Skill Mix Decision-Making for Nursing

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Developed by

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ABOUT THIS PAPER

This paper is one in a series of documents developed for the International Centre for Human Resources in Nursing (ICHRN), which provided funding. The series aims to explore nursing human resources issues and offer policy solutions.

Launched in 2006 by the International Council of Nurses (ICN) and Florence Nightingale International Foundation, the ICHRN is dedicated to strengthening the nursing workforce globally through the development, ongoing monitoring, and dissemination of comprehensive information and tools on nursing human resources policy, management, research, and practice.

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EXECUTIVE SUMMARY

When operating within today's context of rising demand for health services, cost containment, and shortages of health care workers, determining the most effective mix of staff and the skills needed by each category of staff to ensure safe, quality, and cost-effective patient care is imperative.

Staff or skill mix has been broadly defined as "the combination or grouping of different categories of workers that is employed for the provision of care to patients" (McGillis Hall 1997 p. 31). This paper provides an overview of current approaches to skill mix decision-making in nursing and the evidence base that informs them.

Approaches to skill mix decision-making

The approaches used to make decisions about skill mix range from broad macro-level planning at a policy level, to smaller micro-level day-to-day staffing decisions. The American Nurses Association (ANA) has outlined a framework which includes principles to consider when making decisions related to nurse staffing, categorised as: patient care unit related, staff related, and organisation related (ANA 1999).

It is evident from the literature that role-based approaches are used to determine staff mix in many developed countries. This is because health human resources staffing issues are managed at the level of the individual health care organisation. Standardised nurse:patient ratios, which have been legislated in the states of California, in the United States, and Victoria, in Australia, are an example of a role-based approach for making decisions related to nurse staffing.

Task-based analysis is another method of determining skill mix. It focuses on what tasks can be safely shifted and the conditions for ensuring quality. This method of decision-making is used more commonly in developing countries where nurse staffing norms may be set at the population, hospital, primary care or public sector level, and where changes to the skill mix may be driven by a lack of funds and the availability of professional care providers (Hirschhorn *et al.* 2006; Adano 2008).

Despite the differences in determining skill mix in developed and developing countries, it is common for several methods to be used in combination when making skill mix decisions (Buchan *et al.* 2000). Regardless of where or how decisions are made, quality, cost-effectiveness and safety should be universal determinants in making skill mix decisions.

Strengths and weaknesses of approaches

With a range of approaches for skill mix decision-making, nursing policy-makers and managers have the opportunity to choose a combination that suits their purpose. In choosing approaches, the strengths and weaknesses of each should be fully considered.

Limitations of the evidence

Although links between specific nurse staffing models and patient outcomes have been established, gaps remain in the skill mix decision-making literature. These include: determining the impact that factors in the work environment have in relation to staffing models and patient outcomes (McGillis Hall 2005); the cost-effectiveness of different nurse staffing patterns (Spetz 2005); and estimates of what staffing levels are required for safe patient care. Issues with the level of analysis of nurse staffing variables (McGillis Hall 2005) and measurement error when using some staffing allocation methods have also been identified (Harless & Mark 2006).

Contextual issues in decision-making

When making skill-mix decisions, the literature illustrates the importance of considering a number of contextual issues, including: individual demographic characteristics of the workforce; health care worker shortages; migration and capacity development; work environments and safety; regulatory systems; communication of change; and costs.

Although these are global issues, different questions may need to be asked about skill mix when making decisions in high income countries compared to low or middle income countries. Contextual questions should focus on addressing quality, safety and cost-effectiveness in the skill-mix plan.

Information to shape skill-mix decisions

There are a number of data elements that should be considered when making decisions regarding skill mix, including: identifying the problem that a change in skill mix is addressing, determining any constraints on capacity to carry out changes to the mix, understanding the resources available to support the change, and identifying and implementing an approach for skill-mix change (Buchan *et al.* 2006). The importance of working with stakeholders and government to evoke change has also been noted in the literature.

Conclusions

The continuing global shortage of health care personnel has created challenges that require exploration of different staffing models. Despite the fact that little research has been conducted on skill mix decision-making in countries where resources are limited, it is evident that developing and developed countries approach patient care staffing decisions differently, based on issues ranging from the availability of health care resources to the health and needs of the population being served.

INTRODUCTION

Today, managers of health human resources in nursing face an enormous challenge. Operating within a context of rising demand for health services, cost containment, and shortages of nurses and other health workers, they must determine the most effective mix of staff – and the skills needed by each category of staff – to ensure safe, quality, and cost-effective patient care.

Achieving a safe and appropriate staffing mix within nursing, and in relation to other health workers, is a concern in developed and developing countries alike. This suggests the need to assess current approaches and highlight core themes, information that can provide guidance for policy-makers and managers globally in making informed staffing decisions.

Background

Staff or skill mix is broadly defined as: "the combination or grouping of different categories of workers that is employed for the provision of care to patients" (McGillis Hall 1997 p. 31). The unique knowledge and skills that individual health care providers bring to their role distinguish the skill mix within staffing models.

Early literature on skill mix in nursing provides primarily descriptive exemplars of staffing models used by an individual health care setting or patient care unit. These included examples from the United Kingdom, Australia, and North America, the majority of which were focused on acute hospital care. Descriptive scenarios were usually cross-sectional in nature, studying the relationship between variables at one point in time; thus, they did not examine the impact or effectiveness of staffing changes over time. Because follow-up evaluation of many of these staffing models is not documented in the literature, their long-term usefulness remains unknown.

Within the primary care literature, meanwhile, evidence varies on the effectiveness of nurse practitioners in the skill mix. While systematic reviews indicate that patients are more satisfied with care by nurse practitioners who provide longer consults and more investigations than physicians, no differences in patient health status were evident (Horrocks *et al.* 2002). Meanwhile, a meta-analysis of nurse practitioners and nurse midwives in primary care reported higher patient satisfaction and greater resolution of pathological conditions in patients cared for by primary care nurse practitioners as compared to physicians, although overall patient care was equivalent (Brown & Grimes 1995). Nurse midwives used technology and analgesia less frequently than physicians in the intrapartum care period, although patient outcomes were equivalent between nurse midwives and physicians (Brown & Grimes 1995). In contrast, some individual randomised clinical trials report no significant differences in patient outcomes between physicians and nurse practitioners (Mundinger *et al.* 2000), while others report that models employing nurse practitioners are less costly (Ettner *et al.* 2006).

