Nursing Staff Mix:

A Literature Review

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LITERATURE REVIEW

Introduction

Since the early 1990s in Canada, the health care system has been faced with funding cuts that have resulted in significant health care restructuring. Because nurse staffing costs are a large part of health care facilities' budgets, many administrators have reduced their numbers of regulated nurses (Aiken, et al., 1996; O'Brien-Pallas, et al., 1995; Seago, 2002a). While efforts were made to increase efficiency and maintain quality care, many registered nurse and licensed practical nurse positions were replaced with less skilled, unlicensed care providers (Brooten & Naylor, 1995; Grando, 1998; Jawad, et al., 2003; Spetz, 1998).

Many health care facilities implemented approaches to care delivery by redefining the roles of care providers in order to maximize human resources in a time of shortage (Aiken, et al., 2000; Sochalski, et al, 1997). Many of these restructuring attempts resulted in an elimination of support services for nurses. This, in turn, caused an exodus of nurses, despite the fact that patient populations were more acutely ill, hospital lengths of stay were being shortened and patient volumes had increased (London Deutschendorf, 2003; Shindul-Rothschild, et al., 1996). Reports on health care error and the increased occurrences of adverse events[1] have made it clear that these situations have led to a breakdown in the infrastructure in many health care facilities (Institute of Medicine, 2000, 2001a).

In Canada, there are three regulated professional nursing groups accountable to the public for the provision of safe nursing care through authority granted in provincial legislation. They are registered nurses (RNs); licensed or registered practical nurses[2] (LPNs) and registered psychiatric nurses[3] (RPNs). The provincial/territorial regulatory bodies for each of these care providers determine standards of practice and scopes of practice within the legislation. In today's ever changing health care environment it is imperative that these health care providers work together to increase the ability to deliver safe care that is accessible and cost-effective. An understanding of the expectations and contributions that each of these regulated nursing personnel make will lead to more appropriate staff mix, to better working conditions for nurses and, ultimately, to improved patient outcomes (Alberta Association of Registered Nurses [AARN], College of Licensed Practical Nurses of Alberta [CLPNA] and Registered Psychiatric Nurses Association of Alberta [RPNAA], 2003; College of Nurses of Ontario [CNO], 2002; Nurses Association of New Brunswick [NANB] and Association of New Brunswick Licensed Practical Nurses [ANBLPN], 2003; Registered Nurses Association of British Columbia [RNABC], 2001). *Research-Based Staffing for the Delivery of Nursing Care* (AARN, 2002) identifies a framework of key questions to support staffing decisions.

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[1] In this document, an *adverse event* refers to an unexpected and undesirable incident resulting in injury or death, that is directly associated with the process of providing health care to the client (Hébert, Hoffman, & Davies, 2003).

[2] The term *licensed practical nurse* (LPN) is used throughout Canada, except in Ontario. In Ontario, LPNs are referred to as registered practical nurses. In this paper, they are all referred to as LPNs.

[3] Registered psychiatric nurses (RPNs) are licensed to practice in Manitoba, Saskatchewan, Alberta and British Columbia.

The Canadian Nurses Advisory Committee Report (CNAC, 2002), *Our Health, Our Future: Creating Quality Workplaces for Canadian Nurses*, recommends that all employers put policies in place that allow each RN, LPN and RPN to function to the maximum of their practice abilities according to the respective legislation, licensing body and employer. Currently, there is a lack of consensus on how to decide the most appropriate nursing staff mix requirements within the various health care settings. Determining the assignment of patients to the most appropriate care provider is a complex process. Using an evidence-based approach to determine staff mix decisions will help ensure more positive client outcomes, better patient safety and an enhanced quality of work life for nurses (CNA, 2003b; CNAC, 2002).

This literature review examines the evidence and research related to nursing staff mix decisions based on licensed or regulated care providers (RNs and LPNs) and the impacts on patient outcomes. A few studies include unregulated care providers, referred to as nursing assistants[4] (NA). The review found no research related to the RPN in relation to the determination of staff mix.

Several concepts are intertwined in the research, making them difficult to separate and summarize. Much of the research addresses numbers of staff needed rather than the actual staff mix required in order to provide the best outcomes. There is also some overlap as to the use of the term "level of staff" – some studies use "level" when referring to number and others use it when referring to type of nursing category. Some studies refer to the regulated nurse or licensed nurse but do not indicate which category of licensed nurse (RN or LPN) in combination with or without the NA. Studies that addressed staffing numbers only and not the category of nurse were not included in this review.

