

CURRENT CONCEPTS REVIEW**Musculoskeletal Literacy in Orthopedics: Associated Factors, Effects on Patient-Physician Communication and Intervention Strategies**

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Abstract

Health literacy is defined as the degree to which an individual obtains and processes basic health information and services so as to make appropriate and informed health decisions. Limited health literacy (LHL), as assessed by various validated instruments, remains prevalent amongst older adult patients, non-Caucasian ethnicities, and those of lower socioeconomic backgrounds. Of concern, LHL has been associated with decreased medical knowledge, disuse of preventative medical services, worse chronic disease control and increased use of emergency services. Within orthopedics specifically, LHL has been associated with lower expectations regarding outcomes and ambulation following total hip and knee surgery and fewer questions asked regarding diagnosis and treatment in the outpatient care setting. In some cases, LHL has been independently correlated with worse patient-reported outcome measures (PROMs), though this finding may be due in part to the reading level required of the PROMs. There is growing evidence that active intervention by the orthopedic provider and demonstration of empathy improves patient comprehension of the nature of their musculoskeletal complaints, aids informed decision-making and, ultimately, maximizes patient satisfaction. Recognition of the associated factors for LHL will ensure improved physician-patient communication through the implementation of health literate interventions focused on those most at-risk.

Level of evidence: III

Keywords: Associated factors, Effects, Health literacy, Orthopedics

Introduction

Health literacy represents the ability of an individual to obtain, communicate, process, and understand basic health information and services so as to make appropriate health decisions.¹ Approximately 36% of adult Americans demonstrate limited general health literacy (LGHL), with higher prevalence amongst non-Caucasians, older patients, and those with lower levels of education.^{2,3} This is concerning given the association between LHL and decreased medical knowledge, infrequent use of preventative services, increased hospitalization and use of emergency care, and worse control of chronic diseases.^{4,5} Furthermore, physicians tend to overestimate health literacy in 54% of African Americans, 11% of Caucasians, and 36% of patients of other races and ethnicities, suggesting that adequate health literacy is not easily

identifiable.⁶ The negative effect of LHL and its associated factors on physician-patient communication and patient expectations following surgery has been demonstrated in the orthopaedic literature.^{7,8} In particular, patients with inadequate health literacy in an outpatient hand surgery clinic ask fewer questions regarding their condition and treatment.⁹

While multiple validated assessments for determining health literacy have been described, a definitive measurement applicable to all demographics has not been identified.^{2,10} The value of disease- and specialty-specific instruments to assess health literacy has been recognized,^{11,12} particularly with regards to musculoskeletal complaints.^{13,14} Using a validated musculoskeletal-specific health literacy survey,

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Rosenbaum and colleagues found that the prevalence of limited musculoskeletal health literacy (LMHL) amongst adult emergency room patients was greater than that of LGHL.¹³ Furthermore, non-Caucasian ethnicity and less than college education were factors associated with LMHL.^{15,16} Similar factors for LMHL amongst patients seen in an outpatient foot/ankle or hand clinic have been reported.¹⁷ The effect of gender, employment within the medical field, and prior orthopaedic evaluations, however, has not been universally associated with MHL or GHL.^{13,14} Given that many factors associated with LHL are also related to worse patient expectations and outcomes following musculoskeletal care, it is imperative to identify patients most at-risk to improve patient satisfaction and, potentially, clinical outcomes.¹⁸⁻²¹ recognizing the prevalence of LHL in our patient population and identifying potential risk factors for LHL will be instrumental in improving patient-provider interactions in the setting of disparate ethnic, educational and socioeconomic backgrounds. Furthermore, interventions designed to minimize the effect of LHL at each stage of the orthopaedic treatment continuum is required.