By the late 1990s, the science on nurse staffing evolved to include studies that explored the impact of skill-mix models on patient outcomes (Kovner & Gergen 1998; Needleman *et al.* 2002; McGillis Hall *et al.* 2003). Most recently, systematic reviews of the literature linking nurse staffing models to patient outcomes have been undertaken (Lankshear *et al.* 2005; Kane *et al.* 2007). The results indicate that increased registered nurse (RN) staffing in acute care hospital settings is associated with improved patient outcomes (Lankshear *et al.* 2005); specifically, lower hospital-related mortality, hospital-acquired pneumonia, unplanned extubations, respiratory failure, and cardiac arrests (Kane *et al.* 2007).

Still, estimates of a precise number or level of nurse staffing for safe patient care have not been produced for hospitals or the primary care setting. The International Council of Nurses (ICN) tool kit *Safe Staffing Saves Lives* underlined that there is a lack of consensus on what is meant by 'safe staffing' and, by implication, safe skill mix, although key elements included appropriate staff numbers to meet the complex care needs of clients across a variety of settings (ICN 2006).

Current focus

The global crisis in available human resources for health continues to make decision-making related to nurse staffing a critical issue for health care managers. In developing countries, the severe shortage of health care workers is considered "the most serious factor constraining the delivery of health services" (Cohen 2008 p. 1).

Meanwhile, there is an increasing shift in the literature internationally to consider health human resources needs within a broader global context, beyond the micro-organisational level of hospital health care. This not only applies to skill mix within nursing, but to the interaction across disciplines; for example, the African Union Health Strategy asks all governments to "determine the categories of professional, auxiliary (mid-level) and community health workers that will provide an appropriate human resource mix for their needs" (African Union 2007 p. 12).

Scope of paper

Underlining the complexity of today's health care environment, this paper provides an overview of current approaches to skill mix decision-making in nursing and the evidence base supporting their use. Strengths, weaknesses and limitations of approaches are identified. Contextual issues, as well as key data and information necessary to inform skill-mix decisions, are also outlined. Finally, a checklist is provided that integrates findings from the literature into a three-part approach for managers implementing a skill-mix change.

APPROACHES TO SKILL MIX DECISION-MAKING

Health human resources managers use a number of approaches to make decisions about skill mix. Each approach serves a different purpose, from broad macro-level planning at a policy level, to smaller micro-level day-to-day staffing decisions. Few authors have identified comprehensive approaches that cover all aspects of health human resources planning from the far-reaching level of the population and its specific health care needs, to smaller individual organisational assessments that are linked to roles or tasks. Some approaches have been described as:

- Population ratios of providers to the entire population
- Needs-based approaches based on the health needs of a population
- Demand approaches for targeted services
- Role-based models that estimate the number of staff required for a number of patients
- Task-based analysis of a unit of work and identification of the knowledge and skills required to complete that work, and
- Workload-based indicators (Hirschhorn *et al.* 2006)

Most literature provides information on making skill-mix decisions at the more micro-level, within the context of organisational decision-making in hospitals (ANA 1999; Buchan *et al.* 2000; Shullanberger 2000).

A World Health Organization (WHO) discussion paper on skill mix in the health workforce, identified eight distinct approaches to determining skill mix. The approaches, which primarily relate to the micro-level context of the organisation, are: task analysis, activity analysis, self-recording diaries, patient dependency analysis, re-engineering, use of professional judgement, job analysis and role reviews, and brainstorming (Buchan *et al.* 2000; see Table 1). Noting that each approach has its pros and cons, the authors refrain from recommending one specific model to managers.

In the United States, the American Nurses Association (ANA) outlined a comprehensive framework for managers to use when assessing nurse staffing needs (see Table 2). Developed by an expert panel, it includes principles to consider when making decisions related to nurse staffing. The principles were categorised as patient care unit related, staff related, and organisation related (ANA 1999).

Table 1: Approaches to Determining Skill Mix

Approach	Strengths	Weaknesses
Task Based	• Uses trained observers	• Presents challenges with observer agreement related to the skills and knowledge required for work activities • Is costly • Its focus on tasks is often considered a limited measure of nursing work • Lack of staff involvement can lead to questionable uptake of the results • Difficult to use outside of hospital units • Requires substantial data
Activity Analysis	• Uses trained observers	• Presents challenges with observer agreement related to the skills and knowledge required for work activities • Is costly • Is focus on tasks is often considered a limited measure of nursing work • Lack of staff involvement can lead to questionable uptake of the results • Difficult to use outside of hospital units • Requires substantial data
Daily Diaries	• Self-reported by nurses • Directly involves the nursing staff • Not costly • Offers the potential to identify time spent on tasks that could be shifted in a skill-mix arrangement	• Accuracy of information can be problematic • Requires substantial data
Case Mix/Patient Dependency	• Beneficial in determining staffing variations over time in relation to nursing workload • Provides estimates of the overall number of staff needed	• Fails to capture the mix of staff required • Requires substantial data
Re-engineering	• Encourages the necessary innovation in the context of developing world challenges	• Not often used because its radical or fundamental approach to restructuring can face political and organisational constraints • Often suffers from a lack of focus on process • Requires substantial data
Professional Judgement	• Commonly used by staff as a mechanism to reallocate work in the current context	• May lack objectivity and transparency
Job Analysis	• Can be used to make staffing decisions based on relevant information from the interviews	• Lack of objectivity and potential for bias can be problematic
Brainstorming	• May be used as a quick precursor to other staffing approaches	• May raise staff expectations for change and generate material that is contradictory

Source: Adapted from Buchan *et al.* (2000) *American Nurses Association staffing framework*