Scope of Literature Review

Computer database searches included:

- the Cumulative Index Nursing and Allied Health Literature (CINAHL);

- Medline; and

- the Biomedical Reference Collection Corporate Edition for the last ten years (1994-2004).

The subject heading used included the following terms:

- nurse staffing

- nurse staffing AND skill mix

- skill mix AND decision-making

- nurse staffing AND patient outcomes

- nurse staffing AND adverse events

- nurse staffing AND patient safety

- workload measurement

- nurse staffing models

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[4] In Canada, the title *nursing assistant* is not standard. It is used in this document only as it is cited in the literature.

The search strategy also included gathering information related to nurse staffing and decision-making using literature obtained from the World Wide Web, research reports and literature from the regulatory bodies for nursing across Canada.

Research

The following research is listed in order of the largest body of research – RN, RN/LPN, RN/LPN/NA, LPN/NA.

1. Nurse Staffing Studies – RNs

Recent studies have linked RN staffing to positive patient outcomes. (Needleman, et al., 2001; Aiken, et al.,1999; Blegan, Goode, et al., 1998; Lichtig, et al., 1999; Sochalski, et al., 1997). In acute care hospitals, the positive relationship between RN care providers and patient outcomes has been attributed to RNs, who have effective skills for in-depth assessment and surveillance of clinical changes on an ongoing basis. Studies have found that when there are higher numbers of RN staff, there is more time for them to monitor changes in patients' conditions. This results in quicker detection of changes in health status and increases the RNs' ability to intervene before the condition deteriorates so severely that nothing can be done. "Failure to rescue" is the term used to identify situations where interventions have not happened in a timely fashion. In other words, when higher levels of RN staffing are present, failure to rescue is reduced (Aiken, et al., 2002; Needleman, et al., 2002b).

A number of studies related to RN staffing effects on patient outcomes have attempted to use patient mortality as an outcome measure. The first study that examined patient mortality compared magnet versus non-magnet hospitals in the U.S. in relation to 30-day mortality rates (Aiken, et al., 1994). Magnet hospitals have a staff mix "rich" in RNs (higher in RN staff than other regulated and/or unregulated staff). The results show that magnet hospitals had fewer patient deaths per patients discharged than non-magnet hospitals. Researchers recognize results such as these can be problematic since deaths occur infrequently and the cause can be the result of poor care or overwhelming disease. Both these factors make detecting statistically significant differences difficult (Hartz, et al., 1989). Such studies have lacked methodologies for attributing the cause of death to preventable or non preventable causes. Therefore, it is not surprising to see that there is little agreement in studies concerning the relationship between nurse dose (number), nursing staff mix and mortality rates. Hartz, et al. (1989) found a high proportion of RNs to be strongly associated with lower adjusted mortality rates. Blegen, Goode, et al. (1998) found that a high proportion of RN staff – up to 87.5 per cent of all nursing staff – was associated with low patient mortality. Tourangeau, et al. (2002) also concluded that there is a positive correlation between nurse staffing mix rich in RNs and lower 30-day mortality rates.

In nursing home settings the relationship between nurse staffing levels and patient outcomes has been demonstrated in several studies. The findings from the latest Institute of Medicine Report, *Patient Safety: Transforming the Work Environment of Nurses* (2004), relates higher levels of RN hours per patient day and lower RN turnover rates with improved patient survival rates, improved functional status, earlier discharge, fewer pressure ulcers, decreased urinary tract infections and reduced use of antibiotics.

Some research studies in Canada and the United States have demonstrated that a higher proportion of RN staffing levels is consistently associated with higher quality care, lower morbidity and mortality rates, better client outcomes and reduced adverse occurrences in acute,

long term care and community care. They have linked lower rates of adverse events related to nursing care (pressure ulcers, pneumonia, post-op infections and urinary tract infections) to higher RN staffing ratios (Kovner & Gergen, 1998; Kovner, et al., 2000).

Improved client outcomes have been directly linked to RN competencies related to accurate diagnosis, critical thinking and problem-solving capabilities, innovative timely interventions, leadership capabilities and supervisory skills. Studies have also indicated that the higher costs of hiring RN staff are offset by productivity gains and cost savings from decreased lengths of stay and reduced rates of readmission (Aiken, et al., 2002; Blegen, Goode, et al., 1998; Cho, et al., 2003; Clark, 2002; Curtin, 2003; Jawad, et al., 2003; Yang, 2003; Needleman, et al., 2002a, 2001; Needleman & Buerhaus, 2003; RNABC, 2001).

