readmission and infection rates when compared to patients who did not participate in the Prehabilitation Program. |
4. PowerChart for readmissions data checked for pilot program use.
5. Infection rate database evaluated for pilot program use.
4. Evaluate readmissions data for patients enrolled in Prehabilitation Program.
5. Evaluate the PowerChart database for readmissions due to deep joint infection.

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<tbody>
<tr>
<td>7. Check in process and exercise regimen developed at the YMCA</td>
<td>7. Check-in process and exercise regimen agreement secured.</td>
<td>7. Agreement for check-in process and exercise regimen secured.</td>
<td>7. Check-in process and exercise regimen consistently applied to all PPs.</td>
<td>7. Check-in process and exercise regimen consistently applied to all PPs.</td>
</tr>
<tr>
<td>8. Develop exercise diary for each PP</td>
<td>8. Exercise diary developed</td>
<td>8. Discuss and distribute exercise log to PPs.</td>
<td>8. 50% of PPs completed the exercise log.</td>
<td>8. 80% of PPs completed the exercise log.</td>
</tr>
</tbody>
</table>

on PP to CGP from date of admission through 12 week follow up.

5. Query the rate of infection of PP and CGP.
<table>
<thead>
<tr>
<th>Prehabilitation Program</th>
<th>9. Patient enrollment process outlined.</th>
<th>9. Patient enrollment process outlined for Prehabilitation Program.</th>
<th>9. Implement patient enrollment process for exercise regimen.</th>
<th>9. 50% of PP completed Prehabilitation Program.</th>
<th>9. 75% of PP completed Prehabilitation Program.</th>
<th>Obese pre-surgical patients fewer infections post-surgery when compared to the CPG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prehabilitation Program eligibility and enrollment process</td>
<td>10. Identify eligibility requirements for program participation.</td>
<td>10. Educational flyer developed identifying eligibility requirements.</td>
<td>10. Distribute educational flyers to all PP and CGP that meet the eligibility requirements</td>
<td>10. All patients receive educational flyers and understand eligibility requirements.</td>
<td>10. All patients receive educational flyers and understand eligibility requirements.</td>
<td>Obese pre-surgical patients fewer infections post-surgery when compared to the CPG.</td>
</tr>
<tr>
<td>Prehabilitation Program Post-surgery Evaluation</td>
<td>11. Identify and assess each patient on the 7-10 day, 5-6 week and 12 week post-operation days.</td>
<td>11. Develop a reflex communication pattern to those patients who do not attend the scheduled follow up appointments.</td>
<td>11. Contact all PPs and CGPs for return appointments as determined by the Program Director.</td>
<td>11. 50% of PPs attend scheduled appointments for length of program.</td>
<td>11. 90% of patients keep scheduled follow up appointments for length of program.</td>
<td>Patient satisfaction data will demonstrate prehabilitation favorably impacts patient satisfaction, and improves post-operative outcomes at a minimal cost</td>
</tr>
<tr>
<td>Prehabilitation Program Post-surgery Evaluation</td>
<td>12. Develop a process for obtaining the results of the Press Ganey patient satisfaction surveys for the PPs and CPGs.</td>
<td>12. Query the database for the results of the Press Ganey Patient Satisfaction surveys.</td>
<td>12. 80% of PP’s and CPG’s complete the Press Ganey Patient Satisfaction Survey</td>
<td>12. 75% of PP and CPGs report ease of communication and concerns resolved on the Press Ganey satisfaction survey</td>
<td>12. 85% of PP and CPGs report ease of communication and concerns resolved on the Press Ganey satisfaction survey</td>
<td>Obese pre-surgical patients fewer infections post-surgery when compared to the CPG.</td>
</tr>
<tr>
<td>Prehabilitation Program funding</td>
<td>13. Seek funding sources through grants for program of study</td>
<td>13. Develop an expense budget for transparent reporting of fund disbursement to stakeholders</td>
<td>13. The project manager will maintain the budget within the funding provided.</td>
<td>13. The project funds will be managed as the proposal outlines.</td>
<td>13. The successful budget management and program implementation will lead to future funding by the stakeholders</td>
<td>13. The community has a low budget program that allows for improved patient satisfaction and improved, reduced risk healthcare.</td>
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<tr>
<td>Literature Review, mission, vision, problem statement, timeline for project</td>
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<tr>
<td>Timeline</td>
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<tr>
<td>Project Goals and Objectives</td>
<td>X</td>
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</tr>
<tr>
<td>1. Apply for IRB approval</td>
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</tr>
<tr>
<td>2. Achieve IRB approval</td>
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</tr>
<tr>
<td>3. Begin enrollment of patients</td>
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<tr>
<td>3. Complete enrollment of 50 participants that meet the set population characteristics (est. 5 pts./wk. plus 12 weeks post-op follow up) Goal 50 pt. participants in 5 months, 25 to each randomize to control vs. exercise</td>
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<tr>
<td>4. Achieve 90% participation pre-surgically</td>
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<tr>
<td>5. Educate participants on program requirements and benefits of physical activity</td>
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<tr>
<td>6. Address patient concerns or limiting factors that may affect full participation</td>
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</table>

