

Developing and Internally Validating a Clinical Prediction Tool for Walking Impairment in Hip Fracture Patients who can Walk Independently before Injury

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INTRODUCTION: Hip fractures are one of the most common types of fragility fractures and, due to their increasing incidence, are a major concern for orthopaedic surgeons around the world. The loss of ambulation after a hip fracture in older people who were able to walk independently often results in the need for long-term care, a reduction in their quality of life, and an increased burden on society. Early identification of high-risk patients and early intervention are essential to improve patient outcomes and reduce the need for long-term care. However, no practical and user-friendly prediction score is currently available to assist clinicians in the identification of patients at high risk of long-term walking disability. This study aimed to develop an easy-to-use clinical prediction model for predicting walking disability one year after a hip fracture and to assess its internal validity.

METHODS: A prospective cohort study was conducted at a university hospital in Japan, including 189 surgically treated hip fracture patients aged 65 years or older who could walk independently before injury, defined as walking without any aid or with a cane. Data on 10 candidate predictors were collected at the time of admission. The primary outcome was walking impairment at one year of injury, which was defined as either death within one year or lower walking ability than walking with a single cane. A backward stepwise logistic regression model was used to develop the prediction model. Model performance was assessed using the area under the curve (AUC), and internal validation was performed using bootstrap methods to correct for optimism.

RESULTS: The primary outcome occurred in 64 patients (34%). The ACT score was developed as a 7-point model based on three predictors: Age, Cane use, and Trochanteric fracture, reflecting the acronym ACT. For age, patients aged 75 to 89 years were assigned 2 points, while those aged 90 years or older were assigned 4 points. Patients who walked with a cane before injury were assigned 2 points. Patients with a trochanteric fracture were assigned 1 point. The model demonstrated good discriminative ability with an optimism-corrected AUC of 0.84 (95% confidence interval: 0.78 to 0.90). The estimated probabilities of walking impairment were 8.7% for scores 0 to 2, 43% for scores 3 to 4, and 75% for scores 5 to 7. These estimates closely matched the actual prevalence observed in the cohort.

DISCUSSION AND CONCLUSION: The ACT score is a simple and reliable clinical prediction model for walking impairment in hip fracture patients independently walking before injury. This score uses only variables available at admission, enabling clinicians to provide timely prognoses and make informed treatment recommendations. The model's ease of use and accuracy make it a valuable tool in clinical practice, potentially enhancing patient care and informing caregivers and families about future functional outcomes. Further external validation is required to confirm its utility across diverse clinical settings.