

Health Human Resource

Scoping Literature Review and Synthesis



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Executive Summary

The Health Services and Policy Research Support Network (HSPRSN) funded this scoping literature review to determine the extent to which the HHR research literature of the last decade has addressed: 1) the impact of system and organizational-level change and innovation on HHR models related of staffing, service and practice models and deployment patterns, and 2) the extent to which these HHR impacts have, in turn, influenced the key issues of i) staff satisfaction and behavior (e.g. recruitment and retention), ii) addressing population and patient needs, and iii) achieving improved patient health outcomes.

The approach used for this review is consistent with established methods used in previous scoping literature reviews.³⁻⁶ The search strategy included four different activities: 1) electronic database searches; 2) a web site search; 3) key informant contacts and 4) a search of reference lists of relevant key articles.

The combined search strategy yielded 2771 articles, of which 101 met all inclusion criteria. The majority of articles originated from the U.S. (n=45), followed by Canada (n=24) and the UK (n=24). The articles were clustered into 7 major themes, although there was considerable overlap between categories. Almost all studies described inputs of the health care system and the relationship to HHR or outputs of innovation related to HHR. Three themes were considered inputs: 1) acute care restructuring, 2) organizational characteristics, and 3) technology and telehealth. Four themes were considered outputs: 1) staffing models, 2) workload and activity measurement, 3) collaboration and teams, and 4) expansion of roles and use of extenders.

We found that relatively little attention has been paid to the impact of system and organizational change on HHR when compared to the extent to which such changes have occurred during the past decade. The majority of the literature reviewed discusses the impacts of the major acute care restructuring and downsizing of the acute care sector during the 1990s on HHR – primarily in urban environments. Little attention has been paid to innovation in the non-hospital sector and virtually no work was found on the HHR implications of the increasing use of multi-disciplinary teams and interprofessional collaboration, the use of other types of health professionals working to their full scope of practice, or the increased use of a wide range of technology.

The almost exclusive focus on nurses reflects the emphasis on previous hospital restructuring and the subsequent emphasis on nursing intensity and mix. However, this focus has become somewhat obsolete, with attention recently shifting to determining what nurses and other providers actually *do* as the basis for HHR deployment within the broader context of increased interprofessional collaboration, development of complex community acute care services, and in response to the recognition of projected health care provider shortages. By determining what nurses and other providers *do*, it is possible to determine the level and mix of staff required to best respond to patient and population needs.

Examining the activities providers are engaged in as they provide care to different populations is an important shift for HHR planning and development, refocusing attention from solely the provider (e.g. ratios) to meeting patient and population needs. This shift reflects a change in culture that is increasingly evident across the health system.

However, despite the increasing interest in inter-professional teams, collaborative practice, etc., relatively little research was found around their use or their impact within and across different health care sectors such as home and community care, primary care, and acute care, or about the changes or impact of change on health care professionals' roles, especially in Canada. Although the health system has seen the introduction of a wide range of innovations in technology, ranging from telehealth to point-of-care testing to telemedicine, only two articles met review criteria.

Although the response from key informants was minimal, there were suggestions that many innovations, including technology and restructuring of delivery of health services (e.g. integrated health networks) are well underway in BC but that most of these initiatives are not being formally documented or evaluated by the Ministry or the health authorities. Moreover, the impacts of these changes on the workforce are not the focus of research, and their impacts on population health and patient health outcomes are not being routinely explored.

Given the dearth of relevant studies found in the literature, the following areas are suggested as important priorities for further work:

- Documentation of major innovations in BC *with special attention to their HHR impacts*
- HHR models focused on patient and population need (workload and activity measurement)
- Assessment of the HHR impacts of selected key innovations in both urban and rural settings, in particular:
 - Shift of acute care from the hospital to community setting
 - Interdisciplinary teams and collaboration
 - Applied health-related technology/telehealth

1.0 Introduction

While health human resources (HHR) issues have been identified as a top planning and research priority for the last decade⁷, several areas needing more attention have been identified, including workforce planning, training, and regulation.^{8,9} Particularly in the area of workforce planning, employers and governments continue to implement innovative ways of deploying and using the existing HHR, partly in response to current and projected shortages of physicians and registered nurses¹⁰⁻¹³ and partly in response to system-level and organizational change innovation which is being implemented across the health system to meet changing health and population need. Moreover, the need to move towards more flexible HHR planning models¹⁴ that can meet population health needs in areas where the recruitment and retention of professionals is problematic (e.g. more northern and rural areas in Canada) and where there is not ready access to specialized services also has been recognized.^{15, 16}

The purpose of this project is to determine the extent to which the research literature of the last decade has addressed: 1) the impact of system and organizational-level change and innovation on HHR models related of staffing, service and practice models and deployment patterns, and 2) the extent to which these HHR impacts have, in turn, influenced the key issues of i) staff satisfaction and behavior (e.g. recruitment and retention), ii) addressing population and patient needs, and iii) achieving improved patient health outcomes.

The context for this exploration is *innovation at the system or organizational level*. Innovation can be defined as “bringing fresh ideas to program design and business practices, and developing a work environment that fosters creativity.”¹⁷ Innovation is a constant feature of a publicly funded system which continually struggles to address the challenges associated with variations in financing, health policy, clinical and technological advancements, demographics, and societal expectations. However, the extent of recent and current system and organizational change is unprecedented.

Beginning in the 1980s and 1990s with the major restructuring and reengineering of the acute hospital sector and followed by the regionalization of service delivery in the 1990s, the past decade has seen significant system and organizational change across all health sectors. In BC this has included, for example, Home and Community Care Reform, several provincial mental health plans, Primary Health Care Renewal, Acute Care Restructuring (including increased shifts to day surgery and ambulatory diagnostics and treatment), provincial Laboratory Reform, and the Core Functions in Public Health Initiative. Appendix One provides a summary of these major system-level innovations.

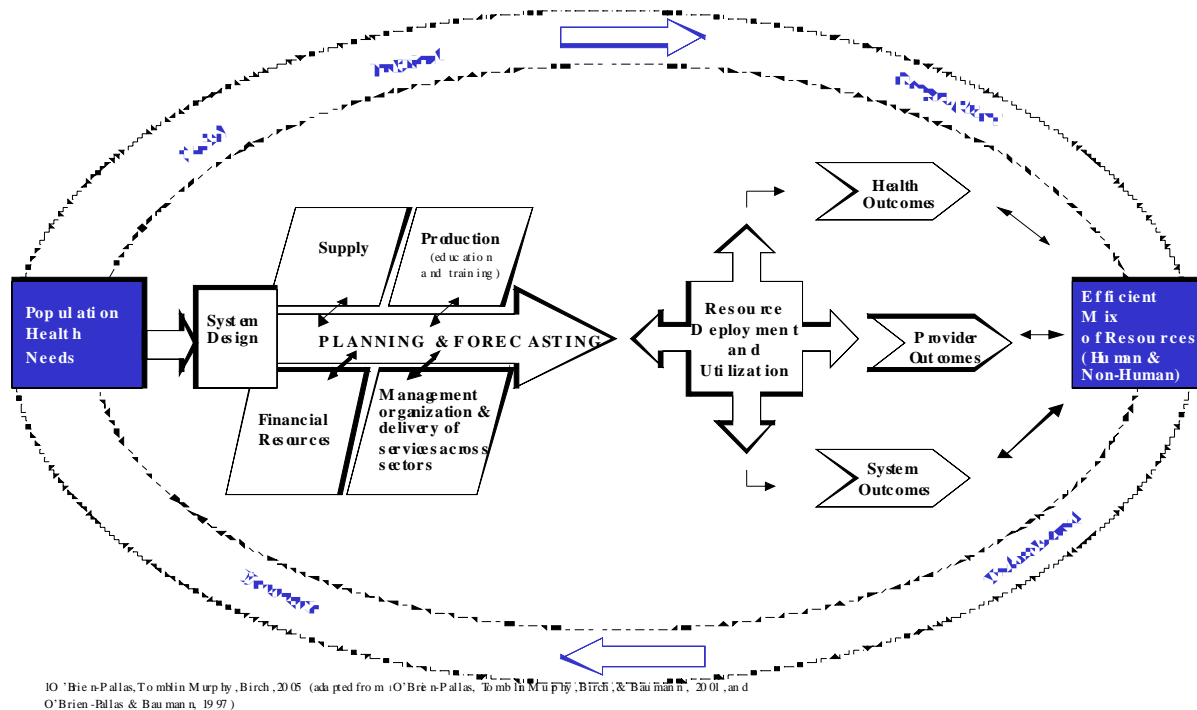
Each of these major initiatives has led to significant change to service delivery, including changes in service and practice models and in deployment patterns of both existing and new staff. What is not known is the extent to which the impact of these changes on health human resources has been explored and documented.

2.0 Background

Conceptual Framework

“The Health System and Health Human Resources Planning Conceptual Framework” developed by Canadian researchers O’Brien-Pallas, Tomblin Murphy, Baumann and Birch¹ and adopted by the Canadian Institute for Health Information, the World Health Organization, and Health Canada as the HHR national planning framework serves as the conceptual framework for this study (figure 1). Grounded in Donabedian’s structure, processes, and outcomes of care framework¹⁸ and Anderson’s health service utilization model,¹⁹ the Health System and HHR Planning framework is dynamic, suggesting that multiple factors influence HHR deployment and utilization including population health needs; health education/training; current supply of providers; planning models; mix of human and non-human resources; and the wider societal context (political, social and economic contexts). Of particular interest were some of the key factors influencing resource deployment and utilization (see Figure 1):

Figure 1: Health System and Health Human Resources Planning Conceptual Framework²⁰

