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Effects of health literacy on treatment outcome and satisfaction in patients with mallet finger injury

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ABSTRACT

Study Design: Prospective cohort.

Introduction: Patient comprehension of their injury, its treatment, and health care provider's instructions plays an important role in health management and recovery from trauma.

Purpose of the Study: This study investigates the effects of health literacy (the ability to obtain, process, and understand health information needed to make appropriate health decisions) on treatment outcomes and satisfaction in patients with mallet finger injuries.

Methods: A total of 72 patients who had been treated with an orthosis for an acute mallet finger injury were enrolled in this prospective study. Health literacy was measured according to the newest vital sign during the initial visit, and adherence according to the treatment protocol was rated at week 7 when orthotic intervention was ceased. At 6 months, a follow-up visit was conducted to assess the extensor lag, treatment satisfaction, and disability (through the Quick Disabilities of the Arm, Shoulder, and Hand score). Bivariate and multivariable analyses were performed to determine whether patient demographics, injury characteristics, and health literacy factors accounted for following outcomes: extensor lag, satisfaction, and disability.

Results: The newest vital sign scores were moderately correlated with patient adherence and age. Extensor lag was associated with an increase in age, poor adherence, and low health literacy, and these 3 factors accounted for 28% of the variation in the extensor lag. A greater disability was associated with poor adherence, which accounted for 12% of the variance in disability. Lower treatment satisfaction was associated with low health literacy and poor adherence, and these 2 factors accounted for 21% of the variation in treatment satisfaction.

Discussion and Conclusions: Limited health literacy was associated with poor adherence in orthosis care for mallet finger injuries and led to poorer treatment outcomes in terms of extensor lag and treatment satisfaction.

Level of Evidence: 2B

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Introduction

The proper comprehension on the part of the patients in terms of an injury, its treatment, and health care provider's instructions plays an important role in health management and recovery from trauma.¹

Conflict of interest: All named authors hereby declare that they have no conflicts of interest to disclose.

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Health literacy (defined as the ability to obtain, process, and understand health information needed to make appropriate health decisions) is a well-recognized but poorly addressed factor that affects public health.² A 2006 study by the US Department of Education found that 36% of adults have only basic or below-basic literacy skills in dealing with health material.³ Many patients have difficulty in understanding their medical condition, medication, and instructions, and these circumstances may be exacerbated by the fact that health care providers overestimate the health literacy of their patients.¹ Physicians were previously reported to believe that most patients understood when to resume normal activities, whereas only about half such patients reported that they had in fact understood.⁴

Mallet finger is characterized by a loss in continuity in the distal insertion of the extensor tendon at the distal phalanx. It is a common orthopedic injury with an incidence of 9.89 per 1000 individuals.⁵ The primary treatment choice in most acute mallet finger cases is orthotic intervention, and the orthosis must be continuously worn for 6–8 weeks.^{6,7} Patient adherence, the extent to which the patient's behavior matches agreed recommendation from the prescriber, is reportedly associated with favorable treatment outcomes for mallet finger injury.^{8,9} Common sequelae include a slight extensor lag and a prominent bump on the dorsum of the finger.⁷

The effects that health literacy has on treatment outcomes and satisfaction after an acute hand injury, such as a mallet finger injury, have not yet been thoroughly investigated. Limited health literacy is reportedly common among patients who are seeing a hand surgeon,¹⁰ and patients' understanding of their injury may be related to their satisfaction with treatment. However, the study design that data were only gathered at 1 point in time did not permit further in-depth analyses of the potential impact of health literacy on treatment outcomes in patients with a hand injury.¹⁰ In addition, the relationship between a low health literacy and treatment outcomes has not been comprehensively evaluated through both self-reports and objective measures of hand function.

The primary purpose of this study is to evaluate associations of a low health literacy in patients with an acute mallet finger with poor adherence and follow-up loss as well as treatment outcomes both in terms of objective measures and self-reports of hand function. Secondarily, we asked if other patient and injury factors were associated with treatment outcomes at 6 months.

Materials and methods

Seventy nine patients who had been treated with an orthosis for an acute mallet finger injury between January 2013 and October 2014 and who were 18 years of age or older were initially enrolled in this prognostic study. The institutional review board approved this study, and all patients provided informed consent after the purpose and procedures for this study had been explained. Patients were recruited when they initially attended the orthopedic outpatient clinic, and the inclusion criteria consisted of a mallet finger with or without a fracture and treatment with an orthosis immobilization. Patients were excluded if the injury was open, distal interphalangeal joint (DIPJ) subluxation was present, or treatment was delayed by more than 2 weeks. Of the 79 potentially eligible subjects, 4 patients were excluded and 3 subjects declined to participate in the study, leaving 72 eligible patients.

