Nurse-sensitive indicators suitable to reflect nursing care quality: a review and discussion of issues

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Aims and objectives. To review nurse-sensitive indicators that may be suitable to assess nursing care quality.

Background. Patient safety concerns, fiscal pressures and patient expectation create a demand that healthcare providers demonstrate the quality of nursing care delivered. As a result, nurse managers are increasingly encouraged to provide evidence of nursing care quality. Nurse-sensitive indicators are being proposed as a means of meeting this need.

Design. Literature review.

Methods. A review of the literature was conducted using CINAHL and MEDLINE from 2002–2011. Key search terms were nurs* and sensitive indicators, outcome measures, indicators, metrics and patient outcomes.

Results. Most of the research has examined the relationship between nursing structural variables and patient outcomes in acute care settings and have explored potential indicators for specific patient groups and nursing roles. When using nurse-sensitive indicators, issues concerning the selection, reporting and sustained use are important for nurse managers to consider.

Conclusion. Evidence for the nurse-sensitivity of some commonly used indicators is inconsistent due to the disparity in definitions used, data collection and analysis methods. Further research on the application and implementation of these indicators is required to assist nurse managers in attempting to quantify the quality of nursing care. Nurses need to continue to strive to achieve agreement on the definitions of indicators, gather strong consistent evidence of nurse-sensitivity, resolve issues of regular data collection and consider selection, reporting and sustainment when implementing nurse-sensitive indicators.

Relevance to clinical practice. Once identified, nurse-sensitive indicators can be applied for quality improvement purposes, but consensus is required to fully realise their potential. Nurse managers need to be aware of the factors that can influence the use of indicators at unit level. Strategies need to be implemented to promote these indicators becoming integrated with routine nursing care.

Key words: nursing care quality, nursing outcome measures, nurse-sensitive indicators, quality improvement initiatives

Accepted for publication: 27 February 2013

Introduction

International reports highlighting concerns for patient safety [Wilson et al. 1995, Institute of Medicine (IOM) 1999, 2001], compounded by influential factors such as fiscal pressures and patient expectation, demand that healthcare providers demonstrate the quality of care delivered. To measure nurses’ contribution to patient outcomes, nurse-sensitive indicators (NSI) have been identified and used by both healthcare organisations and researchers. Yet,
providing the empirical evidence of the accuracy and use of the indicator to nursing has not been straightforward.

The need to measure the impact of nursing care on patient outcomes is not a new concept. Florence Nightingale recognised the need to evaluate the quality of nursing practice and began to measure patient outcomes using statistical methods in the 1850s (Montalvo 2007). Identifying indicators that are sensitive to nursing has not been straightforward. The term NSI originated in 1996 to signify patient-related outcomes that are affected by nursing care (Maas et al. 1996). Defining potential indicators, demonstrating an association between the indicator and nursing care and the collection and analysis of the data all compound the complexity. To assist in identifying potential indicators, Donabedian’s (1988) framework of quality assessment has consistently been used. This framework explicates the relationship between the attributes of nurses providing the care (structure), the interventions of those nurses (process) and the outcomes for their patients (Donabedian 1988). The American Nurses Association has grounded its work on developing NSI on this framework (Gallagher & Rowell 2003), as have others (Doran 2011).

Measuring nurses’ contribution to patient outcomes continues to pose challenges for nurse managers. Although they may have access to extensive data, they are faced with deciding how best to use these data to improve nursing care quality. To provide direction for nurses tasked with measuring and improving nursing services, this review focuses on the use of NSI by nurse managers to increase the quality and safety of nursing care. First, an overview of key studies of NSI is provided. Second, a discussion of issues related to research on NSI is given. Finally, selection, reporting and sustainment of NSI are discussed.