Table 2: American Nurses Association *Principles for Nurse Staffing*

Area Principle		Indicators
Patient Care Unit Related	1. Appropriate staffing levels for a patient care unit reflect analysis of individual and aggregate patient needs. 2. There is a critical need to either retire or seriously question the usefulness of the concept of nursing hours per patient day. 3. Unit functions necessary to support delivery of quality patient care must also be considered in determining staffing levels.	**Staffing factors** Number of patients, levels of intensity of the patients for whom care is being provided, contextual issues including architecture and geography of the environment and available technology, level of preparation and experience of those providing care **Patient factors** Age, functional ability, communication skills, cultural and linguistic diversities, severity and urgency of admitting condition, scheduled procedure(s), ability to meet health care needs, availability of social supports, other specific needs identified by the patient and by the RN **Unit factors** Unit governance, involvement in quality measurement activities, development of critical pathways, evaluation of practice outcomes
Staff Related	4. The specific needs of various patient populations should determine the appropriate clinical competencies required of the nurse practising in that area. 5. Registered nurses must have nursing management support and representation at both the operational level and the executive level. 6. Clinical support from experienced RNs should be readily available to those RNs with less proficiency.	**Nurse characteristics** Experience with the population being served, level of experience (novice to expert), education and preparation, including certification, language capabilities, tenure on the unit, level of control of practice environment, degree of involvement in quality initiatives, measure of immersion in activities such as nursing research which add to the body of nursing knowledge, measure of involvement in interdisciplinary and collaborative activities regarding patient needs in which the nurse takes part, the number and competencies of clinical and non-clinical support staff the RN must collaborate with and supervise
Institution/ Organisation Related	7. Organisational policy should reflect an organisational climate that values registered nurses and other employees as strategic assets and exhibit a true commitment to filling budgeted positions in a timely manner. 8. All institutions should have documented competencies for nursing staff, including agency or supplemental and travelling RNs, for those activities that they have been authorised to perform. 9. Organisational policies should recognise the myriad needs of both patients and nursing staff.	**Patient and nursing staff needs** Effective and efficient support services (transport, clerical, housekeeping, laboratory, and so forth) to reduce time away from patient care and to reduce the need for the RN to engage in 're-work'; access to timely, accurate, relevant information provided by communication technology that links clinical, administrative and outcome data; sufficient orientation and preparation including nurse preceptors and nurse experts to ensure RN competency; preparation specific to technology used in providing patient care; necessary time to collaborate with and supervise other staff; support in ethical decision-making; sufficient opportunity for care coordination and arranging for continuity of care and patient and/or family education; adequate time for coordination and supervision of unregulated workers by RNs; processes to facilitate transitions during work redesign, mergers and other major changes in

		work life; and the right for staff to report unsafe conditions or inappropriate staffing without personal consequence
Evaluation	A number of trends should be evaluated on an ongoing basis over time.	Work-related staff illness and injury rates; turnover/vacancy rates; overtime rates; rate of use of supplemental staffing; flexibility of human resource policies and benefit packages; evidence of compliance with applicable federal, state and local regulations; and levels of nurse staff satisfaction

Source: ANA (1999)

The unique feature of the ANA staffing framework is the inclusion of specific factors or indicators that managers should consider within each of the three areas. Factors related to the patient care unit include the number of patients, intensity of patient care, and physical and psychological considerations. Staff-related factors include staff experience, education, level of control over practice, and degree of involvement in quality practices. Finally, organisational factors include the effectiveness and efficiency of support services, access to timely patient information, adequacy of staff orientation and preparation towards competency, and safety of the work environment (ANA 1999).

Reflecting the ongoing complexity of nurse staffing, the ANA framework grew from a small pamphlet into a larger utilisation guide that provides further information for managers wanting to apply its principles in their settings (ANA 2005). The guide emphasizes the importance of ongoing evaluation of nurse staffing in relation to nurse-sensitive indicators. Specifically, it focuses on capturing how the quality of the work environment can have an impact on the quality of patient care (ANA 2005). The guide represents the most thorough effort to date for determining nurse staffing. By including indicators for managers to use in decision-making, it provides added value not seen in other approaches.

Roles and tasks

It is evident from the literature that role-based approaches are used to determine staff mix in many developed countries. This is because health human resources staffing issues are managed at the level of the individual health care organisation. Role-based approaches are "based on estimating the number of staff belonging to specific cadres (physicians, nurses, etc.) required to serve a given number of patients" (Hirschhorn *et al.* 2006 p. 3). In some countries, such as the United Kingdom, a national health system may have centralised workforce planning that influences decision-making about roles, role redesign, and new roles through regulation and funding models; still, it enables staffing levels to be determined at a more local level. In developing countries, meanwhile, the staggering shortage of health care workers requires that the focus of planning be placed on societal or population needs.

Task-based analysis is also being used to determine skill mix; specifically, it focuses on what tasks can be safely shifted and the conditions for ensuring quality. This is with a view to cost-effectiveness while sparing scarce professional time and skills for more complex tasks.

In practise, as attested to by the WHO report on skill mix, "often more than one method will be used in combination" (Buchan *et al.* 2000 p. 4). Thus, while the purpose of and approaches to staffing decisions will differ, some overlap in their use is apparent. Regardless

of where or how decisions are made, quality, cost-effectiveness, and safety should be universal determinants in making skill-mix decisions.

The majority of relevant literature forming the evidence base on nursing staffing relates to role-based approaches and is outlined below. This is followed by an overview of the emerging body of research using, or combining, task-based and needs-based approaches for determining staffing.

A systematic review of the literature on nurse staffing identified role-based approaches as the predominant mechanisms for staffing decisions by managers, and study by researchers, in this area (McGillis Hall 2005). Role-based approaches included:

- The proportion of registered nurses within the staff mix
- A numerical calculation of available nursing hours divided by the number of patients on a unit (nursing hours per patient day)
- The ratio of registered nurses to patients
- The number of full-time equivalents, and
- The mix of nursing staff (McGillis Hall 2005)

Much of the research from North America, Australia and the United Kingdom has used these measures to determine nurse staffing (Pearson *et al.* 1992; Kovner & Gergen 1998; Needleman *et al.* 2002; McGillis Hall *et al.* 2003; Buchan & Calman 2004). Similarly, in a recent European article highlighting the perspectives of international research experts in nurse staffing and patient outcomes (Van den Heede *et al.* 2007), the experts identified role-based measures as predominant mechanisms of nurse staffing. The measures included nursing hours per patient day and the proportion of registered nurses to total nursing care staff (Van den Heede *et al.* 2007).