Some researchers believe that delivery processes of care need further attention given the current workload of nursing personnel. The fact that nursing staff is being stretched to its limit has resulted in an inability to provide precise clinical assessments. This results in daily crisis management and a chaotic work environment. For these reasons Affonso et al. (2003) recommend an increase in the proportion of RN staff.

A recent study of nursing staff mix and patient outcomes determined that RNs experience high levels of role conflict despite the type of staff mix model they work in; that nurses' job satisfaction is influenced by the type of staff mix model employed on the patient care unit; that nurses' perception of quality care differ with the type of staff mix model utilized and that bed capacity may be a determinant of the staff mix model utilized on patient care units (McGillis Hall, 2003).

2. *Nurse Staffing Studies – RNs and LPNs*

There are studies that conclude that higher levels of regulated nursing staff (RNs and LPNs) are associated with better quality patient outcomes. In a landmark study (McGillis Hall, et al., 2001), staff mix models that included a lower proportion of regulated nursing staff utilized more nursing hours, while a staff mix with higher proportions of RN/LPNs was associated with better health and quality outcomes for patients at the time of discharge. Higher proportions of RNs and LPNs also demonstrated lower unit rates of medication errors and wound infections (McGillis Hall, et al., 2001). This was one of the first studies undertaken which demonstrated an association between the staff mix of nurses and patients' self-reported health outcomes. In view of the diversity of nursing care provided in acute care, each unit may require a particular implementation or formula for staff mix (Aiken, et al., 2002; Blegen, Goode, et al., 1998; McGillis Hall, 2001).

Non-fatal adverse events are thought to have a more indirect relationship with the availability of nursing staff. A consistent finding in the recent literature is that having fewer regulated (RN and LPN) nursing staff is associated with higher rates of nurse-related outcomes such as nosocomial infections, pressure ulcers, and cardiac respiratory failure (Aiken, et al., 2002; Cho, et al., 2003; Kovner, et al., 2000; Needleman, et al., 2002a, 2002b).

Many studies are reviewed in two Institute of Medicine (IOM) reports (IOM, 1996, 2001b) that confirm the important relationship between staffing and quality outcomes. The 1996 IOM report, *Nursing Staff in Hospitals and Nursing Homes: Is It Adequate?,* found that a number of studies using different types of quality measures have shown a positive relationship between regulated nursing staff mix and quality of nursing care.

Another study showed that higher levels of regulated nursing staff on medical-surgical units in Ontario teaching hospitals are associated with lower rates of medication errors and wound infections. There was also a correlation to the experience of nursing staff. The study found that the less experienced the nursing staff, the higher the incidence of wound infections. Given that it is likely that inexperienced nurses will be the most prevalent labour resource for medical-surgical unit vacancies, a certain amount of caution should be utilized when reviewing or determining staff mix. In other words, there must be an attempt made to balance both the experience level and the skill mix of nursing staff to safeguard for quality patient outcomes (McGillis Hall, et al., 2004).

Nurse Staffing Studies RNs, LPNs & NAs

Recent observational studies performed in acute and long-term care settings provide substantial evidence that there is a positive correlation between nurse staffing (RNs, LPNs and NAs) and patient outcomes (Blegen & Vaughn, 1998; Bolton, et al., 2001; Needleman, et al., 2002a, 2002b). All of these cross-sectional studies explored the correlations between nurse staffing (dose and/or type), patient deaths and rates of adverse patient outcomes (including nosocomial infections, decubitus ulcer and falls). These studies also indicate a need for decision-makers to re-examine the appropriate utilization of nursing staff in terms of today's health care environment.

Many studies conducted from the mid-1990s through 2001 in acute care hospitals revealed similar evidence – a correlation between nursing type and/or dose and patient outcomes. The results of these studies conclude that there is strong evidence that inappropriate nurse staffing (type and/or number) is associated with increased lengths of stay, nosocomial infections (urinary tract infection, post-operative infection, and pneumonia), and pressure ulcers. These studies, which utilize a variety of patient types with various acuity levels, provide substantial evidence that richer nurse (regulated) staffing is associated with better patient outcomes (Seago, 2001).