Design

A review and synthesis of the literature followed by a discussion of key issues that arise from this review is provided. This is not a systematic review; it is, however, based on the PRISMA statement that advocates using explicit methods to ensure transparency in reporting the quality of the research literature (Moher et al. 2009). In this instance, the statement has been used to guide a critical evaluation of the literature on NSI. The PRISMA flow diagram details the rigorous search strategy undertaken (Fig. 1). Systematic reviews are available on NSI (Kane et al. 2007, Spilsbury et al. 2011); however, the review presented here provides scholarly discussion on the key issues when studying NSI.
and considerations for the selection, reporting and sustainment of NSI in clinical practice. The objectives of the review are to:  
1. Provide an overview of the key studies examining NSI.  
2. Discuss issues related to the study of NSI.  
3. Discuss considerations regarding the selection, reporting and sustainment of NSI.  

### Methods  
An initial review of the literature was conducted using CINAHL and MEDLINE and included publications dated from 2002–2011. Search terms used included nurses* and sensitive indicators, outcome measures, indicators, metrics and patient outcomes. The search identified 851 articles which were reduced to 40 with the application of the following inclusion criteria: original study, published in English and a full paper available (Fig. 1). An additional four key studies that were conducted from 1998–2001 were sourced from reference lists and were included due to their frequent citation. These studies examined nursing structural and process variables and patient outcomes.  

### Results  

#### Overview of the key studies examining NSI  
The studies reviewed examined the relationship between nursing structural and process variables and patient outcomes (Table 1). Most of the research on NSI have been carried out in acute care settings (Aiken et al. 2002, Needleman et al. 2002, Blegen et al. 2011, Patrician et al. 2011). A small number of studies have focused on specialist units such as neonatal care (Hamilton et al. 2007), chronic haemodialysis (Thomas-Hawkins et al. 2008) and intensive care (Cho et al. 2008). The majority of the studies (25/63%) have been conducted in the United States, with the remainder (15/37%) of studies from Canada (McGillis Hall et al. 2004, Tourangeau et al. 2007, Meyer et al. 2009), Europe (Rafferty et al. 2007, Shuldharn et al. 2009, Van den Heede et al. 2009), Korea (Lee 2007, Cho et al. 2008) and singular studies from Australia (Chaboyer et al. 2010), Taiwan (Yang 2003), Kuwait (Al-Kandari & Thomas 2008) and Thailand (Sasichay-Akkaedchanunt et al. 2003). Particular patient groups have also been studied, including patients with acute myocardial infarction (Person et al. 2004) and surgical oncology patients (Friese et al. 2008). These studies aim to identify the sensitivity of patient outcomes to nursing structural and process variables.  

Several structural variables such as the proportion of registered nurses (RNs) in the nursing workforce, nurse-to-patient ratio, nursing hours per patient day, education level and experience have been used to demonstrate the influence that nurses have on patient outcomes, primarily adverse events (Blegen & Vaughn 1998, Aiken et al. 2002, Needleman et al. 2002, McGillis Hall et al. 2004). Researchers have attempted to identify associations between these nursing structural variables and patient outcomes, but the findings have been inconsistent. For example, the relationship between urinary tract infections and nursing structural measures has been shown to be both statistically significant (Needleman et al. 2002, Yang 2003) and conversely nonsignificant (Sovie & Jawad 2001, Van den Heede et al. 2009). Medication errors and falls (Blegen & Vaughn 1998, Blegen et al. 1998, Sovie & Jawad 2001, Cho et al. 2003, Yang 2003, McGillis Hall et al. 2004) follow a similar pattern of disparate findings. ‘Failure to rescue’ has been more consistently demonstrated as sensitive to nursing. Associations between failure to rescue and the ratio of RNs (Silber et al. 1995) and between patient-to-nurse ratio and failure to rescue within 30 days of admission (Aiken et al. 2002) have been reported. These studies of surgical patients were supported by a large-scale study of both surgical and medical units which confirmed a link between skill mix and lower rates of ‘failure to rescue’ (Needleman et al. 2002) and a meta-analysis (Kane et al. 2007).  