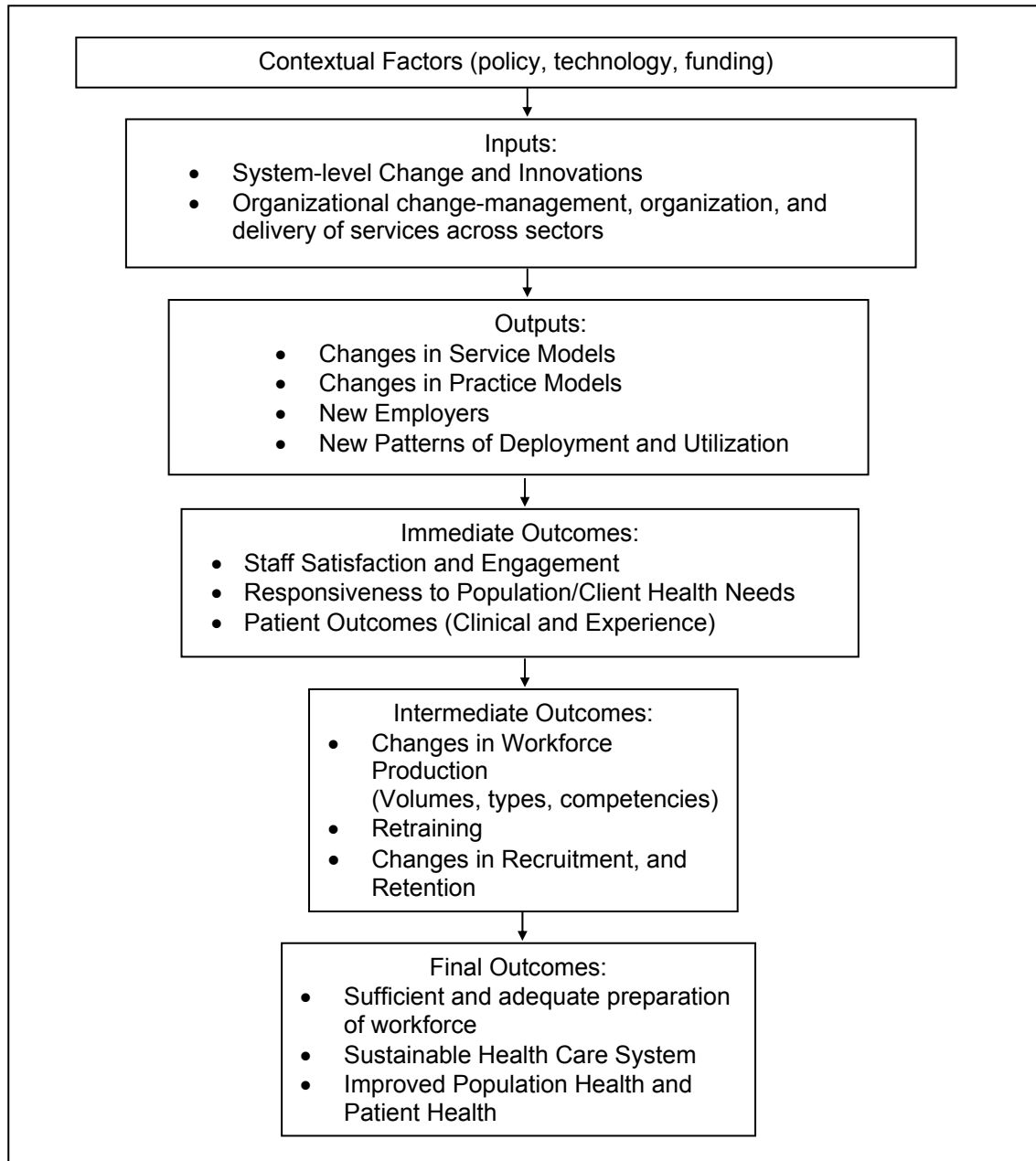


These key factors included resource deployment and utilization, system design, management, organization and delivery of health services, and contextual factors. This model is defined in more detail elsewhere¹, however, some brief definitions are given here. Resource deployment and utilization can be defined as decisions made about the deployment and use of personnel across all sectors of the system that influences access to services and utilization by the population.²⁰ System design, for the purposes of this scoping literature review, refers to health services delivery policies that have reshaped health care delivery models and different health sectors. Management and organizational characteristics refer to the structural arrangements, degree of centralization, environmental complexity and employment arrangements that may influence HHR deployment. Finally, we considered the contextual factor of geographic location given the size and diversity of British Columbia’s geography (e.g. urban versus rural).

While the Health System and HHR planning framework provided guidance for the scoping literature review, we also developed a Logic Model to illustrate the associations between the context of system-level and organizational change and service changes, and how they in turn may impact both HHR and patient outcomes and experience. The HHR Logic Model presented in Figure 2 uses a similar approach as the “Results-Based Logic Model for Primary Health Care”.²

In the HHR Logic Model, the contextual factors affecting HHR deployment, practice and staffing patterns include multiple factors that are known to contribute to system-level change in health care such as: changes in funding levels and government policy directions, changing demographics, advances in clinical practice and technology, professional regulation, and legislation, all of which can be thought of as “restructuring, redesign, reform, and renewal”. The system-level changes influence how services are delivered include: 1) new service models (e.g. structural aspects of care such as staffing model (intensity/mix), sector (acute, primary care, public health, palliative care, specialist care); 2) new practice models (changes in scope or process of practice such as increased collaboration and interdisciplinary teams and new delivery mechanisms such as telehealth, group visits etc.); 3) new employers (integrated health networks); and 4) new patterns of deploying existing staff (changes in sector such as a shift from acute care to community or primary health care.). Key system-level changes within British Columbia can be found in Appendix A. The “Impact of Health System Innovation on HHR” Logic Model should not be considered a simple linear process, but rather, suggestive of how influencing different factors will have multiple implications.

Figure 2: Impact of Health System Innovation on HHR Logic Model



3.0 Methods

3.1 Procedures

Consistent with previous scoping literature reviews, we followed established methods,³⁻⁶ to identify literature relevant to innovative ways in which health care providers are deployed and contextual innovations (e.g. health policy, information technology, funding) or system- or organizational-level changes affecting the delivery of health services nationally and internationally. Throughout the review, we retrieved a number of papers not directly relevant to our topic, but provided additional understanding and contextualization of this body of work. Consistent with these methods, we did not critically review the methodological quality of the studies.³⁻⁶

Our search strategy included four different activities: 1) electronic database searches; 2) a web site search; 3) key informant contacts and 4) a search of reference lists of relevant key articles.

1. *Electronic databases*

Relevant databases, such as PubMed, CINAHL, Cochrane, EPOC (Effective Practice and Organization of Care), were searched for literature published between 1999 and February 2009 using MeSH Headings and free text key words in combinations using Boolean operators “AND” and “OR”. Based on consultation with the UBC librarian, our project reference group, and the HSPRN project advisory committee, a list of MeSH headings and free text key words was developed (Appendix Two)

2. *Website search*

Thirty-one websites from various governments, associations, research networks and repositories known to the research team and suggested by key informants were searched for relevant papers (Appendix Three). In addition, a general internet search using GOOGLE was conducted.

3. *Key Informants*

Key informants either conducting research or working in the area of HHR in Canada were contacted to suggest key papers (peer-reviewed or grey literature) for inclusion in the review (Appendix Four). Each was sent a request electronically to provide information about relevant research underway or yet unpublished and reports/reviews/evaluations of major system or service innovations that address the impact of those changes on HHR.

4. *Reference lists of key literature*

Bibliographies of key articles and reports were reviewed to find additional relevant studies addressing ways to better deploy existing health care providers or application of innovative health service delivery models focused on staffing.

3.2 Inclusion/exclusion criteria and review process

Criteria for inclusion include: published in English or French, between 1999 and 2009, based on relevant experiences within the following health care systems: Canada, US, UK, Australia and New Zealand. Each article needed to include one of the following: a) explicit or implicit context was system-level change or innovation; or b) assessment of the impact of system and organizational change and innovation (e.g. service and practice models or employment and deployment patterns) on HHR related issues; and c) described or assessed issues of how these changes impacted staff satisfaction and behavior (e.g. recruitment and retention), or population and patient needs, or

improved patient health outcomes. Articles were explicitly excluded if they did not meet the inclusion criteria or: a) were a commentary, book review, editorial, or letter, b) addressed only innovation or only HHR, or c) did not address input and outputs or outcomes of HHR and innovations logic model. Additionally, the literature related to HHR forecast modeling was considered to be beyond the scope of this study.

Three levels of review were conducted. Prior to carrying out our review, the project leads and some members of our project reference group (DL, KH) participated in training sessions through teleconference and face-to-face meetings. First, each title and abstract of papers retrieved from the peer-reviewed literature and executive summaries from the grey literature were independently evaluated by two of the three project leads (SW, MM, VF) or project reference group members. Papers and reports were included if there was a lack of consensus about its relevance or if there was not enough information to make a judgment. Next, relevant articles were subject to an independent full text review by at least two research team members. Any disagreements were discussed and consensus reached.

Papers retrieved from websites, bibliography review, and key contacts' suggestions were also assessed independently by two members of the research team. Except for the bibliography review, full texts of articles were available and therefore required only one level of review. Reviewers compared results and reached consensus where there were disagreements. When full papers were not available at the first level of review (i.e. bibliography review), full text articles were retrieved and the second stage of review was conducted.

Finally, data from all relevant articles were extracted using a common data extraction form (Appendix Five), which is a modification of a form previously used by SW.²¹ For each relevant article, a data extraction form was used to assist in synthesizing the relevant data for the purposes of this project. Data were extracted by one member of the research team and then validated by another team member.

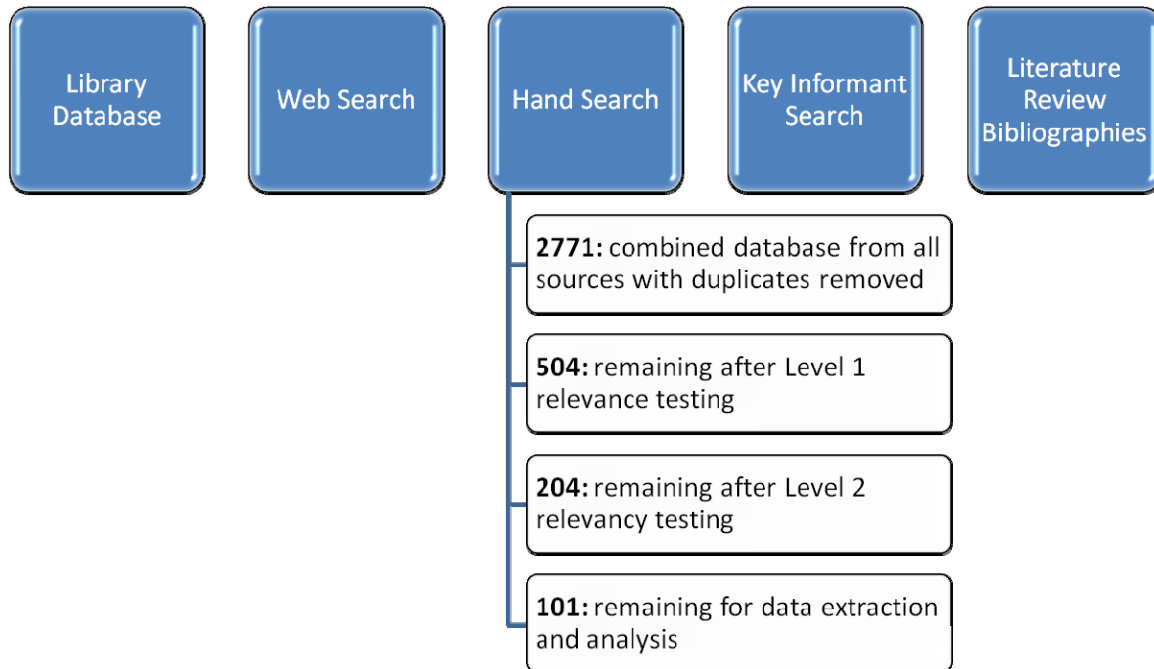
3.3 Analysis

Data from all extracted articles were coded using a qualitative software program, Atlas TI, and organized into themes. The coding structure (Appendix Six) was developed by the project leads and was based on the Health System and Health Human Resources Planning Conceptual Framework.¹ The main focus of the analysis for the papers was on the impact of innovations within the health care context (e.g. policy, information technology) or inputs at the system- or organizational-level changes on HHR deployment, staffing, or practice.

4.0 Findings

The combined search strategy yielded 2771 articles (Figure 3). Of these, 101 articles met the inclusion criteria for the scoping literature review.

