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Exercise as medicine: Providing practitioner guidance on exercise prescription

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ABSTRACT

The purpose of this study was to examine the effect of a practitioner education program (consisting of education on exercise guidelines and exercise prescription) on practitioner (i) confidence in prescribing exercise and (ii) rate of prescribing exercise. A pre-post study design was utilized. A two-session practitioner education and a toolbox of resources was developed and implemented in January 2020, targeting 12 eligible practitioners at a large primary care and functional medicine office in New York City. A three-question confidence survey was given pre and post. Fifty randomly selected charts were reviewed at baseline (pre), and 25 charts were reviewed monthly for 3 months (February – April 2020) post. There were significant increases and a large effect size in both confidence in prescribing exercise (30% to 89% [$p = .020$, Phi = 0.596]) and individualizing an exercise prescription between pre- and post-education sessions (20% to 78% [$p = .023$, Phi = 0.578]). There was also a sustained and significant increase (24% to 63% [$p < .001$, Phi = 0.379]) in exercise prescription over the three-month period following the education sessions. No statistically significant data was obtained regarding increasing the rate of physical activity among patients. The evidence from this study demonstrates the effectiveness of increasing practitioner confidence and uptake of exercise prescription through education sessions that provide them with the knowledge and tools to properly assess patients' activity level and offer individualized exercise recommendations.

1. Introduction

Hippocrates wrote that, "eating alone will not keep a man well; he must also take exercise" (Hippocrates, 1931, p. 229). People who lead a physically active life have a longer life expectancy and decreased mortality rate compared to their sedentary counterparts (Arem et al., 2015; Dhana et al., 2017). Evidence supports the decreased risk of cardiovascular disease, diabetes, cancers, depression, and osteoporosis among other non-communicable diseases through increased levels of physical activity; even minor increases in physical activity are associated with improved health (Pedersen & Saltin, 2015; Warburton & Bredin, 2017). Yet, an estimated 26% of adults in the United States remain physically inactive or sedentary, making physical inactivity a major public health problem (CDC, n.d.).

One of the best and most cost-effective ways to increase physical activity among patients is through the prescription of exercise, incorporating intentional and planned physical activity with the purpose of increasing health promotion, by primary care practitioners (Garrett et al., 2011). The majority of Americans have at least one visit with their primary care practitioner annually, providing a regular opportunity for exercise counseling (Gagliardi et al., 2015). Additionally, patients tend to have confidence in the guidance provided by their primary care practitioner (Martin-Borras et al., 2018). While tailored counseling through the utilization of repetition and a written component is more effective than counseling alone, even a single counseling session has the potential to increase physical activity for up to 1 year (Sanchez et al., 2015). Therefore, the Exercise is Medicine (EIM) initiative was launched by the American College of Sports Medicine (ASCM) in 2007, with the purpose of encouraging primary care practitioners to prescribe exercise as a portion of their treatment plans (Lobelo et al., 2014).

Barriers to the implementation and uptake of exercise prescription, however, have been described by primary care practitioners, with the most common being lack of time, followed by lack of knowledge and/or education regarding the effective counseling of exercise (Gagliardi et al., 2015; Windt et al., 2015). Specifically, practitioners noted the lack of a detailed counseling protocol to follow when providing exercise

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prescription as a key barrier to implementation (Hebert et al., 2012). Previous studies have also demonstrated that practitioners who have a lower level of confidence in counseling on exercise tend to prescribe it far less often (O'Brien et al., 2016).

In this vein, a structured exercise prescription protocol increases practitioner confidence, reduces the time needed for patient education, and increases the rate of exercise prescription (Arciniegas Calle et al., 2016; Hebert et al., 2012; O'Brien et al., 2016). However, while studies have demonstrated increased practitioner knowledge regarding exercise prescription following targeted education programs, none have evaluated the impact on the rate of exercise prescription following the education. Additionally, only one study has evaluated the impact of this training on practitioner confidence in prescribing exercise (O'Brien et al., 2016). Yet they only evaluated the intent to change clinical practice and not the actual impact the education sessions had on changing practitioners' clinical practice and rate of exercise prescription. In order to fill this gap in the literature, the aims of this study were to a) create education sessions based on the ACSM physical activity and exercise prescription guidelines for primary care practitioners; b) examine the effectiveness of the education's ability to increase practitioner confidence in and rate of prescribing exercise; and c) increase the rate of physical activity among patients.