Process variables include both the specific interventions nurses provide such as regular repositioning for pressure ulcer prevention and the process of care delivery such as the model of care. The association between process of care variables and patient outcomes has been explored but to a lesser extent than structural variables (Doran et al. 2006a, Poohchikian- Sarkissian et al. 2008, Thomas-Hawkins et al. 2008, Chaboyer et al. 2010). A survey with items regarding tasks ‘left undone’ at the end of a shift was used in one study exploring the relationship between RN staffing, processes of nursing care and nurse-reported patient outcomes (Thomas-Hawkins et al. 2008). The study reported that necessary tasks left undone positively correlated with higher patient-to-RN ratios and reported frequencies of adverse events. A later study of the effects of implementing changes to nursing processes used medication errors, patient falls and pressure injuries as outcome measures (Chaboyer et al. 2010). A reduction in the proportion of patients experiencing these outcomes that resulted in harm followed the implementation of strategies such as safety scrums, medication vests and bedside handover (Chaboyer et al. 2010). As with studies exploring the relationship between structural nursing variables and patient outcomes, adverse events were...
Table 1 Patient outcomes used in studies of the relationship between nursing structural and process variables and patient outcomes

| Author (year of publication) | Falls | Pressure ulcer | Upper GI bleed | Medication errors | Central line infection | Pneumonia | Respiratory tract infection | Urinary tract infection | Wound infection | Failure to rescue | Septic | Shock/cardiac arrest | Deep vein thrombosis | Postop respiratory failure | Postoperative infection | Functional status | Ventilator acquired pneumonia | Self care | Patient complaints | Patient satisfaction | Restraint application duration | Deterioration | Vascular access infection | Nosocomial infection | Complications | Thrombophlebitis | Fluid overload | Inotropic drug collapse | Activities of daily living index | Patient judgement of hospital quality | Atelectasis | Pain scores | Vascular access thrombosis | Health status | Symptom manager index | Knowledge, behaviour, status change scores | Physical and mental health change scores | Symptom resolution |
|------------------------------|-------|----------------|----------------|------------------|-----------------------|-----------|-----------------------------|------------------------|-----------------|-------------------|---------|-------------------|----------------------|---------------------------------|-------------------|----------------------|-----------------------------|-------------|-------------------|----------------------|---------------------|------------------------|--------------------------|-------------------|------------------|-------------------|-------------------|------------------|-----------------|------------------|-------------------|
| Blegen and Vaughan (1998)    |       |                |                |                  |                       |           |                             |                         |                 |                   |         |                   |                       |                                 |                   |                      |                             |             |                   |                      |                     |                        |                          |                    |                   |                   |                   |                   |                 |
| Blegen et al. (1998)         | ☑     |                |                |                  |                       |           |                             |                         |                 |                   |         |                   |                       |                                 |                   |                      |                             |             |                   |                      |                     |                        |                          |                    |                   |                   |                   |                   |                 |
| Lichtig et al. (1999)        |       |                |                |                  |                       |           |                             |                         |                 |                   |         |                   |                       |                                 |                   |                      |                             |             |                   |                      |                     |                        |                          |                    |                   |                   |                   |                   |                 |
| Sovic and Jawad (2001)       |       |                |                |                  |                       |           |                             |                         |                 |                   |         |                   |                       |                                 |                   |                      |                             |             |                   |                      |                     |                        |                          |                    |                   |                   |                   |                   |                 |
| Whitman et al. (2002)        |       |                |                |                  |                       |           |                             |                         |                 |                   |         |                   |                       |                                 |                   |                      |                             |             |                   |                      |                     |                        |                          |                    |                   |                   |                   |                   |                 |
| Aiken et al. (2002)          |       |                |                |                  |                       |           |                             |                         |                 |                   |         |                   |                       |                                 |                   |                      |                             |             |                   |                      |                     |                        |                          |                    |                   |                   |                   |                   |                 |
| Needleman et al. (2002)      |       |                |                |                  |                       |           |                             |                         |                 |                   |         |                   |                       |                                 |                   |                      |                             |             |                   |                      |                     |                        |                          |                    |                   |                   |                   |                   |                 |
| Barkell et al. (2002)        |       |                |                |                  |                       |           |                             |                         |                 |                   |         |                   |                       |                                 |                   |                      |                             |             |                   |                      |                     |                        |                          |                    |                   |                   |                   |                   |                 |
| Aiken et al. (2003)          |       |                |                |                  |                       |           |                             |                         |                 |                   |         |                   |                       |                                 |                   |                      |                             |             |                   |                      |                     |                        |                          |                    |                   |                   |                   |                   |                 |
| Cho et al. (2003)            |       |                |                |                  |                       |           |                             |                         |                 |                   |         |                   |                       |                                 |                   |                      |                             |             |                   |                      |                     |                        |                          |                    |                   |                   |                   |                   |                 |