Materials and Methods

Scope of the Issue

The prevalence of LGHL amongst the adult population has been reported between 33-48% in the United States.^{2,3} In comparison, the prevalence of LHL has been reported at 26-69% amongst various practice settings and orthopaedic subspecialties. [Table 1] Sabbagh et al, in a study of patients undergoing total shoulder arthroplasty, reported a 39% prevalence of LMHL and found low income to be an independent risk factor.²² In the orthopaedic literature, the Newest Vital Sign (NVS) has been most commonly utilized for assessment of GHL. The NVS questionnaire is a six-question instrument that has been validated in both Spanish and English. The participant is provided with a standard ice cream nutritional label and asked questions that assess their understanding of words, numbers and forms. A score of <4 indicates LGHL.⁴ The validated LiMP questionnaire for MHL is comprised of nine questions which assess a participant's knowledge of basic musculoskeletal anatomy and terminology, familiarity with musculoskeletal conditions, and understanding of diagnostic tests and treatment.^{15,23} A score of <6 indicates LMHL. Over 80% of the studies regarding prevalence of and associated factors for LGHL and LMHL have been published by two groups utilizing either the NVS and/or LiMP.^{7,9,13-16,23-26} In the 3 studies that administered both the NVS and LiMP, it was consistently demonstrated that the prevalence of LMHL was greater than LGHL.^{13,15,25} This suggests that the literacy skills required for making informed decisions regarding musculoskeletal conditions exceeds those required for decisions on general health. The broad scope of this problem within orthopaedics is further underscored by the significant number of musculoskeletal complaints presenting to primary care physicians in the outpatient setting.²⁷

The majority of factors associated with LHL are non-modifiable (ie race/ethnicity, gender, older age), whereas others such as lower levels of schooling achieved may be indirectly modifiable though active patient engagement and specialty-specific education. Several studies have

demonstrated that a previous interaction with a physician for a musculoskeletal complaint was associated with adequate MHL, though regression analysis to identify possible demographic confounders was not performed.^{14,24,25} Regardless, the increased familiarity with musculoskeletal treatment and terminology through the previous interaction suggests the existence of opportunities for the orthopaedic community as a whole to enhance the musculoskeletal literacy of our patients.²⁴ It is critical to recognize that the associated risk factors for LHL are certainly not causative and that patients of Caucasian ethnicity, those with greater than college education and younger age are similarly prone to LHL.^{14,17,24} The results of the current studies may not be generalizable to other practices given their patient demographics, in addition to the fact that the majority of the existing studies enrolled only English-speaking patients, potentially underestimating the prevalence of LHL.^{7,9,13-17,23-26,28}

Health literacy and patient behavior

The relationship between health literacy and patient behavior, including active involvement in their care through question-asking, has become more apparent. [Table 2] Given the risk of orthopaedic patients to be unable to effectively receive and process health information, defining the association between health literacy and patient behavior helps providers empower those patients who would benefit from additional counseling. Menendez and colleagues demonstrated that patients with LHL had a significantly shorter visit by 1.9 minutes with their hand surgeon compared to those with adequate HL. This difference held even after controlling for multiple patient- and disorder-related demographics, suggesting that patients of LHL are less likely to be actively involved in their care.⁷ In a subsequent study by the same group, the authors reported that patients with LHL presenting to an outpatient hand surgeon asked significantly fewer overall questions during the visit, particularly regarding the medical condition and therapeutic treatment.⁵ When evaluated as a continuous variable, health literacy demonstrated a moderate positive association with total number of questions asked. The study also found that surgeons only asked if the patient had a question 29% of the time, though patients asked a question 79% of the time when asked by the surgeon if they had a question. These results collectively support the need for orthopedic surgeons to actively engage patients by universally facilitating question-asking, regardless of their perceived health literacy, and to resist the assumption that lack of questions implies understanding.