Nurse:patient ratios

In the states of California, in the United States, and Victoria, in Australia, recent legislation defining standardised nurse:patient ratios has further highlighted role-based approaches for making decisions related to nurse staffing. Beginning in 1999 in California, acute care hospitals were required to provide minimum licensed nurse:patient ratios of 1:4 or 1:5 on each patient care unit. Initial research reports identified that RN hours per patient day increased, while the number of patients per RN declined. No impact on patient outcomes was noted (Donaldson *et al.* 2005). More recent study results report that adverse events have not been reduced as a result of the mandated staffing ratios (Bolton *et al.* 2007). The use of increased numbers of RNs for fewer patients implies higher costs, although follow-up research has not reported on this.

In 2001, Victoria implemented a nurse:patient ratio of 1:4 in hopes of improving the nursing workforce through increased recruitment and retention. In Victoria, ratios are legally mandated across the state in the public sector under the collective agreement. If the hospital does not meet them, the union can close beds. In 2004, Victoria adopted a modified 5:20 model of the nurse:patient ratio (Gerdtz & Nelson 2007). This model moves nurse staffing ratios from the individual patient to the unit level, requiring five nurses per 20 patients. This type of staffing model allows management to determine patient assignments based on skill

mix and patient acuity. It also allows enough flexibility for sudden adjustments in assignment if there is an emergency or sudden change in patient status, meanwhile maintaining the minimum mandated staffing requirement (Gerdtz & Nelson 2007).

Nurse:patient ratios have also been discussed in Israel since the 1970s, and since 1996, Israeli hospitals have used a staffing method that considers the ratio of nurses to hospital bed and the additional coverage required during absences and holidays (Rassin & Silner 2007). Increased demand for registered nurses due to patient complexity has led to recommendations that the training for licensed vocational nurses be discontinued; registered nurse education be directed towards academic settings, including graduate training to develop enhanced clinical expertise; and hospital skill mix be increased from 73% to 80% registered nurses, with the remaining 20% comprised of unregulated workers (Rassin & Silner 2007).

In a recent Canadian study examining decision-making processes for nurse staffing, interviews were conducted with key informants from across the country, including both users of staff decision-making tools and stakeholders (McGillis Hall *et al.* 2006). The study highlighted some of the challenges with standardisation of nurse:patient ratios and using task-based workload measurement or patient dependency approaches for determining nurse staffing. One of the study's key recommendations was the need for policy-makers to work with managers to develop practice-based solutions and a knowledge translation strategy for moving the evidence into practice (McGillis Hall *et al.* 2006).

Task shifting

In developing countries, nurse staffing norms may be set at the population, hospital, primary care or public sector level, while changes to the skill mix may be driven by a lack of funds and the availability of professional care providers (Hirschhorn *et al.* 2006; Adano 2008). The use of task-based approaches to determine staffing needs in developing countries is reflected in the recent emergence of 'task shifting' (WHO 2007). Task shifting is "a process of delegation whereby tasks are moved, where appropriate, to less specialized health care workers" (WHO 2007 p. 3). These tasks are often moved from higher qualified staff to those with less training and fewer qualifications.

Task shifting emerged primarily in response to the need to expand the health care workforce to increase access to HIV/AIDS care. For example, needs have been analysed with the aim of identifying what knowledge and skills are required, and then what level of health care provider is appropriate, to effectively fulfil the task. This must be understood in the context of the global shortage of health care workers as well as the especially acute situation in 57 countries located mainly in Asia and Africa (WHO 2006a). Twelve recommendations were outlined to deal with the health workforce crisis. They focused on increased investment in health care worker education and safety; comprehensive health workforce planning; and increased efficiency in the use of the existing health workforce. Recommendations aimed at increasing efficiency included allowing less skilled workers, such as volunteers, community health workers, and workers with minimal training, to take on some of the more simple tasks traditionally provided by highly trained workers (WHO 2006a).

Prior to the AIDS epidemic, and later propelled by its demands, many developing countries have had a diverse skill mix, one where health workers with fewer credentials and limited

training have been given more responsibilities, undertaking tasks that can create an ambivalent relationship to nursing, blur scopes of practice, and fall outside the prevailing regulatory environment. Other countries have been more specific in defining roles and scopes of practice. More recently, task shifting has emerged, and with it a more systematic attempt to review the body of literature, hold expert consultations, and research practice in six countries with a view to developing an evidence-based approach. For example, in developing countries, individuals living with HIV/AIDS may safely and effectively provide HIV/AIDS care in a health care organisation and the community (*Medical News Today* 2008). A key consideration with these approaches to task shifting is that "regular assessment and monitoring should be conducted on the entire health system of the country concerned" with a focus on quality assessment of health outcomes (International Confederation of Midwives *et al.* 2008 p. 2).

A needs-based model was developed to project staffing needs for HIV/AIDS care in Mozambique (Hagopian *et al.* 2008). Not unlike the concepts outlined in the American Nurses Association *Principles for Nurse Staffing* (ANA 1999), this model articulates patient-specific factors such as the number of patients that are on therapy, enrolled for treatment, and enrolled in a treatment facility (Hagopian *et al.* 2008).

In an effort to estimate the workforce needs for AIDS treatment in areas of Africa, South-East Asia, and the Western Pacific where access to human resources are limited, a task-based approach was used to identify patient care tasks that could be shifted to other workers (Hirschhorn *et al.* 2006). This 'scaling-up' model includes assigning nurses to evaluate patients and prescribe when cases are not complicated, while "shifting counselling and education from nurses to lay counsellors and trained peers" (Hirschhorn *et al.* 2006 p. 5). Some authors suggest these models may lack the integration and delivery approaches found in a wider health system approach, thus impairing the management of diseases such as HIV and tuberculosis (Atun *et al.* 2008).

In Singapore, meanwhile, time- and task-based approaches have been used to estimate staff requirements based on the frequency and type of nursing intervention required for patient care (Ayre *et al.* 2007). The ministry of health periodically reviews these estimates in relation to population needs (Ayre *et al.* 2007).

