

# Application of the Brief International Classification of Functioning, Disability, and Health Core Set as a Conceptual Model in Distal Radius Fractures

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**Purpose** In 2009, the World Health Organization published a conceptual outcome framework for evaluating upper extremity injury and disease, known as the Brief International Classification of Functioning, Disability, and Health (ICF) Core Set for Hand Conditions. The purpose of this study was to apply the ICF conceptual model to outcomes for distal radius fractures (DRFs) and determine the contribution of each ICF domain to patient satisfaction.

**Methods** Patient-rated and objective functional outcome data were collected at 6 weeks, 3 months, and 6 months after surgery. We measured satisfaction using a subsection of the Michigan Hand Outcomes Questionnaire (MHQ) satisfaction score. Measured study variables were linked to their corresponding ICF domain (personal factors, environmental factors, activity and participation, and body function). We then used hierarchical regression to assess the contribution of each ICF domain to variation in overall patient satisfaction at each time point.

**Results** We enrolled 53 patients with unilateral DRFs treated with the volar locking plating system. Regression analysis indicated that measured study variables explain 93% (6 weeks), 98% (3 months), and 97% (6 months) of variation in patient satisfaction. For all 3 study assessment dates, activity and participation variables (MHQ–Activities of Daily Living, MHQ–Work, and Jebsen-Taylor Score) contributed the most to variation in patient satisfaction, whereas personal and environmental factors had a considerably smaller role in predicting changes in patient satisfaction.

**Conclusions** The results demonstrated that it is possible to reliably model the relative contributions of each ICF domain to patient satisfaction over time, and the findings are consistent with previous research (ie, that most outcome variation is due to physical or functional factors). These results are strong enough to support continued use and further research using the ICF model for upper extremity outcomes. (*J Hand Surg 2010;35A:1795–1805.* © 2010 Published by Elsevier Inc. on behalf of the American Society for Surgery of the Hand.)

**Key words** International Classification of Functioning, Disability, and Health, outcomes, distal radius fractures, MHQ.



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Supported in part by a Clinical Trial Planning Grant (R34 AR055992-01) and an Exploratory/Developmental Research Grant Award (R21 AR056988) from the National Institute of Arthritis and Musculoskeletal and Skin Diseases, and a Midcareer Investigator Award in Patient Oriented Research (K24 AR053120) (to K.C.C.).

The authors thank Jae Song, MD, and Soo Young Kwak for assistance with this project.

Received for publication November 20, 2009; accepted in revised form July 6, 2010.

No benefits in any form have been received or will be received related directly or indirectly to the subject of this article.

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0363-5023/10/35A11-0009\$36.00/0  
doi:10.1016/j.jhssa.2010.07.013

IN 1980, THE World Health Organization initiated development of a universal framework for classifying the consequences of disease.<sup>1</sup> The goal of this model was to provide a comprehensive, internationally flexible, biopsychosocial representation of overall health that included environmental, sociodemographic, and psychological contributions—factors that were previously understudied.<sup>2,3</sup> In 2001, this descriptive method of organizing outcomes, known as the International Classification of Functioning, Disability, and Health (ICF), was formally published (<http://www.who.int/classifications/icf/en/>).<sup>3</sup> The ICF model is composed of 5 major domains: (1) body structure, (2) body function, (3) personal factors, (4) environmental factors, and (5) activity and participation (Fig. 1).<sup>3,4</sup> These 5 domains include factors that focus on a patient's function and disability relating to his or her health condition (body function, body structure, and activity and participation) and contextual factors that affect his or her overall health state and often vary considerably between different cultures and socioeconomic atmospheres (external environmental factors and internal personal factors).<sup>3,4</sup>

To ensure comprehensive coverage of the many different factors that can affect a patient's overall health state, the original ICF model included an extensive list of over 1,400 variables grouped into the above 5 domains.<sup>3</sup> Using this model, several researchers have linked variables from pre-existing outcome tools to the ICF domains to evaluate how well the existing outcome measures assess the overall health state associated with specific conditions, and to validate the utility of the ICF method for these conditions.<sup>2,5–11</sup> Although the results of these studies successfully validated the use of the comprehensive ICF framework for a variety of conditions including distal radius fractures (DRFs),<sup>5</sup> many researchers expressed concerns regarding the feasibility of sorting through such a lengthy list of categories for each disease.<sup>12</sup> Consequently, the World Health Organization developed a smaller ICF Checklist with 125 variables and several targeted Brief ICF Core Sets for evaluating specific health conditions.<sup>12–17</sup> The goal of each Brief ICF Core Set is to select critical, disease-specific sets of variables from the original comprehensive ICF model that may serve as standards for reporting health status in future clinical studies pertaining to that disease.<sup>12</sup> In 2009, the World Health Organization published a Brief ICF Core Set for Hand Conditions, which now requires worldwide implementation and validation (Appendix A; this appendix may be viewed at the *Journal's* Web site, [www.jhandsurg.org](http://www.jhandsurg.org)).<sup>18</sup> This Brief ICF Core Set for Hand Conditions was the result

of a consensus meeting convened in Switzerland and attended by representatives from over 20 nations, at which the senior author of this report was the representative from the United States.

The purpose of the present investigation was to apply measurable outcomes (MHQ and objective functional outcomes) of surgically treated DRFs to a comprehensive conceptual model based on the Brief ICF Core Set for Hand Conditions. Using the Brief ICF Core Set for Hand Conditions as a guide, we aimed to evaluate the relative contribution of each ICF domain (personal factors, environmental factors, activity and participation, and body function) to variation in overall patient satisfaction (as measured by the MHQ–satisfaction score) at 6 weeks, 3 months, and 6 months after surgery for DRFs. We hypothesized that objective outcome measures would contribute most to patient satisfaction, compared with personal and environmental factors.

## MATERIALS AND METHODS

We recruited consecutive, eligible patients with unilateral unstable DRFs as part of a larger study analyzing the volar locking plating system in DRFs.<sup>19</sup> To control for the effect of different treatment methods on overall patient outcome, we chose to limit our analysis to surgical patients treated with the volar locking plating system.<sup>20,21</sup> Patients with concomitant upper extremity injuries, bilateral fractures, or other systemic injuries were excluded from our study. After surgery, all patients received a removable splint to protect their injured wrists for a total of 6 weeks. Within 1 week of surgery, all patients began a 6-week structured hand therapy program focused on passive finger range of motion, hand and wrist edema control, and active wrist motion. Patients were encouraged to use their operated hand and return to their usual activities of daily living (ADL) with the splints as tolerated.

### Outcomes evaluation

Previous research has shown that patients with surgically treated DRFs are able to achieve a substantial portion of their total recovery by the 6-month follow-up visit.<sup>5,19,22,23</sup> Based on these findings, we anticipated that there would be enough outcome variation (change in MHQ–satisfaction score) between 0 and 6 months to demonstrate the relative contributions of each ICF domain to changes in patient satisfaction. At each scheduled postoperative visit, both patient-rated and objective functional outcome measures were

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