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Authors

Humphries, Misty D
Welch, Pierce
Hasegawa, Jason
et al.

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Correlation of Patient Activation Measure Level with Patient Characteristics and Type of Vascular Disease

Misty D. Humphries, **Pierce Welch**, **Jason Hasegawa**, **Matthew W. Mell**

Division of Vascular and Endovascular Surgery, University of California Davis Health, Sacramento, CA.

Abstract

Background: Patient activation or level of engagement in one's medical care is linked to hospital readmissions and worse outcomes in a number of diseases. Patients with higher levels of activation are typically guiding their care rather than acting as passive observers of care. This study aims to determine if either patient demographics or type of vascular disease can predict patient activation.

Methods: All patients presenting over a 4-month period to an outpatient vascular clinic were asked to complete the Patient Activation Measure (PAM) survey. In total, 257 completed surveys were collected. Survey responses were scored on a Likert scale with anchors. Responses are tallied with a score of 1–100 and converted to summary levels 1–4 in accordance with the previously validated scoring system. Level 1 patients are considered disengaged and overwhelmed. Patients in level 2 are becoming aware of their health care, but still struggle. Level 3 patients are taking action, while level 4 represents patients who are maintaining healthy behaviors and pushing further. Chi-squared test and multivariable regression were then performed to determine if patient characteristics or type of disease correlated with activation levels.

Results: In total, 257 patients completed the survey. The mean participant age was 67 years (±15). Sixteen percent of patients lived alone, 58% were married, and in 39% mean household income was <$50,000. Overall, 21 patients (8.2%) were classified as level 1, 65 (25%) level 2, 94 (37%) level 3, and 77 (30%) level 4. The group comprised 32% PAD, 20% carotid, 18% aortic/aneurysm, 14% venous, and 16% were various other vascular diseases. Over each disease group there was a wide range of activation, but no significant difference between the type of vascular disease and activation level. Chronic limb-threatening ischemia (CLTI) patients comprised 35% ($n = 29$) of the PAD group, and 66% of these patients reported an activation level of 3 ($n = 10$) or 4 ($n = 9$). There was no difference in the levels of activation reported by the CLTI patients compared to the general PAD cohort ($P = 0.99$). Multivariable analysis demonstrated that age,

Correspondence to: Misty D. Humphries, MD, MAS, RPVI, FACS, Division of Vascular and Endovascular Surgery, University of California Davis Health, 2315 Stockton Blvd, NAOB 5001, Sacramento, CA 95817, USA; mdhumphries@ucdavis.edu.

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SUPPLEMENTARY DATA

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level of education, household income, and type of vascular disease correlated with PAM score, but there was no correlation between length of symptoms or race and gender.

Conclusions: Patient activation is unpredictable using patient characteristics or type of vascular disease, and CLTI patients report high activation levels. Quality databases that collect only patient demographics may not fully capture patient predictors of poor outcomes. Use of the PAM survey should be further explored in vascular patients to correlate activation level with vascular-specific outcomes.

INTRODUCTION

Patient activation is the willingness and ability of a patient to take independent actions and manage their own healthcare. This definition equates patient activation with understanding one's role in the care process and having the knowledge, skill, and confidence to manage one's health and healthcare.[1] Activation differs from compliance, where the emphasis is on getting patients to follow medical advice. The Patient Activation Measure (PAM) survey (Insignia Health) is a validated survey that measures the patient's confidence in self-management and understanding of their medical conditions.[2,3] The survey results in a numeric score from 0 to 100, which is subdivided into one of the 4 levels of activation (Fig. 1). Level 1 patients are typically either disengaged or overwhelmed with their medical care. These patients tend to become passive observers of their care. At level 4 patients have adopted new health behaviors to manage their chronic conditions but may still struggle in times of stress. Increased PAM score has been shown to correlate with decreased hospitalization and increased medication adherence.[4] One of the benefits of using the PAM tool is that it not only allows providers to determine how to allocate resources for patients but also which patients may need more support before and after hospitalizations.