| Mark et al. (2003)           |       |                |                |                  |                       |           |                             |                         |                 |                   |         |                   |                       |                                 |                   |                      |                             |             |                   |                      |                     |                        |                          |                    |                   |                   |                   |                   |                 |
| Potter et al. (2003)         |       |                |                |                  |                       |           |                             |                         |                 |                   |         |                   |                       |                                 |                   |                      |                             |             |                   |                      |                     |                        |                          |                    |                   |                   |                   |                   |                 |
| Unruh (2003)                 |       |                |                |                  |                       |           |                             |                         |                 |                   |         |                   |                       |                                 |                   |                      |                             |             |                   |                      |                     |                        |                          |                    |                   |                   |                   |                   |                 |
| Sasichay-Akkadechanunt et al. (2003) |       |                |                |                  |                       |           |                             |                         |                 |                   |         |                   |                       |                                 |                   |                      |                             |             |                   |                      |                     |                        |                          |                    |                   |                   |                   |                   |                 |
| McGills Hall et al. (2004)   |       |                |                |                  |                       |           |                             |                         |                 |                   |         |                   |                       |                                 |                   |                      |                             |             |                   |                      |                     |                        |                          |                    |                   |                   |                   |                   |                 |
| Duncron et al. (2004)        |       |                |                |                  |                       |           |                             |                         |                 |                   |         |                   |                       |                                 |                   |                      |                             |             |                   |                      |                     |                        |                          |                    |                   |                   |                   |                   |                 |
| Person et al. (2004)         |       |                |                |                  |                       |           |                             |                         |                 |                   |         |                   |                       |                                 |                   |                      |                             |             |                   |                      |                     |                        |                          |                    |                   |                   |                   |                   |                 |
| Doran et al. (2006a)         |       |                |                |                  |                       |           |                             |                         |                 |                   |         |                   |                       |                                 |                   |                      |                             |             |                   |                      |                     |                        |                          |                    |                   |                   |                   |                   |                 |
| Doran et al. (2006b)         |       |                |                |                  |                       |           |                             |                         |                 |                   |         |                   |                       |                                 |                   |                      |                             |             |                   |                      |                     |                        |                          |                    |                   |                   |                   |                   |                 |
| Rafferty et al. (2007)       |       |                |                |                  |                       |           |                             |                         |                 |                   |         |                   |                       |                                 |                   |                      |                             |             |                   |                      |                     |                        |                          |                    |                   |                   |                   |                   |                 |
| Seago et al. (2006)          |       |                |                |                  |                       |           |                             |                         |                 |                   |         |                   |                       |                                 |                   |                      |                             |             |                   |                      |                     |                        |                          |                    |                   |                   |                   |                   |                 |
| Author (year of publication) | Falls | Pressure ulcer | Upper GI bleed | Medication errors | Central line infection | Pneumonia | Respiratory tract infection | Urinary tract infection | Wound infection | Sepsis | Mortality | Shock/ Cardiac arrest | Deep vein thrombosis | Postop respiratory failure | CNS | coma | Metabolic derangement | Ventilator acquired pneumonia | Postoperative infection | Functional status | Self care | Patient complaints | Patient satisfaction | Restraint application | Duration | Deterioration | Vascular access infection | Nosocomial infections | Thrombophlebitis | Fluid overload | Intracranial / spinal水肿 | I | Activities of daily living index | Patient judgement of hospital quality | Atelectasis | Pain scores | Vascular access infiltration | Vascular access thrombosis | Health status | Symptom manager index | Knowledge, behaviour, status change scores | Physical and mental health change scores | Symptom resolution | NSIs suitable to reflect nursing care quality |