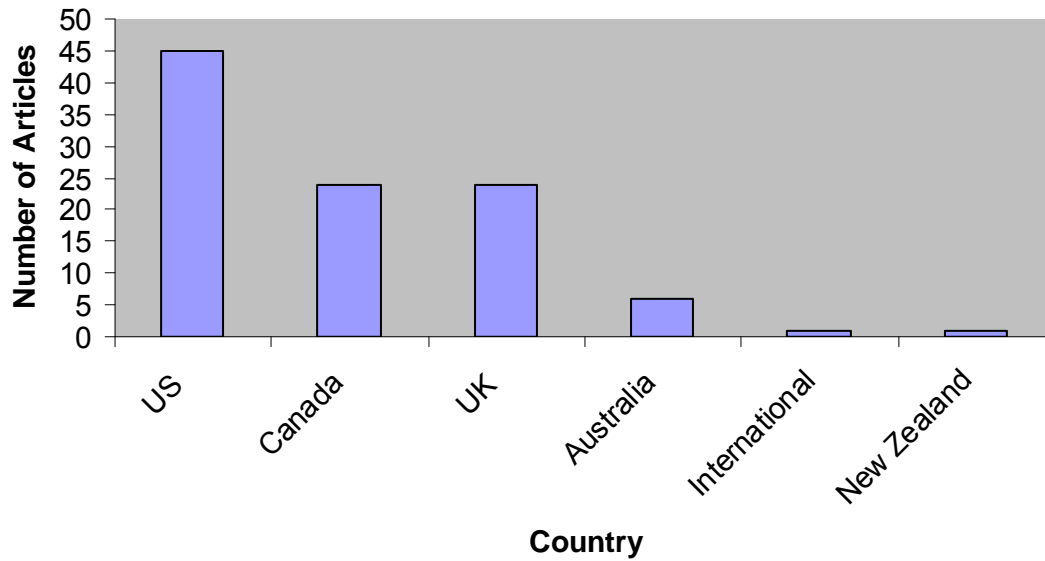
Figure 3: Results of Search Strategy



4.1. Overall Description of Articles

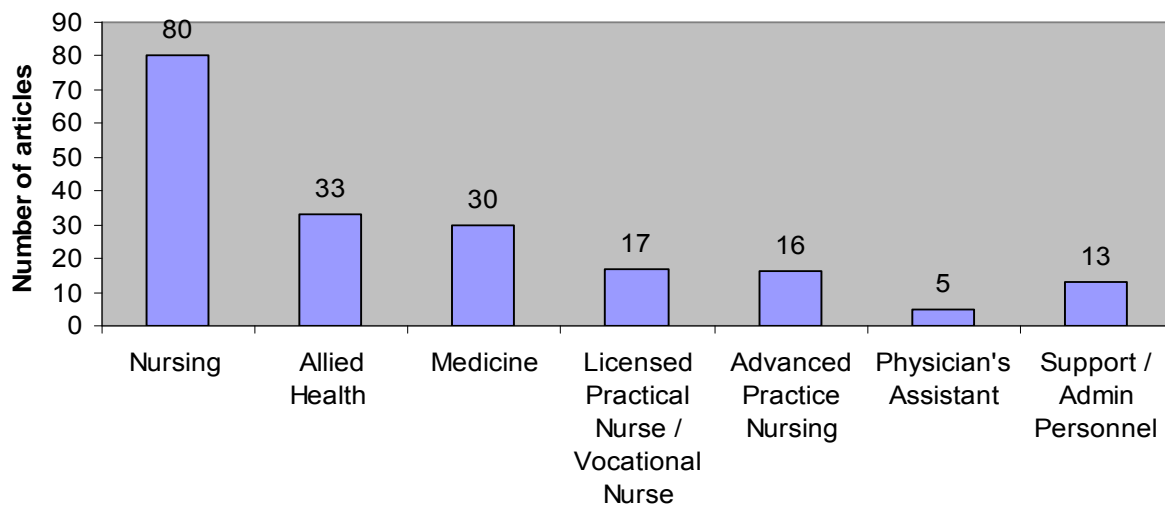
A total of 101 articles were included in this scoping literature review. The majority of articles originated from the U.S.,²²⁻⁶⁶ followed by Canada,⁶⁷⁻⁹⁰ and the U.K.⁹¹⁻¹¹⁴ Many fewer publications were found in either Australia,¹¹⁵⁻¹²⁰ New Zealand,¹²¹ or across several countries (see Figure 4).¹²²

Figure 4: The Impact of Innovation on HHR, by Country



The majority of articles focused on nursing HHR and their work within the hospital setting. Of these articles, 16 were related to advanced practice nursing^{25, 27, 30, 36, 41, 68, 80, 96, 100, 104, 109, 112, 117, 120, 123, 124} (see Figure 5). Notably, there were many fewer articles about HHR and innovation in primary health care and only two articles about telehealth that met our inclusion criteria. Not surprisingly, most of the articles were about changes in the urban setting.

Figure 5: Number of Articles by Health Profession



Note. Allied Health includes: pharmacy, social work, medical technologist, dieticians, radiology technicians, physical and occupational therapists, unlicensed assistive personnel.

Almost all of the articles described inputs of the health care system and the relationship to HHR or outputs of innovation related to HHR. The articles could be clustered into 7 major themes, although there was considerable overlap between categories. Each article was assigned to a theme category based on its *primary* focus. Three themes were considered inputs: 1) acute care restructuring, 2) organizational characteristics, and 3) technology and telehealth. Four themes were considered outputs: 1) staffing models, 2) workload and activity measurement, 3) collaboration and teams, and 4) expansion of roles and use of extenders.

4.2 The Impact of Innovation and Change on HHR: Inputs

Acute Care Restructuring

The impact of restructuring of nurse staffing and the reports of nurse shortages and work overload on nurse and patient outcomes first emerged in the 1980s and 1990s and continued to be studied into 2000s. A number of articles describe research on the impact of restructuring and workforce downsizing in the acute care sector in the late 1990s.^{22, 69, 70, 125} Most of this research was conducted in Canada (n=12), followed by the US (n=5), UK, Australia, and New Zealand. The impact of these changes on professions other than nursing is largely absent with only one study addressing clinical laboratory restructuring.¹²⁶ and two studies examining the impact of restructuring on hospital social workers.^{24, 77} Only one study was retrieved that addresses the impact of restructuring on the community workforce.¹¹⁸

Hospital restructuring was of international interest, with a group of international researchers collaborating on a set of studies, which became known collectively as the Hospital Outcome Study. The initiative was led by the Centre for Health Outcomes and Policy Research at the University of Pennsylvania and undertaken by the International Hospital Outcomes Study Consortium, which included teams of researchers from Scotland, England, United States, Canada and West Germany. Each team used the same tools and methods for their investigations as far as possible, allowing for individual differences in health care systems and data availability. There were three main components in each country: a registered nurse survey, a hospital survey and the collection of outcome data related to patients cared for in the survey hospitals. Several of the articles included in this review were part of this collective international research agenda.

The majority of these articles focus on the effect of acute care restructuring on immediate outcome of nurse staff satisfaction. Hospital restructuring was associated with increased dissatisfaction, burnout, anxiety, and emotional exhaustion.^{22, 69, 70, 108} Few articles describe the affect of restructuring on immediate outcomes such as staff satisfaction and engagement and patient experiences and clinical outcomes. However, several articles address that nursing leadership could mitigate or intensify the negative effects of hospital restructuring on nurses.⁷¹ Moreover, restructuring was associated with changes to the nurse executive role and new challenges in managing nursing practice.⁵⁵ Several articles described the association between restructuring and staff/patient ratios on final outcomes of patient mortality. Increased staffing levels of health professionals^{26, 89, 121} and having more staff with greater years of clinical experience⁸⁶ were associated with decreased mortality rates.

Organizational Characteristics

The focus on the impact of organizational characteristics on HHR issues and patient outcomes initially emerged from the acute care restructuring research. This interest was further developed in early 2000s in response to better recognition of the extent of adverse effects associated with the health system and need to improve its safety. Indeed the Institute of Medicine's (IOM) fourth volume of the *Crossing the Quality Chasm* series, titled *Keeping Patients Safe: Transforming the Work Environment of Nurses*,¹²⁷ emphasized the importance of nursing work environments and their impact on patient safety.

The IOM's Committee on the Work Environment for Nurses and Patient Safety identified areas of healthcare organizations that needed improvement, including evidence-based staffing standards, work-hour regulations, the creation of interdisciplinary teams, and the establishment of visible and responsive nursing leadership. The intended result of these recommendations was to create healthcare settings that reduce the likelihood of errors and subsequent poor patient outcomes. Key stakeholder groups such as the American Hospital Association, American Nurses Association, and the Joint Commission on Accreditation of Healthcare Organizations, also identified practice environment transformations as imperative to attracting and retaining nurses.

In Canada, the Canadian Adverse Events Study¹²⁸ reported an overall adverse incidence rate of 7.5%, suggesting that of the almost 2.5 million annual hospital admissions in Canada similar to the type studied, about 185,000 were associated with an adverse event and close to 70,000 of these potentially were preventable.

Several articles focused on the impact of organizational characteristics on the reduction of errors and increased likelihood of positive patient outcomes. All articles were about registered nurses and the acute care hospital environment and were derived from research conducted in either Canada^{67, 74-76, 82, 90} or the US.^{33, 47, 61, 66, 103} While most articles discuss the impact of organizational characteristics on immediate outcomes such as staff satisfaction and engagement in their work, some articles only describe inputs.

Magnet hospitals, which are more common in the US, were the topic of several studies. Their organizational characteristics such as strong commitment to nursing, recognition of professional nursing practice, and leadership visibility were associated with positive staff outcomes and increased patient safety environment.^{33, 66, 67} Other articles reported that organizational characteristics that enable and enhance autonomous practice (e.g. open-shift scheduling, patient-focused work allocation, taking into account job preferences) are positively associated with both immediate outcomes of staff satisfaction and engagement^{74, 76, 84, 90, 103} and intermediate outcomes of staff retention.^{61, 74, 76, 84, 90, 103}

Technology and Telehealth

Over the past decade there have been many innovations in the use of technology in health care. Despite the recent introduction of such modern technologies as electronic health and electronic medical records, point of care testing, use of PDAs for clinical support, tele-radiology, there is a clear absence of research examining their impact on health human resource issues. Notably, the majority of articles that addressed the impact of technology on HHR were commentaries or contained no empirical research. Only two articles meeting our inclusion criteria examined the impact of using technology on HHR and both articles focused on telehealth.^{54, 80} These articles discuss how the use of telehealth has created a change in practice models where patients can now receive information and advice over the telephone and reported that the use of telehealth did not have any negative affects on immediate outcomes related to staff satisfaction or patient experiences.^{54, 80}

4.3 The Impact of Innovation and Change on HHR: Outputs

Staffing Models

Innovation in staffing models and how health care professionals are deployed has focused almost exclusively on nurses. Past work on examining skill mix and staffing models spans over twenty years.⁹⁴ This body of research emerged largely in response to the restructuring research, which is focused nearly exclusively on the association between hospital workforce downsizing and replacement of registered nurses with lower trained nursing staff to patient mortality and poorer patient clinical outcomes. Research on staffing mix and models also is nearly exclusively focused on registered nurses, including other types of regulated or, in some countries, unregulated nurses and

nursing aides. The majority of the work took place in the US, followed closely by Canada, with some from the UK. Notably, the comprehensive literature reviews suggest that there remains a dearth of strong evidence on the scope, effectiveness, and efficiency of most types of skill-mix,¹⁰⁹ there is incomplete and sometimes conflicting evidence of the determinants of mortality for patients in hospitals and nurse-related conditions,^{78, 84} and that more work is needed that includes other professions¹²² and other health sectors.¹²⁹

All articles meeting our inclusion criteria in this category discuss staffing models within the hospital setting where staffing mix generally refers to registered nurses with other type of nurses, such as licensed practical nurses or unlicensed nursing aides. Notably research on staff mix and effects on patient care in community care facilities were not included in this review given they did not meet the innovation criteria. Only three articles addressed the use of other types of health care professional staff (e.g. respiratory staff, medical residents, and registered pharmacists) and their impact on final outcomes such as mortality.^{26, 65, 109} Positive associations were found between higher numbers of nurse staffing and decreased pain^{39, 56} lower urinary tract infection rates,^{56, 130} and less medication errors and lower wound infection rates.⁷⁴ Higher ratios of unregulated staff affected staff perceptions about the quality of care provided,⁷³ more uncontrolled pain in patients,^{39, 56} and questionable cost-benefit ratios.^{44, 94} Most of these studies focus on ratios of nursing staff to other types of staff (e.g. unlicensed assistive personnel) or beds.

Workload and Activity Measurement

These articles reflect a re-emergence of attention to the alignment of HHR resources with identified patient need, which was initially studied in the 1970s. All articles meeting our inclusion criteria in the area of workload and activity measurement were from the US, except one article from the UK¹¹⁰ and one from Australia.¹²⁰ Indeed there is some overlap of the articles included in the staffing model theme and the workload and activity measurement theme. For example Sovie and Jaward⁵⁶ recognized there was a critical blend of staff required to deliver quality patient care but were unable to define exact specifications from their data. However, these articles differ from the staffing model studies in that the empirical work begins to more closely examine and measure staff activities and their alignment with patient/population characteristics and needs.