There are limited studies of the PAM survey in the vascular literature. Poon et al. used the tool in over 1,200 patients with cardiovascular disease and diabetes. It concluded that activation did not change significantly over time, but that baseline level of activation determined how much patients participated in shared decision-making.[5] Qualitative work from our group has demonstrated that many patients with chronic limb-threatening ischemia (CLTI) have become passive observers of their care, which is consistent with level 1 patient activation.[6] At this time, most quality databases such as the Vascular Quality Initiative or National Surgical Quality Improvement Projects collect extensive patient demographic and procedure-based data, but no data on patient activation, literacy, or patient-reported outcome measures. We hypothesize that patient activation does not correlate with standard fields collected by current quality databases and aim to determine whether socioeconomic factors or type of disease can predict activation in patients with vascular disease.

METHODS

Study Setting

The study was conducted in the vascular outpatient clinic of a tertiary referral center over a 4-month period (January 2019 to April 2019). The clinic sees over 700 new patients each

year with an average of 6,500 clinical encounters annually. The Institutional Review Board approved the administration of the survey to all patients.

Inclusion/Exclusion Criteria

All patients over 18 who presented to the vascular center outpatient clinic were asked to participate. Although the PAM survey is translated into numerous languages, only rights to the English version were purchased. Patients who could not read or write in English were excluded if they did not have a support person willing to translate the survey in order for them to answer the questions. Patients who had taken the survey on a prior visit, or who declined to complete the survey were also excluded.

Patient Activation Measure Survey

The primary outcome was patient activation for self-management, which was assessed with the 13-item Patient Activation Measure (PAM-13) survey (Insignia Health). The PAM-13 is considered a generic measure of activation. It consists of 13 items assessing self-reported knowledge, skill, and confidence for self-care irrespective of underlying chronic conditions.[7,8] Patients are asked to rate their level of agreement with responses of (1) disagree strongly, (2) disagree, (3) agree, (4) agree strongly, or (0) not applicable to questions such as: “When all is said and done, I am the person who is responsible for taking care of my health” (see Survey Document, Appendix). The scores of each response to the 13 questions are then summed to yield an overall raw score, which is converted to a score of 1–100 based on the PAM scoring table. Patients are then categorized into one of the 4 categories of patient activation based on pre-set validated cut-off points. Specifically, a person is considered level 1 with ≤47.0 points, level 2 with 47.1–55.1 points, level 3 with 55.2–67 points, and level 4 with≥67.1 points.[8] Level 1 includes the lowest activation scores corresponding to patients with low self-management engagement (Fig. 1). These patients are not taking an active role in self-management and are thus considered passive recipients of care. Level 2 patients have large gaps in knowledge and continue to believe that healthcare is largely out of their control. Level 3 patients are taking action and believe that they have an understanding of key facts that allow them to build self-management skills. Finally, level 4 patients have adopted new behaviors to improve their care but may still struggle in times of stress.

Patient Characteristics

In addition to the PAM-13 survey, patients were asked to answer questions about basic demographic data. This included age, gender, type of vascular disease, length of time they had vascular disease, education, and annual household income. Patients were also asked about social support networks such as marital status, who they lived with, and how far away their nearest support network person lived from them. Based on the demographic break-down, the income category was analyzed as a categorical variable of <$50,000 and >$50,000.

Survey Administration

Patients were given paper-based surveys to complete on arrival to the vascular clinic. The survey takes on average 10 min to complete and patients were asked to complete and return the survey while in the waiting room. In the event patients were taken back to the clinical area before completion, they were given time prior to the physician seeing them. All surveys were kept anonymous and physicians seeing the patient in the clinic were not told of the patient's PAM score.

