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Original Research

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Health Expectations, Risk Tolerance, and Walking in Peripheral Artery Disease-Related Claudication

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Abstract

We examined the association between health expectations, baseline physical activity, and self-reported symptom severity among patients with claudication: calf pain that occurs during walking and is relieved at rest. Beliefs and attitudes toward exercise influence the behavior. When walking is prescribed as an alternative to surgical intervention with the intention of decreasing symptom severity, as is the case with claudication, it is important to assess patient perceptions, beliefs, and expectations. Through a phone survey, participants described the severity of their symptoms via the Walking Impairment Questionnaire. Data were collected on (1) health expectations and attitudes, value placed on recovery (assessed by measuring perceived risks and benefits), and (2) daily physical activity (Physical Activity Scale for the Elderly, known as the PASE). Between February and August 2016, twenty participants were enrolled. The median age among the predominantly male cohort (19, 95%) was 69 years (interquartile range: 66–75 years). Most participants were "risk-seeking" in that 75% (12/16) were willing to accept the risk of amputation associated with surgery regardless of the level of symptom improvement. The alternative was walking, which was associated with no risk of amputation. Individuals who expected greater walking benefit reported walking greater distances with less difficulty (p = .04; unadjusted). Given that most participants were willing to accept some risk of amputation despite the equivalent effectiveness of exercise and surgery in treating claudication, understanding a patient's perspective is critical to identifying the appropriate approach that will treat symptoms with the least adverse effects.

Keywords: claudication, exercise therapy, expectations, health utilities, peripheral arterial disease

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Introduction

Recent estimates in the United States indicate an increase in the prevalence of peripheral artery disease (PAD) and a corresponding increase in the number of individuals reporting a symptom of PAD—calf pain, known as claudication, which occurs during walking and is relieved at rest (Criqui, 2001; Fowkes et al., 2013; Norgren et al., 2007; Selvin & Erlinger, 2004).

Literature Review

Studies have shown that physical activity, specifically walking, is as beneficial as surgical intervention for symptom alleviation (Al-Jundi et al., 2013; Fakhry et al., 2013; Fakhry et al., 2015; Gardner et al., 2011). Yet, there are individuals for whom recommendations of initial or continued physical activity remain challenging. Accounting for patient expectations, perceptions, and beliefs regarding symptoms is important and will help identify the most effective strategies to use when presenting treatment options. We used health utilities, a set of measures that assess an individual's preference for health-related outcomes (Drummond et al., 2005), to describe treatment preferences, expectations, and risk attitudes. In patients with claudication, it is unclear how these factors impact physical activity behavior and the individual's decision-making process for surgical intervention and/or physical activity. Clarifying the role of these influences (both markers and pathways) would be instrumental in identifying successful strategies that encourage physical activity adherence.

Purpose of the Study

In this pilot study, our aim was to understand the relationship between health utilities in the context of risk/benefit attitudes and physical activity. In addition, we describe the associations between health expectations, risk tolerance, symptom severity, and walking.

Methods

Participants

Adult individuals (>18 years of age) who were referred for initial appointments to the Vascular Surgery clinic with a diagnosis of claudication at the Michael E. DeBakey Veterans Affairs Medical Center were considered for participation in this study.

Context

Claudication was defined as exertional pain (i.e., relieved by rest) in the leg with an ankle-brachial index of 0.9 or less and diagnosis confirmed by a board-certified vascular surgeon. Ankle-brachial indices are non-invasive blood pressure tests that are used to diagnose PAD. We excluded individuals with rest pain and a toe pressure of <50 mmHg or a non-healing wound that was present for more than 2 weeks. The study protocol was approved by the Baylor College of Medicine Institutional Review Board and the Veterans Affairs Research & Development Committee. A waiver of written consent was approved by the IRB as the survey was administered through phone calls. All study participants provided verbal, informed consent prior to participation in this study.

Data Collection

A modified standard gamble method, using previous estimates of the long-term risks of major amputations after revascularization (Fakhry et al., 2015), was used to measure risk/benefit attitudes. Study participants

were asked open-ended questions about expected symptom improvement when provided with the risk of amputation for two treatment types (i.e., surgery and exercise). The Physical Activity Scale for the Elderly (PASE) was used to measure activity. The PASE is a validated instrument that shows significant (P<.01) correlations between questionnaire responses and quantitative data (pedometers; Dinger et al., 2004). The distance and speed sub-scales of the Walking Impairment Questionnaire were used to measure symptom severity (Regensteiner et al., 1990). Type of claudication pain was assessed using the San Diego Claudication Questionnaire (Criqui et al., 1996).

