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Developing a Generic Health Status Measure for Use in a Computer-Based Outcomes Infrastructure

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This descriptive, correlational study was designed to determine the sensitivity of a generic health status instrument to patient population and to time. The study sample included adult patients undergoing total joint replacement (TJR), adult patients in acute congestive heart failure (CHF), and pediatric patients receiving chemotherapy (PediOnc). A 2 X 3 (population X time) ANOVA for TJR and CHF demonstrated a significant main effect of time ($F = 8.0$, $\underline{p} = .0006$) and a significant interaction effect between time and population ($F = 14.4$, $\underline{p} < .0001$) for functional status. In the PediOnc subsample (HSOD child version), the highest scores for all HSOD factors with the exception of functional status were at Time 3. There was also a significant main effect of time on health care involvement, on the caregiver factor, and the family factor. These results support the sensitivity of the HSOD to patient population and to time.

Introduction

In today's rapidly shifting healthcare environment, there is an increasing need to identify methods to evaluate the impact of independent nursing practice on patient outcomes.[1] Although research has demonstrated to some extent the value of nursing, nursing's contributions to improved patient outcomes through assessment and intervention have not been well documented.[2] The paucity of research examining the relationships between nursing interventions and patient outcomes sets a clear stage for the lack of understanding of nursing's contribution to health which exists today.

An outcome is a complex construct requiring diverse conceptual and measurement approaches to achieve an understanding of the phenomenon.[3] A patient outcome reflects a spectrum of effects from nursing interventions and to a broader extent, health care interventions.[4] Results may or may not be observable or measurable for significant periods following the intervention. Additionally, many factors influence outcomes of care, not the least of which are the patient's own recovery powers.[5] It is this complexity which requires large clinical and administrative databases to support health related outcomes research and the identification of best practice methodologies in the provision of nursing care.[6,7]

Besides supporting the complexity of outcomes research,[6,7] combined administrative and clinical databases provide the foundation for an integrated information infrastructure. The science of nursing informatics is essential to this work as it links and transforms data collected over time and across settings of care, into valuable information. At the core of this infrastructure is the Nursing Minimum Data Set[8] which requires that key data elements reflecting the routine care of the patient (i.e., nursing diagnoses, nursing interventions, and patient outcomes linked to nursing care) are joined with administrative variables. This type of infrastructure supports the study of patient outcomes by linking: 1) the continuous quality improvement process; 2) primary data collection and measurement; 3) statistical and analytical tools and 4) systems in a common vocabulary allowing for feedback and interaction.[9, 7]

If patient health outcomes are to be used to define the quality and value of nursing care, there needs to be a method to measure the health status of the individual, family and/or caregiver, over time and across settings of care. These measures of health status must be incorporated into an outcomes infrastructure database. Essential to meeting this requirement is the development of generic measures of health. Generic measures are those pertinent to domains of care which cross all populations, whereas condition-specific measures are germane to patients with unique characteristics which require specific variables and measures to reflect its care requirements.[10] There are strong, norm referenced, generic scales available in the literature. However, these scales have limited application to nursing or to an outcomes infrastructure for use in examining both acute and chronic episodes of care.

The use of generic measures sensitive to the independent practice of nursing provides an opportunity for nursing to evaluate and monitor the impact of the care it provides over the life/health continuum. An outcomes infrastructure which supports the collection of generic and condition specific, administrative and clinical patient linked data over time, is foundational to the analysis of patient outcomes resulting from nursing care.[10]

Purpose of study

For generic measures to be of value to nursing, those measures must be sensitive to patient populations and to time[10] and be sensitive to the independent practice of the nurse. A generic measure of health status has been designed for integration into an outcomes infrastructure.[11,12] This study was part of a larger project designed to examine the reliability and validity of the instrument which measures functional status, health care engagement and psychosocial well-being: domains of care sensitive to nursing practice.[12,13] This study evaluated the sensitivity of the study instrument to three diverse patient populations, over time and across settings of care (hospital, home, medical office). The three populations included adult surgical patients undergoing total joint replacement (TJR), adult medical patients admitted in acute congestive heart failure (CHF), and pediatric oncology patients receiving chemotherapy in the medical office setting (PediOnc).

Methodology

Instruments

The Health Status Outcome Dimensions (HSOD)[11, 12] instrument was designed to capture patient status in the domains of functional status, healthcare involvement, and psychosocial well-being. The design of the HSOD was based on the Quality Audit Marker (QAM) for HIV/AIDS.[14] The QAM has demonstrated internal consistency reliability, content validity, concurrent validity, and predictive validity in the HIV/AIDS,[14] the hip and knee replacement[15] and the gerontological[16] populations. The HSOD is receiving further testing as additional health related measures were added and because it would be used to evaluate outcomes across patient populations and in multiple settings (hospital, home health, medical offices) within a health maintenance organization (HMO).