STRENGTHS AND WEAKNESSES OF APPROACHES

With a range of approaches for skill mix decision-making, nursing policy-makers and managers have the opportunity to choose a combination that suits their purpose. In choosing approaches, the strengths and weaknesses of each should be fully considered.

A WHO discussion paper on skill mix in the health workforce provides background in this regard (Buchan *et al.* 2000; see Table 1), exploring the pros and cons of task-based approaches, activity analysis, daily diaries, case mix/patient dependency, re-engineering, professional judgement, job analysis, and brainstorming. Each of these is discussed in turn below.

The authors indicate that *task-based approaches* and *activity analysis* use trained observers, which they identify as a strength. They also list potential limitations of these approaches, including:

- Challenges with observer agreement on the skills and knowledge required for work activities
- High cost of using observers
- Fact that tasks are often seen as a limited measure of nursing work
- Lack of staff involvement, which can lead to questionable uptake of the results, and
- Difficulty of using these approaches outside of hospital units

Despite these limitations, recent work on task shifting in AIDS care suggests that these models can be aptly applied (Hirschhorn *et al.* 2006; van Rensburg *et al.* 2008), provided ongoing evaluation occurs in a systematic manner (International Confederation of Midwives *et al.* 2008 p. 2).

In contrast, *daily diaries,* used by nurses to self-report their work activities, directly involve the nursing staff and are less costly, although the accuracy of information can be problematic (Buchan *et al.* 2000). Still, the diaries offer the potential to identify time spent on tasks that could be shifted in a skill-mix arrangement.

Case mix/patient dependency approaches for staffing are beneficial in determining staffing variations over time in relation to nursing workload. They also provide estimates of the overall number of staff needed, although they fail to capture the mix of staff required (Buchan *et al.* 2000).

Re-engineering has been described as an infrequently used option for changing the staff mix because its radical or fundamental approach to restructuring can face political and organisational constraints; it also suffers from a lack of focus on process (Buchan *et al.* 2000). However, in the context of developing-world challenges, re-engineering encourages needed innovation.

Staff commonly use *professional judgement,* a strength, as a mechanism to reallocate work. On the other hand, professional judgement may lack objectivity and transparency – a weakness (Buchan *et al.* 2000).

A structured *job analysis* comprised of staff interviews that review work roles, can also be used to make staffing decisions. Although lack of objectivity and potential bias can be problematic (Buchan *et al.* 2000), these can in part be addressed through direct observation.

Finally, *brainstorming,* using group discussion of work activities and roles with staff, may be used as a quick precursor to other staffing approaches; however, it may raise staff expectations for change and generate material that is contradictory (Buchan *et al.* 2000). Focus group discussions also constitute a form of brainstorming.

With the exception of professional judgement, job analysis and brainstorming, most of the approaches outlined by these authors require substantial data. This, too, can be a limitation.

LIMITATIONS OF THE EVIDENCE

Literature emerging from North America over the past decade has established linkages between specific nurse staffing models and patient outcomes. Still, gaps remain. These include determining the impact that factors in the work environment have in relation to staffing models and patient outcomes (McGillis Hall 2005). Further work is also needed to clarify the cost-effectiveness of different nurse staffing patterns (Spetz 2005). Issues with the level of analysis of nurse staffing variables (McGillis Hall 2005) and measurement error when using some staffing allocation methods have been identified (Harless & Mark 2006). Finally, the literature to date has failed to provide concrete estimates of what staffing levels are required for safe patient care.

Several authors describe creative staff-mix practices implemented to deal with the human resources crisis in health care in developing countries (Clarke *et al.* 2005; 2006; Hirschhorn *et al.* 2006; Dick *et al.* 2007; Rolfe *et al.* 2008; Liu *et al.* 2008). While innovative, these initiatives have encountered numerous challenges that bear consideration as new models for staff mix are explored.

An evaluation of the practice of contracting-out primary health care services in developing countries identified improvements in access to care. However, equity, quality, and efficiency could not be determined and staff mix was not addressed (Liu *et al.* 2008).

Independent small-scale midwifery practices were implemented in Tanzania employing nurses who were retired or approaching retirement to provide personalised care in underserviced areas (Rolfe *et al.* 2008). A multiple case study analysis of this initiative over nine districts identified that regulatory requirements forced the practices to be facility-based. The scarcity of start-up loans, lack of business training and bureaucratic registration processes were also problematic, resulting in under-utilisation and concerns over sustainability (Rolfe *et al.* 2008).

Efforts in underdeveloped countries to shift tasks from nurses to counsellors and trained peers, have highlighted the need for adequate training and supervision to maintain the standard of care (Hirschhorn *et al.* 2006). Indeed, a 2006 consultation meeting convened in Zambia by the Global Health Workforce Alliance, WHO, and the Swedish International Development Agency, noted a number of challenges related to the education or training of health care workers in developing countries (WHO 2006b). These included capacity issues related to poor infrastructure and lack of educators; education/training models that are fragmented and unresponsive to needs; educators who are poorly motivated, and education/training that is directed towards a 'quick fix' and thus compromises quality (WHO 2006b). The 2008 joint health professions statement on task shifting emphasizes that "there needs to be sufficient health care professionals to provide the required selection, training, direction, supervision, and continuing education of auxiliary workers" (International Confederation of Midwives *et al.* 2008 p. 1) placed in these task-shifting roles.

In South Africa, meanwhile, primary care nurses developed an educational programme to train peer-selected farm dwellers as community lay health workers (LHWs) in the early detection and treatment of tuberculosis (TB). Studies reported improved case detection, although the results were not statistically significant (Clarke *et al.* 2005; Dick *et al.* 2007).

The authors note that the programme was feasible even when health care human resources were in decline (Clarke *et al.* 2005). A subsequent cost-effectiveness study of the programme identified a 59% reduction in costs per TB case cured on the intervention farms (Clarke *et al.* 2006). Other research studies conducted with the LHWs revealed that while their experiences were positive overall, some criticisms from the community were incurred, and the difficulties of the role were highlighted (Daniels *et al.* 2004). As well, the primary care nurses identified that the LHWs required continuous support (Dick *et al.* 2007). This substantiates the joint health professions statement on task shifting that identifies the need for ongoing evaluation of these new models with a view to their impact on patient and health outcomes (International Confederation of Midwives *et al.* 2008 p. 2).