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| Tourangeau et al. (2007)      |       |                |                |                  |                        |           |                             |                        |                  |        |                       |                        |                          |                         |     |     |                        |                              |                  |                |              |                     |                         |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| Stone et al. (2007)           |       |                |                |                  |                        |           |                             |                        |                  |        |                       |                        |                          |                         |     |     |                        |                              |                  |                |              |                     |                         |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| Hamilton et al. (2007)        |       |                |                |                  |                        |           |                             |                        |                  |        |                       |                        |                          |                         |     |     |                        |                              |                  |                |              |                     |                         |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| Cho et al. (2008)             |       |                |                |                  |                        |           |                             |                        |                  |        |                       |                        |                          |                         |     |     |                        |                              |                  |                |              |                     |                         |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| Sales et al. (2008)           |       |                |                |                  |                        |           |                             |                        |                  |        |                       |                        |                          |                         |     |     |                        |                              |                  |                |              |                     |                         |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| Al-Kandari and Thomas (2008)  |       |                |                |                  |                        |           |                             |                        |                  |        |                       |                        |                          |                         |     |     |                        |                              |                  |                |              |                     |                         |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| Friese et al. (2008)          |       |                |                |                  |                        |           |                             |                        |                  |        |                       |                        |                          |                         |     |     |                        |                              |                  |                |              |                     |                         |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| Thomas-Hawkins et al. (2008)  |       |                |                |                  |                        |           |                             |                        |                  |        |                       |                        |                          |                         |     |     |                        |                              |                  |                |              |                     |                         |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| Van den Heede et al. (2009)   |       |                |                |                  |                        |           |                             |                        |                  |        |                       |                        |                          |                         |     |     |                        |                              |                  |                |              |                     |                         |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| Meyer et al. (2009)           |       |                |                |                  |                        |           |                             |                        |                  |        |                       |                        |                          |                         |     |     |                        |                              |                  |                |              |                     |                         |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| Chaboyer et al. (2010)        |       |                |                |                  |                        |           |                             |                        |                  |        |                       |                        |                          |                         |     |     |                        |                              |                  |                |              |                     |                         |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| Harless and Mark (2010)       |       |                |                |                  |                        |           |                             |                        |                  |        |                       |                        |                          |                         |     |     |                        |                              |                  |                |              |                     |                         |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| Shuldhman et al. (2009)       |       |                |                |                  |                        |           |                             |                        |                  |        |                       |                        |                          |                         |     |     |                        |                              |                  |                |              |                     |                         |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| Mark and Harless (2010)       |       |                |                |                  |                        |           |                             |                        |                  |        |                       |                        |                          |                         |     |     |                        |                              |                  |                |              |                     |                         |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| Sidani and Doran (2010)       |       |                |                |                  |                        |           |                             |                        |                  |        |                       |                        |                          |                         |     |     |                        |                              |                  |                |              |                     |                         |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| Patrician et al. (2011)       |       |                |                |                  |                        |           |                             |                        |                  |        |                       |                        |                          |                         |     |     |                        |                              |                  |                |              |                     |                         |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| Trinkoff et al. (2011)        |       |                |                |                  |                        |           |                             |                        |                  |        |                       |                        |                          |                         |     |     |                        |                              |                  |                |              |                     |                         |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| Blegen et al. (2011)          |       |                |                |                  |                        |           |                             |                        |                  |        |                       |                        |                          |                         |     |     |                        |                              |                  |                |              |                     |                         |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
used as outcome measures. The selection of more ‘positive’ outcome measures that may be more effective at demonstrating the contribution of nursing has prompted research using alternatives such as functional status and therapeutic self-care (Mitchell & Lang 2004, Doran et al. 2006a,b, McGillis Hall et al. 2008).