Statistical Analyses

Categorical variables were described using frequencies and percentages. Continuous variables were described using mean and standard deviation (SD) with nonparametric continuous variables reported as the median and interquartile range (IQR). Categorical variables were analyzed using the chi-squared and Fisher's exact tests where appropriate and continuous variables were analyzed using the Kruskal-Wallis test when data were nonparametric and paired *t*-test when data were parametric. Univariate linear regression was used to determine if patient characteristics predicted PAM score. Variables with a *P*-value <0.2 were included in a multivariable linear regression model to determine which characteristics correlated with PAM score. Multivariable logistic regression was used to determine the relationship between patient characteristics and type of vascular disease on PAM level. All statistical analyses were completed in R Programming for Statistical Analysis (R Foundation for Statistical Computing) version 3.6.3.

RESULTS

Over the study period, 257 patients completed the survey. The mean patient age was 67 years (±15 years) and 139 (54%) were men (Table I). Fifty-eight percent of the participants were married. The majority of patients (59%) had a high school degree or less and only 13% had a 4-year degree or higher. Annual household income was also reported to be <$50,000 by 134 (52%) of survey participants. The group consisted of 32% PAD, 20% carotid, 18% aortic/aneurysm, 14% venous, and 16% other vascular diseases. The median length of time patients had been followed for their disease was 36 months (IQR = 21–60 months) (Table II).

The mean PAM score for the cohort was 64.3 (SD ±14). Univariate linear regression was performed to identify characteristics for the multivariable model (Table III). On univariate analysis, age, level of education, household income, and type of vascular disease were identified as variables with trends toward significance to include in the multivariable model. On multivariable analysis, the combined factors resulted in a statistically significant change in the PAM-Score ($P = 0.04$), which can be interpreted that as education and income level increases PAM score increases, and conversely as age increases PAM score decreases. Finally, the type of vascular disease can compound these factors, where patients with different vascular conditions may be more or less activated, and this needs to be further researched as to how they affect PAM score.

Using the 4 categories of patient activation, 21 patients (8.2%) were classified as level 1 activation (8%), 65 (25%) as level 2, 94 (37%) as level 3, and 77 (30%) as level 4. When the PAM score was broken into the 4 levels there were no significant differences between patient factors and disease state between the 2 groups (Tables I and II).

When the PAM score was broken down into the 4 levels, there was a wide variation in the degree of patient activation based on the type of vascular disease (Table II). The difference between PAM level and type of vascular disease however was not statistically significant ($P = 0.26$). We specifically evaluated patients with CLTI, which comprised 35% ($n = 29$) of the PAD group. Compared with patients with non-limb-threatening PAD, CLTI patients had a much shorter median duration of symptoms (PAD = 24 months versus CLTI = 12 months, $P \leq 0.001$). The PAM level in patients with CLTI also varied widely. Only 2 patients were categorized as level 1 (7%), 8 (28%) patients were categorized as level 2, 10 (34%) reported level 3 activation, and 9 (31%) reported level 4 activation (Table IV). There was no difference in the levels of activation reported by the CLTI patients compared with the general PAD cohort ($P = 0.99$). Multivariable analysis did not identify any significant differences among the length of symptoms or other patient characteristics and PAM level in the CTLI cohort when compared to either the general PAD group or the overall disease cohort ($P = 0.91$).

DISCUSSION

Patient activation is an underutilized tool, especially in vascular surgery. The concept has significant implications as we strive to improve both shared decision-making and quality of care while searching for additional factors that predict postoperative complications in patients with vascular disease. In this study, we found that patient demographics frequently used in quality databases are not associated with the PAM score. In addition, the length of time a patient has vascular disease does not predict activation. In multivariable regression, socioeconomic factors and type of vascular disease did correlate with the PAM score, with higher levels of education and household income predicting a higher PAM score. Finally, we found that patients with the most severe level of peripheral artery disease, CLTI, overwhelmingly reported higher levels of activation no different from patients with claudication.

