The Creation and Implementation of an Electronic Exercise Prescription at an Ontario Family Health Team

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Introduction

Recent evidence shows that 85% of Canadian adults do not meet the recommended physical activity (PA) guidelines set forth by the Canadian Society for Exercise Physiology (Colley et al. 2011). In Kingston, Ontario, Canada 66% of males and 50% of females are overweight or obese, which may be associated with decreased PA levels among the Kingston community as compared to previous years (Vital Signs 2012). There is unequivocal evidence regarding the importance of physical activity in the prevention of a wide variety of diseases and obesity. Regular PA is inversely related to the occurrence of obesity, cardiovascular disease, type 2 diabetes, hypertension, and other common lifestyle related diseases. CSEP's suggested 150 minutes of weekly PA is a guideline to help Canadians achieve the health benefits and disease prevention associated with regular PA (Haskell et al. 2007). At Queen's University, located in Kingston, senior students in the School of Kinesiology and Health Studies have been given a chance to make an impact on the PA levels of Kingston residents through the *Community-Based Physical Activity Promotion* course. By connecting students with a community-based group or organization, the year-long course provides an opportunity for students to practically apply the theories, evidence, and skills discussed in course seminars to the promotion of community PA involvement.

In collaboration with the Exercise is Medicine (EIM) at Queen's initiative established by graduate students at the Queen's School of Kinesiology and Health Studies, we have actively participated in the creation, implementation, and evaluation of a computerized exercise prescription program (Exercise-Rx) to be used by the Loyalist Family Health Team in Amherstview, near Kingston, ON. This initiative aims to increase PA discussion and prescription by health professionals on this team to ultimately increase PA levels amongst patients in the Amherstview and Kingston communities. Previous research has shown that receiving written exercise advice from a physician can significantly increase the number of people participating in PA when compared to receiving verbal advice alone (Swinburn et al. 1998). In New Zealand, exercise prescription interventions have been implemented and analyzed on a large scale. General practioners provided written advice on physical activity, leading to significant increases in PA and quality of life over 12 months (Elley et al. 2003). Although the majority of Canadian physicians (85%) report asking patients about their PA levels, only 16% report using written exercise prescriptions (Petrella, Lattanzio, and Overend 2007). Increasing the use of written PA prescriptions by physicians in the Kingston area is therefore warranted.

In the following report, we will present an overview of the activities involved in the development of the Exercise-Rx and explain how these relate to various concepts and evidence covered in our course. We will draw insight from our experiences as well as literature in the area to explain our various successes and challenges faced in creating, implementing, and evaluating the Exercise-Rx. Lastly, we will suggest directions for change in future projects and identify next steps in improving written exercise prescription methods.

Project Activities and their Relation to Course Concepts

Formative Evaluation

When beginning our placement with the Exercise is Medicine initiative, our original goal was to conduct a process and outcome evaluation of the written Exercise Prescription Referral Form (EPRF) that had been implemented at the Queen's Health Counselling and Disability Services (HCDS) Centre on campus. This center serves the Queen's student population. The original EPRF (**Figure 1**) involved physicians writing their own exercise prescriptions according to the FITT principle, which stipulates the Frequency, Intensity, Type, and Time (duration) of exercise to be taken. This method has proven effective in other similar programs (Petrella et al. 2003). The EPRF also provided an opportunity for the physicians to refer student patients to various PA consultants and resources on campus. We promptly developed a brief questionnaire to assess the frequency of use of the EPRF by the physicians as well as its effectiveness in increasing PA participation of Queen's students. From this questionnaire and individual meetings with physicians at the HCDS, we quickly realized the shortcomings of the EPRF and its lack of effectiveness in encouraging student PA. The physicians raised many concerns about and barriers to using the EPRF and exercise prescriptions in general at HCDS. For example, one respondent explained that physicians do not have the training or the time to be writing exercise prescriptions based on the FITT guidelines. Although the physicians remained optimistic about the potential for exercise to be prescribed within the HCDS, they did not see the current version of the EPRF as feasible or effective.