2. Methods

2.1. Study design

A pre-post-study design was utilized with data collected at baseline and at 1-month intervals for 3 months following the intervention. Given that this study constitutes a quality improvement (QI) project and is not classified as research as per the Duke University Institutional Review Board (IRB), it was exempt from the requirement for IRB approval. However, in accordance with ethical compliance, the study met guidelines for the protection of human subjects and privacy.

2.2. Setting

A large primary care and functional medicine office in New York City served as the primary study location. This is a membership-based office, accepting only private pay and no insurance. It has ~3,000 adult and pediatric patients with various chronic conditions and it employs many types of practitioners, including medical doctors (MDs), doctors of osteopathic medicine (DOs), nurse practitioners (NPs), and physician assistants (PAs), as well as health coaches.

2.3. Subjects

The target population included a convenience sample of the 12 eligible primary care practitioners (11 MDs/DOs and 1 PA). Those who were ineligible or excluded, included the practitioners on the study committee and those who opted out (with no impacts on their employment). Patient samples included a random sample of 50 patients seen 6 months prior to the education sessions and a random sample of 25 patients seen per month, in the first 3 months following the education sessions, for a total of 75 patients. Patients were seen medically for a variety of reasons for both sick and well examinations. Patients under 18 years of age, those who did not speak English, had cognitive or physical impairment, and patients who had been seen by a practitioner on the study committee were excluded. All patients seeing other practitioners beyond the committee members were included.

2.4. Education session design and content delivery

While there was no available standard education program, the ACSM created an education course for personal trainers that was modified by the study committee to target the needs of primary care practitioners (ACSM, 2019). This adapted education program was formatted into a total of two 1-hour education sessions. The primary aims of these sessions were to disseminate a structured practitioner training surrounding exercise prescription based on the ACSM guidelines, to provide a toolbox of resources for practitioner use in order to efficiently prescribe exercise, and to increase practitioner confidence regarding exercise prescription.

Education sessions included information regarding the pathophysiologic benefits of exercise. They also outlined the four main steps in exercise prescription: a) application of the 5As (assess, advise, agree, assist, and arrange) (Hechanova et al. 2017); b) utilization of motivational interviewing techniques (Windt et al., 2015); c) specific guidelines surrounding exercise prescription in accordance with the ACSM, including mode, frequency, duration and intensity (ACSM, 2019; Garber et al., 2011); and d) individualization of the exercise prescription based on patient comorbidities, as well as readiness and/or barriers to engaging in physical activity.

Additionally, in order to decrease the time needed during a clinical visit for the actual prescription implementation, a toolbox of resources was developed for practitioner utilization. This included a) quick "chart parts" for the electronic medical record encompassing the ACSM guidelines to be used and individualized in each patient's medical visit note and b) a patient handout for easy incorporation into the patient portal with exercise recommendations and a list of class suggestions and resources, including on-line exercise videos.

Each of these education sessions was conducted during a weekly all-practitioner meeting held 2 weeks apart in the month of January 2020. Following the final session, the practitioner toolbox was disseminated and activated within the electronic medical record (EMR).

2.5. Chart review

Retrospective chart reviews were conducted. The clinic's data engineer compiled lists of eligible patients from the existing database. The first list consisted of 50 randomly selected patients seen 6 months prior to the education sessions (June 2019). The subsequent lists included a random sample of 25 patients seen per month in the first 3 months following the education sessions (February, March, and April 2020), for a total of 75 patients. These reviews were completed on a monthly basis in the month following the timeframe being assessed, allowing the post-education session chart review to be conducted via a run chart.