Data Analysis

Pearson's χ^2, Fisher's exact, and the nonparametric equality of medians tests were used to compare ordinal variables. Pearson's correlations were used to determine presence and strength of correlations between continuous variables. Unadjusted associations were evaluated using linear regression for the following outcomes: expected symptom improvement (exercise and surgical intervention), expected improvement at different risk levels (2%, 4%, and 10%), and acceptable risk at different symptom improvement levels (100%, 75%, 50%, and 35%). Results were statistically significant at a *P*-value <.05. All statistical analyses were conducted using Stata IC version 13.0 (StataCorp, College Station, TX).

Results

Between February and August 2016, 20 eligible participants were administered the questionnaire through a phone call. The median age was 68.5 years (IQR: 66–75 yrs.). Almost all the participants were male (19, 95%). More than half were White (11, 55%). Table 1 delineates the baseline demographic and medical history characteristics of the cohort while presenting, comparing by type of claudication pain.

Table 1. *Baseline Descriptive Characteristics of Participants Who Were Referred to the Vascular Surgery Service for Intermittent Claudication*

Variables	**Entire cohort** *N = 20 (%)*	**Classic claudication**[a] *N = 10 (%)*	**Exertional pain**[a] *N = 10 (%)*
Age, median (IQR)	69 (66–75)	68 (66–74)	70 (66–78)
Male	19 (95)	10 (100)	9 (90)
Race/ethnicity			
White	11 (55)	7 (70)	4 (40)
Black	8 (40)	2 (20)	6 (60)
Native Hawaiian	1 (5)	1 (10)	0
Bilateral claudication	4 (20)	4 (40)	0
ABI, median (IQR)	0.6 (0.5–0.7)	0.6 (0.5–0.6)	0.7 (0.5–0.9)
Toe pressures, median (IQR)	41 (30–51)	42 (30–46)	38 (30–62)
BMI, median (IQR)	28 (20–30)	29 (20–30)	26 (20–30)
Current or past history of smoking	18 (90)	9 (90)	9 (90)
Hypertension	16 (80)	8 (80)	8 (80)
Hyperlipidemia	12 (60)	8 (80)	4 (40)
Diabetes mellitus	6 (30)	3 (30)	3 (30)

COPD [b]	5 (25)	0 (0)	5 (50)
Total WIQ score, median (IQR) [c]	8 (0.8–36)	9 (0.8–34)	7 (1–46)
WIQ distance score, median (IQR) [c]	6 (2–40)	5 (2–35)	6 (2–49)
WIQ difficulty score, median (IQR) [c]	10 (0–29)	10 (0–29)	7 (0–29)
Total PASE score, median (IQR) [d]	100 (71–146)	98 (82–148)	113 (63–144)

Abbreviations: ABI—Ankle-Brachial Index; BMI—Body Mass Index; COPD—Chronic Obstructive Pulmonary Disease; WIQ—Walking Impairment Questionnaire

[a] Defined by the San Diego Claudication Questionnaire

[b] Significant difference between groups ($p<0.05$)

[c] Lower scores indicate greater impairment.

[d] Increasing scores indicate increasing physical activity.

Expectations at Different Levels of Risk

As risk estimates increased, the proportion of participants who expected significant improvement did not clearly increase or decrease. In general, individuals expected significant improvement in symptoms regardless of the level of risk presented. Self-reported symptom severity did not increase or decrease significantly based on expected symptom improvement either.

Acceptable Risk at Different Levels of Symptom Improvement

In exchange for relatively marginal (35%) symptom improvement, nine participants (56%) were willing to accept between 0% and 4% risk. Most participants (12/16, 75%) were willing to accept at least *some* risk of amputation in exchange for symptom relief. When asked how much improvement they expected with surgery compared to exercise, more participants expected greater than 60% improvement in symptoms after surgery (13/18, 72%) than with exercise (5/19, 26%). Expected improvement from surgery was significantly associated with exercise when adjusted for expected improvement from exercise, symptom severity, and claudication pain type (p = .04).

With zero as the score indicating the greatest impairment or lowest walking ability from symptom severity, the median Walking Impairment Questionnaire score for the entire cohort was 7.5, with a range between 0.3 and 52.6. Total physical activity was not related to self-reported symptom severity. However, expectations of improvement were dependent on walking impairment. For exercise, individuals who expected greater walking benefit reported greater walking distances with less difficulty (p = .04; unadjusted). Overall, as the expectation of benefit from exercise increased, total walking impairment decreased. In other words, individuals who thought that walking was better for them reported feeling less impeded in their walking. This could also mean that being able to walk greater distances influenced the individual's expectation.