**Notes:**
- X indicates the activity has been completed.
- Dates are: 05/15 - 09/15, 06/15 - 09/15.
7. Complete post-surgical evaluation at 1.5-6 weeks post-operation | X

8. Evaluation of results | X

Evaluation plan developed and conducted throughout project. | X X X X X X X X | X X X

Budget | X

**Communication Plan**

Meet with orthopedic service line director to secure agreement to begin study | X

Identify costs of participation | X

Seek funding through grants for cost of study | X

Educate office staff on project, instruct them on physical activities prescribed | X

YMCA trainer to participate with patients once weekly for four weeks for each participant in the study | 06/15 - 09/15 X

Provide patients with handbook on exercises and a diary that they can record the home fitness activities they participated | 09/14 X | 05/15 - 09/15 X

Dissemination | 03/16

**Final Report** | 03/16
### Appendix E  Long Term Prehabilitation Budget

<table>
<thead>
<tr>
<th>Items</th>
<th>2015 (start up)</th>
<th>2016</th>
<th>2017</th>
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<tr>
<td></td>
<td>Annual cost</td>
<td>Annual Cost</td>
<td>Annual Cost</td>
</tr>
<tr>
<td>Personnel expenses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program Director*(10 hrs. /week x 9 months)</td>
<td>$23,400.00</td>
<td>$23,400.00</td>
<td>$23,400.00</td>
</tr>
<tr>
<td>Office Nurse ($20/hr.)*</td>
<td>$250.00</td>
<td>$2,250.00</td>
<td>$2,250.00</td>
</tr>
<tr>
<td>Office MA ($12/hr.)*</td>
<td>$150.00</td>
<td>$1,350.00</td>
<td>$1,350.00</td>
</tr>
<tr>
<td>Research Assistant ($15.83/hr.*</td>
<td>$5,698.80</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Trainer</td>
<td>$2,906.25</td>
<td>$8,000.00</td>
<td>$8,000.00</td>
</tr>
<tr>
<td>Statistician*</td>
<td>$3,125.00</td>
<td>$3,125.00</td>
<td>$3,125.00</td>
</tr>
<tr>
<td>Non-Personnel Expenses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education Materials</td>
<td>$100.00</td>
<td>$500.00</td>
<td>$500.00</td>
</tr>
<tr>
<td>Equipment*</td>
<td>$225.00</td>
<td>$2,025.00</td>
<td>$2,025.00</td>
</tr>
<tr>
<td>Exercise Facility</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Travel Reimbursement (participants</td>
<td>$1,000.00</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>IRB</td>
<td>$2,000.00</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Travel (for Dissemination)</td>
<td>$0.00</td>
<td>$3,600.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Total Expenses</td>
<td>$38,855.05</td>
<td>$44,250.00</td>
<td>$40,850.00</td>
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<tr>
<td>In-Kind *</td>
<td>$32,848.80</td>
<td>$32,150.00</td>
<td>$32,150.00</td>
</tr>
<tr>
<td>Grant Funding</td>
<td>$10,761.25</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Total Out of Pocket</td>
<td>$6,006.25</td>
<td>$8,500.00</td>
<td>$8,700.00</td>
</tr>
</tbody>
</table>

The 2016 and 2017 budgets have been increased to include participation of 100 clients annually (total patients 500, 60% obese, estimate of 1/3 living in the Treasure Valley and desiring to participate once weekly for four weeks)  
* In Kind
## Appendix F