The preference for limited involvement in health decision-making may be a reason for fewer questions being asked by patients, particularly amongst those with LHL.⁹ Interestingly, Tarabochia et al reported that 78% of patients presenting for outpatient hand care preferred an active or collaborative role in decision-making and that health literacy was not independently associated with preference for an active role in the decision-making process.²⁹ The number of years of education, however, was associated with preference for an active patient-directed role in decision-making. Dardas et al found that, amongst patients >65 years of age seeking hand care, the majority of participants (87%) preferred either shared- or patient-directed decision-making. In particular, being a new patient predicted the

desire for patient-directed as opposed to physician-directed decision-making, even after controlling for health literacy.³⁰

Table 1. Prevalence and associated factors for LHL

Study	Year	Study setting	Subspecialty	Literacy Assessment Instrument	# of pts	Prevalence LHL	Associated risk factors for LHL
Rosenbaum et al ¹³	2013	Emergency department	General MSK	MHL (LiMP), GHL (NVS)	65	MHL (60%), GHL (48%)	NA
Rosenbaum et al ¹⁴	2015	Emergency department, outpatient	ED: general MSK; Clinic: hand surgery	LiMP	130	45%	Lack of prior orthopaedic interaction †; ED: non-Caucasian
Rosenbaum et al ¹⁵	2015	Emergency department	General MSK	MHL (LiMP), GHL (NVS)	248	MHL (69%), GHL (48%)	MHL: non-Caucasian, <college †
Menendez et al ²³	2015	Outpatient clinic	Hand surgery	NVS	200	43%	Older age, publicly insured/uninsured, lower income
Rosenbaum et al ¹⁶	2016	Emergency department	Foot & ankle	LiMP	56	32%	Non-Caucasian, <college †
Rosenbaum et al ²⁴	2016	Outpatient clinic	Hand surgery (carpal tunnel)	LiMP	65	34%	Lack of prior orthopaedic interaction †
Menendez et al ⁷	2016	Outpatient clinic	Hand surgery	NVS	224	31%	Older age, female gender, non-white, publicly insured, unemployed
Johnson et al ²⁵	2017	Outpatient clinic	General MSK	LiMP	120	MHL (57%), GHL (43%)	MHL: † Rural pts: < some college Urban pts: lack of prior orthopaedic interaction
Menendez et al ⁹	2017	Outpatient clinic	Hand surgery	NVS	84	26%	NA
Alokozai et al ²⁷	2018	Outpatient clinic	Hand surgery	NVS	112	27%	NA
Glassman et al ²⁸	2018	Outpatient clinic	Spine surgery	NVS	186	44%	Older age, lower educational level †
Noback et al ¹⁷	2019	Outpatient clinic	Foot & ankle/hand surgery	LiMP	231	49%	Non-Caucasian, < college

NVS: Newest Vital Sign

LiMP: Literacy in Musculoskeletal Problems

MSK: Musculoskeletal

ED: Emergency Department

NA: Not applicable

† Regression analysis not performed

Table 2. Clinical studies on the effect of HL on physician-patient interaction

Study	Year	Subspecialty	HL Assessment	Behavior(s) studied	Findings
Chu et al ²¹	2013	Hip/knee arthroplasty	REALM (Chinese version)	Understanding of information	Physician empathy strengthens relationship between HL and understanding preoperative information
Menendez et al ³⁰	2015	Hand surgery	NVS	Patient satisfaction	No association between HL and patient satisfaction
Menendez et al ⁷	2016	Hand surgery	NVS	Duration of visit	Pts w/ LHL: - Shorter visit duration by 1.9 minutes
Parrish et al ³¹	2016	Hand surgery	NVS	Patient satisfaction	No association between HL and patient satisfaction
Menendez et al ⁹	2017	Hand surgery	NVS	Number of questions asked during visit	Pts w/ LHL: - ask fewer questions overall - ask fewer questions regarding medical condition and treatment
Alokozai et al ²⁷	2018	Hand surgery	NVS	- Time spent seeking hand care - Time from booking to being seen	No correlation between HL and: - time spent seeking hand care - time from booking to evaluation
Glassman et al ²⁸	2018	Spine surgery	NVS	Resource utilization of standard lumbar spine treatment modalities	Pts w/ LHL: - less likely to see specialists - less likely to use medications - use chiropractors more frequently

REALM: Rapid Estimate of Adult Literacy in Medicine
LHL: Limited Health Literacy
NVS: Newest Vital Sign

As patients become more comfortable with their provider, they become more willing to share some of the responsibility for medical decisions. The reliance of patients on family and friends to make an informed decision regarding care cannot be overemphasized,^{26,30} and every effort should be made to encourage the presence of family members during the decision-making process.