The chosen charts were reviewed by the study committee to evaluate documented changes within the patient visit note in one or more categories of the ACSM guidelines, i.e. aerobic, weight training, or flexibility, in order to be considered positive uptake. Specifically, the notes were evaluated for documentation of exercise assessment in the subjective history and recommendations for exercise within the plan of care. They were then graded on a nominal scale of "yes" or "no" based on whether any activity was documented.

Practitioner detailing, a technique that uses face-to-face encounters to promote practice change, was utilized during the post-education session chart review period to offer encouragement and ongoing support based on the results. Each time results were shared with the practitioners, they were directly compared to the pre-education chart review results (or baseline results) and any other previous month already evaluated during the post-education time period. Utilizing practitioner detailing also aimed to prevent implementation decreases over time by providing ongoing reminders to prescribe exercise. These practitioner detailing interactions occurred on a monthly basis during one of the weekly all-practitioner meetings.

2.6. Practitioner and patient surveys

A practitioner survey was developed by the study committee and administered pre- and post-education to collect data on practitioner confidence in exercise prescription. Given the lack of previously validated questionnaires for self-assessment of practitioner confidence

concerning exercise prescription, a self-reflection questionnaire was modified from a previous study by O'Brien et al. (2017). Changes in practitioner confidence levels were assessed via a 3-question anonymous survey. Practitioners were able to self-report their confidence in assessing, prescribing, and individualizing exercise prescriptions. The ordinal scale was four-pointed: no confidence, slight confidence, moderate confidence, and high confidence. This same survey was given to the practitioners immediately before the first education session and following the final education session for direct comparison and evaluation of changes.

A patient survey was developed by the study committee to assess whether practitioners discussed exercise at the patient's last visit and whether the patient subsequently made any changes to their physical activity level. This anonymous survey was emailed at the end of each month being assessed for a total of 3 months (March, April, May) to the same randomly selected patients chosen for the post-education chart reviews. The survey included two questions ("Did your doctor provide exercise/movement recommendations at your last visit with them?"; "Did you make changes to your current physical activity level based on the recommendations you were given?") graded on a nominal scale of "yes" or "no" and a multiple-choice question ("If you did not make changes to your current physical activity level, why?", followed by 4 answer choices) aimed at assessing current barriers to change if no change was made in their activity level.

2.7. Statistical analysis

Pre- and post-education session surveys were utilized to measure changes in confidence regarding exercise prescription through a Fisher's exact test with significance at $p < .05$. Practitioner uptake of the knowledge gained from the education sessions and the rate of exercise prescription was evaluated through chart reviews, which were compared pre- and post-education sessions via descriptive statistics. The chart reviews were also compared in the aggregate form, where the total of all the post-education reviews were compared to the pre-education reviews via a Fisher's exact test with the required sample size of 44 for each of the groups, pre and post (power set at 80% and $\alpha = 0.05$). Patient survey data were also evaluated through descriptive statistics. Effect size for the Fisher's exact tests were calculated using the Phi coefficient. All data analyses were completed using IBM SPSS version 25 and Microsoft Excel version 16.35.

3. Results

3.1. Practitioner confidence

Confidence in assessing readiness to engage in exercise was already high (100%) pre-education and was sustained post-education (Table 1). There were significant increases in both confidence in prescribing exercise and individualizing exercise prescription from pre- to post-education sessions ($p < .05$), as well as a large effect size (Phi > 0.50).

Table 1
Practitioner confidence survey results pre- and post-education sessions. (*$p <$ .05).

Item	Pre (n = 10)	Post (n = 9)	Phi
	n (%) reporting "moderate" or "high confidence"		
What's your confidence level in assessing readiness to engage in physical activity?	10 (100%)	9 (100%)	
What's your confidence level in prescribing exercise?	3 (30%)	8 (89%) *	0.60
What's your confidence level in individualizing an exercise prescription?	2 (20%)	7 (78%) *	0.58

Specifically, 30% of practitioners reported a moderate or high level of confidence in prescribing exercise pre-education, which increased to 89% ($p = .02$; Phi = 0.60) post-education. The confidence level in individualizing an exercise prescription also increased. Pre-education, only 20% of practitioners reported a moderate or high confidence level, but this increased to 78% ($p = .02$; Phi = 0.58) post-education.