Quality healthcare means providing patients with appropriate services in a technically competent manner with good communication, shared decision-making, and cultural sensitivity. It has been argued that poor quality can mean too much care (unnecessary procedures with associated risks and side effects), too little care (not providing indicated tests or a lifesaving surgical procedure), or the wrong care (using poor surgical technique).[9] For over 15 years, studies in vascular surgery have reported both gender and racial disparities in treatment and outcomes for aortic surgery,[10] peripheral artery disease,[11,12] and carotid disease.[13] There has been less of a focus on trying to understand some of these disparities, however. In our prior work with PAD patients, we were able to show that racial disparities no longer become significant when we adjusted for repetitive ER use and frequent hospitalizations,[14] both of which are associated with lower levels of patient activation.[15] In this study utilizing multivariable analysis, we showed that the type of vascular disease along

with higher household income and higher levels of education were associated with increased PAM scores. Current quality databases do not include social determinants of health, nor is there an adequate surrogate for health literacy or patient activation. Most surgeons can recall a patient in their office advocating for a procedure they believed was absolutely needed, when the patient was not medically optimized or potentially prepared to handle the postoperative course. These patients return to the clinic with wounds that have broken down or are infected, and ultimately require readmission. By understanding patient activation, a provider can determine early on which patients are not prepared for surgery, and those that may require more resources postoperatively. This allows providers to adjust follow-up, length of stay, or discharge. PAM level can also aid physician–patient interactions in shared decision-making by allowing physicians to understand which patients likely need more education and assistance with decisions. Finally, risk-adjusting quality of care outcomes for patients with different levels of activation would provide better insight into why patients with the exact same disease profile can have drastically different postoperative courses.

One of the major barriers to patient engagement is the unwillingness of patients to accept their chronic conditions.[16] Many patients with chronic illnesses go through an initial state of denial, even adopting maladaptive and unhealthy behaviors.[17] The most effective methods to engage patients with chronic conditions are family/friend support followed by education.[18] Moving through the various stages of acceptance and becoming educated about a chronic illness takes time. In our study, PAM score was not significantly different based on the length of time patients reported living with their disease. However, the median length of time patients reported having their disease in this study was 36 months. Prior studies have only looked at changes in PAM scores at short-term intervals, such as 6 months or after specific interventions. These short-term studies show that in the majority of patients (52%), PAM levels tend to remain relatively stable, but can increase or decrease over time based on health conditions.[19] In addition, baseline PAM scores correlate the best with patients' experiences in shared decision-making.[5] Because there are no long-term studies of how PAM changes over time, the 36 months median duration of symptoms seen in this study may be a significant contributor to the relatively high baseline PAM scores.

PAM scores have been shown to correlate with better hemoglobin A1C control in patients with diabetes,[20] willingness to quit smoking,[21] and lower healthcare utilization.[15] In our prior work with patients being treated for CLTI, a major theme regarding caring for their lower extremity ulcer was that many patients appeared to be passive observers of their care. This would correlate with level 1 or 2 activation. Because there are no studies using the PAM questionnaire in patients with vascular disease, let alone CLTI or claudication, we therefore do not know how activation correlates with outcomes in these patients. There are ongoing studies in Germany and the United States regarding PAM level with outcomes in PAD patients, but until that data are available several questions remain unanswered from our discovery that there was no significant difference in the PAM score between patients with CLTI and claudication. Moreover, 65% of patients with CLTI were scored as level 3 or 4 activation compared to 68% in patients with claudication. The most pressing questions are: Do patients overestimate their ability to care for their chronic conditions and Do they understand the nature of chronic conditions? If they do not overestimate their abilities, it

is possible that patients with early PAD may be in denial that it is a chronic disease and therefore not make life-changes to prevent them from developing CLTI.

There are several limitations to this work. First, this work is only the first step to studying PAM in vascular disease. Because this survey was administered in an anonymous fashion, we cannot go back and correlate the information with patient outcomes. We also cannot look at who chose not to participate, and this may have skewed the results of the work. This clearly needs to be one of the next steps. Although we did collect the length of time that patients had vascular disease, the long duration of conditions in this study may have had an effect on baseline PAM. We did not resurvey patients over time to determine if the PAM levels changed, which may occur in patients with long-standing conditions like vascular disease. Finally, we did not consider the severity of disease or how acute patients had been seen, which may also play into the level of activation. All of these remain areas to further explore.