Resource Utilization

The utilization rate of total knee arthroplasty in the United States, even after patient-related risk and hospital-volume adjustment, has been demonstrated to be lower amongst racial minorities, a patient-related factor associated with LHL.³¹ Lower socioeconomic status, however, transcends the reported ethnic differences in the field of joint arthroplasty¹⁹ and is related to higher rates of hospitalization, more post-operative complications, longer hospital stays, higher mortality and worse treatment adherence.^{5,8,20} In addition, LHL has been associated with worse patient expectations regarding ambulatory status following total hip and knee surgery, which itself has an effect on patient satisfaction.⁸ Interestingly, when examining time spent seeking outpatient care from a hand specialist, Alokozai and colleagues found that LHL was not independently associated with total waiting time, travel time, face-to-face time, and booking-to-appointment time.²⁶ The authors attributed this to the increased efficacy with which electronic health systems track patient referrals and the ability to more easily reach out to

patients to remind them of upcoming visits. Clearly, even patients with LHL can navigate the complexities of the health system. In a study involving outpatients seeking spine care, patients with LHL were found to use more medications for chronic lower back pain, were less likely to visit a specialist and visited the chiropractor more often, though multivariable regression analysis of other patient- and disease-related demographics was not utilized in this study.²⁸ Puzzitiello and colleagues found that patients with LHL had significantly higher hospital LOS, but not total hospitalization costs or in-hospital opioid use following shoulder arthroplasty.³² The disparate results regarding the relationship between health literacy and the utilization of resources suggest that individual patient- or disease-related factors, apart from simply LHL, may have a more direct influence on utilization patterns.

Health literacy and PROMs

Patient-reported outcome measures (PROMs) have been utilized as the primary means to determine patient-centered response to treatment, and quantify symptom intensity and capability. [Table 3] A commonly utilized PROM is the Patient-Reported Outcomes Measurement Information System (PROMIS) Upper Extremity (UE) function.²⁶ PROMIS UE function represents a computer adaptive tool (CAT) that maximizes information gained from patients based on prior responses and can be administered in a cross-sectional fashion or longitudinally.^{26,33} Despite widespread use,

controversy exists as to whether PROMs used in orthopaedics are written at an appropriate reading level such that they can be comprehensible by patients.^{34,35} It has been recommended that the survey instruments be written at the sixth-grade reading level or below. Apart from readability, other factors such as formatting, use of technical words, as well as the site and mode of survey administration may exert demands on a patient's health literacy.³⁶

Prior studies have demonstrated a negative effect of LHL on specialty-specific PROMs.³⁷ Glassman et al reported that adult patients with chronic lower back pain and LHL had significantly worse back and leg pain scores than those with adequate HL, though no significant differences were found for the Oswestry Disability Index (ODI) and Euro-QUOL5D (EQ-5D) surveys.²⁸ It is unclear whether the worse pain scores amongst patients with LHL represented a worse stage of disease, worse perception of their disorder or simply a fundamental issue related to the measurement instrument. In contrast, however, others have reported no independent association between LHL and PROMIS UE CAT scores.^{26, 33} amongst factors associated with lower PROMIS scores was a traumatic nature of the presenting diagnosis, older age and being on disability. These discordant results indicate that the association may be subspecialty- or PROM-specific. A variety of health literacy assessment tools were utilized which may affect the generalizability of the findings. Based on the current literature, however, the PROMIS UE CAT may be administered to patients regardless of their GHL.