### Expense Budget

<table>
<thead>
<tr>
<th>Source of Expense</th>
<th>Expense Description</th>
<th>Dollar value</th>
<th>Type of Cost</th>
<th>Description of Cost</th>
<th>Estimated Volume</th>
<th>Cost Per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel</td>
<td>Estimated 3 hours per week</td>
<td>$2,906.25</td>
<td>Variable</td>
<td>Trainer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Prehabilitation Equipment/Supplies</td>
<td>$ 9.00/band</td>
<td>$225.00</td>
<td>Variable</td>
<td>Exercise bands</td>
<td>25</td>
<td>$9.00</td>
</tr>
<tr>
<td>Prehabilitation Equipment/Supplies</td>
<td>Education Material</td>
<td>$100.00</td>
<td>Variable</td>
<td>Education Material</td>
<td>25</td>
<td>$4.00</td>
</tr>
<tr>
<td>Project IRB</td>
<td>IRB</td>
<td>$2,000.00</td>
<td>Fixed</td>
<td>IRB</td>
<td>1</td>
<td>$1500.00</td>
</tr>
<tr>
<td>Travel</td>
<td>$40.00/PP</td>
<td>$1,000.00</td>
<td>Variable</td>
<td>Re-imbursement for PP travel</td>
<td>25</td>
<td>$40.00</td>
</tr>
<tr>
<td>Total Requested</td>
<td>$6006.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grand Total</td>
<td>$6006.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Statement of Operations 2015

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Revenues</strong></td>
<td></td>
</tr>
<tr>
<td>Grant Funds</td>
<td>$10,761.25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$10,761.25</td>
</tr>
<tr>
<td><strong>Expenses</strong></td>
<td></td>
</tr>
<tr>
<td>Education Materials (log, exercise pictorial)</td>
<td>$100.00</td>
</tr>
<tr>
<td>Equipment (exercise band)</td>
<td>$225.00</td>
</tr>
<tr>
<td>Exercise Facility (gifted)</td>
<td>$0.00</td>
</tr>
<tr>
<td>Travel Reimbursement (participants)</td>
<td>$1,000.00</td>
</tr>
<tr>
<td>IRB</td>
<td>$2,000.00</td>
</tr>
<tr>
<td>Travel (for Dissemination 2016)</td>
<td>$0.00</td>
</tr>
<tr>
<td>Trainer (3 hours per week as necessary based on participants each week)</td>
<td>$2,906.25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$6,231.25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$4,530.00</td>
</tr>
<tr>
<td><strong>Operating Income</strong></td>
<td>$10,761.25</td>
</tr>
</tbody>
</table>
## Appendix H
### Prehabilitation Cost-Benefit Analysis

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Total Program Savings (Based on 2017 estimates)</th>
<th>Tangible Primary or Secondary Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced readmissions</td>
<td>Improved patient satisfaction</td>
<td></td>
</tr>
<tr>
<td>(1% reduction on estimated 2700 TJR with estimated cost per readmission $8750= annual savings of $236250)</td>
<td>Improved patient overall health</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reduced patient needs post-operatively</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(nursing phone calls, unplanned office visits, wound management needs, etc.).</td>
<td></td>
</tr>
<tr>
<td><strong>Net Benefits</strong></td>
<td>Total benefits- total costs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$236,250-$8,700</td>
<td>=$227,550</td>
</tr>
<tr>
<td><strong>Benefit-cost Ratio</strong></td>
<td>Total benefits divided by total costs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$236,250/$8,700=27</td>
<td>For every one dollar spent 27 will be saved</td>
</tr>
</tbody>
</table>
Appendix I  Press Ganey Tool

SAMPLE

Saint Alphonsus Medical Group

CLINICIAN & GROUPキャンスル SURVEY
SURVEY INSTRUCTIONS: Answer each questionnaire completely filling in the circle to the left of your answer. You are sometimes asked to give some questions in this survey. When this happens you will see two arrows with a note that tells you which question to answer, like this: Yes → If Yes, go to 

Please rate the care you received: Precede 1

Please rate the care you received from: Precede 2

YOUR PROVIDER
1. Our records show that you got care from the provider named below:
Precede 1
2. Is that right?
O Yes 
O No → If No, go to F29
The questions in this survey will refer to the provider named in Question 1 as "this provider." Please enter the name of the person as you answer the survey.

2. Is this the provider you usually use? If you need a check-up, want advice about a health problem, or get sick or hurt?
O Yes
O No

3. How long have you been going to this provider?
O Less than 6 months
O At least 6 months but less than 1 year
O At least 1 year but less than 3 years
O At least 3 years but less than 5 years
O 5 years or more

YOUR CARE FROM THIS PROVIDER IN THE LAST 12 MONTHS
These questions are about your own health care. Do not include care you get when you stayed overnight in a hospital. Do not include the times you went for dental visits.
4. In the last 12 months, how many times did you visit this provider to get care for yourself?
O If None, go to F29
O 1 time
O 2
O 3
O 4
O 5 or 6
O 10 or more times

5. In the last 12 months, did you phone this provider’s office to get an appointment for an illness, injury, or condition you needed care right away?
O Yes
O No → If No, go to F7

6. In the last 12 months, were you given an appointment for an illness, injury, or condition you needed care right away?
O Yes
O No → If No, go to F9

