

# Conjoint Analysis of Treatment Preferences for Nondisplaced Scaphoid Fractures

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**Purpose** We used conjoint analysis to assess the relative importance of factors that influence a patient's decision between surgical or nonsurgical management of a nondisplaced scaphoid fracture. Our hypothesis was that out-of-pocket costs will have a greater influence on decision making than the time spent in a cast or brace, degree of soreness, or the risk of treatment failure.

**Methods** Two-hundred and fifty participants were recruited using Amazon Mechanical Turk and asked to assume that they had experienced a nondisplaced scaphoid waist fracture. They then indicated their relative preferences among 13 pairs of alternatives with variations in the following attributes: time in a cast, time in a brace, duration of ongoing soreness, risk of treatment failure (by which we meant scaphoid nonunion), out-of-pocket costs based on estimates of direct costs (\$500–2,500), and apprehension about surgery. A conjoint analysis was used to determine the relative importance of these factors when choosing between surgical or nonsurgical management.

**Results** The factor with the greatest influence on treatment choice was the cost of the procedure. After assessing the respondent's apprehension to undergo surgery, a sensitivity analysis showed the proportion of respondents who would choose surgery given different outcomes. To make the predicted share of those who are "not worried" about surgery equal to those who are "somewhat worried" or "a little worried" would require that the cost of surgery increase by \$2,700. In addition, 2 weeks in a cast, 3 weeks in a brace, 2 months of soreness, or a 2% increase in the risk of fracture nonunion generates the same surgical choice probability as a \$2,000 increase in the out-of-pocket cost of surgery.

**Conclusions** As conceptualized in this conjoint analysis, out-of-pocket costs and apprehension about surgery seem to have a greater impact on a decision for surgery than the time spent in a brace or cast and the risk of treatment failure. (*J Hand Surg Am.* 2018; ■(■): ■–■. Copyright © 2018 by the American Society for Surgery of the Hand. All rights reserved.)

**Type of study/level of evidence** Economic and decision analysis III.

**Key words** Conjoint analysis, hand surgery, patient preferences, scaphoid fracture, shared decision making.

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PATIENTS WHO EXPERIENCE nondisplaced scaphoid fractures may be treated with cast immobilization or surgical treatment with various types of internal fixation. Immobilization of the wrist for at least 6 to 12 weeks is an effective treatment with bony union achieved in greater than 90% of patients.<sup>1-3</sup> However, cast immobilization is cumbersome and may lead to temporary stiffening of the wrist, reduced grip strength, a longer return time to manual work, and a prolonged healing time.<sup>3-5</sup> Internal fixation limits immobilization and provides patients with an earlier return to work and higher rates of union.<sup>5</sup> However, patients undergoing surgery may be at an increased risk for osteoarthritis, soft-tissue injury, and implant-related complications.<sup>5</sup> Furthermore, the risks associated with surgery will vary according to the type of internal fixation selected. Thus, the best treatment for nondisplaced scaphoid fractures remains disputed.

The importance of patient preferences in shared decision making has gained increased attention, and becomes particularly valuable when many effective treatment options exist.<sup>6-14</sup> Often, a person's values may influence his or her treatment preferences. Physicians can weigh patient preferences in the context of the available clinical evidence to facilitate shared decision making. Conjoint analysis is one method that has been successfully used to develop outcome measures and to study how a person's values may affect his or her treatment preferences.<sup>6,15-18</sup> Conjoint analysis is based on the premise that each treatment derives value from its expected advantages and disadvantages. It provides estimates of what are the most important factors to patients when deciding amongst treatments.<sup>7,15-22</sup> Furthermore, when out-of-pocket cost is incorporated as a study attribute, the conjoint analysis can provide an estimate about how much a person is willing to pay for a change in a given attribute.<sup>23-26</sup> In this study, we tested the hypothesis that out-of-pocket costs would have a greater influence on decision making for the management of a scaphoid fracture when compared with the time spent in a cast or brace, degree of soreness, or the risk of treatment failure. We also determined the relative importance of each attribute as it relates to a surgical or nonsurgical treatment.

## MATERIALS AND METHODS

The Institutional Review Board granted an exempt research status to this protocol. The authors of this study selected 5 attributes that were deemed to influence a person's quality of life after a wrist fracture.

These included time in a cast, time in a brace, remaining soreness and stiffness, risk of treatment failure, and out-of-pocket cost. We also assessed an individual's level of apprehension about surgery. The attributes selected for this study are those that have been consistently addressed in research and patient care. Our survey was developed based on the interpretation of the best available evidence from randomized clinical trials that compare cast immobilization and screw fixation for a nondisplaced scaphoid fracture, with the understanding that there are various interpretations of the best available evidence (Table E1, available on the *Journal's* Web site at [www.jhandsurg.org](http://www.jhandsurg.org)).<sup>5,27-33</sup> This method of attribute selection has been employed in previous studies.<sup>34-36</sup> The various levels for each attribute reflect current practice patterns and data as described in the literature. By providing different levels of each attribute for 13 hypothetical relative preference experiments, it is possible to estimate a value of each level for each respondent. The levels assigned to each attribute are presented in Table E1, and are as follows: time in a cast (2, 4, or 8 wk), time in a brace (2, 4, or 8 wk), remaining soreness or stiffness (2, 4, or 6 months), risk of treatment failure (3%, 5%, or 10%), and out-of-pocket costs (\$500, \$1,000, or \$2,500). A complete example of the administered survey may be found in Appendix A (available on the *Journal's* Web site at [www.jhandsurg.org](http://www.jhandsurg.org)).

## Participants and survey process

Participants of this survey were recruited from an online panel of members using Amazon Mechanical Turk (MTurk) to administer an electronic survey.<sup>37</sup> This provides a large pool of users who can be recruited for academic or private sector research surveys. The MTurk method of data collection has been previously validated in obtaining high-quality data in an inexpensive and rapid manner.<sup>6,7,10,12,19,22,34,38-43</sup> Similar papers have suggested that a sample size can be based on prior studies.<sup>42</sup> On the basis of the limited number of reports in the medical<sup>6,7,21,34,41</sup> and orthopedic literature,<sup>19,42</sup> the authors concluded that the appropriate sample size for this study was approximately 250 surveys. Furthermore, before releasing the finalized survey, a separate pilot test of the survey was conducted to provide assurance that the survey was well comprehended and that a sample of 250 responses would produce sufficiently small standard errors and stable measures of the importance of the tested surgical procedures. Using the online MTurk survey, introductory questions first assessed similar past injuries, relative activity levels, types of

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