A physician applied a volar-padded aluminum orthosis to the subject's finger with the aim of slightly hyperextending the DIPJ. The slight hyperextension was only visually estimated and not measured. All participants were provided specific written instruction regarding the care of the finger and orthosis including adjustment or replacement of the orthosis (Flesch-Kincaid grade level = 7.4, equivalent to American seventh grade reading level) and the importance of maintaining the mallet deformity in a corrected position. The physician reinforced the importance of keeping the DIPJ extended at all times and provided instruction on how to change the orthosis to examine the skin without allowing the DIPJ to flex. Patients discontinued the orthosis after 7 weeks of continuous wear.

Health literacy was orally measured with the newest vital sign (NVS)¹¹ in person by a research assistant (trained nurse). The NVS was published by Weiss et al¹¹ in "Quick assessment of literacy in primary care: the newest vital sign."¹² The assessment is comprised of a 6-item questionnaire that assesses health literacy and numeracy. Patients can receive a total score of 6 (where 0–1 =

limited literacy, 2–3 = potentially limited literacy, and 4–6 = appropriate literacy). The NVS was originally validated against the Test of Functional Health Literacy in Adults.^{13,14}

Patient adherence with a treatment protocol was rated by a research assistant at week 7 (when orthotic intervention was ceased at the orthopedic outpatient clinic) using a 3-point self-report (patient-reported) scale as a modified version of that provided by Groth et al.¹⁵ Patients were rated as 3 (compliant) when the orthosis was never removed or removed only with extreme care, 2 (secondary compliant) when an orthosis was loose or accidentally dislodged and instantly replaced, and 1 (noncompliant) when an orthosis was not worn properly or taken off several times.

A physician who was unaware of the patient NVS score completed the following measurements at 6 months: degree of extensor lag at the DIPJ (measured with a standardized steel finger goniometer with 1° increments using a dorsal approach); patient satisfaction with treatment outcomes on a 10-point Likert scale, ranging from 0 (very dissatisfied) to 10 (very satisfied); and patient-reported evaluation of a Quick Disability of the Arm, Shoulder, and Hand score (QuickDASH), with higher scores reflecting greater arm specific disability. QuickDASH has been shown to be reliable and valid for patients with disorders in the upper extremities.¹⁶ The investigators (trained nurse) checked all returned questionnaires for completion, and the participants were assisted in completing the missing items.

Statistical analysis

A power analysis indicated that the sample consisting of 64 patients would provide an 80% statistical power with an alpha of 0.05 for an effect size of f -squared of 0.20 for a regression with 4 main predictors.

Descriptive statistics were calculated to determine the patients' demographic and clinical characteristics. The relationships between potential predictors (NVS, adherence, gender, age, type of injury, and mean days postinjury) and dependent variables (extensor lag, DASH scores, and patient satisfaction) were determined by using a correlation coefficient for continuous predictor variables and using a 1-way analysis of variance or an independent t test for categorical potential predictors after normality testing. Bivariate predictors that had been found to have $P < .1$ in the bivariate analysis were selected as candidates for the multivariable linear regression model to prevent model overfitting. The categorical variables were dummy coded with the subgroup for the largest sample size considered as the reference group (male sex and tendinous mallet). Potential predictor variables were tested for collinearity (intercorrelation) before analysis, and if correlations were found to be >0.8 , 1 of the pair was eliminated from the regression model. A multiple linear regression analysis with a forward stepwise variable selection was conducted with marginal significance levels for entry and removal at 5% and 10%, respectively. This approach was selected to minimize the collinearity between the predictor variables and determine the independent predictors of treatment outcomes in patients after an acute mallet finger injury. We conducted a total of 3 regressions each for the extensor lag, QuickDASH, and satisfaction. We used the mean imputation to deal with the missing data, which is a method that is frequently used for clinical research.¹⁷ Statistical significance was accepted at $P < .05$.

Results

Overall, 19% (14) of the participants were found to have a limited health literacy and 33% (24) had a potentially limited health literacy (Table 1). Of the 72 patients who were initially included, a total 8

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