According to McKenna (1995), quality of care has been directly associated with the skill mix. He states that studies supporting the retention of high numbers of staff with rich skill mix results in reduced lengths of stay, mortality rates, costs and complications, as well as increased patient satisfaction, recovery rates, quality of life and patient knowledge/compliance.

A study entitled *Appropriateness of Minimum Nurse Staffing Ratios in Nursing Homes* was done in two phases under the auspices of the U.S. Department of Health and Human Services (DHHS) and the Centers for Medicare and Medicaid Services (CMS). Together, these reports provide a comprehensive assessment of staffing-related issues in long-term care and the policy context for addressing them. The core of this work demonstrated consistent associations between staffing levels (dose and/or mix) and quality of care based on outcome measures relevant to patient safety, including incidence of pressure ulcers, skin trauma and weight loss. The data collected had a significant association until a certain staffing threshold was reached. Beyond this threshold, there were no further detectable benefits. These findings were consistent in all three categories of nursing staff (RNs, LPNs and NAs). This study also found a strong relationship between staff retention and positive patient outcomes related to patient safety (CMS, 2000; CMS, 2001).

In one large-scale study, researchers examined the three categories of care providers (RNs, LPNs and NAs) by measuring the proportion of nursing hours provided and the number of hours per patient day provided by each category of staff. The study found that RN staffing has

the biggest impact on adverse outcomes and that lower levels of staffing were associated with higher rates of urinary tract infections, pneumonia, shock, upper gastrointestinal bleeding and failure to rescue as well as longer lengths of stay. The study found no relation to patient outcomes and the use of LPNs or NAs (Needleman, et al., 2002a).

Nurse Staffing Studies LPNs and NAs

According to the IOM report, *Keeping Patients Safe: Transforming the Work Environment of Nurses* (2004), Schnelle et al. conducted a blind study to determine whether there were differences in the quality of care in 34 randomly selected long-term care facilities with different categories of nursing care providers (as cited in IOM, 2004). Results indicated that in the facilities that had a skill mix rich in LPNs compared with NAs, the residents were out of bed more, were more active during the day and demonstrated higher levels of self care. When these findings were compared with those of studies that utilized separate quality indicators such as weight loss, pressure ulcers, incontinence and loss in levels of physical activity, the researchers concluded that staffing type is an effective predictor of high-quality care processes.

Another study linked higher levels of LPN staffing with improved functional status as measured by activities of daily living (ADL) dependency (Cohen & Spector, 1996). Hours of care provided by licensed nurses (not unlicensed hours) have been found to be significantly related to improved functional ability, increased probability of discharge home and reduced mortality in the first year after admission (Bliesmer, et al., 1998).

Summary of Issues Affecting Staffing Decisions

It is evident from reviewing the literature that in most countries there is a lack of consensus on determining cost effective nurse staffing requirements based on skill level. Canada is no exception. Given the ever increasing complexity of patient care and the decreased length of patient stay, the proper utilization of personnel is a significant challenge for health care administrators (Shamian, et al., 1994). Other factors that contribute to the complexity of this issue include the world-wide concern with patient safety, the ever escalating cost of health care, the corresponding lack of funding and the shortage of nurses (Needleman & Buerhaus, 2003; Buerhaus & Needleman, 2000).

Research indicates that nurse staffing has a definite impact on patient outcomes, medical errors, lengths of stay, nurse turnover and patient mortality. It is recognized that staffing decisions must be modified depending upon the nurses' experience, the organization's characteristics and the quality of collaboration between all levels of staff within the facility (Curtin, 2003).

This growing body of evidence relating staff mix to nurse-sensitive patient outcomes emphasizes the need for decision-makers to consider the appropriate utilization of regulated nursing personnel within the various practice settings. Research indicates that one of the issues central to ensuring the best patient outcomes is to determine the right mix of care providers for the patient population.

Despite increasing research in the literature concerning patient outcomes and staff mix, there is a lack of literature related to the actual process or evaluation of nursing staff mix decision-making (Jawad, et al., 2003; Yang, 2003; Needleman, et al., 2002a; Cho, et al., 2003).

Creating a safer health care system requires an effective and appropriate use of available nurse resources. This is accomplished by using the appropriate skill level to meet the patients' needs. To this end, there is a need to review nursing workload by applying nursing costing formulas that take into account the complexities of the care environment and the clinical uncertainties in patient care. This is the key to a strong, vibrant health care system, which is essential to achieving desired patient outcomes (Affonso, et al., 2003).