7. In the last 12 months, did you make any appointments for a check-up or routine care with this provider?
O Yes
O No → If No, go to F5

8. In the last 12 months, when you made an appointment for a check-up or routine care with this provider, how often did you get the appointment as soon as you needed?
O Never
O Sometimes
O Usually
O Always

9. In the last 12 months, did you phone this provider’s office with a medical question during routine office hours?
O Yes
O No → If No, go to F11

10. In the last 12 months, when you phoned this provider’s office during routine office hours, how often did you get an answer to your medical question that same day?
O Never
O Sometimes
O Usually
O Always

11. In the last 12 months, did you phone this provider’s office with a medical question after routine office hours?
O Yes
O No → If No, go to F13

SAMPLE
Prehabilitation Quality Improvement Project

Sample

Saint Alphonsus Medical Group

Clinician & Group Campus Survey

Survey Instructions: Answer each question by carefully filling in the circle to the left of your answer. You may be asked to complete several of the survey questions in this survey. After this happens, you will then be asked to note down notes that help you what you think is important next. For the survey, please read the following instructions carefully.

1. If the clinician received a referral from another provider, please answer the following questions:
   - How often do you receive referrals from other providers?
   - How often do you refer patients to other providers?

2. If the provider received a referral from another provider, please answer the following questions:
   - How often do you receive referrals from other providers?
   - How often do you refer patients to other providers?

3. If the provider received a referral from another provider, please answer the following questions:
   - How often do you receive referrals from other providers?
   - How often do you refer patients to other providers?

4. If the provider received a referral from another provider, please answer the following questions:
   - How often do you receive referrals from other providers?
   - How often do you refer patients to other providers?

5. If the provider received a referral from another provider, please answer the following questions:
   - How often do you receive referrals from other providers?
   - How often do you refer patients to other providers?

6. If the provider received a referral from another provider, please answer the following questions:
   - How often do you receive referrals from other providers?
   - How often do you refer patients to other providers?

7. If the provider received a referral from another provider, please answer the following questions:
   - How often do you receive referrals from other providers?
   - How often do you refer patients to other providers?

8. If the provider received a referral from another provider, please answer the following questions:
   - How often do you receive referrals from other providers?
   - How often do you refer patients to other providers?

9. If the provider received a referral from another provider, please answer the following questions:
   - How often do you receive referrals from other providers?
   - How often do you refer patients to other providers?

10. If the provider received a referral from another provider, please answer the following questions:
    - How often do you receive referrals from other providers?
    - How often do you refer patients to other providers?

11. If the provider received a referral from another provider, please answer the following questions:
    - How often do you receive referrals from other providers?
    - How often do you refer patients to other providers?
## Appendix J

### Cardiovascular Risk Assessment

<table>
<thead>
<tr>
<th>ACC/AHA</th>
<th>1 MET</th>
<th>4 MET</th>
<th>Greater than 10 METS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circle level of activity patient is able to perform</td>
<td>Self-care</td>
<td>Light housework (e.g., dusting, washing dishes)</td>
<td>Strenuous sports (e.g., swimming, singles tennis, football, basketball, skiing)</td>
</tr>
<tr>
<td></td>
<td>Eating, dressing, or using the toilet</td>
<td>Climbing a flight of stairs or walking up a hill</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Walking indoors and around the house</td>
<td>Walking on level ground at 4 mph</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Walking one to two blocks on level ground at 2 to 3 mph</td>
<td>Running a short distance</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Heavy housework (e.g., scrubbing floors, moving heavy furniture)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Moderate recreational activities (e.g., golf, dancing, doubles tennis, throwing a baseball or football)</td>
<td></td>
</tr>
<tr>
<td>Is patient taking any of the following medications?</td>
<td>Nitrates, digitalis, or phenothiazines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Circle any patient is taking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the patient report history of:</td>
<td>Uncontrolled angina in the last 6 months</td>
<td>Cardiomyopathy severe enough to compromise cardiac functioning</td>
<td></td>
</tr>
</tbody>
</table>
### Prehabilitation Exercise Log

<table>
<thead>
<tr>
<th>Date of Exercise</th>
<th>Comments</th>
<th>Location</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>WK 1</td>
<td></td>
<td>Home</td>
<td>YMCA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WK 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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</tr>
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<td>WK 3</td>
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<tr>
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</tr>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>WK 4</td>
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<tr>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Why Not Try Prehabilitation?

Exercise and physical activity are good for just about everyone, including older adults. There are four main types and each type is different. Doing them all will give you more benefits.