One study of eight medical and surgical units in four acute hospitals demonstrated an association between three nursing interventions: (1) positioning, (2) self-care interventions related to oral hygiene and (3) exercise promotion and functional status (Doran et al. 2006a). A study to examine the relationship between the processes and outcomes of acute care nurse practitioners used the processes of coordination of care and provision of counselling and education as the process variables and the outcome measures of symptom resolution, functional status and satisfaction with care as opposed to adverse events (Sidani & Doran 2010). This study demonstrated a relationship between selected nursing processes, and improvement in function and satisfaction with care. Research using these ‘positive’ outcome measures is limited in comparison with those using adverse events. The difficulty in obtaining the data for measures such as functional status or therapeutic self-care may explain their poor use (Doran et al. 2006a). Reliable sources of data are required to increase the use of such measures. It is evident that further studies are needed to explicate the relationship between nursing care processes and patient outcomes.

Discussion

This discussion focuses first on issues identified in the research reviewed and then on considerations for selecting, reporting and sustaining NSI in clinical practice.

Issues related to the study of NSI

Methodological differences have been implicated as an explanation for the discordance in research findings attempting to identify potential nurse-sensitive indicators. These include the definition used for each indicator, data source, unit or hospital level of analysis and risk adjustment model used. In regard to the definitions of indicators used, there is a need for standardisation to allow for comparison. For example, mortality has been defined in relevant studies as ‘in hospital’ (Needleman et al. 2002, Van den Heede et al. 2009) or ‘within 30 days of admission’ (Aiken et al. 2002). Another example is the calculation of RN hours, with some databases not separating nursing hours associated with inpatient and outpatient nursing (Harless & Mark 2010). A common definition needs to be determined, to allow for comparison of nursing care quality.

In regard to the source of the data, some studies have used large administrative databases to achieve substantial sample sizes of medical and surgical patients (Aiken et al. 2002, Needleman et al. 2002, Van den Heede et al. 2009). Various administrative data sets have been used such as the Patient Administration System (PAS) in the UK (Shuldham et al. 2009) and the University HealthSystem Consortium (UHC) in the United States (Blegen et al. 2011) and can be country and organisation specific. These large sample populations can strengthen the generalisability of findings, however, may conversely result in spurious associations due to the potential bias and confounding of multiple factors increasing the probability of type I errors (i.e. false positives). The cross-sectional nature of the data in many of these studies can only demonstrate associations not causation. As previously mentioned, another limitation of this source of data is the inconsistency of the data derived (Needleman et al. 2009), due to the different methods employed to generate the data (e.g. the calculation of RN hours). Sourcing data at unit level such as medical charts and incident reports has been used to address these limitations (Shuldham et al. 2009, Chaboyer et al. 2010), but is not without its own limitations. The reliability of these data sources is affected by the diligence of healthcare professionals who are undertaking the documentation and reporting. Although reporting is strongly encouraged, it is not universally mandated and therefore remains voluntary. Conceivably, the use of administrative databases is appropriate when there is a lack of control of the study intervention and a large sample size is sought. However, careful consideration of the data source is needed to ensure internal and external organisational comparisons are valid.

Different approaches to data analysis can also create inconsistencies. The method for adjusting for patient acuity is based on variable assumptions (Powell et al. 2003, Harless & Mark 2010) and needs to be considered when interpreting the NSI data, as does the level at which analysis is performed (e.g. unit or hospital). Hospital-level analysis performed from large administrative data sets does not allow shift-by-shift variation at unit level to be compared. The consequence of this aggregation of data is a loss of variance (Gallagher & Rowell 2003). This has led to more contemporary research attempting nursing unit-level analysis (McGillis Hall et al. 2008, Shuldham et al. 2009), increasing the potential for the findings to inform nursing service delivery at unit level (Meyer et al. 2009). The discrepancies in research findings create the need to validate
appropriate NSI with other methods to assist nurse leaders in selecting and applying appropriate NSI.

Considerations for selection, reporting and sustaining NSI in practice

In the past decade, progress has been made in collecting and reporting of NSI in a clinical setting. Nevertheless, NSI remain peripheral to routine clinical practice requiring strategies at unit level to help nurses to interpret and act on the NSI data. A caveat here is that a wealth of data may be collected but not analysed and used to influence clinical practice at a local level. To realise the potential of NSI, nurse managers need to consider three key elements. First, they need to consider which NSI to select for measurement in their clinical context. Second, they need to consider how they will report the NSI for their use or others to use. Finally, they need to consider how they will embed and sustain the use of NSI in clinical practice. There are some reports of the practicalities of using NSI that recognise these factors. The following section focuses on these considerations.