The HSOD consists of 12 to 17 items (depending on age) related to patient care. In the adult version, eight items were selected from the 10-item Quality Audit Marker (QAM).[14] These were bathing, grooming, toileting, dressing, physical performance, ambulation, fear, and anxiety. Nine additional items were developed: individual and caregiver knowledge, individual and caregiver involvement in healthcare, individual role performance, individual and family coping, and family and caregiver role strain. Definitions and defining attributes for role performance, coping, and role strain were adapted from Carpenito.[17] Definitions for knowledge and healthcare involvement were developed by the Outcomes Taskforce of the HMO. Pediatric nurse experts developed three age specific versions of the instrument. For example, ambulation and anxiety measures were removed from the infant version, and a focus on caregiver ability to support the infant in the care elements was included as appropriate. The content validity of the HSOD has been established.[14]

Sixteen of the HSOD elements of care are measured on a four point scale. Ambulation was developed as a five point scale. Each scoring option on the scales is linked to a clear, discrete, definitional phrase thereby enhancing the overall reliability of the scale. For each scale, higher scores are related to better function, knowledge, involvement, or psychosocial well-being. A principal components factor analysis with varimax rotation provided evidence for the construct validity of the HSOD. The internal consistency reliability as measured by a standardized alpha is adequate for all subscales (factors): functional status = .91, healthcare involvement = .69, psychosocial well-being = .77, caregiver status = .67, and family status = .83.

Setting/Sample

The study was conducted in four of sixteen medical centers providing care for members of a large HMO in Northern California. The study sample (total n,_ = 125) consisted of three clinical populations: patients with a primary or secondary admitting diagnosis of CHF (n,_ = 37), patients undergoing a first time, single TJR of the hip or knee (n,_ = 57), and stable PediOnc patients within the first six month of chemotherapy treatment and scheduled to receive at least three additional months of therapy (n,_ = 31). The sample was predominantly white. Fifty five percent of the study sample was male.

Procedure

Patients meeting study inclusion criteria were approached near hospital admission (CHF and TJR) or during an outpatient clinic visit (PediOnc) and asked to participate in the study. After informed consent was obtained from either the patient or family member by a registered nurse, the HSOD was completed based upon the nurse's assessment of the patient, caregiver and family. Four different versions of the HSOD were used depending upon the patient's age: adult (above age 12), child (age 3 plus 1 day to age 12), toddler (age 1 plus 1 day to age 3), and infant (age 1 and below).

For CHF and TJR patients, HSODs were also completed at hospital discharge, at admission and discharge to home health care, and approximately six weeks post hospital discharge during a medical office or home health visit. HSODs were completed for the PediOnc patients in the medical offices at monthly intervals, for three months. Additional demographic and clinical data were obtained via chart audits and from the computerized medical records coding system.

Descriptive, correlational techniques, Chi square analyses, t-tests, and analyses of variances (ANOVA) were used to examine the sensitivity of the HSOD to clinical population and time.

Results

A series of ANOVAs were conducted to assess changes over time and the interaction between time and clinical population. To control for the potential of a galloping alpha, the alpha level for significance was set at .017 for the three patient-related comparisons between TJR and CHF. A 2 X 3 (population X time) ANOVA for TJR and CHF demonstrated a significant main effect of time (F = 8.0, p = .0006) and a significant interaction effect between time and population (F = 14.4, p < .0001) for functional status. TJR patients had lowest (M = 16.8) functional status scores at discharge while CHF patients had lowest (M = 20.0) functional status scores at hospital admission. There were no significant main or interaction effects for psychological distress. For healthcare involvement, there was a significant interaction effect. The lowest involvement score for CHF were at the outpatient visit, while the lowest scores for TJR were at hospital discharge. There were no significant main or interaction effects of time or population (TJR vs. CHF) for family or caregiver variables. There was adequate power to detect differences in the family analysis, but not in the caregiver analysis.

In the pediatric oncology subsample (HSOD child version, n = 16), the highest scores for all HSOD factors with the exception of functional status were at Time 3. Using a conservative alpha of .017 for the three patient-related analyses there was a significant main effect of time on health care involvement. There was also a significant main effect of time on the caregiver factor (p = .0001) and the family factor (p = .04). In the toddler sample (n = 9), the only significant main effect of time was in the caregiver factor (F = 6.8, p = .009) with the highest score occurring at Time 3.

