



A pressure ulcer and fall rate quality composite index for acute care units: A measure development study



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ABSTRACT

Background: Composite indices are single measures that combine the strengths of two or more individual measures and provide broader, easy-to-use measures for evaluation of provider performance and comparisons across units and hospitals to support quality improvement.

Objective: The study objective was to develop a unit-level inpatient composite nursing care quality performance index—the Pressure Ulcer and Fall Rate Quality Composite Index.

Design: Two-phase measure development study.

Settings: 5144 patient care units in 857 United States hospitals participating in the National Database of Nursing Quality Indicators[®] during the year 2013.

Methods: The Pressure Ulcer and Fall Rate Quality Composite Index was developed in two phases. In Phase 1 the formula was generated using a utility function and generalized penalty analysis. Experts with experience in healthcare quality measurement provided the point of indicator equivalence. In Phase 2 initial validity evidence was gathered based on hypothesized relationships between the Pressure Ulcer and Fall Rate Quality Composite Index and other variables using two-level (unit, hospital) hierarchical linear mixed modeling.

Results: The Pressure Ulcer and Fall Rate Quality Composite Index = $100 - PUR - FR$, where PUR is pressure ulcer rate and FR is total fall rate. Higher scores indicate better quality. Bland-Altman plots demonstrated agreement between pairs of experts and provided evidence for inter-rater reliability of the formula. The validation process demonstrated that higher registered nurse skill mix, higher percent of registered nurses with a baccalaureate in nursing or higher degree, higher percent of registered nurses with national specialty certification, and lower percent of hours supplied by agency staff were significantly associated with higher Pressure Ulcer and Fall Rate Quality Composite Index scores. Higher percentages of unit patients at risk for a hospital-acquired pressure ulcer and higher unit rates of physical restraint use were not associated with higher Pressure Ulcer and Fall Rate Quality Composite Index scores.

Conclusions: The Pressure Ulcer and Fall Rate Quality Composite Index is a step toward providing a more holistic perspective of unit level nursing quality than individual measures and may help nurses nursing administrators obtain a broader view of which patient care units are the higher and lower performers. Further study is needed to examine the usability of the Pressure Ulcer and Fall Rate Quality Composite Index.

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What is already known about the topic?

- The individual nursing sensitive quality indicators of hospital-acquired pressure ulcer rate and total fall rate are reliable and valid indicators that provide standardized rate calculations across patient care units and hospitals.

- A criticism of individual quality measures is that they may not reflect the overall quality of care by providers.
- Health care quality composite indices are single measures that combine the strengths of two or more individual quality measures and provide easy-to-use indices.

What this paper adds

- We developed the Pressure Ulcer and Fall Rate Quality Composite Index and provide initial evidence of reliability and validity.
- The Pressure Ulcer and Fall Rate Quality Composite Index is a step toward a broader view of unit level nursing quality that may be useful in providing a higher level, more aggregate view of organizational quality.

1. Background

There is increasing demand for better quality indicators in order for healthcare leaders and providers to benchmark standards of care and implement quality improvement strategies (Simms et al., 2012). However, one criticism of individual quality measures is that they may not reflect the overall quality of care by providers (Majeed et al., 2007). Improvement in scores on one quality measure may have the unintended consequence of decreasing quality scores on another measure. For example, changes in clinical practice to improve quality scores for hospital-acquired pressure ulcer rate could decrease the quality scores for fall rate due to the focus on hospital-acquired pressure ulcer prevention including increased or earlier mobilization of patients.

Health care quality composite indices are single measures that combine the strengths of two or more individual quality measures and provide easy-to-use indices for performance evaluations and comparisons. Simms et al. (2012) argue that composite indices provide a better comparison of provider performance than single indicators. For example, Dimick et al., (2009) combined two quality measures (observed mortality rate and hospital volume for each of six surgical operations) and found the composite to be a strong predictor of future performance. Our study objective was to develop an inpatient unit-level composite nursing care quality outcome performance indicator—the Pressure Ulcer and Fall Rate Quality Composite Index.

