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The GAMMA® nursing measure: Its calibration for construct validity with Rasch analyses☆

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ABSTRACT

Background: The GAMMA nursing measure was developed to routinely score a person's ability to independently perform activities of daily living. The nursing utility of the scale has been established as being satisfactory and it has been recommended that its use be extended to home-based care where restorative nursing is required for rehabilitation and elderly care.

Purpose: To subject the GAMMA nursing measure to the Rasch Measurement Model and to report if the measure can function as an interval scale to provide metric measurements of patients' ability to perform instrumental activities of daily living.

Method: A quantitative design was followed whereby GAMMA raw scores were collected from persons ($n = 428$) living in seven retirement villages and patients ($n = 334$) receiving home-based care after an acute or sub-acute nursing episode. In most of the retirement villages only cross-sectional data were collected; however, in the home-based care patients both admission and discharge data were collected. The data were prepared for Rasch analyses and imported into WINSTEP® Software version 3.70.1.1 (2010). Persons with extreme scores were eliminated, resulting in a final sample of 570 persons. The calibration and analyses of the final reports are illustrated with figures and graphs.

Results: The Rasch analyses revealed that the GAMMA functions optimally as an interval scale with a four-category structure across all eight items, rather than a seven-category structure as originally intended. Overall, the GAMMA satisfies the Rasch Model with a good to excellent fit.

☆ **Research significance**: The GAMMA is a nursing scale designed to routinely score an elderly or disabled person's ability to live independently. In this study, the GAMMA's construct validity is tested to confirm the extent to which the GAMMA can function as a standardised metric. With this known, restorative nursing has the potential to become an empirical science to calculate patient improvement, nursing performance and efficiencies of nursing service delivery.

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Conclusion: The use of a validated measure of patients' ability to perform instrumental activities of daily living has the potential to provide evidence of patient improvement, nursing performance and effectiveness of nursing service delivery.

1. Introduction

1.1. Background

Person-centred nursing became a popular new directive in gerontological nursing in 2001 (McCormack & McCance, 2006). It consisted of four key components which became the mainstay for good gerontological nursing practice. These four components comprise the attributes of the nurse, the care environment or context in which care is delivered, person-centred processes, and the care delivered through a range of activities (Nolan, Davies, Brown, Keady, & Nolan, 2004). The assumption was that good person-centred nursing results in good patient outcomes. Some years later, Slater, McCormack, and Bunting (2009) went further and developed a measurement tool, the Nursing Context Index (NCI), which measured the improvement in nursing work conditions when person-centred nursing is applied. The NCI thus enhanced the person-centred nursing approach to increase nursing work conditions and nursing satisfaction. According to Slater et al. (2009), the NCI revealed that nursing work conditions improved when the person-centred nursing framework was implemented in gerontological practice. In other words, person-centred nursing improves the nursing outcomes. What seems to be a problem in the clinical setting though is that nurses can measure how good they are in caring, but not how effective their caring is for their patients. There seems to be a lack in empirical evidence that good person-centred nursing care correlates with good patient outcomes. Nurses seem to believe that good nursing care correlates positively with good patient outcomes. But is this true? The answer is not known as validated routine nursing measures of patient outcomes are not available.

Nurses often find themselves inattentive within the multidisciplinary team meetings when restorative issues on patient functional improvement are discussed (Loubser, 2012). Yet, nurses observe patients continuously and are thus in an ideal position to proactively inform and guide the team on patient functioning and progress in independent execution of activities of daily living. However, in multidisciplinary meetings they seem to lose their patient advocacy role and take a supportive rather than a leading stance within the team (Ghebrehiwet, 2012). This absence of active nursing participation when restorative strategies and techniques are discussed is a major barrier to effective health team functioning and can impact on the success of person-centred care. This may also give rise to the first concern that good person-centred nursing may not necessarily correlate with good patient outcomes. Loubser (2012) proposes that the reason nurses do not fully participate in the multidisciplinary process is because they are not privy to patient evidence-based measurements to manage the patient's progress towards independent execution of activities of daily living.

The GAMMA nursing measure (hereafter referred to as the GAMMA) has been reported by Loubser, Bruce, and Casteleijn (2014) as an instrument that measures the ability of a patient to perform activities of daily living such as meal preparation, running errands, commuting and emotional stability. It has a high acceptance and usefulness level among community-based nurses to be used routinely, i.e. it has high nursing utility ratings (Loubser et al., 2014). Further, it provides routine patient evidence-based scores to enhance nurses' confidence in their patient outcomes. Loubser (2012) proposed that the empirical evidence provided by the GAMMA could provide the nurses with the ability to reclaim their patient advocacy role, their accountability character and the management identity required by the NCI. To achieve this, the GAMMA's construct validity as an accurate nursing measure had to be demonstrated. The purpose of this article is thus to report on the construct validity and reliability of the GAMMA.

1.2. The Rasch Measurement Model (RMM)

The Rasch Measurement Model (RMM) was conceptualised by Georg Rasch, a Danish mathematician, in the 1960s. He studied the relationship between human ability and item (or task) difficulty, and developed a mathematical formula to calculate this relationship (Rasch, 1960). In essence, this formula expresses the probability that a person with a certain level of ability will pass items in a test with a certain difficulty level. In other words, persons with low ability will pass items with low levels of difficulty and vice versa. He intended his formula to be applied in the field of education, but his probability theory is so fundamental that it has been used in the healthcare sciences since the late 1990s. The RMM is particularly useful in healthcare where assessments contain rating scales with ordinal levels of measurement. For example, when a person's ability to dress himself is assessed and scored, the possible categories on the rating scale are described as 1 – completely unable, 2 – able with much assistance, 3 – able with minor assistance, 4 – independent with use of assistive devices, and 5 – completely independent. The disadvantage of ordinal rating scales is that it is not legitimate to sum the scores of the items in an assessment to obtain the total score and treat it as an interval scale because the distances between the categories are not equal. One may only sum scores that are on an interval level of measurement, such as millimetres on a ruler (Iramaneerat, Smith, & Smith, 2008). The RMM transforms