CONTEXTUAL ISSUES IN DECISION-MAKING

As the literature makes clear, a number of contextual issues need to be considered when making decisions around skill mix. These include:

- Individual demographic characteristics of the workforce
- Health care worker shortages
- Migration and capacity development
- Work environments and safety
- Regulatory systems
- Communication of change, and
- Costs

Although all these issues apply globally, different questions may need to be asked in the developed and developing worlds. Contextual questions should focus on addressing quality, safety, and cost-effectiveness in the skill-mix plan.

Demographic characteristics

Several researchers in North America have identified that the level of educational preparation and the experience of nursing staff are important contextual characteristics to consider when making determinations about staff mix. In one study, hospitals with higher proportions of baccalaureate-prepared nurses had lower rates of surgical mortality and failure to rescue (Aiken *et al.* 2003). In another study, clients cared for by baccalaureate-prepared nurses in the community had better odds of improved knowledge and behaviour scores (O'Brien-Pallas *et al.* 2002).

In underdeveloped countries, many different forms of community health worker provide care. Often, workers' education occurs as on-the-job training. Taking place without standardised or common core curricula, it can fail to confirm that workers have attained the levels of competence needed for the tasks they are expected to perform. Many of the tasks fit into the realm of basic nursing care, leading some to question whether the full time community health workers – who undergo six months to a year of education – should be regulated similar to nursing. This would allow them the organisational, supervisory, and regulatory benefits common to the health professions and contribute to the quality of care.

Health care worker shortages

The character of the global health worker shortage varies across different countries and continents. Although health care workers around the world are integral to the functioning of health care systems, "there is a huge disparity among countries in how human resource policies and strategies are developed and implemented. Major variations occur in the numbers of health care workers per inhabitant and in the skill mix employed" (Gupta *et al.* 2003 p. 2).
African countries face one of the most challenging situations (WHO 2008), having the highest morbidity rates and greatest health worker shortages in the world. A recent conference on the health human resources crisis in African countries reported that, "The

WHO Region of the Americas, with 10% of the global burden of disease, has 37% of the world's health workers spending more than 50% of the world's health financing, whereas the African Region has 24% of the burden but only 3% of health workers commanding less than 1% of world health expenditure" (WHO 2008 p. 12).

Another challenge Africa faces is the unequal distribution of health care workers, with greater numbers in major cities and referral facilities compared with often deserted rural areas and front-line facilities (WHO 2008). This raises skill-mix imperatives for both developing and developed countries. The first imperative is that more registered nurses need to be trained globally, to close the professional workforce gap and provide the safe, quality care that is within their unique scope. The presence of more registered nurses would also help ensure the necessary support, supervision, and education of sub-professional categories.

A statement issued by six key international health professional organisations acknowledges that health worker shortages have resulted in the need to consider task shifting in some countries to address today's health human resources crisis (International Confederation of Midwives *et al.* 2008). Twelve principles are presented with a view to ensuring that task shifting to new roles is effective (see Table 3). These include consideration of country-specific and local factors; description of competency requirements for the roles; adequate support systems and support roles for new workers; implementation of regulatory mechanisms for new workers; planning and monitoring of the roles; assessment of the roles' economic benefits; adequate compensation and safety environment; sensitivity towards increases in demand for health care; quality monitoring in relation to global health needs; assurance that the new roles are not used to replace unemployed or underemployed health professionals; concerns with sustainability; and integration into the local team (International Confederation of Midwives *et al.* 2008).

When task-shifting models are employed, clear emphasis should be placed on the need to support nursing personnel, rather than replace them. Prior to employing task shifting, every effort should be made to use unemployed health care staff. Recent reports identify that in Kenya "a substantial pool of qualified health professionals, especially nurses, are unemployed" as a result of a hiring freeze from the 1990s (Adano 2008 p. 2). Key health professional groups have explicitly stated that "assistive workers should not be employed at the expense of the unemployed or underemployed health professionals" (International Confederation of Midwives *et al.* 2008 p. 2).

Determination to offer a professional-based rather than professional-led service in situations of nursing shortage may influence the quality and safety of patient care. By implementing an appropriate skill mix   for example, educating and using other categories of workers for basic education and counselling   the time saved could be applied to providing better quality care for patients who specifically require 'professional' expertise.

Table 3: Principles for Task Shifting

Factor	Principle
Skill-Mix Decisions	Skill-mix decisions should be country-specific and take account of local service delivery needs, quality and effectiveness factors, efficiency, the current configuration of health services and available resources, as well as production and training capacity, and include the health professions in decision-making.
Role Competency	Roles and job descriptions should be described on the basis of the competencies required for service delivery and constitute part of a coherent, competency-based career framework that encourages progression through lifelong learning and recognition of existing and changing competence.
System and Supports Required	There needs to be sufficient health professionals to provide the required selection, training, direction, supervision, and continuing education of auxiliary workers.
Regulatory Needs	Regulations for assistive personnel and task shifting need to be set with the professions involved. It should be clearly stated who is responsible for supportive supervision to assistive personnel. In any case the curriculum development, teaching, supervision, and assessment should always involve the health professionals from whom the task is being shifted.
Planning and Monitoring	There must be adequate planning and monitoring to avoid the danger of generating a fragmented and disjointed system that fails to meet the total health needs of the patient, offers a series of disconnected and parallel services that are both inefficient and confusing, and may lead to de-motivation and high attrition rates.
Compensation and Workplace Safety	Assistive personnel need compensation and benefits that equal a living wage, a safe workplace, and adequate supplies to ensure their own safety and that of patients. At the same time they should be expected to work within the code of conduct of their employer.
New Demands	Deploying assistive personnel will increase demand on health professionals in at least three ways: (1) increased responsibilities as trainers and supervisors, taking scarce time away from other tasks; (2) higher numbers will be needed to take care of the new patients generated by successful task shifting; and (3) health professionals will be faced with patients who have more complex health needs (the simpler cases will be covered by task shifting) and thus require more sophisticated analytical, diagnostic, and treatment skills.
Economic Analysis	There needs to be credible analysis of the economic benefit of task shifting to ensure equal or better benefit, i.e. health outcomes, cost-effectiveness, productivity, etc. Ongoing evaluation, particularly in skill-mix changes and the introduction of new cadres and/or new models of care, should systematically consider the impact on patient and health outcomes as well as on efficiency and effectiveness.
Ongoing Health System Quality Monitoring	When task shifting occurs in response to specific health issues such as HIV, regular assessment and monitoring should be conducted on the entire health system of the country concerned. In particular, quality assessment linked to overall health outcomes of the population is essential to ensure that programmes are improving the health of patients across the health care system.
Role Complementarity	Assistive workers should not be employed at the expense of unemployed and underemployed health professionals. Task shifting should be complemented by fair and appropriate remuneration of health professionals and improvement of their working conditions.