Correlations were done between HSOD scores and variables expected to converge or diverse with HSOD factors. For TJR, total patient care hours had a significant, inverse correlation with functional status at hospital admission (r,_ = -.39, p,_ = .016) and discharge (r,_ = -.42, p,_ = .006), with healthcare involvement at discharge (r,_ = -.55, p,_ < .001), and psychological well-being at admission (r,_ = -.41, p,_ = .011). Length of stay was significantly negatively correlated only with psychological well-being at hospital admission (r,_ = -.29, p,_ = .031). There were not significant correlations between admission and discharge HSOD scores and hematocrit, however, psychosocial well-being status at discharge had a significant, inverse correlation with discharge hemoglobin. Patient age had significant, negative correlations with three factor scores at discharge: functional status, r,_ = -.29, p,_ = .040; health care involvement, r,_ = -.32, p,_ = .022; and family status, r,_ = -.39, p,_ = -.017. There was a significant main effect of the presence of anxiety on functional status (p = .005), involvement (p = .002), and psychosocial well-being (p = .0001). The presence of anxiety was associated with significantly decreased HSOD scores in all instances.

For CHF, there were no significant correlations between HSOD factor scores and total patient care hours. However, length of stay had a significant, inverse correlation with functional status at admission (r,_ = -.36, p,_ = .038) and healthcare involvement at discharge (r,_ = -.50, p,_ = .006). There were also significant negative relationships between both admission and discharge blood urea nitrogen (BUN) levels and all except one of the factor scores (caregiver status). Patient age also had a significant, negative correlation with functional status at discharge (r,_ = -.42, p,_ = .023).

Additionally, in the CHF group a known group differences approach was used to contrast CHF patients requiring home oxygen with those who did not. There were significant differences between patients who required home oxygen therapy prior to hospital admission and those who did not on functional status scores at admission and discharge; those requiring home oxygen therapy had lower functional status scores.

For the pediatric oncology sample using the child version (n = 16) of HSOD (greater than age 3 to 12th birthday), age had a significant, negative correlation with functional status (r = -.51, p = .04) at Time 3. An alpha of .05 per comparison was used to explore the effect of patient risk (mild, moderate, severe) and time on the five HSOD factors. The results of the ANOVAs indicated that risk had a significant main effect on functional status (p = .010) and family status (p = .047) only, while time had a significant main effect on engagement (p = .004), psychological status (p = .016), caregiver status (p < .001), and family status (p = .038).

Discussion

One of the reasons the three clinical populations were chosen was their difference in expected clinical trajectories that should be reflected by items on the HSOD. The results of the study supported this hypothesis. The functional status factor differed over time for the three clinical populations consistent with their associated clinical trajectory; for TJR functional status decreased from admission to discharge, for CHF functional status increased from admission to discharge, and for PediOnc functional status remained fairly stable over a three month course of chemotherapy. The pediatric analyses that demonstrate improvement in caregiver and family status as well as patient involvement and psychosocial status over time (in the absence of improvement in functional status) are consistent with the family focus of independent nursing intervention in the pediatric oncology clinics. These results have important implications for evaluating the impact of care on health. Which models of care or nursing interventions maximize the slope of the recovery trajectory for the TJR patient? Likewise, which models of care or nursing intervention sets reverse or minimize the negative slope associated with the chronic CHF population? Are nurses available to support the educational and psychosocial needs caregiver and family of patients receiving chemotherapy?

Functional status also was significantly different where expected to differ, among groups within a single population. For PediOnc, there was a main effect of risk category on functional status with the lowest risk associated with the higher functional status score. CHF patients who required home oxygen therapy prior to hospital admission had significantly lower functional status scores. Increased age was associated with decreased functional status at discharge for TJR and CHF and with the third monthly functional status assessment for the pediatric oncology subsample. TJR patients requiring higher total patient care hours and who were older had decreased involvement at discharge.

The results of the study support the use of the HSOD, a generic health status instrument, within an outcomes infrastructure. This type of routine data capture can be used to define predictors for patients that might not follow the normal clinical trajectory. When clinical trajectories outside of the norm can be predicted, the healthcare team is provided the opportunity to proactively implement a more intensive level of care for the high risk patient.

Next steps include the integration of the HSOD into the forms and clinical information systems supporting nursing documentation. It is planned to collect HSOD data during the normal assessment process in all clinical areas where independent nursing is practiced within the HMO. The patient health data will be linked to an existing nursing utilization database,[12] also driven by patient specific workload information. The sensitivity of the HSOD will then be evaluated across multiple clinical populations. Finally, the impact of models of care and nursing interventions on patient health and organizational outcomes will be evaluated. This research could provide the foundation for defining best practices, and for defining the quality of nursing to the public in terms of health.

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