The trend to casual staffing rather than full-time positions has lead to nurses under the age of 30 being increasingly employed in part-time and casual positions. This trend results in fewer opportunities for these nurses to be socialized into the profession, to gain the valuable experience of refining skills in a supportive environment and to learn to be effective members of the health care team. The skill mix needed should be based on the determination of desired outcomes of care and the relationship between the skill set of the worker and the outcomes of care (O'Brien-Pallas & Baumann, 2000).

According to a recently released report, *Keeping Patients Safe: Transforming the Work Environment of Nurses* (IOM, 2004), California staffing levels are now (as of January 2004) regulated in all patient care units and settings. The standards require certain numbers of licensed nursing (RN and LPN) staff. The regulations allow flexibility in determining the category of nurse to be used, based on scope of practice and patient acuity. The IOM report recognizes that imposing staffing ratios is an inadequate methodology to achieve optimal staffing in terms of staff mix. Minimum ratios may not provide quality care or ensure patient safety. Positive patient outcomes are more dependent on staff mix, the expertise of the nurse and patient acuity. Given these limitations, the IOM report recommends that staffing be increased as the number of patients increases. The report also states that it would be feasible to establish a minimum staffing number for each category of nursing staff. The staff mix required would be determined by research and/or a consensus of expert opinion based on the level of risk to the patients for untoward events.

The Use of Patient Classification Systems in determining nursing staff mix

Currently, there are limited decision-making tools for determining staff mix. The most common tools used are patient classification systems (PCSs).

Hospitals and other health care facilities in many countries determine nursing staff mix by using a PCS. A PCS is a workload measurement tool. Generally speaking, it produces quantitative formulas that measure patient acuity and translates patient care needs into actions that need to be performed by caregivers. The time that it takes to perform these actions is referred to as nursing workload. Calculations from the PCS are used to estimate nurse staffing needs. Each nurse checks off the relevant activities, treatments and procedures – according to each of their respective frequencies – for each patient in their care, at least one time per shift, depending on the PCS utilized. Depending on the number of activities that must be evaluated for each patient, this can prove to be an onerous task, requiring valuable time, and one that may lead to a decrease in staff satisfaction. Nurses feel that they spend too much time rationalizing their worth, leaving less time for patient care (DeGroot, 1989a, 1989b, 1994a, 1994b; Lawson, et al., 1993). PCSs lack the ability to ascertain variations in patient acuity, which locks staffing predictions into an average estimate, and as a result, fails to acknowledge the need for flexibility in staffing decisions (DeGroot, 1994a, 1994b).

These systems are both praised and criticized by nurses in all domains of practice. Researchers studying nurse staffing and the use of PCSs state that there is a wide mistrust of virtually all such tools and that these tools are inadequate for determining unit staffing on a daily or shift basis (Seago, 2001).

Most developers of PCSs promise nurse executives that these systems will measure and collect longitudinal data about nursing workload, which can then be used to estimate future labour needs in relation to budgets. Managers are told that the PCS allows them to compare the workloads of nurses across units within their hospital, thereby making their staffing requirements and subsequent budget requests more objective for hospital administrators. Staff nurses are lead to believe that the PCS is able to accurately predict staffing needs for the next shift. Research has shown that no matter how good the PCS, it is only able to fulfill the first promise of being able to provide longitudinal data to use in negotiating annual budgets (Bayiz, 2003).

Since most PCS systems are designed to be unit specific, cross-unit comparison is not possible. As well, there is no system that can accurately predict staffing needs for the next shift. The most a PCS can offer is an average prediction of what staffing should be. There is no ability in a PCS to control patient admissions or to predict the actual workload due to fluctuations in patient care conditions. In health care systems where the environment is unstable (i.e., acute care) and there are frequent admissions and discharges, the PCS will not be able to reflect staffing needs with any high degree of accuracy. These factors have lead to a widespread mistrust of virtually all PCS tools currently in use. Many nurses feel that staffing requirements determined by a PCS actually reflect the hospital budget rather that the needs of patients or the competency of the nursing staff. There may be some credence to such an argument because all PCSs are designed to measure nurse workload and fit within the hospital budget (American Nurses Association, 1997, 1999, 2000; Needleman, et al., 2001; Seago, 2002b).

PCSs are inadequate in taking into account:

- the experience level or skill mix of nursing staff;

- the availability of support staff;

- the organization of and delivery system for patient care across units; and

- the physical layout of the various units.