We thus decided to treat the EPRF implementation at the HCDS as a pilot project and as a formative evaluation for our larger exercise prescription initiative project within the Loyalist Family Health Team (FHT) in Amherstview. Formative evaluation is generally any evaluation that takes place before, or in the early stages of, a project's implementation with the aim of improving the project's design and performance (Dehar, Casswell, and Duignan 1993). Although in many cases it requires time and money, it should be viewed as a valuable investment that has the potential to improve program appropriateness and effectiveness (Petosa 2001).

Our formative evaluation continued in our first meeting with the health professionals of the Loyalist FHT. At this initial meeting, one of our goals was to explore how exercise discussion, prescription, and programming were currently being implemented within the clinic. We sought to understand the health professionals' opinions of our current EPRF form and how it could be tailored to the needs of the clinic and its patient population. At the end of this final meeting, we invited eight physicians to complete a short questionnaire to gain insight into the feasibility and requirements of implementing a prescription at this clinic. Through feedback gained from our pilot project, our meeting with the Loyalist FHT, as well as through a critical review of the literature, we gained valuable insights that allowed us to refine our approach to exercise prescription development and implementation.

We recognize that our formative evaluation could have been improved. In similar interventions that have used formative evaluation to inform implementation of PA programs, researchers conducted interviews with both program staff and participants (Milton et al. 2011; Grim et al. 2013). If we had gathered patient feedback, in addition to meeting with various health professionals, we would likely have further ensured that the exercise prescription was appropriate and effective from a patient's perspective. Although our formative evaluation was not originally intended as such and could have been improved, we see it as a valuable process

that helped to inform the creation of the Exercise-Rx at the Loyalist FHT.

Creation of a Logic Model

The purpose of intervention mapping, or creating a logic model, is to provide program planners with a framework for effective decision-making at each step in the intervention development process (Bartholomew, Parcel, and Kok 1998). Logic models have been used as a tool for planning and evaluating effectiveness in many PA promotion programs. For example, researchers in Curitiba, Brazil worked with two organizations to create logic models for their PA promotion programs (Ribeiro et al. 2010). The creation of the logic models allowed the program managers to refine program goals as well as to identify areas of overlap and gaps within the programming. The logic models also helped to frame the evaluation questions, identify data sources, and describe realistic outcomes. Logic models serve as a means of communication that enables all stakeholders to understand how activities link to anticipated program outcomes and which allows program staff to track the progression of the plan.

In collaboration with the occupational therapist, executive director, and several physicians at the Loyalist FHT, a logic model was created. It outlines the overarching goals of our program, specific activities involved, as well as short-term (three-six months) and long-term (one year) specific outcomes that allow us to assess whether or not these goals are being reached (**Figure 2**). Various "inputs" are also listed; these help outline the sources of information and people who will be involved in the various program activities. This model was created following our initial meetings with the health professionals at the Loyalist FHT. This is in line with the practices of Ribeiro et al. (2010), who suggest that the logic model should be created following initial engagement of stakeholders, so that a clear understanding of the overarching goals and intended program activities can be developed.

Program planners who create logic models for PA programming generally use them as iterative tools, which enable them to return to initial goals and to evaluate whether ongoing activities and outcomes are in line with the original program goals (Ribeiro et al. 2010; Fielden et al. 2007). The Exercise-Rx is in the early stages of implementation, and therefore not many outcomes and activities have been evaluated thus far. However, we hope that the healthcare professionals at the Loyalist FHT will use the logic model as an iterative tool and make adjustments to ongoing activities when they are not in line with the original goals of the program.

Participatory Approach

The participatory approach to community-based PA programs is one that seeks involvement of all stakeholders through the entire process of program creation and implementation (Israel et al. 2001). Such an approach is beneficial as it allows for various stakeholders to contribute their expertise and to create a program that is tailored to the intended benefactors. A participatory approach has also been shown to increase ownership among those involved in the planning process, thus increasing enthusiasm and dedication to the program (Tufte and Mefalopulos 2009).