A focus on workload and activity measurement first emerged as a means of increasing productivity in hospital units to address staff shortages. Therefore, not surprisingly, almost all articles included in the workload and activity measurement theme take place in the acute care setting. Only one article describes workload amongst health care professionals in a primary care setting.²⁵ Results from these studies suggest that over 50% of tasks could be delegated to a properly trained licensed vocational nurse⁵¹ or certified nursing assistant.³⁴ Moreover, there is large variation in the time registered nurses spend on value-added care ranging from 30%-55%,⁵⁸ value-added care being defined to include direct (e.g. giving medications, patient monitoring and teaching, communication with patient and team) and indirect (e.g. chart review, care rounds and conferences) care.⁵⁹

Articles in this theme shift attention from determining an ideal service model or ratio (e.g. the California mandated standards)^{131, 132} to a more inclusive focus on “service redesign” and minimization of non-valued added work, such as looking for people and equipment or transporting people.²⁹ Importantly, these articles reflect a shift from focusing on one type of health care professional, nurses and determining staffing models based only on provider perceptions and needs to recognizing the value of other members of the health care team in contributing to the quality of patient care.^{29, 31, 32, 120} Moreover, they include an implicit shift, away from a mainly economic and efficiency perspective on maximizing productivity, towards an interest in how to best meet patient needs using staff with complimentary skill sets.^{51, 60}

Relevant to this area of work is a synthesis of HHR productivity¹³³ and service quality improvement by the Canadian Health Services Research Foundation and *Transforming Care at the Bedside* by

the Robert Wood Johnson Foundation (RWJF) and the Institute for Health Care Improvement (IHI).¹³⁴ The Transforming Care at the Bedside Institute for Health Care Improvement (TCAB) framework for improvement change aims to empower front-line nurses and other staff to develop, test and implement changes that will dramatically improve care on hospital medical/surgical units. This framework focuses on improving care on medical/surgical units and is built around improvements in four main categories: safety and reliability, care team vitality, patient-centeredness, and increased value. The fundamental tenet of TCAB is that improvements in the nurse work environment will positively affect the quality of patient care.

The TCAB initiative has become a multiphase program, with the Association of Nurse Executives as a new partner for phase three. Phase one began in three hospitals, phase two spread to 13 hospitals and it is now being implemented in 78 hospitals. A comprehensive evaluation began in May 2004 and was planned to end in May 2009, led by Jack Needleman, Ph.D., of the UCLA School of Public Health.¹³⁵ The evaluation team has developed a standardized measurement plan that will be implemented within each strategy, and will provide the Foundation with information about the ability to spread the TCAB process using differing levels of intensity. The results of this evaluation will likely have significant implications for HHR.

TCAB-type initiatives are underway in several hospitals in BC, and Vancouver Island Health Authority has developed a tool, the Care Delivery Model Redesign, to systematically assess staff activity as a basis for improving patient care and outcomes.

Collaboration and Teams

Several articles addressed various aspects of teamwork and collaboration; most of these were from the UK, followed by the US and Australia. Only two articles from Canada^{79, 81} met our inclusion criteria. This is the first theme in which study setting was more evenly balanced between hospital and community sectors. However, work in the area of interprofessional collaboration and team-based health care remains in its infancy in Canada. While this type of health service delivery model has been more prevalent in other countries (e.g. UK, US), relatively few articles address the impact of collaboration or team work on HHR.

Most studies examined the relationship between nurses and physicians. Evidence on collaboration between these types of health care professionals remain mixed. Wilkinson & Hite¹³⁶ did not find a correlation between nurse-physician relationship and job satisfaction, staff nurses can perceive more situational stress (e.g. less staffing and time) in collaborating with physician colleagues,²⁷ and shifting nurses roles to take on activities of junior physicians could lead to a task-based system of health services delivery.⁹⁹ Other studies suggest that nurse-physician collaboration is positively associated with immediate outcomes such as better clinical care in diabetes resulting in improved mean systolic blood pressure and A1C,^{35, 92} increased problem solving and leadership abilities,²⁷ increased work efficiency and communication between practice staff,¹¹⁵ and increased preventive screening such as colorectal cancer screening.³⁷

Only two studies examined the role of other types of health care professionals in collaborative teams. Sellors, et al⁷⁹ found that the use of pharmacists as primary care consultants was feasible given that physicians were receptive to the pharmacists' recommendations but that it was not clear if they had any effect on patient outcomes. However, introducing interprofessional teams to provide assessment, communication, care and discharge planning was associated with reduced length of hospital stay, lower in-hospital mortality, and fewer patients experiencing functional decline.¹¹⁹

Research on the impact of interprofessional collaboration and teamwork on HHR remain a newer area for Canada. Past work suggests areas where more work is needed in training the future HHR workforce in to be more successful in delivery of health services. There is evidence to suggest that an advanced nursing role, either as a nurse practitioner, clinical nurse specialist, or nurses who are

specialized in a specific clinical area (e.g. oncology) may be perceived as a threat to family and specialist physicians.^{112, 113} These studies highlight grey areas and places where each health discipline may perceive there is role overlap. Moreover, the studies suggest there has been more emphasis placed on individual roles rather than focus being placed on the needs of the patients or target populations. Currently, there are several research projects underway such as the examination of family health teams on patient outcomes in Ontario and interprofessional teams in Quebec and future educational needs for preparing health care professionals to work in a team-based environment through the Western Canadian Interprofessional Health Collaborative (WCIHC), which may shed more light on the impact of collaboration on HHR and patient outcomes.

Expansion of Roles

The majority of studies address the use of nurse practitioners or physician assistants in acute care settings. The evidence suggests that if appropriate support structures are present, physician assistants are a viable option for emergency rooms¹³⁷ and nurse practitioners can be successfully integrated into acute care services such as the trauma service.^{30, 41} Immediate outcomes associated with the use of advance practice nurses include: more counseling and education,³⁶ decreased floor, intensive care and overall hospital lengths of stay,³⁰ reductions in wait times and length of stay in the emergency department,¹¹⁷ and no difference in patient satisfaction when compared with physicians or physician assistants.⁵² Given the fairly recent introduction of nurse practitioners to Canada, it is not surprising that most of the articles were from the US and UK, with only one article from Australia.¹¹⁷

There were few studies examining other types of health professionals or supportive personnel. Structural barriers and acceptance by other health care providers were seen as possible barriers to expanded roles for registered nurses in offering nurse-led ambulatory chemotherapy service⁹⁶ and rehabilitation assistants to deliver integrated rehabilitation programs.¹¹¹ Clearly more work is needed in this area given results for expanded roles of health professionals in different areas of health care (e.g. primary care, residential care) or the right type of skill sets remains mixed. While Mackenzie¹⁰² suggests that paraprofessional health support workers can assist in increasing community capacity, Hughes, Rollins, Write, & Lapane⁹⁷ found that use of medication assistants in nursing homes could lead to an increase in errors.

5.0 Discussion and Recommendations

The results of this scoping literature review suggest that relatively little attention has been paid to the impact of system and organizational change on HHR when compared to the extent to which such changes have occurred during the past decade (see Appendix One which summarizes the type of recent system-level and organizational changes in BC). The majority of the literature discusses the impacts of the major acute care restructuring and downsizing of the acute care sector during the 1990s on HHR in urban environments.²² Whereas, we found very little work that examines the system and organizational innovation in the non-hospital sector and virtually no work was found on the HHR implications of the increasing use of multi-disciplinary teams and interprofessional collaboration, the increased use of other types of health professionals in addition to nurses and physicians, providing care to their full scope of practice or the increased use of a wide range of technology.

These results also suggest an almost exclusive focus on one of the largest HHR type of provider, nurses. In part, this focus has been in response to hospital restructuring where administrators have responded to reduced government funding by running deficits, closing beds, reducing lengths of patients' stay, laying off nurses, transforming full-time nursing positions into part-time ones, contracting services out, and intensifying the work of remaining staff.¹²⁵ Other hospital restructuring strategies include shifting nursing focus to be more task based.¹²⁵

However, the focused emphasis on nursing skill mix in the area of acute care restructuring and HHR has become somewhat obsolete within the current health care context of increased interprofessional collaboration, development of complex community acute care services, and projected health care provider shortages including registered nurses, pharmacists, general physicians, and public health.¹³⁸ As well, Canadian healthcare organizations are increasingly adopting formal change management strategies, such as the Institute of Health Improvement's Quality Improvement Model and LEAN methodology, which take a system rather than discipline perspective in identifying opportunities for improvement, such as reducing repeated laboratory orders, staff walking miles to find equipment, and forms completed but never read.¹³⁹

There has been much work done in the area of workload and activity measurement.¹³³ While most work in this area does not address how staff spend their time, recent observational work was designed to identify what nurses and other providers actually *do* in order to determine the level and mix of staff required for a particular patient population, an approach that is consistent with the shift towards addressing population health needs. Examining the activities providers are engaged in represents an important shift for HHR planning and development, refocusing from the provider (e.g. ratios) to meeting patient and population needs.

Workload and activity measurement has been redefined to be an important part of examining the effectiveness of interprofessional collaboration and improving patient care.¹⁴⁰ Clements, Dault, & Priest¹⁴¹ note that for decision-makers, effective teamwork could be a way to achieve a better balanced and more productive workforce and a way in which to better serve patient needs. Moreover, teamwork is seen as necessary from a patient's perspective and a way to improve the quality of care and achieve immediate outcomes for providers such as job satisfaction.¹⁴¹ Clearly more work is needed in the areas of workload and activity measurement, especially within the context of effective teams within and across different health care sectors such as home and community care, primary care, and acute care.

More work is also needed to examine the area of expansion of health care professionals' roles, especially in Canada. In the US, the proportion of patients who saw a nonphysician clinician (e.g. chiropractors, midwives, nurses or nurse practitioners, optometrists, physician assistants, psychologists, social workers) increased from 30.6% to 36.1% between 1987 and 1997.¹⁴² Although

the type of clinician who provides care may be less important to patients, providers are concerned with role overlap between physician and nonphysician providers. Authority to prescribe medications between psychiatrists and psychologists has been particularly heated.¹⁴³ However, with more incentives and rewards available for providers to collaborate, interprofessional care and expanded practice roles could serve to decrease fragmentation of care.

Despite the introduction of a wide range of innovations in technology, ranging from telehealth to point-of-care testing to telemedicine, only two articles met review criteria. Although response from key informants was minimal, suggestions were made that many innovations, including technology and restructuring of delivery of health services (e.g. integrated health networks) are well underway in BC yet most initiatives are not formally documented or evaluated by the Ministry or the health authorities. Moreover, the impacts of these changes on the workforce are not the focus of research, nor are their impacts on population health and patient health outcomes being explored.

5.1 Recommendations

As we have discussed, our search identified relatively little research addressing the impact of system-level and organizational change on HHR, despite the extensive system and organizational change that has occurred in all health sectors during the past decade. Given that the health system must continue to rapidly evolve and innovate in response to a variety of well-documented factors (such as a rapidly aging population; significant advancements in technology, pharmaceuticals, and clinical practice; and increasing shortages of health care providers, etc.), it seems prudent for HSPRSN to be strategic in the allocation of new HHR research funding. Research often takes several years; given this rapidly changing health environment, it is important that this funding be used to support studies that align with these changes rather than addressing questions that may be interesting but no longer relevant.

Accordingly, although we acknowledge that researchers have identified shortcomings and gaps in all of the themes identified in this search, we recommend that HSPRSN prioritize three key areas for new research funding. We believe that these areas are important priorities for providers, but also reflect important strategic changes underway in the broad health system.

Recommendation One: Document major innovations in BC with special attention to their HHR impacts.

As previously discussed, the BC health sector, as other jurisdictions, continues to implement a wide range of system-level innovations across all health sectors. Many of these have resulted in changes to service and practice models and to both employment and deployment that are highly likely to have had an impact on providers and patients. We found none of these changes to have been documented in the research literature, and in fact respondents suggested that few of these changes have been formally documented or evaluated by either the Ministry of Health Services or health authorities. Given this, it is difficult to understand how the Ministry of Health Services is adequately informing its long term HHR planning.

Documenting the major health system innovations in BC, identifying their effects on HHR, and highlighting where research is required, are critical first steps in setting the parameters for HHR modeling and planning.

Recommendation Two: Fund HHR research that focuses on matching types of providers with patient and population need (i.e. workload and activity measurement).

The majority of HHR planning and much of the research identified in this search and review is from the provider's perspective – and mostly that of nurses. The shift in attention from defining nurse staffing models to work activity analysis reflects a major shift from the provider perspective to the patient and population perspective. It includes an increasing focus on determining patient and

population need and matching the type and mix of providers that can best deliver the quality care required in a particular setting, including recognizing that this may differ from urban to rural communities. This work not only shifts perspective from only the provider but also recognizes the value of all members of a health care team in contributing to the quality of patient care.