There is no "one size fits all" set of standard times that can be used across hospitals (Bayiz, 2003). Workload estimates are also criticized for being derived from measurements of care that have already been delivered. Such care may be inaccurately measured due to staffing limits at the time of measuring. Therefore, it cannot be considered an accurate predictor of care that is actually needed (Jennings, et al., 1989). Due to these factors many nurses at all levels of practice and within all domains feel that the use of the PCS has lead to the perception that "a nurse is a nurse is a nurse," and that all nurses are equal and interchangeable in the eyes of decision-makers (Malloch & Conovaloff, 1999). A study comparing four different PCSs for the same patient population found large statistically and clinically significant differences in hours of care needed by the patients according to the four tools (O'Brien-Pallas, et al., 1992).

These concerns point to the need to validate and evaluate PCSs during their actual implementation. There are reports in the literature concerning the validity and reliability of a system in its initial implementation (efficacy) phase but there is a lack of research related to PCS validation after

implementation (effectiveness) (Hlusko and Nicholas, 1996). The literature also points out that continual changes in personnel, work environments, tools and equipment, and technology result in corresponding changes in the time required to perform the work. In other words, revisions are required to the standard times on a continual and timely basis. Experts recommend that these reviews be conducted annually and on an ad-hoc basis whenever major work redesigns are undertaken (Bayiz, 2003). It is fair to say that the value of PCSs is being questioned by nurses due to shrinking resources. There is an ever increasing need to determine whether these systems provide the information necessary to make appropriate, well-informed decisions. Research indicates that PCSs provide a partial answer to staffing questions but they do not provide the necessary level of information required to ensure the correct number and mix of nursing care providers (Seago, 2002b).

A Need for Effective Staffing Practices – Alternative Staffing Methodologies

Given the various problems identified in the literature with PCSs, many researchers, hospital executives and policy analysts are calling for a more reliable and valid measure of patient acuity (Reed, et al., 1998). Due to the rapid pace of change in care requirements today, there is a demand for the utilization of approaches other than PCSs to determine nurse staffing needs in relation to patient needs (Kovner, et al., 2000). Some are urging for the development of a formula-based approach to determining staffing, one that would allow for consideration of multiple factors in addition to patient acuity. Factors to be considered include:

- RN and LPN expertise;
- work intensity;
- physical layout of the unit; and
- the availability of other health care providers, support staff and physicians to the unit (Seago, 2002b).

Workload estimates produced by PCSs provide only one dimension of a three- dimensional puzzle. Nursing staff needs to be involved in determining, implementing and evaluating any approach used to estimate nurse staffing needs. There is a need to provide "on time" staffing which accommodates the unpredicted variations in patient volume and/or acuity. Such elasticity in staffing can be accomplished by staffing above predicted estimates, cross-training nurses to go to other units when the need arises or by using nurses from external agencies. Staffing above predicted levels is costly and difficult, but given the current nursing shortage, this approach offers the best results for consistent quality care, patient outcomes and patient safety. This method of staffing utilizes the principle of redundancy in staffing that is employed by high-reliability organizations. Excess in staffing is not considered wasteful by such organizations as this provides enough slack in the system to accommodate for continuous learning opportunities. This allows staff the ability to stay current in technological and information advances, which is seen as imperative to the best outcomes for all concerned (Bayiz, 2003).

If the supply side of the staffing equation is not negotiable, then the demand side has to be moderated. Achieving optimum nurse staffing requires empowered nursing staff who are encouraged to use their creativity in delivering efficient quality care to patients. Allowing staff to regulate the work flow will decrease the need for having excess staff. For example, in one hospital in Wisconsin, patient flow is regulated through a unit assessment tool administered by nursing staff. Staff is given the authority to limit new admissions, even if there are empty beds, when – in

their judgement – the number of available nursing staff (based on type and experience) is insufficient for the workload and patient safety is jeopardized (Rozich & Resar, 2002).

Another example is the Work Complexity Assessment (WCA) tool. This tool "is aimed toward a care-team approach that positions the [RN], working in concert with [other colleagues] to determine how they will manage their work volume" (Forte & Forstrom, 1998, p. 4).