CONCLUSION

Patient activation score correlates with other social determinants of health, but not gender, race, or duration of symptoms. Patients with long-standing conditions such as CLTI report high activation levels. Quality databases that collect only patient demographics may not fully capture patient predictors of poor outcomes. The use of the PAM survey should be further explored in vascular patients to correlate activation level with vascular-specific outcomes. Until this study is completed, the PAM survey should be used cautiously in vascular surgery studies.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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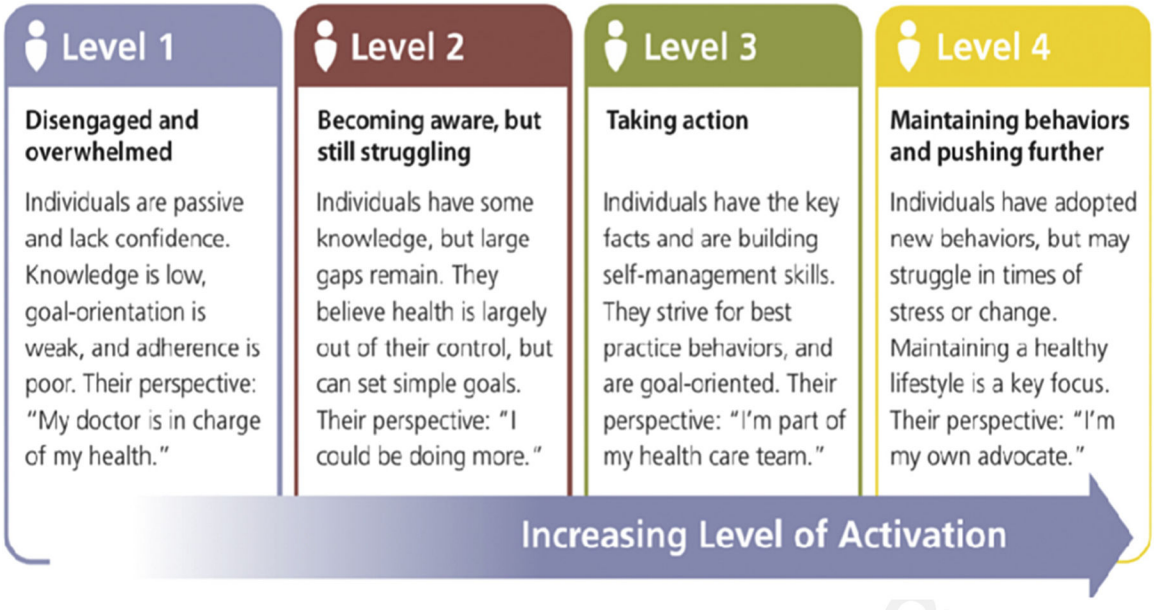

Fig. 1.

The 4 levels of patient activation. Level 1 represents individuals who are passive observers of their care, whereas Level 4 individuals are driving their own health care (Insignia health).

Table I.