Health literacy and patient satisfaction

Patient satisfaction represents an important aspect of patient-centered care, not simply as another outcome measure, but because of its reported association with patient compliance and understanding of treatment.^{38, 39} Knowing which factors positively influence patient satisfaction further enhances the patient-physician interaction. Using the Consultation and Relational Empathy (CARE), a validated measure for empathy, two studies assessed the relationship between patient- and visit-related variables and patient satisfaction amongst patients evaluated in an outpatient hand clinic.^{33,38} Health literacy was not significantly associated with either patient satisfaction or patient-perceived physician rush. Interestingly, only patient-perceived physician empathy and greater symptoms of depression were independently associated with patient satisfaction and only patient-perceived physician empathy was associated with perceived physician rush.³³ Orthopaedic provider efforts should be focused on maximizing the quality rather than actual time of the physician-patient visit. Menendez et al reported that the most significant predictor of patient satisfaction in the outpatient hand surgery setting was physician empathy, followed by patients of older age. Health literacy was not found to be a predictor of patient satisfaction.³⁸ The use of formal empathy training through learning modules has been shown to improve patient-perceived empathy from their providers.^{40,41} Higher decisional satisfaction for electing to undergo surgical intervention has been significantly associated with increased procedural knowledge provided during the informed consent process.³⁹

Table 3. Effect of HL on patient-reported outcomes measures (PROMs)

Study	Subspecialty	HL Assessment	PROM instrument	Findings	Factors associated w/ PROM
Alokozai et al ²⁷	Hand surgery	NVS	PROMIS UE function	LHL not independently associated w/ PROMIS UE	Lower PROMIS score: Diagnosis (trauma vs. non-trauma), higher PROMIS pain interference score
Glassman et al ²⁸	Spine surgery	NVS	ODI, Numeric Rating Scales for back/leg pain, EQ-5D	- LHL not associated w/ ODI and EQ-5D - LHL associated w/ significantly worse back/leg scores	NA
Udawatta et al ³⁵	Sports medicine	Health LiTT	PROMIS UE function	LHL not independently associated w/ PROMIS UE	Lower PROMIS score: disability, older age, GED or lower, underwent surgery

NVS: Newest Vital Sign PROM: Patient-reported outcome measure; LHL: Limited health literacy; ODI: Oswestry Disability Index; EQ-5D: EuroQOL5D; Health LiTT: Health Literacy Assessment; Using Talking Touchscreen Technology; GED: Graduate Equivalency Degree)

Intervention strategies

Few studies have investigated intervention strategies for mitigating the effect of LHL.⁴² [Table 4] Rosenbaum and colleagues emphasized the importance for the orthopaedic community to become familiar with current interventions to improve health literacy so that successful strategies can be

universally implemented and further developed.⁴³ Health literacy training focused on patient-centered communication within the medical school curriculum has been demonstrated to increase health literacy knowledge and confidence in communicating with patients possessing LHL.⁴¹ Despite the emphasis on communication as a core competency by the

Accreditation Council for Graduate Medical Education (ACGME), health literacy training during residency has not been consistently implemented. While many communication strategies may mitigate the effects of LHL, the effectiveness may be enhanced by collaborating with the patient and determining the strategy that most aligns with their preferences. A study of older patients seeking hand-related care found that patients mostly relied on information provided by their surgeon during the visit, followed by internet searches of medical websites.³⁰ These patients, however, expressed an overwhelming preference for decision aides such as paper handouts. While the actual preferred informational medium may change with more widespread integration and use of technology, patients can clearly be more actively involved in their care by providing them with the appropriate information to make a shared decision.

Table 4. Effective communication strategies for enhancing patient-physician encounter quality

<p>1. Implementation of teach-back^{44,48} "We've talked about a lot of things today. Can you summarize for me what we are going to do for your back pain?" "Can you tell me what I told you about the risks of the surgery?"</p> <p>2. Use of simple terminology, minimizing medical jargon⁴⁴ "broken bone" for "fracture"; "stretched muscle" for "strain"</p> <p>3. Use of decision aids such as models, pictures, charts, videos, etc.⁹ Particularly useful for common orthopaedic diagnoses, ie hip/knee arthritis, RTC tears</p> <p>4. Patient informational handouts, AAOS and/or specialty websites^{32,45,46} AAOS OrthoInfo (https://orthoinfo.aaos.org)</p> <p>5. Demonstration of physician empathy^{9,21,30} Engage in active listening through paraphrasing patient statements, actively solicit questions (ie, "What are your questions regarding our plan?")</p>
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RTC: rotator cuff; AAOS: American Academy of Orthopedic Surgeons

