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Original Study

Comprehensive Care Improves Physical Recovery of Hip-Fractured Elderly Taiwanese Patients With Poor Nutritional Status

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A B S T R A C T

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Objectives: The effects of nutritional management among other intervention components have not been examined for hip-fractured elderly persons with poor nutritional status. Accordingly, this study explored the intervention effects of an in-home program using a comprehensive care model that included a nutrition-management component on recovery of hip-fractured older persons with poor nutritional status at hospital discharge.

Design: A secondary analysis of data from a randomized controlled trial with 24-month follow-up.

Setting: A 3000-bed medical center in northern Taiwan.

Participants: Subjects were included only if they had “poor nutritional status” at hospital discharge, including those at risk for malnutrition or malnourished. The subsample included 80 subjects with poor nutritional status in the comprehensive care group, 87 in the interdisciplinary care group, and 85 in the usual care group.

Interventions: The 3 care models were usual care, interdisciplinary care, and comprehensive care. Usual care provided no in-home care, interdisciplinary care provided 4 months of in-home rehabilitation, and comprehensive care included management of depressive symptoms, falls, and nutrition as well as 1 year of in-home rehabilitation.

Measurements: Data were collected on nutritional status and physical functions, including range of motion, muscle power, proprioception, balance and functional independence, and analyzed using a generalized estimating equation approach. We also compared patients’ baseline characteristics: demographic characteristics, type of surgery, comorbidities, length of hospital stay, cognitive function, and depression.

Results: Patients with poor nutritional status who received comprehensive care were 1.67 times (95% confidence interval 1.06–2.61) more likely to recover their nutritional status than those who received interdisciplinary and usual care. Furthermore, the comprehensive care model improved the functional independence and balance of patients who recovered their nutritional status over the first year following discharge, but not of those who had not yet recovered.

Conclusions: An in-home program using the comprehensive care model with a nutritional component effectively improved the nutritional status of hip-fractured patients with poor nutrition. This comprehensive care intervention more effectively improved recovery of functional independence and balance for patients with recovered nutritional status.

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Malnutrition in elderly hip-fractured patients has a prevalence of 9.0% to 88.6%.^{1,2} Postsurgical nutrition interventions for these patients have improved clinical outcomes, such as shorter hospital stays,³ fewer postoperative complications,⁴ less mortality,⁵ and more stability in quality of life.⁶ However, the effectiveness of nutritional supplements following hip-fracture surgery was shown in a meta-analysis to have inconsistent and insufficient supporting evidence.⁷ On the other hand, combining nutritional supplementation and progressive resistance training during outpatient rehabilitation improved patients' physical function and quality of life as well as decreased their disability.⁸ These effects decreased the risk of weight loss more than the independent effect of progressive resistance training, suggesting that resistance training without nutritional supplementation limits the effectiveness of rehabilitation.⁹ This finding suggests the importance of nutritional support along with rehabilitation to enhance the recovery of patients following hip fracture. However, the combined effects of nutritional intervention and rehabilitation on hip-fractured patients with poor nutritional status have yet to be explored.

To address this gap in knowledge, we conducted a secondary analysis of data from a clinical trial involving a comprehensive, multicomponent intervention program including a malnutrition management component.¹⁰ The trial compared usual care with 2 care models featuring in-home components: interdisciplinary care (including in-home rehabilitation) and comprehensive care (including in-home rehabilitation with nutritional management). Our aim was to determine the effects of nutritional management and the combined effect of nutritional management with other intervention components on physical function of hip-fractured patients with poor nutritional status at hospital discharge. We asked 2 research questions: (1) Does in-home comprehensive care with a nutritional management component improve the nutritional status of hip-fractured patients with poor nutrition at discharge? (2) Does the in-home comprehensive care model more effectively improve overall physical function for patients with recovered nutritional status than for those who did not recover nutritionally during the first year following discharge? We hypothesized that improving the nutritional status of these patients using the in-home comprehensive care model would enhance their physical recovery.