Overall patient characteristics and characteristics by PAM level

Patient characteristics	Overall cohort, *n* = 257	Level 1 activation, *n* = 21 (8%)	Level 2 activation, *n* = 65 (25%)	Level 3 activation, *n* = 94 (37%)	Level 4 activation, *n* = 77 (30%)	*P*-value
Mean PAM score	64 (±15)	44 (±3)	51 (±3)	58 (±7)	83 (±9)	
Age (years)	67 (±15)	70 (±14)	66 (±15)	65 (±15)	63 (±14)	0.37
Gender						
Male	139 (54%)	12 (57%)	32 (49%)	51 (54%)	41 (53%)	0.82
Female	118 (46%)	9 (43%)	33 (51%)	43 (46%)	36 (47%)	
Married	148 (58%)	12 (57%)	37 (57%)	55 (58%)	44 (57%)	
Race						
White	134 (52%)	11 (52%)	33 (51%)	51 (54%)	39 (51%)	0.85
Black	8 (3%)	1 (5%)	1 (2%)	2 (2%)	4 (5%)	
Hispanic	21 (8%)	2 (10)	4 (6%)	7 (7%)	8 (10%)	
Asian	17 (7%)	0	8 (12%)	5 (5%)	4 (5%)	
Declined to state/other	77 (30%)	7 (33%)	19 (29%)	29 (32%)	22 (29%)	
Highest education						0.11
High school degree or less	153 (59%)	15 (71%)	42 (65%)	55 (58%)	37 (48%)	
Some college	75 (28%)	5 (24%)	17 (25%)	24 (26%)	29 (38%)	
Bachelor’s degree	21 (8%)	1 (5%)	3 (5%)	11 (12%)	6 (8%)	
Masters/doctorate	14 (5%)	0	3 (5%)	4 (4%)	5 (6%)	
Household income						
<50,000	134 (52%)	15 (71%)	38 (58%)	47 (49%)	34 (4%)	0.19
50,000–100,000	69 (27%)	2 (10%)	16 (25%)	24 (26%)	27 (35%)	
100,000–150,000	26 (10%)	3 (14%)	7 (11%)	8 (9%)	8 (10%)	
>150,000	28 (11%)	1 (5%)	4 (6%)	15 (16%)	8 (10%)	
Who live with						
Adult children	23 (5%)	2 (10%)	7 (11%)	8 (9%)	6 (8%)	0.62
Family members	24 (10%)	0	7 (11%)	8 (9%)	9 (12%)	
Alone	73 (28%)	1 (5%)	16 (25%)	26 (28%)	24 (31%)	
Spouse/significant other	135 (53%)	7 (33%)	35 (53%)	52 (54%)	37 (47%)	
Roommate	2 (4%)	11 (52%)	0	0	1 (2%)	

Table II.

Disease-based characteristics of the cohort and based on PAM level

Patient characteristics	Overall cohort, *n* = 257	Level 1 activation, *n* = 21 (8%)	Level 2 activation, *n* = 65 (25%)	Level 3 activation, *n* = 94 (37%)	Level 4 activation *n* = 77 (30%)	*P*-value
Type of vascular disease						
Carotid	52 (20%)	3 (14%)	15 (23%)	14 (15%)	20 (26%)	0.26
Peripheral artery disease	82 (32%)	5 (24%)	22 (34%)	29 (31%)	26 (34%)	
Aneurysmal disease	47 (18%)	6 (29%)	10 (15%)	20 (21%)	11 (14%)	
Venous disease	36 (14%)	5 (24%)	4 (6%)	15 (16%)	12 (16%)	
Other	40 (16%)	2 (10%)	14 (22%)	16 (17%)	8 (10%)	
Length of condition (months)						0.12
<12	54 (21%)	4 (19%)	11 (17%)	17 (18%)	22 (29%)	
12–36	107 (42%)	9 (44%)	34 (52%)	43 (45%)	22 (29%)	
>36	96 (38%)	8 (38%)	20 (31%)	35 (37%)	33 (42%)	

Table III.

Linear regression analysis of numerical PAM score based on patient characteristics and disease characteristics

Patient/disease characteristics	*R* squared	*P*-value
Age	**0.017**	**0.15**
Gender	0.029	0.84
Race	0.012	0.69
Highest education	**0.025**	**0.09**
Household income	**0.012**	**0.07**
Who they live with	0.023	0.66
Type of vascular disease	**0.021**	**0.14**
Length of condition	0.005	0.24
Multivariable mModel with highlighted variables	0.075	0.04[a]

Table IV.

Level of activation for patients with CLTI compared to those with claudication

Type of vascular disease	Overall cohort, *n* = 82	Level 1 activation, *n* = 5 (6%)	Level 2 activation, *n* = 22 (27%)	Level 3 activation, *n* = 29 (35%)	Level 4 activation, *n* = 26 (32%)	*P*-value
Chronic limb-threatening ischemia	29 (35%)	2 (7%)	8 (28%)	10 (34%)	9 (31%)	0.99
Claudication	53 (65%)	3 (6%)	14 (26%)	19 (36%)	17 (32%)	