The use of empirical evidence is one method that can be used to select NSI for measurement. Other methods of identifying NSI have also been used. A consensus approach such as the use of expert panels has been applied to identify appropriate NSI (Cho et al. 2003, McGillis Hall et al. 2003, Potter et al. 2003) and to select indicators for a multi-institutional report card (Whitman et al. 2001). Research has also been guided by the NSI identified by leading nursing organisations. The consensus standards of the American National Quality Forum were used in a case study of the relationship between nurse staffing and patient outcomes (Shuldham et al. 2009). Some researchers have attempted to identify indicators relevant to specific patient groups such as common potential complications (Unruh 2001, Thomas-Hawkins et al. 2008). At times, the rationale for choosing a specific NSI is not clearly provided and may reflect what is obtainable from the data source available. Alternative methods such as expert panels and specialty-specific indicators are available to assist nurse managers who need to give careful consideration to the selection of NSI prior to using them to influence nursing care quality. The same consideration needs to be given to how the NSI are reported and sustained in practice.

Nurse managers need to decide which NSI they will select for measurement. The key to this decision is clarifying the reason for the collection of the NSI. There are two important reasons for measuring NSI in quality improvement and monitoring. First, NSI can be used for quality improvement purposes to identify the outcomes of practice or process change. Second, NSI may be collected continuously or for a set period of time depending on whether they are required as part of an ongoing or one off quality improvement process. Recent nursing care quality initiatives such as Transforming Care at the Bedside (TCAB) in the USA and The Productive Ward in the UK require the ongoing collection, reporting and interpretation of NSI following the establishment of baseline data to drive nursing care quality at unit level (Martin et al. 2007, Foster et al. 2009, Chaboyer et al. 2010). These initiatives operationalise nurse-sensitive indicators, potentially ensuring the collation of data on which much time and energy can be expended is not wasted.

The need to monitor nursing care quality may be driven by internal and external benchmarking requirements, and the availability of NSI data affords this opportunity (Robb et al. 2007). This decision may be influenced by the requirements of organisations and peak bodies at national or state level or for accreditation purposes. If the NSI are being collated for benchmarking, then a suite of NSI needs to be selected that all parties participating in the benchmarking collective can obtain. The NSI also need to be relevant to all patient groups in the participating units unless there is a mechanism to deselect certain patient groups from particular NSI. In the United States, the National Databases of Nursing Quality Indicators (NDNQI) have been providing quarterly and annual reports to units in contributing facilities since 1999 (Montalvo 2007). The Collaborative Alliance for Nursing Outcomes (CalNOC) is a similar initiative of the state of California as is the Belgian Nursing Minimum Data Set (B-NMDS) (Sermeus et al. 2008) and the Irish Nursing Minimum Dataset (Butler et al. 2006).

The value of benchmarking has been demonstrated. A pilot study of the ANA Nursing Care Report Card reported its use to identify solutions to decrease the number of falls (Langemo et al. 2002). Furthermore, Robb et al. (2007) described the introduction of a tool for monitoring nursing performance indicators and the process of reviewing them monthly by the senior nursing and midwifery team and generating action plans to drive change. Outcomes achieved included improved documentation and clearer standards on compliance with resuscitation trolley and controlled drug checks. To drive benchmarking, acceptable benchmarks need to be identified to address different specialties to assist nurse managers.

In selecting NSI to evaluate a singular nursing practice change, nurse managers need to select NSI relevant to the context. For example, if a pressure injury prevention
intervention is being implemented, then it would be reasonable to measure the number of patients acquiring a pressure injury. Studies have attempted to select appropriate NSI for specific patient groups such as ventilator-assisted pneumonia for intensive care unit patients (Stone et al. 2007) and sepsis for postsurgical patients (Mark & Harless 2010). There has also been an attempt to identify appropriate NSI for a specific role, that of acute care nurse practitioners (Sidani & Doran 2010). Nurse managers therefore need to consider the underlying reason why NSI are required to clarify which NSI should be selected for measurement.