3.2. Chart reviews

There was a sustained increase in exercise prescription by practitioners over the 3-month period following the education sessions (Fig. 1). At baseline pre-education sessions, only 24% (12/50) of charts scored positively for exercise prescription. In the first month post-education sessions, this increased by 20%, up to 44% (11/25). In the subsequent 2 months, it increased another 27% and remained at 72% (18/25). Additionally, aggregate data comparing pre- and post-education sessions, showed a significant increase in the rate of exercise prescription with a medium effect size ($p < 0.001$; Phi = 0.379) post-education.

3.3. Patient surveys

Post-education session patient survey response was inadequate. While 75 surveys were sent out, only 5 responses were returned. This was due in-part to historical changes in New York during that time, where the COVID-19 outbreak overlapped the time period from March through May 2020. Therefore, the response rate was too low to draw any statistically significant conclusions.

4. Discussion

Increasing physical inactivity remains a top priority in addressing the public health burden of non-communicable diseases. Evidence suggests that providing effective exercise education to patients helps reduce this burden by increasing physical activity and decreasing disease (Arciniegas Calle et al., 2016; O'Brien et al., 2016; Windt et al., 2015). However, exercise education is not a part of the academic curriculum for most medical professionals (MDs, PAs, NPs, etc.). The purpose of this study was to address this gap by examining the effect of a practitioner education program. The effectiveness of this study was evaluated through the use of a pre-post survey and chart review data. As expected, the results indicate that by educating practitioners on the specific guidelines for exercise prescription and how to individualize the prescription based on each patient's needs, practitioner confidence in both of these areas increased. As expected, there was also an increase in the overall rate of exercise prescription. This is an important connection because lack of confidence in exercise counseling is one of the key barriers to exercise prescription, therefore we were able to help the practitioners overcome

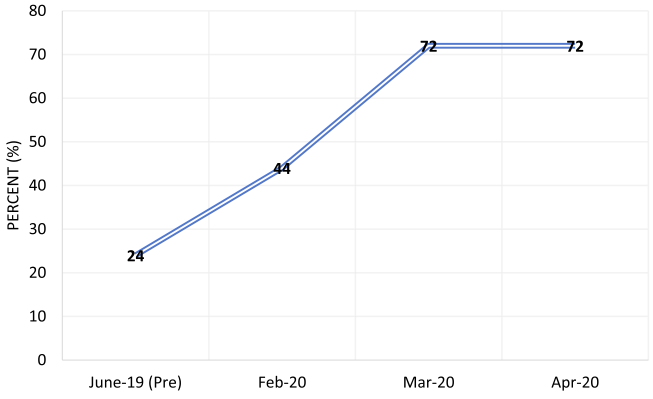

Fig. 1. Rate of exercise prescription by practitioners before and after an education program.

this barrier through the education sessions (O'Brien et al., 2016).

While many studies have demonstrated increased practitioner knowledge regarding exercise prescription following education sessions, none have looked at the impact on the rate of exercise prescription among practitioners following these sessions. Clinical trials have examined the effectiveness of exercise in enhancing patient outcomes, demonstrating decreased morbidity and the importance of incorporating exercise prescription into clinical practice (Pedersen & Saltin, 2015; Warburton & Bredin, 2017). A few studies have also examined how to address this practice change among primary care practitioners by utilizing education sessions of various timeframes; from a 3-hour workshop, to a 6-hour workshop, and even a full day event (Arciniegas Calle et al., 2016; O'Brien et al., 2016; Windt et al., 2015). However, they have not been able to correlate an actual practice change with the education sessions. This study, on the other hand, has successfully demonstrated that practitioner education increases the rate of exercise prescription.