Pictorial/Informational Intervention

Tsahakis and colleagues evaluated the improvement in patient comprehension of post-discharge instructions following informational intervention amongst orthopaedic trauma patients who underwent surgical intervention.⁴⁴ Additional informational sheets resulted in a statistical improvement in comprehension of which bone was involved and whether DVT prophylaxis was required. Lower educational level and lower income levels were significantly associated with a positive impact on three of five questions and two of five questions, respectively. Patient preference for decision aids providing background material on diagnosis and treatment of hand-related issues has been demonstrated.³¹ Choi and colleagues evaluated the use of web-based, pictographic discharge instructions for low-literate elderly patients after undergoing hip arthroplasty and found that it was well-received by the participants for conveying complex instructions.⁴⁵

Active Patient Engagement

Patient activation includes asking questions of patients during a medical visit to actively engage that patient in their care.⁴⁶ Patients who are highly activated experience better health-related outcomes and more positive clinical experiences.^{5,46} Despite the importance of patient-centered care and the emphasis on communication within graduate medical curriculum, health literacy has not been consistently addressed.⁴³ Teach back represents an effective health-literate communication technique to improve the patient-physician interaction wherein patients are asked to explain back concepts in their own words.^{43, 47} the provider should acknowledge the amount and complexity of the information provided during the visit, and ensure that misunderstanding has been corrected. The implementation of formal teach back training amongst residents has been demonstrated to significantly increase their use of this modality.⁴⁷ Perhaps as important is the use of simple language, making certain to define any medical terminology.⁴³ In light of the time constraints placed upon the patient-physician interaction, it has become clear that the quality of the visit be maximized. The utilization of standardized scripts for common conditions encountered, the use of charts and other decision aides to simplify complex topics, the recognition of both verbal and non-verbal patient expressions for possible confusion and the active solicitation of questions by patients to ensure understanding are useful.⁷

Provider Empathy

Empathy refers to the ability to understand and share in the feelings, perspectives and experiences of others. It has been increasingly recognized as an important and effective communication tool to enhance the patient-physician relationship.^{21,38} The use of empathy has clinical implications in that it results in more collaborative patient involvement in their care, and encourages active participation in recovery from musculoskeletal issues.²¹ The ability to allow patients to feel as though their concerns are being heard may be as important, if not more so, than even the most comprehensive orthopaedic information.³⁸ Physician empathy exerts a positive influence on the relationship between health literacy and understanding of preoperative information amongst patients undergoing total hip and knee arthroplasty.²¹ By communicating with patients empathically, providers can improve knowledge retention and, thereby, clinical outcomes. LHL cannot be undone in a single specialty visit and it is not necessary to improve HL to provide good care or encourage patient agency. What is important is that clinicians anticipate various levels of HL and check for understanding, gently correct common misconceptions, and ensure that expressed preferences are consistent with what matters most to individuals and aligns with their values.

Current Knowledge Gaps

To date, the majority of studies in the orthopaedic literature assessing the prevalence and risk factors for LHL have been conducted in the outpatient setting^{7,9,14,17,23,24,26,28} and emergency room.^{13-16,25} In the outpatient setting, most

studies deal with hand surgery^{5,7,17,23,24,26} and were performed by 2 groups, limiting the generalizability of the results.^{7,9,13-16,23-26} The studies in hand surgery assessed GHIL using the NVS tool, whereas studies in the emergency department and the outpatient foot/ankle setting used the LiMP survey. The prevalence of LHL may not accurately reflect the diverse patient populations seen by individual orthopaedic practices. A systematic review of health literacy in the surgical fields concluded that further prevalence studies would not advance the topic and recommended emphasis on intervention techniques.⁴²

Conclusion

Both LGHL and LMHL have been reported amongst patients evaluated for musculoskeletal complaints and adversely affect patient expectations, adherence to treatment and outcomes. Patient comprehension of their treatment can be improved through interventions aimed at providing additional information regarding their care. While many patient factors are non-modifiable, practice interventions aimed at active engagement and musculoskeletal education should be focused on patients regardless of ethnic, educational and socioeconomic backgrounds.

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