Relevant to this priority direction is the *Transforming Care at the Bedside* quality improvement process that is underway in throughout the US and also has begun to be adopted in BC and across Canada. *Releasing Time to Care: The Productive Ward* is a similar quality improvement framework in use in the UK and has been adopted by the Saskatchewan Quality Health Council. The expansion of formal quality improvement frameworks illustrates the importance of this work to the broader health system, and its acceptance of this priority. As noted above, Vancouver Island Health Authority has developed a tool, the *Care Delivery Model Redesign* (CDMR), to systematically assess staff activity as a basis for improving patient care and outcomes; we understand that they also are in the process of adopting the *Transforming Care at the Bedside* quality improvement framework to support the improvements in staffing that have been identified by the CDMR.

It is our view that this work reflects a strategic shift in culture that is increasingly evident throughout the health system and given this, warrants HSPRSN's attention.

Recommendation Three: Fund research to assess the impacts of selected key health system innovations on HHR in both urban and rural settings, with particular attention to:

- **The shift of acute care from the hospital to primary health care in community settings, including the introduction of integrated health networks**
- **The use of the Model for Improvement, Lean, and other methodologies to support quality improvement**
- **Interdisciplinary teams and interprofessional collaboration**
- **Applied health-related technology/telehealth**

Although considerable research was directed to exploring the impact of the service changes following the restructuring and reengineering of the acute hospital sector in the 1980s and 1990s, we note that virtually none was directed to exploring the resulting impacts on the community sector and that this trend has continued. Despite significant “renewal, reform, and reinvestment” in the community health sector, including in primary health care, public health, mental health, addictions treatment, and home and continuing care, there is virtually no published research addressing the impact of these changes on HHR. Clearly these changes have influenced the development of new service and practice models, from interdisciplinary teams to primary health organizations to point-of-care testing, just as examples. However, this search failed to find substantial evidence that these important changes are being documented and that their impacts on HHR are being considered or researched in either urban or rural settings.

These three key recommendations – documentation of system-level innovation, further research on matching providers with patient and population need (i.e. workload and activity measurement), and research to assess the impacts of key health system innovations on HHR – reflect not only important directions for HHR, but important directions for the health system and for population health.

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Appendix One

Selected Innovations In BC Health Service Delivery: Potential HHR Implications

Inpatient Services

Acute Care Restructuring

All BC health authorities are engaged in major restructuring initiatives within their acute care services with the aim of increasing patient flow and reducing admissions, ALC days, LOS, etc. Initiatives focus on better utilization of inpatient beds, diagnostic services, and surgical capacity, increased day surgery/ambulatory care (e.g. pacemakers, cataracts, diagnostic outpatient services), and improved discharge planning and liaison with community services.¹

Emergency Department Decongestion

All large hospitals and many community hospitals are undertaking redesign of internal ED processes, for example creating internal specialized units such as Medical Assessment Units and introducing new staffing arrangements within the ED (e.g. use of LPNs and RPNs) to improve patient care.²

HHR implications include new patterns of staff deployment, new service and practice models, new roles for all types of nursing, technologists, aides and assistants, and new skills related to discharge planning and community liaison, and other new competency requirements.

Primary care

Primary Health Care Renewal

The federal government initiated primary health care renewal across Canada with the Health Transition Fund (1998-2001) and the Primary Health Care Transition Fund (2002-2006) with the aim of encouraging the development and testing of new models of primary health care delivery. Federal guidance for these new models identified a number of key characteristics to be incorporated, including integrated, multi-disciplinary group approach to care, group medical practice, 24/7 access to medical services, health promotion and illness/injury prevention services, integration with community based services, continuous patient health records via clinical information management systems technology, and quality assurance mechanisms (population health goals, case-finding, use of clinical protocols, peer review, patient satisfaction surveys). BC developed a range of new service models and currently is implementing Integrated Care Networks and the associated Physician Support Program.³

¹ E.g. *Fraser Health Directional Plan for Acute Services to 2020: Fraser Health, 2006.*

² *The \$100-million Health Innovation Fund was created in Budget 2007 to provide health authorities with funding to allow them to undertake projects that focus on new and innovative ways to improve patient care. Funded projects focus on three key strategic areas: emergency room decongestion, to improve efficiency and reduce emergency wait times; primary health-care services, to improve care at the community level; and pay for performance. In total, 51 projects – 29 major initiatives and 22 smaller scale projects – received monies from this one-time fund.*

³ *The four year (2002-2006) Primary Health Care Transition Fund (PHCTF), was an \$800 million Health Canada initiative, was designed to facilitate systemic, long-term renewal by supporting Canada's provinces and territories in their efforts to improve their delivery of primary health care services. BC received \$74 M and focused on three major strategies:*

** Supporting a Range of Practice Models*

** Improving Health Outcomes, with a focus on Chronic Disease Management (CDM), and*

** Professional development, evidence and evaluation*

HHR implications include new roles and competencies for family physicians; increased utilization of nurse practitioners; expanded roles for practice-based nurses and medical office assistants; development of new service models and strategies such as primary health care organizations, integrated care networks, group visits, interdisciplinary teams, etc.; and new care management strategies, such as advanced access.

Community Based Services

Home and Community Care Redesign

A combination of the decade-long shift from residential-based care to more home-based services for seniors and people with disabilities and the rapidly aging population has led to increasing acuity levels and corresponding higher care needs in community residential facilities. In response, these facilities are developing new levels of care, including sub-acute capacity and specialized services, such as dementia units. Community-based home services are expanding beyond home-support to include a broader range and higher intensity health services in order to maintain people in their homes longer, including “hospital replacement” services designed to prevent unnecessary hospital admissions, reduce length of stay, and allow earlier discharge (home nursing, home IV, home oxygen, wound management, home-chemotherapy, home-palliative care, etc.)⁴

HHR implications include new patterns of deployment and new roles and competencies for registered nurses, LPNs, technologists, care aides, etc.

Mental Health and Addictions

10 Year Mental Health and Addictions Plan (expected to be released in 2009)

This plan is anticipated to take a much broader scope than previous provincial mental health and addictions plans, including a significant investment in prevention (e.g. early childhood and youth development) and equipping a wide range of health professionals across the health system with the capacity to engage in early identification and provide brief intervention and treatment.

HHR implications are likely to include the development of new roles and competencies in mental health and addictions prevention and treatment/interventions for a much larger proportion of the non-mental health/addictions workforce and increased focus on interdisciplinary working.

Public and Population Health

Implementation of Core Public Health Programs

BC is in its third year of a quality improvement process, Core Functions in Public Health, aimed at strengthening 21 core public health functions. These include not only traditional public health functions such as prevention of communicable diseases and infant and child development, but also relatively new and less developed areas, such as air and water quality, the built environment, food security, etc.⁵

HHR implications include new roles and expanded competencies for public health nurses, environmental protection technologists, and a number of other health professionals (e.g. expanded

...cont

⁴ *Better Care for Seniors, Health Authority Redesign Accomplishments: A Four-Year Picture.* Ministry of Health, September 2005

⁵ *Public Health Renewal in British Columbia: An Overview of Core Functions In Public Health, Population Health and Wellness,* Ministry of Health Services, March 2005.

roles in community development and environmental health), increased use of paraprofessionals, and new service delivery models (group visits, integrated/bundled services, etc.). The Academic Health Council is overseeing a project focusing on identifying emerging competencies and their training implications.

Appendix Two

MeSH Terms and Keywords

Components	MeSH terms	Keywords
Practice Settings	After-hours care Emergency Medical Services Home care services Home care services – Community Health and Nursing services Home care services – Hospital-based Home nursing Hospice care Hospitals Intensive care Long-term care Public Health	Primary Care/ Primary Health Care Acute Care Clinic Learning difficulties and community centre Residential/nursing home Terminal care
Countries	Australia Canada Great Britain New Zealand United States North America (Canada and United States)	United Kingdom
Occupations and occupational Groups	Allied health personnel Allied professionals Auxiliary Nurse Community Health Aides Community health nursing Doctor Family Nursing Healthcare Assistants Laboratory personnel Nurse Clinicians Nurse Practitioners Nurses Nurses aides Nursing Staff, Hospital Occupational Therapy Pharmacists Physical Therapy (specialty) Physician Physician Assistant Physician, family Physiotherapy (UK literature) Primary Nursing care Professional practice Psychiatric aides Psychiatric nursing Public health nursing Social work	Registered Nurse Doctor Midwives Mid wives Mid wife Practitioner Surgeon Pediatrician Health care providers Case manager Community matrons Clinical Nurse leader Foreign medical graduates Clinical Nurse specialist

Components	MeSH terms	Keywords
	Social work, Psychiatric	
Health Human Resources	Employment Health Manpower Health Resources Human Resources Development Nursing staff Nursing staff, hospital Personnel Management Personnel Staffing and Scheduling	Staffing models Deployment of HHR New ways of working Identify strategies Staffing practices innovations Health human resources
Innovations in occupational groups and health care system in general	Delivery of Health Care Health care reform Hospital Restructuring Organizational innovation Pilot Projects Program evaluation Personnel downsizing Primary Health Care Renewal	Capacity building Collaborative care Delivery models Implementation strategies Innovation Organizational models Patient care model Practice models Restructuring Role clarity Short term issues Strategic health plan Substitution Sustainable health care Systematic solutions Systems analysis Multidisciplinary, inter professional Economic approaches
Medically Underserved Area	Medically Underserved Area Rural Health Services Suburban Health Services Telemedicine Remote Consultation Telehealth Telepathology Teleradiology Telepsychiatry American Indians/Alaska Native Emigrants and Immigrants Tele Home care Aboriginal/First nation Remote	
Inter-relations among providers	Interprofessional practice Interdisciplinary team	

Components	MeSH terms	Keywords
Indicators	Practice patterns Legal and health policy framework In service training Clinical competence Physician practice patterns Provider turnover Personnel turnover Clinical practice guidelines Professional practice location Task performance and analysis	Expanded Scope of practice Enhances scope of practice Team delivery models Use of health professionals to their Use of communities Use of paraprofessional workers Increase use of assistants Recruitment Training
Type of Health Care	Health care facilities Community Health Services Public Health Primary Health Care Mental Health Services	Family Practice General Surgery Primary Care Addiction services
Outcome Measures	Outcome assessment (health care) Competency based education	Best practices Clinical outcomes Education and training needs Educational programs design to support collaborative approaches Efficiency measures Hospital utilization Injury rates Outcome measures Patient satisfaction Reduction in costs System outcomes and utilization Workforce outcomes

Appendix Three

Websites

1. Health Canada
<http://www.hc-sc.gc.ca>
2. Canadian Policy Research Networks
<http://www.cprn.org/>
3. Canadian Health Services Research Foundation
<http://www.chsrf.ca>
4. Canadian Institutes for Health Research
<http://www.cihr-irsc.gc.ca>
5. Centre for Health Economics and Policy Analysis (McMaster)
<http://www.chepa.org>
6. Health and Social Service Utilization Research Unit (McMaster)
<http://fhs.mcmaster.ca>
7. Health Policy Research Unit (Kingston – Queen's)
<http://www.chspr.ubc.ca/>
8. Community Health Research Unit (Ottawa)
<http://aix1.uottawa.ca>
9. Hospital Management Research Unit (U of T)
<http://www.hpme.utoronto.ca>
10. Quality of Nursing Worklife Unit (U of T)
<http://www.nhsru.com>
11. Institute for Clinical Evaluative Sciences (Ontario)
<http://www.ices.on.ca/webpage.cfm>
12. MANITOBA CENTRE FOR HEALTH POLICY EVALUATION
<http://umanitoba.ca/medicine/units/mchp/>
13. HEALTH WORKFORCE RESEARCH NETWORK OF ALBERTA
<http://www.hwrna.ca>
14. NOVA SCOTIA HEALTH RESEARCH CENTRE
<http://www.nshrf.ca>
15. ATLANTIC HEALTH HUMAN RESOURCES ASSOCIATION
<http://www.ahhra.ca>
16. Centre for Rural and Northern Health Research (Laurentian)
<http://www.cranhr.ca/>
17. Northern Health Research Unit (Manitoba)
<http://www.ornh.mb.ca>
18. Nursing Health Services Research Unit