Sustainability	Where task shifting is meant as a long term strategy it needs to be sustainable. If meant as short term, there needs to be a clear exit strategy.
Worker Integration	Assistive workers need to be integrated into health care delivery systems and treated as part of the team.

Source: International Confederation of Midwives *et al.* (2008)

Migration and capacity development

Another human resources challenge African and Asian countries face is the active recruitment of their nurses, physicians, pharmacists, and other health professionals by more developed countries, such as the United Kingdom (WHO 2006a; WHO 2006b; Fox 2008; Hagopian *et al.* 2008). A recent study of over 100 Ugandan nursing students revealed that the majority wished to leave Uganda for work in the United States or the United Kingdom within five years of completing their education, primarily for better financial remuneration (Nguyen *et al.* 2008). This highlights the need for developing countries to consider efforts to retain nurses.

Participants at a Global Health Workforce Alliance consultation meeting in Zambia highlighted the importance of increasing the capacity of educational institutions, while implementing innovative education methods that are responsive to health care needs (WHO 2006b). They also underlined the need to place more focus on integration opportunities; for example, providing nurse/midwifery education together (WHO 2006b).

The recent joint health professions statement on task shifting reinforces this by identifying that "in geographical areas facing a critical shortage of health professionals, efforts should be made and supported to increase professional training opportunities (undergraduate and graduate), and to provide incentives for the retention of health professionals" (International Confederation of Midwives *et al.* 2008 p. 2). This combination of increasing education and overcoming the push factors leading to migration is essential to ensure that developing countries have sufficient professionals in their skill mix. At the same time, developed countries should reduce their reliance on recruiting professionals from developing countries. This can be accomplished by increasing education and retention as well as by implementing skill-mix solutions, where appropriate, in their own health systems.

The issue of health care worker migration is also a concern in developed countries. For example, a recent Canadian study identified concern that Canadian nurses are migrating to the United States (McGillis Hall *et al.* 2009a; 2009b). According to Brush (2008), Canadian nurses form the second highest proportion of nurse immigrants to the United States, representing just over 20% of foreign-trained nurses entering the United States to work, after those from the Philippines. This work highlights the importance of managers and policy-makers developing a better understanding of factors that contribute to the migration of nurses so they can create policy initiatives aimed at reducing this problem.

Work environments and safety

A synthesis of the literature on quality work environments and patient safety identified several key factors in the health care work environment, at the unit level, that are important to consider along with the skill mix (McGillis Hall 2005). These factors include teamwork and multidisciplinary collaboration, organisational culture and climate, span of control of the unit manager, workload and productivity of nursing staff on the unit, autonomy and decision-making of the nursing staff, professional development opportunities, absenteeism rates, and overtime utilisation (McGillis Hall 2005). An American report from the Institute of Medicine suggests that nursing work environments are experiencing threats to patient safety related to organisational management, workforce deployment practices, work design, and organisational culture (Page 2004). Meanwhile, research from the United Kingdom highlights the importance of considering autonomy in nurse staffing studies (Currie *et al.* 2005). A recent Australian report on work environments in nursing identified that nurses' autonomy, control over their practice, and unit-based nursing leadership were key factors in the provision of safe patient care (Duffield *et al.* 2007).

At a global level, safety in the work environment has also been highlighted from a personal perspective, in relation to health care workers who live with HIV/AIDS (Hirschhorn *et al.* 2006).

Regulatory systems

Gupta *et al.* (2003) suggest that several factors affect how individual health care systems make decisions on the number of health care providers and skill mix, such as availability of resources, regulatory environment, culture, and customs of the country. The American Organization of Nurse Executives projects that while the core values of caring and knowledge will remain the same, the work of the nurse will change in the future, as will the requirements for nurses (Health Research and Educational Trust 2008).

While health professional regulation is designed to protect the public by ensuring competency of registrants to practise, a review of current evidence suggests that nursing regulation will need to be more transparent and flexible in the future, to reflect the changing work environment and the development of new roles (Bryant 2005). In short, regulatory changes for registered nurses will need to align with the nurses' responsibilities in skill-mix solutions. Regulatory changes will also apply to those assuming new tasks and need to cover such diverse areas as standards, ethical practice, and records. In summary, then, countries implementing skill-mix arrangements should ask themselves what regulatory changes are required.

Communication of change

An area that has received little attention is that of managing a change in staffing or skill mix. Beyond the normal reticence about change, staff will have many concerns and questions. The ICN tool kit on safe staffing recognises this and highlights the importance of a communication plan in influencing staff decision-making changes (ICN 2006). Communication should not just be top-down, but also consultative, involving staff in planning and in aspects such as clarifying role definitions or providing data on work tasks and

activities (Buchan *et al.* 2000). These mechanisms are presumed to be more effective because the nurse is engaged in the activity as it rolls out.

Costs

Some authors suggest that decision-making on nurse staffing should follow the basic economic principle of costs and benefits, including non-monetary and opportunity costs, where opportunity costs are those associated with the choice of resource use (Spetz 2005). "The optimal level of nurse staffing is *not* simply the number of nurses that would avert the most deaths" (Spetz 2005 p. 305). However, economic research on nurse staffing is complex, and research in this field has many limitations, such as difficulties in adjusting for differences in acuity, differences in staff competencies, the regulation of nursing practice, poor measurement of costs in health care and outcomes in a manner that overcomes confounders. It is not simply costs, but cost-effectiveness that is at issue. Clearly, employing an assistant is cheaper than employing a registered nurse; however, if the outcome is worse, the total cost of the assistant is greater even if the salary is lower.