Future methods used to determine staff mix must take into consideration the changes in patient characteristics, economic status of the facility and numbers and types of staff available. The demand for competency and quality patient outcomes will continue to be the driving force, as health care becomes more complex. The provision of competent staff having a thorough understanding of the care provider's scope of practice is dependent on those responsible for staffing decision-making (AARN, 2002, 2003; Association of Registered Nurses of Newfoundland and Labrador [ARNNL], 2000; CNA 2003b; CNO, 2002; College of Registered Nurses of Manitoba [CRNM], 2002; NANB & ANBLPN, 2003; RNABC, 2001).

Providing patients with the best possible care is central to nursing. According to the literature, appropriate nurse staffing requires an adequate number of knowledgeable nursing care providers to meet this outcome (Shullanberger, 2000; Gonzalez-Torre, et al., 2002; London Deutschendorf, 2003; Benton, 2003; Adams-Wendling, 2003; Walsh, 2003; Seago, 2002a; Manthey, 2001; Keeling, 1999a, 1999b; Davidhizar, et al., 1998, O'Brien-Pallas, 1997). Literature related to staffing recognizes that the provision of care is dependent on caregiver characteristics (i.e., nurses' age, skills and education); patients' medical condition (i.e., chronic or acute, level of severity and complexity); and the environment (i.e., clinical supports, number and type of staff). The variability in workload measurement causes a need to carry excess staff for peak demand scenarios. The aim is to balance total operating costs (appropriate number and type of staff required) while maintaining quality care and optimum patient safety.

Gaps in the Literature

Bolton, et al. (2001), studying hospital staffing levels (number and/or type) and patient outcomes, found that evidence does not yet indicate the necessary (minimum) or ideal (optimal) staffing across the various types of inpatient care units. The Agency for Healthcare Research and Quality (AHRQ) evidence report *Making Health Care Safer: A Critical Analysis of Patient Safety Practices* found that there is no definitive evidence to determine specific thresholds in relation to RNs, the ideal nursing staff hours per patient day or nursing skill mix for various patient populations or nursing unit types (Seago, 2001). A consistent opinion expressed in the skill mix literature is that the results of the most rigorous of studies cannot necessarily be applied to a different setting. One can conclude from this that skill mix should be examined through the identification of care needs of a specific patient population and then used to determine the required skills of staff (Buchan & Dal Poz, 2002). Several other researchers have pointed out the need to collect data and to adjust for patient severity at the unit level where the impact of nurse staffing is more direct (Aiken, et al., 2002; Blegen, Goode et al., 1998; McGillis Hall, 2002).

The literature clearly shows that there is a strong relationship between type of care provider and better patient outcomes. The problem is that the reduced adverse events research that produced these results has not yet included sufficient studies of staffing within specific types of patient care units. As a result, there is an inability to identify quantitative staffing levels that could be used by hospitals in evaluation of the appropriateness of their staffing. There have been studies

done in relation to staffing in ICU (Intensive Care Units) but fewer studies have been done in general medical/surgical units. Research in additional settings needs to be done to develop a strong, standardized approach for classifying patient acuity in terms of nursing care required. There is a general lack of uniform, reliable and available data on nurse staffing, preventing the issue from being better understood (Kovner, et al., 2000; Needleman, et al., 2001; Sochalski, 2001; Unruh, 2002).

There is a need to facilitate the collection of more accurate and reliable staffing data. At the present time, staffing data from both hospitals and long-term care facilities is unreliable. For this reason, the IOM Report (2004) recommends that a standardized staffing report be developed, which would ensure a higher degree of accuracy and consistency in facility reports related to staffing. In order to remedy the lack of database information related to nurse staffing, report development would need to: include staffing levels by type of patient care unit; distinguish direct nursing care providers from nursing staff in administration, education or other non-direct patient care position; and distinguish inpatient nurses from those nurses that work in ambulatory care facilities. These factors have thwarted an understanding of the role of nurse staffing in patient care and the more efficient and effective deployment of nursing staff (IOM, 2004).

The research-based literature fails to adequately address the invisible aspects of nurses' work or the area of skill mix. Care is context-specific and skill depends on experience and education. Future research needs to focus on the changing roles and ever expanding scopes of practice for regulated health care providers. Too often, the activities of health care providers are being evaluated without assessing patient needs in relation to the type of care provider that might be best suited to provide care to meet those needs. The process of nursing care remains key in understanding the relationship between appropriate type and number of nurse staffing and positive patient outcomes (Spilsbury & Meyer, 2001; Cho, et al., 2003).