<http://www.nhsru.com/>

19. Saskatchewan Health Quality Council

<http://www.hqc.sk.ca>

20. Health Research Council of New Zealand

<http://www.hrc.govt.nz/>

21. Health Services Research Association Australia & New Zealand

<http://www.chere.uts.edu.au/hsraanz/>

22. Centre for Health Economics Research and Evaluation (Australia)

<http://datasearch.uts.edu.au>

23. National Health and Medical Research Council (Australia)

<http://www.nhmrc.gov.au/>

24. NHS Institute for Innovation and Improvement

<http://www.institute.nhs.uk>

25. UK Department of Health

<http://www.dh.gov.uk>

26. Institute for Employment Studies

<http://www.employment-studies.co.uk>

27. HRH Global Resource Centre

<http://www.hrresourcecenter.org>

28. Agency for Healthcare Research and Quality (US)

<http://www.ahrq.gov/>

29. American Society for Healthcare Human Resources Administration

<http://www.ashhra.org>

Appendix Four

Key Informants Contacted

Researchers

1. Andrea Baumann, McMaster/WHO Collaborating Centre
2. Linda O'Brian Pallas, University of Toronto
3. Linda McGillis Hall, University of Toronto
4. Gail Tomblin Murphy, Dalhousie and WHO Collaborating Centre
5. Morris Barer, CHSPR
6. Kim McGrail, CHSPR
7. Lisa Jakamanian, ICES
8. Sandra Regan, CRNBC
9. Judy Ritchie, McGill
10. Ivy Oandassen, University of Toronto
11. Lesley Bainbridge, College of Health Disciplines, UBC

Change Leaders

12. Lynn Stevenson, VP/CNO, VIHA
13. Suzanne Johnston, VP, CNO NHA
14. Jennifer McKenzie, VP Innovation, PHSA
15. Janet Joy, VCH/VCRI
16. Valerie St. John, ADM, Ministry of Health Services, BC
17. Gulrose Jiwani, ED, Health Human Resources (Nursing), Ministry of Health Services, BC
18. Judy Huska, Impact BC
19. Jeanne Besner, Calgary Health Region, Health Systems and Workforce Unit

Appendix Five

Categories for Data Extraction Form

Data Capture Matrix

- Ref Number/Authors/Publication Date
- Country
- Type of Study
- Sector
- Disciplines or Providers
- Purpose of Study
- Key Innovation Precipitating Innovation
- Description of Method
- Results/Summary
- Results: Outcomes for Practice
- Results: Outcomes for Patient Care
- Authors Insights or Implications (discussion)
- Educational Implications

Appendix Six

HHR Coding Schema

Based on Health System and Health Human Resources Planning Conceptual Framework

Study Identification

- Reference Number

Contextual features

- Location of study (Canada, US, Aus, New Zealand, Europe, Other)
- Sector (Hospital/Acute, community, home care, residential, public health, primary care, diagnostics, mental health/addictions)
- Geography (urban, rural)

Study Methods

- Type of study design
 - Qualitative (Descriptive, interpretive, grounded theory, ethnographic)
 - Quantitative (cross sectional surveys, experimental, cohort)
 - Mixed-methods
 - Policy Analysis
 - Literature Review/Synthesis
- Data Sources
 - Large/national datasets such as Administrative, census, national surveys
 - Primary (meaning the authors collected the data themselves such as interviews, focus groups, provider surveys)
 - Literature/policy documents

Purpose of the study

System design

- Health system restructuring – intersectoral, skill mix, degree of centralization, environmental complexity
- Program Redesign (system level)
- Technology (systems level)
- Primary Health Care, Public Health, etc. Renewal/reform/innovation (system wide — these might be things such as policy mandates, health authority or country wide reforms)
- Education Innovation (policy level)

Management and organizational

- Collaboration/interprofessional (at the organizational level)
- Hospital restructuring, (employment arrangements at the organizational level, includes staff mix)
- Structural arrangements (hospital structures, work process redesign, hospital reengineering)⁶
- Program Redesign (within a sector-such as Primary care, public health, etc)

⁶ See Aiken, Clarke and Sloan, page 417, para 2 and 3 for definitions of these

- Technology (within a sector)
- Clinical innovation (innovative use of providers, introduction of new provider such as pharmacy assistant, radiology tech)

Education

Implications for deployment of HHR (were there any implications/changes to the way in which HHR resources were deployed?)

Implications Other HHR (were there any other implications to HHR-e.g. introduction of new provider, use provider differently, etc)

Outcomes for patients

Appendix Seven

Summary of Key Studies

Inputs: Acute care restructuring

Study	Summary of Key Findings
Aiken LH, Clarke SP, Sloane DM. Hospital restructuring: does it adversely affect care and outcomes? <i>The Journal of nursing administration</i> . Oct 2000; 30(10):457-465.	Authors used data from a variety of sources to examine changes in staff relative to the case-mix of patient receiving care and changes in nursing practice environments in response to major restructuring initiatives in the US hospital sector between 1996 and 1998. They reported that the increases in nurse-to-patient ratios may have been deceiving and that increases in patient acuity and nurses' responsibilities may have increased the workload of nurses in hospitals in ways, that when coupled with deteriorating practice environment, may have adversely affected patient outcomes.
Berger CS, Robbins C, Lewis M, Mizrahi T, Fleit S. The impact of organizational change on social work staffing in a hospital setting: a national, longitudinal study of social work in hospitals. <i>Social work in health care</i> . 2003;37(1):1-18.	Examined the impact of changes within the hospital setting associated with hospital restructuring on the social work department's organizational structure, leadership, and staffing. The study employed an exploratory/descriptive, longitudinal (cohort) survey design and used a stratified random sample of 750 (of 3,700) US hospitals. The findings did not support anecdotal reports and impressions of a disproportionate reduction on social work programs. While dramatic, the downsizing of social work staff was not commensurate with the overall decreases in hospital staffing, over 70% of the respondents report that social work staff was not experiencing decreases.
Bond CA, Raehl CL, Pitterle ME, Franke T. Health care professional staffing, hospital characteristics, and hospital mortality rates. <i>Pharmacotherapy</i> . Feb 1999;19(2):130-138.	Integrated 1992 data from the Medicare Hospital Mortality Information data tape with census and personnel data from the American Hospital Association for 3763 matched hospitals. Authors reported that hospital characteristics associated with lower mortality were occupancy rate and private nonprofit and private for profit ownership. They noted that mortality rates decreased as staffing level per occupied bed increased for medical residents, registered nurses, registered pharmacists, medical technologists, and total hospital personnel. Mortality rates increased as staff level per occupied bed increased for hospital administrators and licensed practical-vocational nurses.
Burke RJ. Hospital restructuring, workload, and nursing staff satisfaction and work experiences. <i>The health care manager</i> . Apr-Jun 2003;22(2):99-107.	Reported on the changes in patient-nurse ratios resulting from hospital restructuring and the relationship of these changes to staff satisfaction, psychological health, and perception of hospital functioning. They reported that 53% of nurses indicated an increase in patient-nurse ratios and those nursing staff who indicated increased ratios generally reported less job satisfaction poor psychological health, and less effective hospital functioning.
Burke RJ, Greenglass ER. Effects of changing hospital units during organizational restructuring. <i>The health care manager</i> . Sep 2001;20(1):10-18.	Examined the effects on work experience, satisfaction, and psychological well-being of hospital based nursing staff when faced with a change of nursing units during a period of major health care system and hospital restructuring. Data were collected from 1,362 staff nurses using anonymous questionnaires. Although the effects of changing units were small, staff nurses who had changed units generally reported higher levels of work stressors, less satisfaction, and more negative emotional well-being.

Study	Summary of Key Findings
<p>Cummings GG. Hospital restructuring and nursing leadership: a journey from research question to research program. Nursing administration quarterly. Oct-Dec 2006;30(4):321-329.</p>	<p>Examined how multiple episodes of hospital restructuring leading to layoff of nurses affected nurses who remained employed and how nursing leadership mitigated or intensified the negative effects of hospital restructuring on nurses. The findings suggested that hospital restructuring had significant negative physical/emotional health effects on nurses who remained employed. However, nurses who worked for resonant (emotionally intelligent) leadership reported positive health and well-being, and opportunities to provide quality patient care. Nurses who worked for dissonant leadership reported greater negative effects of hospital restructuring.</p>
<p>Francis D, Christian L, Peddecord KM, Wiesner C, Tucker ES, 3rd. Effects of reorganization on laboratory quality: preliminary findings and lessons learned. Clinical leadership & management review : the journal of CLMA. Sep-Oct 2002;16(5):293-305.</p>	<p>A case study that described the implementation of major restructuring of a clinical laboratory which resulted in a shift from clinical laboratory scientists to lower waged non-licensed technical staff. The impact of this change on the analytical quality and other indicators of laboratory performance were assessed and no significant change was reported. The authors noted that dealing with the human side of the changes was the biggest challenge.</p>
<p>Kemp LA, Harris E, Comino EJ. Changes in community nursing in Australia: 1995-2000. Journal of advanced nursing. Feb 2005;49(3):307-314.</p>	<p>Examined changes in community nursing in Australia between 1995 and 2000 in response to changes in the acute care sector in that country. They identified the addition of increasing focus on health promotion, prevention, early identification and intervention and suggested that these changes added additional pressure and created tensions for community nurses, as well documented in the literature. However, they noted the lack of empirical evidence of actual changes in community nurses' workloads and any change in focus of their work.</p> <p>Authors reported that there was documentary evidence of a large increase in the number of adult clients, and all clients increasingly receive shorter, more intensive, clinically focused services and before being discharged from care, rather than receiving a lower intensity service over a longer period of time.</p> <p>They suggested that there was evidence that staffing numbers had not increased to match this higher acuity and intensity. These changes were echoed by the nurses, who reported that expanded acute care roles were impacting on their workload and resulting in a loss of holistic primary health care focus. The authors concluded that community health care in Australia was shifting from primary to short-term clinical care and that there were opportunities for community nurses to engage proactively in defining and promoting their role in the health care system are needed in order to ensure an appropriate balance of acute clinical and holistic primary health care in the community.</p>
<p>MacPhee, Maura. Hospital Networking: Comparing the Work of Nurses with Flexible and Traditional Schedules. Ovidsp, vol 30(4), April 2000, 190-198.</p>	<p>The impact of reengineering strategies such as flex nurse staffing on socialization of nurses was studied. No significant differences were found in the nurses social network compositions. Both types of nurse constructed peer-based networks and nurse managers were also present in their networks.</p>