1.1. Nursing quality of care measures

Nursing quality of care measures or nursing-sensitive measures are “processes and outcomes—and structural proxies for these processes and outcomes (e.g., skill mix, nurse staffing hours)—that are affected, provided, and/or influenced by nursing personnel, but for which nursing is not exclusively responsible” (NQF, 2004, p. 2). What has been measured as nursing sensitive generally has fallen under Donabedian’s (1988, 1992) Structure-Process-Outcome paradigm (Maben et al., 2012), in which the structure and processes of care influence the outcomes of care. *Structure* refers to setting attributes, including provider characteristics (e.g., skill mix, nurse staffing hours) in which patient care takes place. *Processes* are what is done, including interactions between patient and providers (e.g., risk assessment, prevention interventions, patient-provider communication). Patient *outcomes* are results of care and include patient safety measures (e.g., hospital-acquired pressure ulcers, falls, healthcare associated infections). Comprehensive lists of nursing quality measures are provided by Helsop and Lu (2014) and Maben et al. (2012).

In a recent concept analysis of nursing-sensitive indicators, Helsop and Lu (2014) found that pressure ulcers and falls were the two most frequently cited outcome attributes of nursing-sensitive indicators. Hospital-acquired pressure ulcer and total

fall rates are widely recognized, are important measures of inpatient nursing care quality, and have been endorsed by the National Quality Forum as nursing-sensitive (Helsop and Lu, 2014; Maben et al., 2012; NQF, 2004). Further, both adverse events are foci of United States health care policy and patient safety initiatives. The National Database of Nursing Quality Indicators (NDNQI) collects data on hospital-acquired pressure ulcer and total fall rates from participating hospitals in order to provide standardized rate calculations across patient care units and hospitals—allowing for easy comparisons of like units in like hospitals for quality improvement initiatives. The two measures are the most reported by NDNQI participating hospitals. Therefore, hospital-acquired pressure ulcer rate and total fall rate were selected for development of an initial inpatient unit-level composite nursing care quality performance indicator, the Pressure Ulcer and Fall Rate Quality Composite Index.

1.2. Hospital-acquired pressure ulcers and inpatient falls

Hospital-acquired pressure ulcer rate is measured as the percentage of patients assessed who have a least one pressure ulcer that developed after hospital admission and total fall rate is measured as the total number of falls per 1000 patient days (NQF, 2004). The National Quality Forum endorsed hospital-acquired pressure ulcer rate and total fall rate as national consensus measures, meeting the National Quality Forum criteria of (a) importance to measure and report, (b) scientific acceptability, (c) feasibility, (d) usability and use, and (e) comparison to related or competing measures (NQF, 2015). Reliability evidence for the hospital-acquired pressure ulcer measure includes a Kappa agreement of 0.56 for wound identification, indicating moderate reliability, and 0.65 for pressure ulcer staging, indicating substantial reliability (Hart et al., 2006). Bergquist-Beringer et al. (2011) found substantial reliability for pressure ulcer staging among both certified and noncertified nurses, Kappa=0.75 and 0.68 respectively. For the total falls measure, reliability evidence includes a sensitivity of 0.90 and specificity of 0.88 of fall classification (Simon et al., 2013). Garrard et al. (2016) reported an overall intra-class correlation (ICC 1,1) of 0.85 for injury level assignment of falls, indicating substantial reliability.

Nursing care characteristics associated with lower hospital-acquired pressure ulcer rate are higher skill mix (percent of total nursing care hours supplied by registered nurses), higher registered nurse hours per patient day, and higher percentage of baccalaureate prepared registered nurses. The percent of nursing care hours supplied by agency nurses has not been shown to be associated with hospital-acquired pressure ulcers (Dunton et al., 2007; Xue et al., 2012). The nursing care processes associated with lower hospital-acquired pressure ulcer rate are recent pressure ulcer risk assessment and having pressure ulcer prevention measures in place (Bergquist-Beringer et al., 2013; Blegen et al., 2013; Dunton et al., 2007; Park et al., 2014). A higher rate of physical restraint use has been associated with higher hospital-acquired pressure ulcer rate (Castle and Engberg, 2009; Rakhmattullina et al., 2013).

Nursing care characteristics linked to lower total fall rate are higher skill mix, higher total nursing hours per patient day, higher registered nurse hours per patient day, lower non-registered nurse hours per patient day, and higher percent of registered nurses with nursing specialty certification (Boyle et al., 2015; Kendall-Gallagher and Blegen, 2009; Lake et al., 2010; Titler et al., 2011). The percent of nursing care hours supplied by agency nurses has not been shown to be associated with fall rates (Dunton et al., 2007; Xue et al., 2012). Higher rates of physical restraint use have been associated with higher fall rate (Castle and Engberg, 2009).

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