Our program has utilized a participatory approach as we actively sought to include as many stakeholders as possible through the planning process. In our initial planning meetings, we invited all physicians at the Loyalist FHT as well as the clinic's nurse practitioner, registered

dietician, occupational therapist, and executive director. It was important to include the health professionals at the Loyalist FHT throughout the creation of the Exercise-Rx because they are the experts on patient-prescription adherence and would be regularly utilizing the program. For example, the physicians identified that the prescription needed to be electronic for it to be practical for their health team. They also indicated that the FITT guidelines should be pre-determined according to specific exercise clinical guidelines for each disease status as the physicians lack the time and training to tailor prescriptions to different patient populations. An example of the final prescription for patients with diabetes is found in **Figure 3**. Through consultation with the occupational therapist, we discovered that an "Introduction to Exercise" program was already in place at the clinic for diabetic patients. The occupational therapist suggested that an optional referral to this program should be included in our exercise prescription. Considering the information gained, seeking involvement of all stakeholders within the clinic was crucial in creating a prescription that was appropriate to the needs of the health care professionals and their patients.

Regrettably, we did not include the actual patients who would be benefitting from the program in the development stage of our participatory approach. This has been shown to be effective in creating health promotion programs and should be considered the gold standard in community-based participatory approach planning (Plaut, Landis, and Trevor 1992). Considering the implementation of this program was time-sensitive and that the patients involved in planning must accurately represent a large population, including patients would have been difficult. Although patients of this clinic have been informed of the program through various media outlets and by the physicians, it is recommended in the future, if time allows, to include the patients themselves in the creation of such exercise prescription programs.

Although our approach to the creation of the Exercise-Rx did not reach all stakeholders, we found that involving many healthcare professionals from the Loyalist FHT played a role in generating enthusiasm and helped to create a program that was based in evidence and tailored to the needs and capabilities of the clinic.

Outcome Evaluation

As of June 2014, the Exercise-Rx is currently being implemented at the Loyalist FHT and outcome evaluation methods have been put into place. Outcome evaluation is an important step as it allows us to assess the effectiveness of our intervention to alter PA behaviors of patients in a clinical setting, as well as to determine if our model could be used in other FHTs in Ontario. Evaluation additionally allows us to detect the potential positive and negative outcomes associated with PA in this population (Dollman et al. 2009).

In line with the above objectives, our outcome evaluation is two-fold. First, our evaluation intends to measure the uptake of the Exercise-Rx prescription by physicians and its effectiveness in actually increasing PA levels of patients. The clinic has set a goal for 40% of the general clinic population (11,000) and 75% of the diabetic and hypertensive population (approximately 2,600 patients) to be prescribed exercise within the first year of use. Through electronic chart audits, the team will be able to obtain an accurate understanding of Exercise-Rx use by the physicians. To assess patient adherence, each patient who receives an exercise prescription is also given a PA log to record his or her weekly exercise participation. Upon return visit, the information in this log will be recorded into the patient's chart. Secondly, this evaluation will quantitatively measure the effects of physician administered exercise prescription

on risk factors for health outcomes. The clinic has decided on two clinically relevant health markers (blood pressure and Glycated Hemoglobin, known as HbA1C), which will be measured in follow-up appointments in select patients who have been prescribed exercise.

Other PA interventions have used similar objective and subjective measures of PA adherence and health outcomes to evaluate the effectiveness of their programs. In an evaluation of the "First-Step" program for persons with diabetes, researchers objectively assessed cardiovascular health and glycemic control by measuring the resting blood pressure and HbA1C levels respectively (Tudor-Locke et al. 2004). The First Step program also assessed exercise adherence through pedometer use (Tudor-Locke et al. 2004). It has been repeatedly found in the literature that objective measures of PA, such as pedometers and accelerometers, are more accurate in describing PA behaviors as compared to self-reported measures (Prince et al. 2008). However, due to the large size of the patient population at the Loyalist FHT (12,000) and the lack of funding for pedometers, subjective measures were deemed appropriate. The lack of objective measurement for PA behavior may be considered a limitation of our evaluation. Evaluation is an important part of any program and, at the Loyalist FHT, a combination of subjective and objective measures of PA and health outcomes will determine the effectiveness of the program.

Critical Reflection

This experience has taught us about the practical considerations involved when creating and implementing community-based PA programs. We learned that many practices based on theoretical concepts, as discussed in our course, are often in reality difficult to implement. Here, we will discuss the elements that helped to make this program successful, as well as reflect on some of the challenges that we faced.