- Endurance, or aerobic, activities increase your breathing and heart rate. Brisk walking or jogging, dancing, swimming, and biking are examples.
- Strength exercises make your muscles stronger. Lifting weights or using a resistance band can build strength.
- Balance exercises help prevent falls.
- Flexibility exercises stretch your muscles and can help your body stay limber.

NIH: National Institute on Aging

To ensure the best possible outcome, you can prepare yourself for surgery with prehabilitation, which is defined as physical and/or lifestyle preparation designed to improve recovery time following surgery.

According to the National Institutes of Health, “By improving an individual’s functional capacity through increased physical activity before an anticipated orthopaedic procedure, it seems reasonable to assume that the individual will maintain a higher level of functional ability and rebound more rapidly in the rehabilitation process. Prehabilitation is the process of enhancing functional capacity of the individual to enable him or her to withstand the stressor of inactivity associated with an orthopaedic procedure. A generic prehabilitation program incorporates the components of warm-up, a cardiovascular component, resistance training, flexibility training, and practicing functional tasks.”

Doing pre-surgery exercises for knee surgery, for example, can speed recovery time and reduce the need for in-patient rehabilitation after surgery.
**Hip extension (kick backs), standing**
Begin by looping the middle of the band around the ankle of the exercising leg. Place the ends of the band under the opposite foot to stabilize the band and hold onto the ends. Keeping the knee straight, extend the leg backwards against the band. Hold and slowly return.
*Tip: Keep your back straight; don’t lean over.*

**Ankle calf raise, standing**
Place the middle of the band under the balls of both feet. Hold onto the ends of the band near the hips. Keeping the elbows straight, raise your heels off the floor. Hold and slowly return.

**Ankle dorsiflexion (foot raises), sitting**
Begin by wrapping the middle of the band around the foot of the ankle that will exercise. Place the ends of the band under the opposite foot to stabilize the band. Hold onto the ends of the band near the knee. Lift your foot upward against the band. Hold and slowly return.

**Step-up**
Step up onto stairs or steps facing forward. Use the railing or other sturdy object for balance if needed.

**Lateral step-up**
Step up onto stairs or steps facing the side. Use the railing or other sturdy object for balance if needed.
**Chair squat**
Begin with center of band under feet. With hands at sides, grasp ends of bands. Keeping your elbows straight, slowly bend your knees while leaning forward slightly at the hips. Maintain tension in the band. Slowly return to starting position.
*Tip: Keep your back straight.*

**Knee curl, standing**
Begin by looping the center of the band around the ankle of the exercising leg. Bring the ends of the band underneath the foot of the opposite leg to stabilize, and hold onto the ends near the knee. Slowly bend the knee, pulling upward against the band. Hold and slowly return.

**Hip abduction (kick outs), standing**
Begin by looping the middle of the band around the ankle of the exercising leg. Place the ends of the band under the opposite foot to stabilize the band and hold onto the ends. Keeping the knee straight, kick the leg outward against the band. Hold and slowly return.
*Tip: Keep your back straight; don’t lean over.*

**Hip adduction**
Securely attach one end of the band to a sturdy object, loop the band above the exercising ankle, then fasten the remaining end securely. Keeping the knee straight, bring the exercising leg inward toward the opposite leg. Hold and slowly return. Use a sturdy object nearby for balance if needed.

**Hip flexion, sitting**
Sit in a sturdy chair. Begin by looping the center of the band around the top of the knee of the exercising leg. Bring the ends of the band underneath the foot of the opposite leg to stabilize and hold onto the ends near the knee. Slowly flex the hip against the band, pulling upward. Hold and slowly return.
*Tip: Keep your back straight; don’t lean forward.*
Appendix L

Consent and Authorization for Quality Improvement Project Participation In A Prehabilitation Program for the Total Joint Patient

Principal Investigator: Pamela Fields, RN, BSN, FNP-C, MSN, DNP (candidate)
Co-Investigator: Molly Prengaman, MSN, FNP-C, PhD (candidate)

1. General Information
   a. You are invited to be in a quality improvement project. Before you decide, it is important for you to understand why the quality improvement project is being done. Please take time to read the following information and talk about it with friends and family if you wish. Ask the researchers if you are unclear about any part of the project.

2. Purpose
   a. You are being asked to be in this quality improvement project because you are planning a joint replacement surgery within the next 8 weeks. This project will help project leaders determine if participation in a prehabilitation program improves patient satisfaction, reduces post-operative readmission rates and reduces the post-operative infection rate compared to those who do not participate in a prehabilitation program.