Study	Summary of Key Findings
<p>McCloskey BA, Diers DK. Effects of New Zealand's health reengineering on nursing and patient outcomes. Medical care. Nov 2005;43(11):1140-1146.</p>	<p>Used a retrospective analysis of administrative data to focus on the frequency of 11 nurse sensitive patient outcomes, average length of stay, and mortality, along with the number of full time nursing equivalents, hours worked and skill mix. They reported a drop in nursing FTEs of 36%, an 18% skill mix increase; a 20% drop in average length of stay; substantial increase in adverse clinical outcome rates; but reduced mortality amongst medical patients and stable mortality among surgical patients.</p>
<p>McGillis Hall L, Doran D, Baker GR, et al. Nurse staffing models as predictors of patient outcomes. Medical care. Sep 2003;41(9):1096-1109.</p>	<p>This study evaluated the impact of different nurse staffing models on the patient outcomes of functional status, pain control, and patient satisfaction with nursing care. The proportion of regulated nursing staff on the unit was associated with better Functional Independence Measure scores and better social function scores at hospital discharge. In addition, a mix of staff that included RNs and unregulated workers was associated with better pain outcomes at discharge than a mix that involved RNs/RPNs and unregulated workers. Finally, patients were more satisfied with their obstetric nursing care on units where there was a higher proportion of regulated staff.</p>
<p>McGillis Hall L, Doran D, Pink GH. Nurse staffing models, nursing hours, and patient safety outcomes. The Journal of nursing administration. Jan 2004;34(1):41-45.</p>	<p>Assessed the perceptions of 1116 registered nurses on the relationship between nurse staffing and care delivery models in relation to patient care quality. Authors reported that these nurses perceived that an all-RN staffing model is associated with better quality outcomes for patients and that a staffing model that included professional and unregulated staff could pose a challenge for unit-based communication and coordination of care.</p>
<p>Michalski JH, Creighton E, Jackson L. The impact of hospital restructuring on social work services: a case study of a large, university-affiliated hospital in Canada. Social work in health care. 1999;30(2):1-26.</p>	<p>A study examining the impact of hospital restructuring on social workers, using workload measurement, interview, and questionnaire data. Authors reported that while the shift to program management had some intended effects in regard to increasing direct service supporting patients, social workers reported somewhat lower job satisfaction than expected in response to the dismantling of the professional infrastructure.</p>
<p>Noorish, BR; Rundall, TG. Hospital restructuring and the work of registered nurses. The Milbank Quarterly, 2001, 79(1), 55-79</p>	<p>This review of the literature focused on the impact of hospital restructuring on the work of registered nurses, in particular describing the restructuring-related changes frequently reported with respect to three key characteristics: work roles, workload, and control over work of registered nurses. After restructuring, nurses typically spend less time providing care and comfort measures for patients and more time doing care planning and administration, activities that many nurses find less rewarding than direct patient care. Restructuring often results in the nurse executive's leadership role being downgraded to a staff position. Restructuring affects the control of nursing work by undermining established shared-governance arrangements.</p>

Study	Summary of Key Findings
<p>Sharp ND, Greiner GT, Li YF, et al. Nurse executive and staff nurse perceptions of the effects of reorganization in Veterans Health Administration hospitals. <i>The Journal of nursing administration</i>. Oct 2006;36(10):471-478.</p>	<p>Examined the effects of hospital restructuring on nursing management and nursing staff. They assessed nurse executive perceptions of effects of service line reorganization on nurse executive roles, nursing staff and patient care, and compared nurse executive responses to staff nurse reports of job satisfaction and quality of care in the same types of Veterans Health Administration facilities in the US. Structured interviews were conducted with 125 nurse executives and staff nurse data were derived from a survey of Veterans Health Administration nursing staff.</p> <p>The authors reported that the nurse executives described significant changes in the nurse executive role, and new challenges for managing nursing practice and achieving consistent quality of nursing care. Although nursing management reportedly perceived differences in the overall effects of restructuring on nursing staff depending on the type of reorganization, staff nurses reported significant differences in perceived quality of patient care across organization types.</p>
<p>Sheward L, Hunt J, Hagen S, Macleod M, Ball J. The relationship between UK hospital nurse staffing and emotional exhaustion and job dissatisfaction. <i>Journal of nursing management</i>. Jan 2005;13(1):51-60.</p>	<p>Examined the relationship between nurse outcomes (dissatisfaction and emotional exhaustion) and nurse workload, nurse characteristics and hospital variables. A questionnaire developed for the International Hospital Outcomes Study was administered to registered nurses working in the specialties of interest to the study (medical, surgical, CCU, ITU, gynecology and urology, accident and emergency and day surgery nurses in 29 acute care hospitals in England and Scotland). Significant relationships were found using the combined English and Scottish data between nurse patient ratios and (1) emotional exhaustion and (2) dissatisfaction with current job reported by nurses.</p>
<p>Tourangeau AE, Giovannetti P, Tu JV, Wood M. Nursing-related determinants of 30-day mortality for hospitalized patients. <i>Canadian journal of nursing research</i>, 2002;33(4):71-88.</p>	<p>Examined the effects of nursing-related hospital variables on 30-day mortality rates for hospitalized patients. Findings supported a relationship between lower 30-day mortality and 3 predictors; a richer registered nurse skill mix; more years of experience on the clinical unit; and reported larger numbers of shifts missed. The authors suggested that their findings could be used to predict the effects of hospital changes on nursing skill mix and years of RN experience on patient mortality.</p>
<p>Way, C., Gregory, D., Baker, N., Lefort, S., Barrett, B., & Parfrey, P. Attitudes and perceptions of registered nurses during and shortly after acute care restructuring in Newfoundland and Labrador. <i>Journal of Health Services Research & Policy</i>, 2005, 10 Suppl 2, S2:22-30.</p>	<p>Monitored changes in registered nurses' perceptions of the impact of seven years of health care restructuring in Newfoundland and Labrador (NL) and measured the attitudinal and behavioral reactions over four years comparing the St John's region, where hospital aggregation occurred, to other regions of the province. The authors collected data on acute care nurses' personal characteristics and perceptions of the importance of reform and its impact on workplace conditions and health care quality in 1995, 1999, 2000 and 2002. Nurses' attitudes and intentions were monitored across three time periods (i.e. 1999, 2000 and 2002).</p> <p>The authors reported that perceived workplace conditions and health care quality, as well as attitudes and behaviors were generally negative and but there was some improvement over time.</p>

Study	Summary of Key Findings
Woodward CA, Shannon HS, Cunningham C, et al. The impact of re-engineering and other cost reduction strategies on the staff of a large teaching hospital: a longitudinal study. Medical care. Jun 1999;37(6):556-569.	A two-year longitudinal study at three large Ontario teaching hospitals that assessed hospital staff's perceptions of how rapid organizational change, caused by fiscal constraints imposed by government, affected them, their work environment, and the quality of care and services they provided. The authors reported significant increases in depression, anxiety, emotional exhaustion, and job insecurity, particularly in the first year of change. By the second year employees reported deterioration in team work, increased uncertainty of role, and increased use of distraction to cope. Job demands were reported to increase throughout the period whereas little changed in the employees' job influence or decision latitude. Although patient care was not seen to deteriorate in the first years, a significant decline in the perception of patient care, attention to quality improvement, and overall quality of care were later seen.

Inputs: Organizational Characteristics

Authors	Summary of Key Findings
<p>Armstrong KJ, Laschinger H. Structural empowerment, Magnet hospital characteristics, and patient safety culture: making the link. <i>Journal of nursing care quality</i>. Apr-Jun 2006;21(2):124-132, quiz 133-124.</p>	<p>Reported preliminary evidence of important relationships between workplace empowerment, as seen in Magnet environments, and professional practice environments conditions and patient safety climate.</p>
<p>Friese CR. Nurse practice environments and outcomes: implications for oncology nursing. <i>Oncology nursing forum</i>. Jul 1 2005;32(4):765-772.</p>	<p>Examined the practice environments and outcomes of nurses working in oncology units or Magnet hospitals. The authors report that oncology nurses had superior outcomes compared with non-oncology nurses and that emotional exhaustion was significantly lower among oncology nurses working in Magnet hospitals. Scores on the Collegial Nurse-Physician Relations subscale were highest among oncology nurses. Outcomes were associated with Practice Environment Scale of the Nursing Work Index scores and Magnet status. Oncology nurses with favorable collegial nurse-physician relations were twice as likely to report high-quality care.</p>
<p>Makinen A, Kivimaki M, Elovainio M, Virtanen M, Bond S. Organization of nursing care as a determinant of job satisfaction among hospital nurses. <i>Journal of nursing management</i>. Sep 2003;11(5):299-306.</p>	<p>Examined the relationship between methods of organizing nursing and employee satisfaction. A survey of nurses on 26 wards of which 12 worked according to primary care nursing model and 14 according to team model was undertaken and job satisfactions assessed by self-completion questionnaires. Methods of organizing nursing, such as primary, modular, team and functional nursing, were associated with job satisfaction. However, this association involved only certain features of these organizational models and specific components of satisfaction. After the effects of demographic and ward characteristics were controlled, for, hierarchical regression analyses showed that patient-focused work allocation, opportunity to write nursing notes and accountability for patient care contributed to nurses satisfaction with supervision and personal growth. The relationships of duty rotation and liaison with other discipline to job satisfaction were weaker or non-existing.</p>
<p>Martin PA, Gustin TJ, Uddin DE, Risner P. Organizational dimensions of hospital nursing practice: longitudinal results. <i>The Journal of nursing administration</i>. Dec 2004;34(12):554-561.</p>	<p>This longitudinal case study assessed a hospital's experience in selecting, evaluating, and discarding instruments to attain the best information on their nurses' perceptions regarding their work environment.</p>

Authors	Summary of Key Findings
<p>McGillis Hall, L.; Pink, L.; Lalonde, M.; Tomblin Murphy, G.; O'Brien-Pallas, L.; Spence laschinger, L.; Tourangeau, A.; Besner, J.; White, D.; Tregunno, D.; Peterson, J.; Seto, L.; Akeroyd, J. Decision Making for Nurse Staffing: Canadian Perspectives. Policy, Politics & Nursing Practice, 2006, 17(4), 261-269.</p>	<p>A stratified sample of key informants were interviewed to explore their perceptions of nurse staffing decision-making process, supports in place for nurses, nursing workloads being experienced, and perceptions of nursing care and outcomes. These authors suggest that despite a great deal of interest in Canada, there is lack of consensus on nurse-decision making process. Their study identified a number of key themes that they suggested could form the basis of policy and practices changes in regard to determining appropriate workload, including staffing principles and frameworks, nursing work-load measurement systems, and nurse – to nurse patient ratios. They noted the need for better uptake of evidence related to nurse staffing and that linking nurse staffing models to patient outcomes was a rare occurrence.</p>
<p>McGillis Hall L, Peterson J, Baker GR, et al. Nurse staffing and system integration and change indicators in acute care hospitals: evidence from a balanced scorecard. Journal of nursing care quality. Jul-Sep 2008;23(3):242-252.</p>	<p>After participating in interventions designed specially to improve the nursing-working environment on patient and nurse outcomes, nurses reported a higher perception of their work and work outcome. The authors also noted that demographics, unit, and hospital characteristics also had an impact on the work environment and outcomes.</p>
<p>Tourangeau AE, Coghlan AL, Shamian J, Evans S. Registered nurse and registered practical nurse evaluations of their hospital practice environments and their responses to these environments. Nursing leadership (Toronto, Ont.). Dec 2005;18(4):54-69.</p>	<p>Over 13000 Ontario nurses were surveyed to explore how both registered nurses and registered practical nurses evaluated their hospital work environments and their responses to these practice environments. Significant differences were found between registered nurse and registered practical nurse characteristics such as mean age, full-time employment rates, mean years of nursing experience and proportion enrolled in university or college educational programs. Both groups reported weak professional practice environments; however, there were some significant differences between the evaluations by registered nurses and those of registered practical nurses.</p>
<p>Tourangeau AE, Cranley LA, Jeffs L. Impact of nursing on hospital patient mortality: a focused review and related policy implications. Quality & safety in health care. Feb 2006;15(1):4-8.</p>	<p>A hypothesized model of the determinants of nurse intention to remain employed in current hospitals of employment was tested. Previous research had shown that stronger nurse intention to remain employed is associated with higher job satisfaction, higher organizational commitment, higher perceived manager support, lower burnout, higher work group cohesion, being older, having more years of nursing experience and having lower levels of education. The authors reported that the strongest predictors were nurse age, overall nurse job satisfaction and years of employment in the current hospital. Although the proposed model hypothesized six categories of predictors of intention to remain employed, only four of these were statistically significant determinants of nurse intention to remain: job satisfaction, personal characteristics of nurses, work group cohesion and collaboration, and organizational commitment of nurses.</p>