Successes

Many different factors played a role in the success of our program. First, we recognize that this program was created under a larger movement, namely "Exercise is Medicine." Creating the Exercise-Rx in association with EIM at Queen's and with the support of EIM Canada, added credibility and legitimacy to our proposal and efforts. The vast amount of current evidence and clout behind the idea that exercise can and should be part of a treatment plan, and be specifically prescribed by a physician, provided momentum to our initiative. Secondly, it was critical that we had the opportunity to involve a number of individuals from a variety of backgrounds within the healthcare field. The wide range of expertise at our disposal not only provided us with a wealth of knowledge on exercise prescription, but also provided insights into the specific needs and capacities of the FHT. We recognize that the physicians within the clinic who championed this movement were instrumental to its success. Implementing such programs in Family Health Teams that lack the enthusiasm and support of the physicians would be very difficult; a prescription can be created, but ultimately it is the doctors who must believe in the potential behind it.

Multimedia promotion, aimed both at the health care professionals and the patients, was an effective way to create momentum and excitement about the program. For example, the Loyalist FHT hosted an internal health challenge, which encouraged the team members to become more physically active. Additionally, the clinic has posted motivational exercise posters

in waiting rooms that are aimed at increasing awareness and discussion of PA. "How to" resistance band exercise videos, that we created, have also been posted on the clinic's website, which is public to patients. Externally, the program has been receiving attention via newspaper articles and radio talk-shows. Together, these factors have helped to promote the principles behind our program, and will hopefully increase patient and physician willingness to participate.

Challenges Faced

Although overall we feel that our program has been successful, we faced several challenges along the way. Our lack of financial resources throughout this process meant that we relied mainly on volunteer efforts. The creation of the electronic prescription was beyond the realm of the expertise of individuals within Exercise is Medicine or the FHT. Thus, volunteers at the Queen's FHT took on this task. Although we greatly appreciate their efforts, this process was frustrating at times as the creation of the Exercise-Rx was not a top priority for these volunteers and took a long time to implement. Additionally, the lack of funding limited the amount of additional resources we were able to provide to the patients. For example, we would have liked to provide pedometers to the patients, but instead were limited to subjective measures of PA.

Future Recommendations

For future projects similar to this one, using a true participatory approach by involving patients in the planning stages would be advantageous. For example, performing pilot work with a small group of patients prior to the creation of the prescription would allow for it to be directly tailored to the specific target population. Additionally, performing a process evaluation of similar programs in the future is warranted. A process evaluation could come in the form of a survey to the patients and physicians during the implementation stages of the program in order to gain feedback on what is working well and what needs to be improved (Linnan and Steckler 2002).

The next steps of our program specifically involve data collection to evaluate the effectiveness of the program. One year following implementation, the clinic will perform a chart audit to determine physician uptake and patient adherence as well as to determine changes in quantitative health markers in individuals who have been prescribed exercise. The results from this evaluation will help determine if the original goals set by the team have been met. We believe that this program, if found effective, can be used as a model for prescribing exercise in primary care clinics that utilize electronic medical records in Canada.

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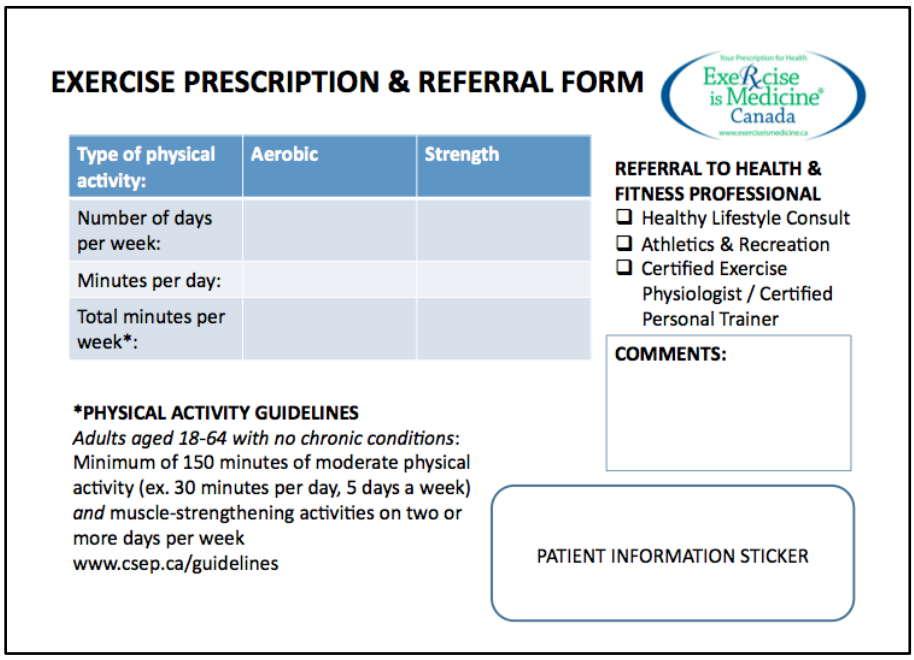
We would like to express our sincerest appreciation to Dr. Lucie Levesque at Queen's University for her words of advice and provision of independence in this project. Additionally, thank you to the Exercise is Medicine at Queen's group and the Loyalist Family Health Team for their involvement and continual support.