3. Procedures
   a. As a participant, you will be asked to participate in a strength and cardiovascular physical exercise routine at the YMCA wellness center at least once weekly with the assistance of a physical trainer from the YMCA. You will also be asked to perform the same routine at your home. The goal is three sessions weekly either monitored or at home with at least once weekly participation at the YMCA up until your surgery. Your medical chart will be reviewed and data such as height, weight, gender and age will be collected and stored privately for comparison to the control group. You will be asked to respond to a patient satisfaction survey on week 5-6 of your post-operative course.
   b. If you are not able to participate in the prehabilitation program, but you have provided consent to be a control subject, you will continue with your normal lifestyle and you will provide responses to the patient satisfaction survey on week 5-6 post-operation. Your medical chart will be reviewed and data such as height, weight, gender and age will be collected and stored privately for comparison to the participant group.
   c. The project team members are not being paid to perform this evaluation.

4. Number of People
   a. The project leaders expect to include 50 people in this quality improvement project.

5. Risks, Discomforts and/or Potential Side Effects
There are minimal risks involved with the addition of prehabilitation. Persons who do not regularly participate in exercise may be at increased risk of cardiovascular event when starting a
new exercise program. The project leader has screened you and you have been found to have low probability for cardiac events based on the American College of Cardiology/American Heart Association guidelines on perioperative risk for non-cardiac surgery.

a. Being in this quality improvement project, however, may involve risks that we do not know about or can predict. Patients who do not frequently exercise may have soreness of muscles or joint stiffness. The risks involved in traveling to the YMCA for training are similar to normal daily activities. You will be encouraged to keep well hydrated.

b. Every consideration to avoid possible breach of confidentiality will be performed, including privacy in the office and secure storage of electronic data.

6. Benefits
   a. We cannot promise benefits to you for being in this quality improvement project. But possible benefits may include weight loss, improved satisfaction, and reduced post-operative risks.

7. Costs & Payments
   a. There will be no cost to you for your visits with the YMCA trainer. The project team leaders will provide you with one $40.00 gift card to use for travel costs. The cost of your surgical intervention, hospitalization and other medical expenses will be billed to you or your insurer in the usual way.

8. Alternative Treatment
   a. You do not have to participate in this quality improvement project or you may choose to participate as a control subject. Your care and your relationship with your providers will not be affected in any way if you choose not to be in the quality improvement project.

9. New Information
   a. You will be told about any new information that becomes known during the quality improvement project. If you decide to stop being in the quality improvement project after learning about the new information you can still receive the usual care that is available to you.

10. Removal from Quality Improvement Project
    a. The team leader may remove you from the quality improvement project without your approval if it is determined that your safety or the safety of the staff is at risk.

11. Voluntary Participation
    a. Being in the quality improvement project is voluntary. If you decide to participate, you may stop at any time and without giving a reason.
    b. Your decision not to be in or stop being in the quality improvement project will not affect your care or your benefits in any way. You will still receive the usual care that is available to you and it will not affect the relationship you have with your care providers.
    c. If you decide to stop being in the quality improvement project, please contact June Goering, RN at (208) 377-0777. Ceasing participation early is not thought to have any side effects.

12. Contact Information
    a. You may call the team leader Pamela Fields MSN, FNP-C about any part of this quality improvement project at (208) 377-0777.
b. If you think you may have been injured from being in this quality improvement project, please call (208) 377-0777 and speak to June Goering, RN

13. Confidentiality
   a. All information in this quality improvement project is kept confidential. The paper patient satisfaction surveys will be converted to computer images and these images will be stored on the secure Saint Alphonsus database. Only people who work on this quality improvement project will have access to your information. For this quality improvement project, the project leaders are requesting demographic information. Due to the make-up of Idaho’s population, the combined answers to these questions may make one individual person identifiable. The project leaders will make every attempt to protect your confidentiality. However, if you are uncomfortable answering any of these questions, you may leave them blank.
   b. Results of this quality improvement project may be presented or published. Your identity will not appear in any publication or presentation.
   c. People from the Saint Alphonsus research department, may inspect records that identify you. Your name and other identifying information will be kept private. The quality improvement project team will do everything they can to keep your records private, but cannot guarantee this.

14. Your Rights
   a. If you have any concerns about your rights as a participant or wish to discuss problems about the quality improvement project you do not feel you can discuss with the project leader, please call the Saint Alphonsus Research Integrity Office at (208) 367-8897.

15. Project Related Injury
   a. If you are injured from being in this quality improvement project, medical care is available to you at any medical facility of your choosing. Minor issues may be treated in a non-urgent fashion at the Saint Alphonsus Medical Group Hip and Knee Reconstruction Clinic.
   b. Saint Alphonsus does not have a program to pay you if you are hurt or have other bad results from being in the quality improvement project. The costs for any treatment or hospital care would be charged to you or your insurance company.