Methods

Study Design and Subjects

This study is a secondary analysis of data from a randomized controlled trial approved by the Institutional Review Boards at the study hospitals.¹⁰ Original criteria for inclusion were (1) age 60 or older, (2) admitted to hospital from home setting for an accidental single-side hip fracture, (3) receiving hip arthroplasty or internal fixation, (4) able to perform full range of motion against gravity and some or full resistance, (5) having a prefracture Chinese Barthel Index (CBI) score >70, and (6) living in northern Taiwan. Exclusion criteria were (1) severely cognitively impaired and unable to follow orders (determined by a Chinese Mini-Mental State Examination score <10),¹¹ and (2) terminally ill. Following consent, patients were randomly assigned to 1 of 3 groups: comprehensive, interdisciplinary, or usual care. Outcomes were assessed at 1, 3, 6, and 12 months after discharge.

Subjects in the present study were included only if they had "poor nutritional status" at hospital discharge, including those at risk for malnutrition [Mini Nutritional Assessment (MNA) score 17–23.5] or being malnourished (MNA score <17). During the first year following hospital discharge, those who improved to stable normal nutritional status—defined as having MNA >23.5 at 3, 6, and 12 or 6 and 12 months following discharge—were categorized as "nutritionally

recovered"; otherwise subjects were categorized as "not recovered." In the original trial, 299 participants were recruited from September 2005 to July 2010. Of these, 252 had "poor nutritional status" at discharge. At the end of 12 months for this trial subsample, 227 subjects remained (Figure 1).

Interventions

Comprehensive care

The nutritional management component was provided to the comprehensive care group along with other intervention components; (ie, continuous rehabilitation and fitness enhancement, geriatric assessment, supported discharge planning, depression management, and fall prevention).¹⁰

Nutrition intervention. Subjects' nutritional status was assessed by a geriatric nurse using the MNA before discharge and at 1, 3, 6, and

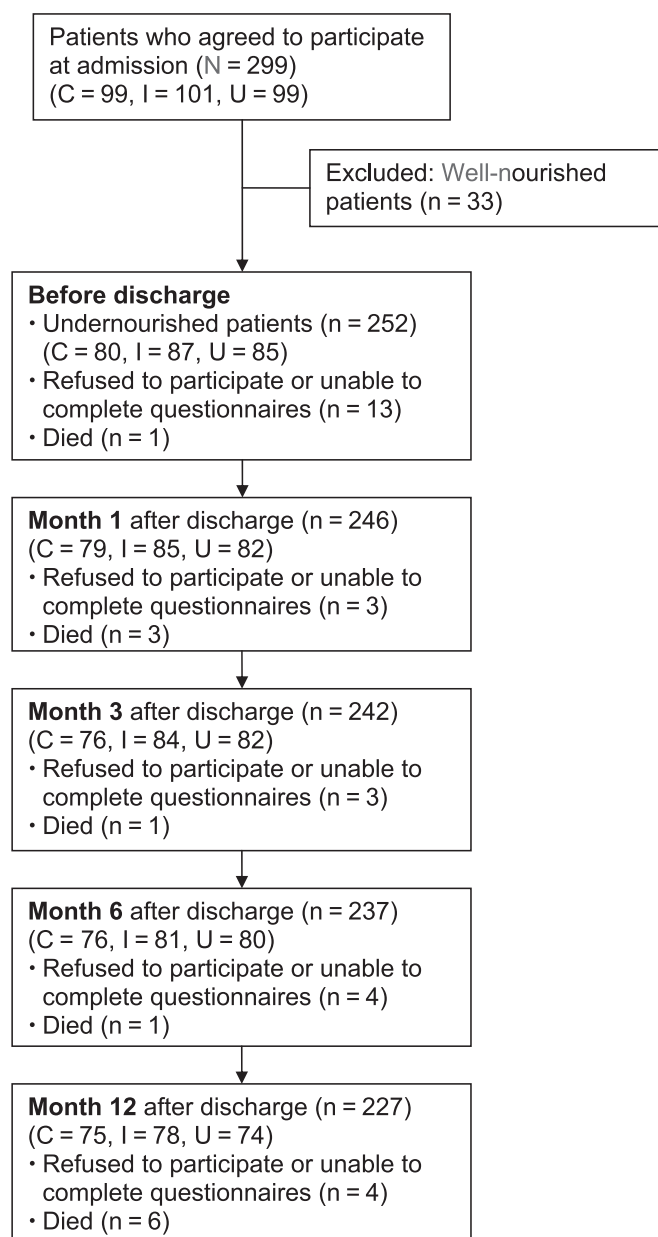


Fig. 1. Flow chart of the study. C, comprehensive care; I, interdisciplinary care; U, usual care.

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