Appendix



EXERCISE PRESCRIPTION & REFERRAL FORM

Exercise is Medicine® Canada

Type of physical activity:	Aerobic	Strength
Number of days per week:		
Minutes per day:		
Total minutes per week*:		

REFERRAL TO HEALTH & FITNESS PROFESSIONAL

- ❑ Healthy Lifestyle Consult
- ❑ Athletics & Recreation
- ❑ Certified Exercise Physiologist / Certified Personal Trainer

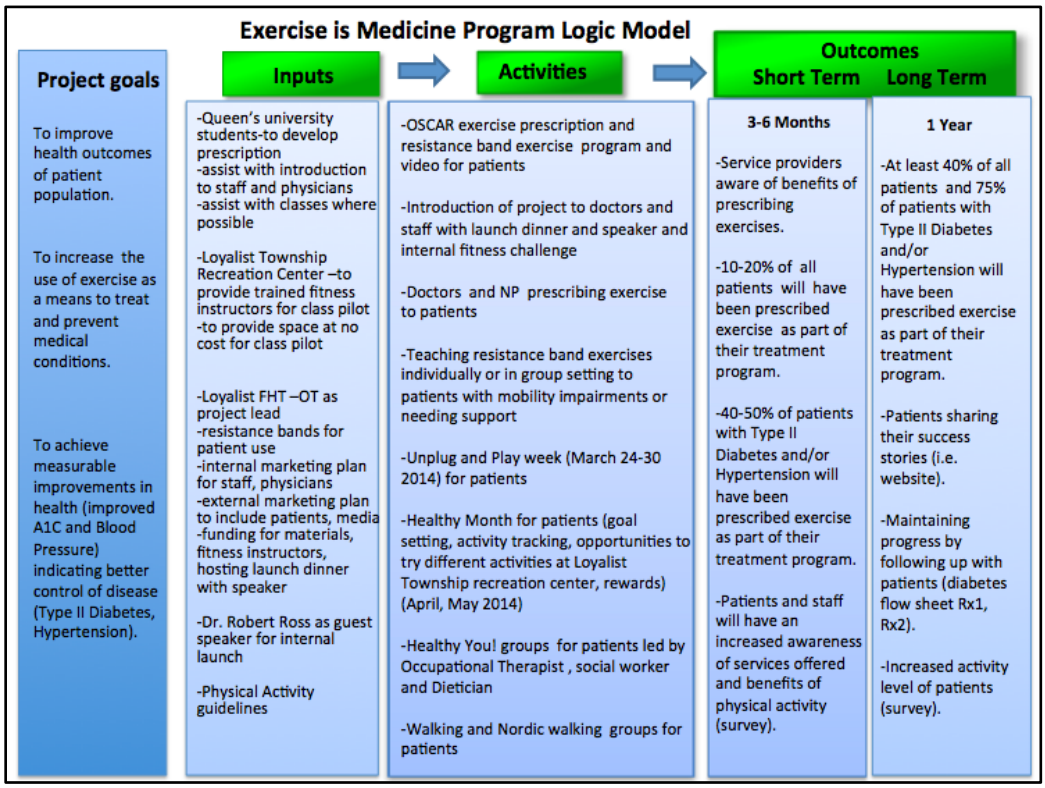
COMMENTS:

***PHYSICAL ACTIVITY GUIDELINES**

Adults aged 18-64 with no chronic conditions: Minimum of 150 minutes of moderate physical activity (ex. 30 minutes per day, 5 days a week) *and* muscle-strengthening activities on two or more days per week
www.csep.ca/guidelines

PATIENT INFORMATION STICKER

Figure 1: Original (paper version) Exercise Prescription Referral Form (EPRF) created by graduate students from the Exercise is Medicine at Queen's group. The form was introduced in the HCDS Center on campus on written prescription pads.