16. Authorization for use of Your Protected Health Information
   a. You are being asked to authorize Boise State Doctorate of Nursing Program and Saint Alphonsus Regional Medical Center and its medical staff to use and/or disclose your health information for quality improvement project purposes. Consistent with state and federal laws concerning the privacy of health information, Saint Alphonsus is requesting your authorization to use and/or disclose your health information as part of a performance improvement project that may include providing you with treatment. This health information may include but is not limited to age, weight, height, gender, rates of satisfaction and post-operative complications and readmissions.
   b. Others who may have access to this information for this quality improvement project include, but are not limited to the Saint Alphonsus Institutional Review Board, Food and Drug Administration (FDA), the Office of Civil Rights (OCR), the Office for Human Research Protection (OHRP), or authorized people at Saint Alphonsus Medical Group Hip and Knee Reconstruction Clinic.
c. If the person or organization that receives your health information is not a health care provider or a health plan covered by federal privacy regulations, your health information above may be re-disclosed and no longer protected by these regulations.
d. This Authorization is in effect until it is revoked or it expires.
e. Please understand that you may refuse to sign this authorization. You may revoke this Authorization at any time by sending written notification of your decision to the following address, except to the extent that action has been taken in reliance on this Authorization:

Saint Alphonsus Regional Medical Center
Attn: HIPAA Privacy Officer
Organizational Integrity Program
1055 N. Curtis Road, Boise, Idaho 83705

f. You may inspect and/or copy any of your health information that is used or disclosed under this authorization.
g. Access to this information may be suspended until the completion of the performance improvement project.
h. Revoking this authorization may result in the quality improvement project related treatment being provided you to end.

17. Patient Consent

A. I understand that my participation in this quality improvement project is entirely voluntary and that I have the right to refuse to continue if I so desire without any fear of prejudice to my future medical treatment. My signature below indicates that I have decided to participate in the quality improvement project after having been advised of the risks, benefits and alternatives and having read the information provided, and having had the opportunity to ask and have my questions answered.

B. I understand that the information collected during this study will remain confidential, and I acknowledge the possibility that the National Institute of Health, Food and Drug Administration, or other sponsors may inspect the records.

C. I understand that a copy of the consent and authorization form I am signing will be returned to me.

Participant name (printed)

Participant Signature

Date

Name of Person Obtaining Consent/Authorization

Signature of Person Obtaining Consent/Authorization

Date
### Appendix M

**Participant Data**

<table>
<thead>
<tr>
<th></th>
<th>Participant 1</th>
<th>Participant 2</th>
<th>Participant 3</th>
<th>Participant 4</th>
<th>Participant 5</th>
<th>Participant 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics (Age, Gender, BMI)</td>
<td>64/F/41</td>
<td>60/F/31</td>
<td>/M</td>
<td>55/M/50</td>
<td>52/F/42</td>
<td>67/M/32</td>
</tr>
<tr>
<td>Pertinent past medical history</td>
<td>Gastric bypass</td>
<td>HTN, GERD, Hypothyroidism, Anxiety</td>
<td>HTN, sleep apnea, hypotestosteronism</td>
<td>Asthma, COPD, HTN, Tobacco use 1 pack per day</td>
<td>HTN/Insulin dependent DM</td>
<td></td>
</tr>
<tr>
<td>Surgery performed</td>
<td>TKA</td>
<td>THA</td>
<td>None</td>
<td>TKA</td>
<td>TKA</td>
<td>TKA</td>
</tr>
<tr>
<td>Times participating (total, with trainer, at home or gym on own)</td>
<td>10/0/10</td>
<td>13/4/9</td>
<td>0/0/0</td>
<td>29/5/24 (4 at gym without trainer)</td>
<td>25/0/25</td>
<td>0/0/0</td>
</tr>
<tr>
<td>Prehabilitation program participants will experience a lower rate of post-operative infections than non-participants in the 12-week post-operative period</td>
<td>No post-operative infection</td>
<td>No post-operative infection</td>
<td>No data The participant did not participate and did not have surgery</td>
<td>No post-operative infection</td>
<td>Patient was re-admitted in 30 day post-operative time for cellulitis, not related to surgery</td>
<td>No data, participant did not schedule prehabilitation program appointments</td>
</tr>
<tr>
<td>There will be fewer readmissions for the prehabilitation participant population with comparison to the general population of primary joint replacement patients during the 12-week post-operative period.</td>
<td>No 90 day readmission</td>
<td>No 90 day readmission</td>
<td>No data The participant did not participate and did not have surgery</td>
<td>No 90 day readmission</td>
<td>Patient was re-admitted in 30 day post-operative time for cellulitis, not related to surgery</td>
<td>No 90 day readmission</td>
</tr>
</tbody>
</table>
Participants will report greater satisfaction than the non-participants report at the 5-6 and 12-week week follow up visit.