Discussion

Much of claudication symptomatology is subjective. While quantitative disease severity measures (i.e., ABIs and toe pressures) are commonly used to influence provider-level treatment decisions, the effects of patient-level qualitative factors, patient-reported quality of life, daily activity impairment, and treatment preferences are largely unknown. Because of the degree of subjectivity involved in both symptom experience and the uptake of one of the treatment pathways (i.e., physical activity), it is important to fully understand the effect of these qualitative variables on treatment recommendations from the patient's perspective to ensure that the best course of action is agreed upon and completed. Among veterans with claudication, studies have shown

that psychosocial factors have no small importance in the patient's approach to treatment recommendations (S. Sharath et al., 2016; S. E. Sharath et al., 2016). In this study, we found that (1) most participants were "risk-seeking" in that they were willing to accept at least *some* risk of amputation in exchange for symptom improvement, and (2) individuals reporting lower walking impairment scores expected greater benefit from walking.

Integration Into the Current Literature

The associations between beliefs, expectations, and actions have significant implications on physical activity behavior and adherence. Numerous studies have compared the benefits and limitations of community-based and supervised exercise therapy (Bendermacher et al., 2006). Yet, few studies have examined adherence rates and the reasons for both adherence and non-adherence from a beliefs and risk tolerance perspective. In addition, despite acknowledgment that adherence to activity recommendations among claudication patients is low (Bendermacher et al., 2006), there have been few examinations on the reasons for non-adherence.

To address some of the uncertainty on this subject, we investigated how risk attitudes and tolerance were related to a patient's expected symptom improvement. We hypothesized that individuals who expected greater improvement at the lowest level of risk (2%) compared to the highest level of risk (10%) could be considered "risk-averse" and, therefore, more likely to seek alternative treatment options (in this case, physical activity). Conversely, those who expected greater improvement at the highest level of risk could be considered "risk-seeking" and less likely to enact exercise recommendations. Our participants were "risk-seeking" in the sense that they were willing to accept some risk of amputation in exchange for symptom improvement. Morbi et al. (2017) reported similar findings of risk-seeking behavior among their cohorts: Individuals were willing to accept significant risk of treatment failure in exchange for greater benefit. Yet, in Morbi's study, unlike ours, nobody was willing to accept any amputation risk. In our study, most subjects (72%) were willing to accept a maximum of 4% risk regardless of the hypothesized improvements in symptoms (35%, 50%, 75%, and 100%). While we did not observe any differences in expectations when the question was phrased in terms of risk, we observed greater differences when scenarios were presented in the context of symptom improvement. This, perhaps, highlights the significant effect that subjective symptoms have on patient treatment preferences. In addition, we noted that although the data show the benefit of exercise over surgical intervention in treating claudication, participants in our study reported the reverse understanding.

Limitations

There were some challenges in understanding the risk/benefit questions. Subjects had trouble responding to the hypothetical scenarios presented and tended to use risk information presented earlier on (the evidence-based 4% risk) as touchstones for their responses. Other subjects refused to even consider surgical intervention. Yet, this hostility to risk did not seem to translate into significant activity. Another consideration is that people with mild to moderate claudication tend to continue on with their symptoms without seeking sources of symptom respite.

It is important to note that our sample size significantly limits the interpretation of our findings. Specifically, in terms of representation, this mostly male, White cohort does not characterize the experiences and attitudes of women and members of other races/ethnicities. In addition, we were unable to statistically adjust for significant factors that would have strengthened the accuracy of estimates.

Implications for Theory and Practice

Despite the limitations outlined, as a hypothesis-generating study, we did find that factors not previously considered in claudication research (i.e., benefit expectations, symptom severity) provided insight into physical activity behavior. While this is not sufficiently robust evidence to apply in clinical practice widely, the

risk/benefit calculation of using this information to influence provider–patient discussions leans toward benefit rather than risk—specifically, directing special attention to clear and contextual descriptions of the disease and treatment options. We hope that this study (1) contributes to understanding the role of behavior among patients with PAD and (2) encourages further robust investigation on the topic.

Conclusion

Most participants were willing to accept some risk of amputation in exchange for symptom improvement. Decreasing symptom severity was associated with an increasing expectation that walking will result in symptom improvement. Our findings may reflect the uncertainty and lack of understanding of the mechanism and benefits of the treatment options among people with claudication, specifically, that exercise is integral to symptom management regardless of revascularization status. This report also suggests that as subjective symptom severity increases, the deterrent effect of amputation risk decreases, and surgical intervention is more likely to become a treatment choice. When providers recommend exercise, accounting for a patient's symptom understanding and expectations regarding the treatment options may ensure increased walking adherence.

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