To our knowledge, while some studies have looked at the impact of exercise prescription education on increasing practitioner knowledge, only one other study has evaluated the impact of this education on practitioner confidence in prescribing exercise (O'Brien et al., 2016). However, while O'Brien et al. (2016) evaluated the intent to change clinical practice, they did not evaluate the actual impact of their education sessions on changing practitioners' clinical practice and rate of exercise prescription. The results of this study, on the other hand, demonstrate a clear correlation between increased confidence and exercise prescription following the education sessions, filling a critical gap in the literature regarding the successful implementation and impacts of practitioner education on exercise prescription.

5. Strengths and limitations

This is one of only a few studies looking at the effectiveness of a practitioner-targeted intervention focused on the utilization of education sessions in increasing the rate of exercise prescription and practitioner confidence in exercise prescription. To our knowledge, it is the only study that has not only implemented an education program for practitioners, but also evaluated whether that program facilitated a clinical practice change through increased rates of exercise prescription. Utilization of practitioner detailing, by providing reminders and ongoing support to practitioners promoted ongoing clinical practice change with a steady increase of exercise prescription. Serving as an additional strength to the study design, the intervention was not solely based on providing education, but also on providing clinical tools and support to target the clinical change, overcoming perceived barriers to providing exercise prescription. The integration of motivational interviewing, which has been utilized in previous studies with positive results, also supported patient behavior change and served as a strength of the education session design (Windt et al., 2015).

The study clinic provides primary care services with a focus on functional medicine, which is a systems-biology approach that identifies the root cause of disease. Though this serves as an advantage to this study, it potentially hinders external validity. Inherent in this specialty is a focus on lifestyle changes including diet, exercise, sleep, and stress. Practitioners have extended visits, affording them the time to obtain thorough histories and offer patient education regarding aspects of the proposed plan of care. Therefore, practitioners had a full understanding of the importance of exercise and motivation to improve their confidence regarding exercise prescription. Additionally, despite having a section in the note template for exercise recommendations predating the intervention, it is also possible that some of the increase was in documentation alone rather than an actual increase in exercise prescription.

Further serving as a limitation, the practitioner sample size was relatively small at 12, with not everyone responding to the pre- and post-education surveys. This resulted in a sample size that was below the power calculation of 17. Due to the reliance on self-reported data within the practitioner and patient surveys, there was an inherent risk for response bias. For instance, despite anonymity, practitioners might have responded in a more desirable way given that the primary author was a colleague, reporting higher rates of confidence post-education sessions. There was also risk for observation bias given that practitioners were aware they were being evaluated via chart reviews and patient surveys. Additionally, there was a subjective nature to the chart-reviews as the data was pulled through written documentation versus checkboxes of completion, which potentially resulted in confirmation bias.

Finally, the timing of this study during the COVID-19 pandemic served as both a barrier and a facilitator. Practitioners were more aware of promoting exercise to enhance mental health during quarantine. However, patient response to the survey was quite poor, far missing the target of 75 total. This resulted in insufficient data, inhibiting the ability to facilitate a significant correlation between the education sessions and changes in patients' level of physical activity.

6. Conclusion

This study demonstrates the promising effect of increasing practitioner confidence and uptake of exercise prescription through education sessions that provide them with the knowledge and tools to properly assess patients' level of activity and offer individualized recommendations. The education sessions conducted through this study increased practitioner confidence on exercise prescription, resulting in an increased rate of prescription for patients. Further research should utilize larger sample sizes and target practitioners in various primary care settings in order to enhance the generalizability of results. It is also recommended that more objective measures be utilized to assess practitioner behavior through direct observation and/or more concise documentation tools. Additionally, given that we do not have data on the sustainability of the clinical practice change, it would be important to conduct a study for a longer timeframe. Ideally, a longer-term study of at least a year or more would be able to further investigate whether the intervention not only changes practitioners' clinical practice, but also changes patients' behavior, as this would be the greatest key to decreasing the rate of non-communicable diseases.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.pmedr.2021.101323.

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