<table>
<thead>
<tr>
<th>Disease</th>
<th>No data received</th>
<th>See Appendix N as PGPST was anonymous</th>
<th>No data</th>
<th>See Appendix N as PGPST was anonymous</th>
<th>See Appendix N as PGPST was anonymous</th>
<th>No data received</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic obstructive pulmonary disease (COPD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension (HTN)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes Mellitus (DM)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gastroesophageal reflux disease (GERD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix N Patient Satisfaction Data
## Patient satisfaction comparison between Control Group Participants and Prehabilitation Participants

<table>
<thead>
<tr>
<th>Nurse/Assistant</th>
<th>Control Group Participants Satisfaction</th>
<th>Prehabilitation Participants Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friendliness/courtesy of nurse/asst</td>
<td>95%</td>
<td>100%</td>
</tr>
<tr>
<td>Concern of nurse/asst for your problem</td>
<td>93.1%</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Care Provider</th>
<th>Control Group Participants Satisfaction</th>
<th>Prehabilitation Participants Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>CP explanations of prob/condition</td>
<td>91.4%</td>
<td>100%</td>
</tr>
<tr>
<td>CP concern for questions/worries</td>
<td>91.1%</td>
<td>100%</td>
</tr>
<tr>
<td>CP efforts to include in decisions</td>
<td>90.7%</td>
<td>91.7%</td>
</tr>
<tr>
<td>CP information about medications</td>
<td>89.4%</td>
<td>91.7%</td>
</tr>
<tr>
<td>CP instructions for follow-up care</td>
<td>91.4%</td>
<td>100%</td>
</tr>
<tr>
<td>CP spoke using clear language</td>
<td>94%</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Overall Assessment</th>
<th>Control Group Participants Satisfaction</th>
<th>Prehabilitation Participants Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall rating of visit</td>
<td>93%</td>
<td>100%</td>
</tr>
</tbody>
</table>
## Appendix O
### Project Score Card

<p>| #1 Enrollment | Enroll 25 participants and 25 comparison group | 100% | 24% of expected |
| #2 IRB Approval | Apply for and receive IRB approval for project | Approval | Approval Received |
| #3 Patient Satisfaction | Participants complete Press Ganey for scoring of satisfaction | 75%-80% satisfaction rates reported | 100% |
| #4 Readmission Rates | Review PowerChart for all-cause readmission rate for comparison (4.6%) and participant groups | Decrease readmission rate by 1% | 24% readmission rate |
| #5 Deep Joint Infection | Review PowerChart for deep infection readmission rate for comparison (0.8%) and participant groups | Decrease deep infection rate by 1% | 0% Deep infections |
| #6 YMCA Contracting | Secure participation from YMCA | Successful partnership | Partnership secured |</p>
<table>
<thead>
<tr>
<th>#7 YMCA Check in and participation process</th>
<th>Participants receive the same check in and exercise process</th>
<th>100%</th>
<th>Check in was amended, for flow and 100% of participants did receive same exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td>#8 Exercise Log</td>
<td>All participants receive the exercise log</td>
<td>50% complete and return the log</td>
<td>100% received 100% returned</td>
</tr>
<tr>
<td>#9 Prehabilitation Participation</td>
<td>Implement patient enrollment process for exercise regimen</td>
<td>50% of participants complete the program</td>
<td>50% completed</td>
</tr>
<tr>
<td>#10 Prehabilitation Education</td>
<td>Distribute educational flyers to all PP and CGP</td>
<td>100% of participants receive prehabilitation information</td>
<td>100%</td>
</tr>
<tr>
<td>#11 Follow up appointments</td>
<td>Schedule and contact participants for scheduled post-operative follow up appointments</td>
<td>90% of participants keep follow up appointments</td>
<td>100% kept follow up appointments</td>
</tr>
<tr>
<td>#12 Communication</td>
<td>Query the database for the results of the Press Ganey Patient Satisfaction surveys.</td>
<td>85% of participants report ease of communication</td>
<td>100% of participants reported higher levels of communication (Appendix M)</td>
</tr>
<tr>
<td>#13 Funding</td>
<td>Develop an expense budget for transparent reporting of fund disbursement to stakeholders</td>
<td>The successful budget management and program implementation will lead to future funding by the stakeholders</td>
<td>The budget was maintained, and plans for expansion of the program are supported by the administration.</td>
</tr>
</tbody>
</table>