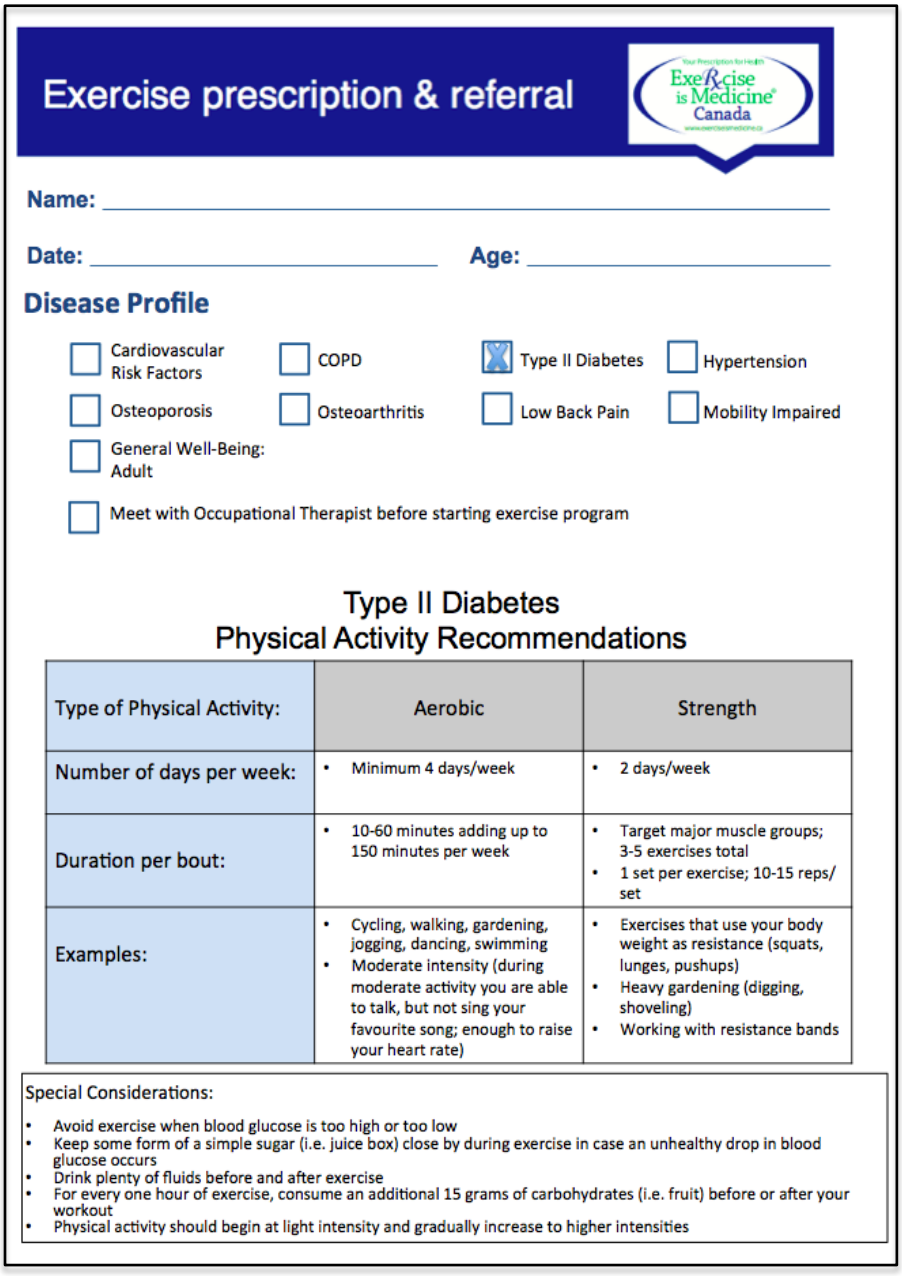


Exercise is Medicine Program Logic Model

Project goals	Inputs	Activities	Outcomes Short Term	Outcomes Long Term
To improve health outcomes of patient population. To increase the use of exercise as a means to treat and prevent medical conditions. To achieve measurable improvements in health (improved A1C and Blood Pressure) indicating better control of disease (Type II Diabetes, Hypertension).	-Queen's university students-to develop prescription -assist with introduction to staff and physicians -assist with classes where possible -Loyalist Township Recreation Center –to provide trained fitness instructors for class pilot -to provide space at no cost for class pilot -Loyalist FHT –OT as project lead -resistance bands for patient use -internal marketing plan for staff, physicians -external marketing plan to include patients, media -funding for materials, fitness instructors, hosting launch dinner with speaker -Dr. Robert Ross as guest speaker for internal launch -Physical Activity guidelines	-OSCAR exercise prescription and resistance band exercise program and video for patients -Introduction of project to doctors and staff with launch dinner and speaker and internal fitness challenge -Doctors and NP prescribing exercise to patients -Teaching resistance band exercises individually or in group setting to patients with mobility impairments or needing support -Unplug and Play week (March 24-30 2014) for patients -Healthy Month for patients (goal setting, activity tracking, opportunities to try different activities at Loyalist Township recreation center, rewards) (April, May 2014) -Healthy You! groups for patients led by Occupational Therapist , social worker and Dietician -Walking and Nordic walking groups for patients	**3-6 Months** -Service providers aware of benefits of prescribing exercises. -10-20% of all patients will have been prescribed exercise as part of their treatment program. -40-50% of patients with Type II Diabetes and/or Hypertension will have been prescribed exercise as part of their treatment program. -Patients and staff will have an increased awareness of services offered and benefits of physical activity (survey).	**1 Year** -At least 40% of all patients and 75% of patients with Type II Diabetes and/or Hypertension will have been prescribed exercise as part of their treatment program. -Patients sharing their success stories (i.e. website). -Maintaining progress by following up with patients (diabetes flow sheet Rx1, Rx2). -Increased activity level of patients (survey).