What is important to recognise is the difference in implications of a payment-for-service model, prevalent in some developed countries, versus the fixed budgets found in many developing countries. In the former, if the load or acuity increases, income increases and more funds become available, allowing more registered nurses to be employed. Also, the salary gaps between registered and unregistered nurses may be narrow, offsetting the cost benefits of using lesser skilled workers. In developing country situations, meanwhile, one has to consider seeking maximum care with available capped funds and therefore seeking the best balance of numbers between professional, auxiliary and community-level staff.

INFORMATION TO SHAPE SKILL- MIX DECISIONS

It is evident from this review of the literature that there are a number of data elements that should be considered when making decisions regarding skill mix. Some have suggested practical guidelines that include identifying the problem that a change in skill mix is addressing, determining any constraints on capacity to carry out changes to the mix, understanding the resources available to support the change – including technical, data access, information systems, and staff – and identifying and implementing an approach for skill-mix change (Buchan *et al.* 2000).

Others have taken a broader view, highlighting the importance of working with stakeholders and government to evoke change. For example, the 2006 ICN report on safe staffing similarly recommends determining the extent of the staffing problem, defining what safe staffing is in the context of patient requirements, collecting relevant data, and using an assessment tool to refine any issues. However, it expands beyond these preliminary concepts to suggest:

- Preparing a communication plan aimed at influencing decision-making
- Using the ICN tool kit as background to support safe staffing
- Participating in health human resources planning and policy development at the governmental level
- Supporting further studies to examine the impact of staffing changes on working conditions, work life, and patient safety
- Lobbying employers regarding healthy work environments and safe staffing levels
- Further educating the public about the importance of the services that nurses provide, and
- Working on local initiatives that promote healthy work environments for nurses (ICN 2006).

When changes to the skill mix are planned, it is important to consider the full scope of available evidence. Of particular value, are data that inform items in Table 4, a checklist developed to guide the process of skill mix decision-making. The table provides three components to decision-making, each with its own information requirements. The first component is designed to address the broader contextual issues of the change in skill mix, the second outlines possible approaches, and the third provides specific indicators that can be useful in assessing the key considerations of patient care needs, staff capacity, and character of the setting.

Table 4: Checklist for Implementing a Skill-Mix Change

Prior to implementing a change in skill mix:

√   identify the problem that a change in skill mix is addressing
√   determine any constraints on your capacity to carry out changes to the mix
√   understand the resources available to support the change (including technical, data access, information systems, and staff resources)
√   identify an approach for skill-mix change

Source: Buchan *et al.* 2000

Selecting an approach for a change in skill mix to address:

√   population ratios of providers to the entire population[2]
√   needs-based approaches based on the health needs of the population[2]
√   demand approaches for targeted services[2]
√   role-based models that estimate the number of staff required for a number of patients[2]
√   task-based analysis of a unit of work and the identification of the knowledge and skills required to complete that work[1,2]
√   workload-based indicators[1,2]
√   activity analysis or sampling[1]
√   daily diary self-reporting[1]
√   re-engineering[1]
√   professional judgement[1]
√   group brainstorming[1]

Source: Adapted from Buchan *et al.* 2000[1;] Hirschhorn *et al.* 2006[2]

Specific indicators to consider:

(1) Patient
    √   age
    √   functional ability
    √   communication skills
    √   cultural and linguistic diversities
    √   severity and urgency of [admitting] condition
    √   scheduled procedure[s] and [its] complexity
    √   ability to meet health care needs
    √   availability of social supports
    √   other specific needs identified by the patient and by the RN

(2) Staff
- √ experience with the population being served
- √ level of experience [novice to expert]
- √ education and preparation, including certification
- √ language capabilities
- √ tenure on the unit [setting]
- √ level of control of practice environment
- √ degree of involvement in quality initiatives
- √ measure of immersion in activities, such as nursing research, which add to the body of nursing knowledge
- √ measure of involvement in interdisciplinary and collaborative activities regarding patient needs in which the nurse takes part
- √ the number and competencies of clinical and non-clinical support staff the RN must collaborate with and supervise

(3) Health Care Setting/Institution
- √ number of patients
- √ levels of intensity of the patients for whom care is being provided
- √ contextual issues including architecture and geography of the environment and available technology
- √ governance structure
- √ involvement in quality measurement activities
- √ development of critical pathways
- √ evaluation of practice outcomes
- √ effective and efficient support services (transport, clerical, housekeeping, laboratory, and so forth) to reduce time away from patient care and to reduce the need for the RN to engage in re-work
- √ access to timely, accurate, relevant information provided by communication technology that links clinical, administrative and outcome data
- √ sufficient orientation and preparation, including nurse preceptors and nurse experts to ensure RN competency
- √ preparation specific to technology used in providing patient care
- √ necessary time to collaborate with and supervise other staff
- √ support in ethical decision-making
- √ sufficient opportunity for care coordination and arranging for continuity of care and patient and/or family education
- √ adequate time for coordination and supervision of unregulated workers by RNs
- √ processes to facilitate transitions during work redesign, mergers and other major changes in work life
- √ the right for staff to report unsafe conditions or inappropriate staffing without personal consequence

Source: Adapted from ANA (1999)

CONCLUSIONS

In most countries worldwide, the nursing profession provides the majority of patient care at all levels of the health system (Cohen 2008). However, the continuing global shortage of health care personnel has created challenges that require exploration of different staffing models.

While strengths are evident in staffing models that have been linked to patient outcomes, the majority of this work has been conducted in developed countries. Little research has been conducted on skill mix decision-making or modelling in areas where resources are limited (Hagopian *et al.* 2008). Despite this, it is evident that developing and developed countries approach patient care staffing decisions differently, based on issues ranging from the availability of health care resources to the health and needs of the population being served.

This review has identified some of the challenges accompanying implementation of alternate staff-mix practices, such as those introduced in developing countries. Further work is needed to determine the impact of these new models on outcomes, as well as identify the supports required to enable supportive and effective implementation.

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