Once the NSI have been selected for measurement, nurse managers need to consider how they will report them, particularly the format for presentation and the population of data. Reports of tools implemented in various healthcare settings to present the data to nurses at unit level have been published. These describe the development and use of report cards, scorecards, dashboards and audit tools delivered in paper or in electronic formats (Whitman et al. 2001, McGillis Hall et al. 2003, Robb et al. 2007). Consideration must be given to the audience for the information as this will affect the presentation format selected. Some tools have their foundations in the balanced scorecard framework first developed by Kaplan and Norton (Kaplan & Norton 1996). The balanced scorecard and the measures included are linked to the organisation’s mission and are not purely financially orientated, with the framework based on four components: (i) internal business processes, (ii) learning and growth, (iii) customer and (iv) financial (Kaplan & Norton 1996). Dashboards provide a snapshot set of key indicators (Kocakülah & Austill 2007) and may be a scaled-down version of a scorecard. They provide a quick visual reference of the data, making it more meaningful and easier to interpret such as by the inclusion of charts and graphs (Douglas 2010). This framework has been used to underpin hospital performance reporting, but nursing report cards have tended to be based on Donabedian’s structure, process and outcome framework (McGillis Hall et al. 2003), with less focus on the financial perspective. If a generic format is not provided for the nurse manager, the purpose and audience of the report need to be clear to assist in the development of an appropriate format supported by the necessary resources.

The challenge with any of these tools is the variety of data contained within them. The data are usually generated from various sources such as medical charts, incident reporting systems and administrative databases. This is time-consuming for nurse unit managers (Langemo et al. 2002) and burdensome to complete (Robb et al. 2007). The problems generated by information technology infrastructure have been summarised as related to the variable quality and reliability of information, limited informatics expertise, lack of personal keyboard skills and concern about increased pressure on the clinicians’ time (Harvey 2004). To encourage the interpretation of NSI to influence nursing care quality, data need to be readily available to nurse managers in an easy-to-use format.

Processes to promote the sustained use of NSI to drive nursing care quality at both local and organisational levels are in their infancy. The use of NSI as part of continuous quality improvement initiatives and monitoring purposes will serve to sustain their use. Further strategies to embed NSI into routine practice are the inclusion of a minimum data set of nursing indicators into meeting agendas, minutes and handover (Harrington 2009) and the integration of internationally recognised nursing quality indicators into nursing documentation (Clark 2009). The success of these strategies needs to be evaluated but relies on the mechanism of feedback. Opportunities to integrate NSI into nursing care need to be taken to assist in ‘hardwiring’ these strategies so that they become automatic and routine (Harrington 2009).

Conclusion

This review has sought to provide direction to nurses using NSI to improve the quality and safety of nursing care and has highlighted the complexity of achieving this in practice. The evidence to support identifying appropriate NSI suggests a close relationship between nursing structural factors and patient outcomes, yet it is not consistent. There are also limited reports available to support nurse managers to use NSI to influence nursing practice in regard to the selection, reporting and sustainment of NSI. This presents a challenge to nurse managers charged with providing evidence of the quality of nursing care. Nurses need to continue to strive to achieve agreement on the definitions of nurse-sensitive indicators, gather strong consistent evidence of nurse-sensitivity, resolve issues of regular data collection and consider which NSI they will use and how they will use them. Until then, it will remain difficult to validate what nurses do, how they do it and the impact this has on their patients.

Relevance for clinical practice

The challenge for nurse managers to demonstrate the impact of nursing practice on patient outcomes continues.
When using NSI, they need to be able to justify the relevance of the NSI they select by considering the definition, sensitivity to nursing, how the data have been generated, the context in which they will be used and how they will be reported and sustained in clinical practice. Nurse managers can then realise the potential of nurse-sensitive indicators to demonstrate nursing care quality.

References


Contributions

Study design: SB, WC, BG; data collection and analysis: SB, WC, BG and manuscript preparation: SB, WC, BG.

Conflict of interest

The authors declare that they have no conflict of interests.


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