Figure 2: Loyalist FHT Logic Model created by healthcare professionals at Loyalist FHT in collaboration with members of Exercise is Medicine at Queen's. The Logic Model outlines project goals, activities, and outcome

evaluation both three-six months and one year from the date of implementation.



Exercise prescription & referral

Exercise is Medicine® Canada

Name: _____

Date: _____ **Age:** _____

Disease Profile

- [ ] Cardiovascular Risk Factors
- [ ] COPD
- [x] Type II Diabetes
- [ ] Hypertension
- [ ] Osteoporosis
- [ ] Osteoarthritis
- [ ] Low Back Pain
- [ ] Mobility Impaired
- [ ] General Well-Being: Adult
- [ ] Meet with Occupational Therapist before starting exercise program

Type II Diabetes
Physical Activity Recommendations

Type of Physical Activity:	Aerobic	Strength
Number of days per week:	• Minimum 4 days/week	• 2 days/week
Duration per bout:	• 10-60 minutes adding up to 150 minutes per week	• Target major muscle groups; 3-5 exercises total • 1 set per exercise; 10-15 reps/ set
Examples:	• Cycling, walking, gardening, jogging, dancing, swimming • Moderate intensity (during moderate activity you are able to talk, but not sing your favourite song; enough to raise your heart rate)	• Exercises that use your body weight as resistance (squats, lunges, pushups) • Heavy gardening (digging, shoveling) • Working with resistance bands

Special Considerations:

- Avoid exercise when blood glucose is too high or too low
- Keep some form of a simple sugar (i.e. juice box) close by during exercise in case an unhealthy drop in blood glucose occurs
- Drink plenty of fluids before and after exercise
- For every one hour of exercise, consume an additional 15 grams of carbohydrates (i.e. fruit) before or after your workout
- Physical activity should begin at light intensity and gradually increase to higher intensities

Figure 3. Exercise-Rx Type II Diabetes prescription form. When brought up in the electronic medical record system, the prescription auto-populates with an individual patient's information. The physician then "checks" the disease profile of the patient and the corresponding exercise recommendation is printed. Seen here is the exercise prescription for a type II diabetic patient, based on the FITT principle.

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