While "nursing staff mix has become one of the most vigorously studied topics in contemporary nursing systems research" (Mark, et al., 2003, p. 552), there are no clear recommendations made in studies concerning the most effective deployment of skill mix (Spilsbury & Meyer, 2001). Making generalizations about results is difficult as research fails to offer guidance regarding the most effective skill mix to ensure the provision of the best care. In other words, skill mix issues are not widely researched and the few studies that have been done should be regarded with a degree of caution and used primarily to continue the debate surrounding skill mix decision-making related to staffing.

Although research has increased evidence in relation to rising patient acuity, evidence of the shift on the use of nursing resources needs to be further investigated to effectively capture patient acuity and complexity as part of future nurse staffing models (McGillis Hall, et al., 2004).

Conclusions

This literature review indicates that there is a lack of effective staff mix decision-making models within the current health care system. It would seem that staffing models should be based on a standardized set of criteria that reflects the needs of the current patient populations and the nursing personnel available in the health care settings. Health care providers can no longer afford to operate in solitude; they must collaborate to develop staffing tools that will maximize human and financial resources to ensure quality outcomes for nurses and their patients. Safe patient care demands that ongoing processes be put in place to ensure the timely review of staff

mix decision-making. According to O'Brien-Pallas, et al. (2001), much improvement in staffing and patient outcomes can be achieved by ensuring that there is:

- a sufficient number and appropriate staff mix employed to meet the needs of patients without the use of overtime or excessive capacity expectations that may affect nurses' health and patient outcomes;

- a strong, cohesive and knowledgeable group of nurses available to provide continuity of patient care, which will in turn create a healthier work environment for nurses; and

- an examination of the roles and activities of front-line nurses to determine ways to increase the time available for patient care.

It can be seen from the research that patients do benefit from appropriate staff mix, as do health care facilities. Staffing decisions based on the evidence:

- reduce patients' lengths of stay;

- reduce the occurrence of adverse events;

- increase patient safety;

- increase patient and nurse satisfaction;

- improve overall patient outcomes;

- avoid costly errors;

- decrease staff turnover rates; and

- capitalize on experience and education of staff.

In summary, research findings underscore the complexity of the issue and the difficulty in recommending a universal ideal mix of care providers. It is, therefore, felt that nurse staffing decision-making should be unit-based and evaluated by patient outcomes.

An evaluative framework for nursing staff mix decision-making would benefit nurses, employers and ultimately patients. As Judith Shamian (Executive Director, Health Canada's Office of Nursing Policy) said at the November 2003 Western Canadian Nurse Leaders Forum in Saskatoon, "If we fix nursing, it's good for the health care system. If we fix the health care system, it's good for nursing."

DEFINITION OF TERMS

Acuity: "the degree of severity of a client's condition and/or situation" (RNABC, 2003, 7).

Complexity: "the degree to which a client's condition and/or situation is characterized or influenced by a range of variables (e.g., multiple medical diagnoses, impaired decision-making ability, challenging family dynamics)" (RNABC, 2003, 7).

Nursing Intensity/Nursing Workload: the amount of time, and mental and physical energy that nurses devote to various work-related activities and to direct patient care (Aiken, et al.,1996; Blegen, Goode, et al., 1998; Blegen & Vaughn, 1998; O'Brien-Pallas, et al., 1997; Shamian, et al., 1994; Sochalski, et al., 1997).

Nursing Staff Mix: the combination and number of regulated and unregulated persons providing direct and indirect nursing care to clients in all settings where regulated nursing groups (RNs, LPNs, RPNs) practice (CNA, 2003).

Patient [Client] Outcomes: the observable events/results of nursing interventions or the care environment on patients. The focus is on attempting to determine whether the level of nursing staff was related to the number and/or frequency of adverse events (Blegen, Goode, et al., 1998; Blegen & Vaughn, 1998; Sochalski, et al., 1997).

Satisfaction: the perception that the expected care that is being given is at least adequate and safe. Satisfaction is looked at in terms of the patient and the nursing staff. (Blegen, Goode, et al., 1998; Sochalski, et al., 1997).

Scope of Practice: the range of services that a professional group is authorized to provide. Both legislation and education determine the scope of practice of a professional group, and they are obliged to practice in accordance with their professional code of ethics and set of professional standards (College of Registered Nurses of Manitoba, 2002).

Variability: "the degree to which a client's condition or situation changes or is likely to change. Considerations include predictability, stability and patterns of change" (RNABC, 2003, 7).

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