Authors	Summary of Key Findings
<p>Valentine NM, Nash J, Hughes D, Douglas K. Achieving effective staffing through a shared decision-making approach to open-shift management. <i>The Journal of nursing administration</i>. Jul-Aug 2008;38(7-8):331-335.</p>	<p>Authors described the use of open-shift management technology as a strategy to improve staffing effectiveness and the work environment. They suggested that in many US hospitals, open-shift management technology has become an essential workforce management tool, nursing benefit, and recruitment and retention incentive. In this article, the authors discussed how a successful nursing initiative to apply automation to open-shift scheduling and fulfillment across a 3-hospital system had a broad enterprise-wide impact resulting in dramatic improvements in nurse satisfaction, retention, recruitment, and the bottom line. In this case study they reported that this nurse-driven open-shift management program had been demonstrated to be an effective tool for developing effective staffing practices that leveraged and expanded the existing workforce not just in nursing, but throughout a number of key departments, including the laboratory, radiology, occupational therapy, physical therapy, and respiratory therapy.</p>
<p>Zeytinoglu IU, Denton M, Davies S, Baumann A, Blythe J, Boos L. Retaining nurses in their employing hospitals and in the profession: effects of job preference, unpaid overtime, importance of earnings and stress. <i>Health policy (Amsterdam, Netherlands)</i>. Nov 2006;79(1):57-72.</p>	<p>Examined the effects of job preference, unpaid overtime, importance of earnings, and stress in retaining nurses in their employing hospitals and in the profession. Data came from their survey of 1396 nurses employed in three teaching hospitals in Southern Ontario, Canada. Data were analyzed for all nurses and for each of full-time, part-time, and casual nurses.</p> <p>With regards to retaining nurses in their hospitals, working in their preferred type of job was reported to be important, particularly for part-time nurses. Working unpaid and longer than agreed hours was also a factor for increasing the likelihood of part-time nurses to leave the profession. All nurses were less inclined to leave as the importance of their earnings for the family increased, but it was particularly important for part-time nurses. Stress was an ongoing concern for retaining nurses in their hospitals and within the profession. The authors concluded by suggesting that managers and policy makers pay attention to employing nurses in jobs they prefer, decrease unpaid overtime, and consider the importance of earnings for them and their families in developing policies and programs to retain nurses.</p>
<p>Upenieks VV. Assessing differences in job satisfaction of nurses in magnet and nonmagnet hospitals. <i>The Journal of nursing administration</i>. Nov 2002;32(11):564-576.</p>	<p>Used a work index questionnaire to assess levels of job satisfaction of nurses at Magnet and non-Magnet hospitals. The author described Magnet hospitals as being recognized as organizations with organizational characteristics that enhance nurse leadership and support clinical nurses. Clinical nurses at Magnet hospitals were reported to have more autonomy and control over their practice setting compared to nurses in non-Magnet hospitals, i.e. independence to deploy needed resources for patient care delivery, accountable for patient care issues, and relative freedom to make patient care decisions.</p> <p>Magnet hospital nurses also characterized their work environment as one of support from administration more often than nurses in non-Magnet settings. Factors identified as influencing nurse leader effectiveness included a strong commitment to nursing, recognition of professional nursing practice, leadership visibility, and support of an autonomous climate. As well, Magnet nurse leaders were reported to have greater visibility and responsiveness; provide better support of clinical nurse autonomous decision-making; and provide greater support of a professional nursing climate as evidenced by adequate staffing in the workforce.</p>

Inputs: Technology and Telehealth

Study	Summary of Key Findings
<p>Schlachta-Fairchild L. Telehealth practice in home care. Synopsis of the 2000 US Telenursing role study. Caring : National Association for Home Care magazine. Apr 2002;21(4):10-13.</p>	<p>This synopsis of the 2000 US Telenursing Role Study, which involved an online survey of US Telnursing, describes the integration of new technologies into nursing. A telenurse was defined as a nurse that worked in a telehealth program or with telehealth technology. Telenurses from 40 states were included in the study, as were home care telecare nurses from 16 of those 40 states. Overall telehealth nurses were more highly educated than the general population of US RNs. Telenurses also worked in at least 29 different practice settings with only 23% working in hospitals. The second largest setting for telehealth was home care. They also noted that work satisfaction of telehealth nurses was no different than general nurses.</p>
<p>Staples P, Earle W. The nature of telephone nursing interventions in a heart failure clinic setting. Canadian journal of cardiovascular nursing = Journal canadien en soins infirmiers cardio-vasculaires. 2008;18(4):27-33.</p>	<p>Reported on the effectiveness of telephone management for patients with heart failure. Nurses changed medications and provided education over the telephone. The authors noted that while some interventions were only with in the scope of a nurse practitioner, many also fell within the scope of an RN. They suggest that the combination of a NP and a RN may be a feasible model of nursing staff mix for this type of chronic disease care.</p>

Outputs: Workload and Activity Measurement

Authors	Summary of Key Findings
<p>Best RG, Hysong SJ, Pugh JA, Ghosh S, Moore FI. Task overlap among primary care team members: an opportunity for system redesign? <i>Journal of healthcare management / American College of Healthcare Executives</i>. Sep-Oct 2006;51(5):295-306; discussion 306-297.</p>	<p>Using a functional job analysis protocol, the study identified overlap in the performance of primary care tasks among multiple occupational groups and suggested that there were opportunities to reallocate work responsibilities. Their results show that registered nurses, physicians, advanced practitioners, and licensed vocational nurses reported performing 60 percent to 97 percent of the same tasks, while clerks and health technicians appeared to be underutilized. The frequency and duration with which occupational groups performed each task were also examined, providing additional evidence to be used in improving clinic efficiency.</p>
<p>Capuano T, Bokovoy J, Halkins D, Hitchings K. Work flow analysis: eliminating non-value-added work. <i>The Journal of nursing administration</i>. May 2004;34(5):246-256.</p>	<p>Authors had previously identified key drivers of unnecessary work associated with the day-to-day delivery of patient care in their Magnet-designated institution. They noted that attention to the ideal practice environment was key to their organization and so this study evaluated the implementation of changes based on those findings. Their goal was to maximize patient centered care by eliminating non-value added work. They used both quantitative and qualitative methods to evaluate specific and defined process improvements in ten major practice environment areas, ranging from inefficiencies in job functions and roles to legibility of physician's handwriting. They reported significant changes in overall distribution of observed activities and important adjustments made to job descriptions and the environment that served to eliminate key drivers of unnecessary work in the delivery of patient care. These authors suggested that in the current acute care environment, nursing has become a collaborative and multifaceted process that requires the nurse to engage in other patient and team activities not reflected as direct or in direct care (for example, patient/family education, physician rounding, shift report, transporting patients, and communicating with ancillary team members).</p>
<p>Eastaugh, S. R., (2002) Hospital Nurse Productivity. <i>J Health Care Financ</i> 29(1):14-22</p>	<p>Productivity was reported to vary widely among hospitals as a function of staffing patterns, methods of organization and the degree of reliance on nurse-extender positions. The author suggested that nurse-extenders could enhance the marginal value product of the most educated nurse as the registered nurses concentrated their workday around patient care activities.</p>
<p>Eastaugh SR. Hospital nurse productivity enhancement. <i>Journal of health care finance</i>. Spring 2007;33(3):39-47.</p>	<p>Production function results from a study of nurse output from 2002 to 2005, demonstrated productivity varied widely across 39 hospitals as a function of staffing patterns, methods of organization, and the degree of reliance on nurse extender technicians. Nurse extenders were reported to enhance the marginal value product of the most educated nurses as the RNs concentrate their workday around patient care activities. The author suggests that these results demonstrate that that nurse extenders free RNs from the burden of non-nursing tasks.</p>

Authors	Summary of Key Findings
<p>Gran-Moravec MB, Hughes CM. Nursing time allocation and other considerations for staffing. <i>Nursing & health sciences</i>. Jun 2005;7(2):126-133.</p>	<p>Evaluated how nursing staff on a telemetry unit spent their time on selected nursing tasks, and how they believed staffing and patient acuity levels could best be determined. A self-report survey tool was developed, piloted and administered. Of the tasks that were listed in the survey, registered nurses (RNs) reported spending 39% of their time performing tasks that RNs only can perform. RNs reported spending 12% of their time performing activities that certified nursing assistants (CNAs) could perform alone and 49% of their time was spent on tasks that both RNs and CNAs must perform. Authors concluded that RNs may not be used efficiently due to task overlap.</p>
<p>Ringerman, ES, Ventura S. An outcomes approach to skill mix change in critical care. <i>Nursing management</i>. Oct 2000;31(10):42-46.</p>	<p>The success of the introduction of trained licensed vocational nurses (LVN) as part of a critical care unit was examined. The decision to introduce this project was in response to severe nursing shortages. While adhering to the principles of primary nursing, the project developed an explicit nursing partnership between the RNs and the LVNs. Based on a literature search, they classified interventions of critical care nursing as either complex or basic. Their analysis of work on that unit showed that 55% of tasks could be delegated to a properly trained LVN when working in partnership with a well-trained nurse. Outcomes measured pre and post program implementation remained unchanged, with three exceptions: patient and physicians satisfaction increased while nurse satisfaction decreased and labor costs dropped 18%.</p>
<p>Spilsbury K, Meyer J. Use, misuse and non-use of health care assistants: understanding the work of health care assistants in a hospital setting. <i>Journal of nursing management</i>. Nov 2004;12(6):411-418.</p>	<p>The authors reported that despite the increase in numbers of health care assistants employed by the National Health Service in the UK to support registered nurses providing nursing care, little was known about the make-up of the health care assistant workforce and the changing nature of their role. Accordingly they developed an in-depth account of health care assistants work in one organization: what they say they do compared with what they actually do in practice and how and whether the work of health care assistants is adequately supervised. They also noted tensions between the work of health care assistants and registered nurses and the subsequent effects on teamwork and patient care.</p> <p>The authors reported that although there are policy expectations associated with the work of health care assistants, their study revealed significant deviations from these goals. They suggest that with the workplace arena the negotiations between health care assistants and registered nurses actively shape the health care assistants work. Findings suggest dynamic patterns of use, misuse and non-use of the health care assistants as a resource to patient care.</p> <p>The changing roles of registered nurses also was noted to have had direct implications for the roles of health care assistants: as registered nurses take on extra duties and responsibilities they are conceding some of their role to health care assistants. This has implications for nurse managers. The authors suggested that the competence of health care assistants to carry out nursing work needs to be reassessed and there also needs to be ongoing monitoring and supervision of their work to maximize, and further develop, their contribution to patient care and to ensure quality standards. Finally they suggested that managers need to be aware of the importance of workplace negotiations in the interpretation of formal policies and the subsequent shaping of health care assistant work at the level of service delivery.</p>

Authors	Summary of Key Findings
<p>Upenieks VV, Kotlerman J, Akhavan J, Esser J, Ngo MJ. Assessing nursing staffing ratios: variability in workload intensity. Policy, politics & nursing practice. Feb 2007;8(1):7-19..</p>	<p>Two comparable telemetry units with a 1:3 staffing ratio within a California hospital system were studied to determine the relative rates of variability in nursing activities. The results demonstrated significant differences in categorical nursing activities (e.g., direct care, indirect care, etc.) between the two telemetry units and no correlation between workload categories with daily staffing ratios and staffing mix between the two units. Although patients were grouped in a similar telemetry classification category and care was mandated at a set ratio, patient needs were variable, creating a significant difference in registered nurse (RN) categorical activities on the two units.</p> <p>The authors concluded that much more needs to be learned about staffing policies before links can be made regarding set staffing ratios, and pointed to the importance of determining how nurses spend their time in terms of variability in their daily work.</p>
<p>Upenieks VV, Akhavan J, Kotlerman J, Esser J, Ngo MJ. Value-added care: a new way of assessing nursing staffing ratios and workload variability. The Journal of nursing administration. May 2007;37(5):243-252.</p>	<p>The relative times allocated to workload activities among registered nurses was studied. They suggested that nursing is a synergistic and intuitive process, which may not be capable of being easily translated in to minimum patient-to-nurse ratios and that a fundamental step in evaluating the appropriateness of prescribed ratios is assessing how registered nurses spend their time while caring for patients. Using a workflow methodology, they assessed the amount of time that nurses spent on direct care and other categorical activities and found a marked variation in a medial-surgical unit compared to the two telemetry units reference in the above study. A marked variation was observed in the amount of time spent on value-added, necessary, and non-value-added activities, as well as in the amount of time spent on direct care, indirect care, documentation, waste, and other activities.</p>
<p>Upenieks VV, Akhavan J, Kotlerman J. Value-added care: a paradigm shift in patient care delivery. Nursing economic\$. Sep-Oct 2008;26(5):294-300</p>	<p>Assessed work activity to gain an understanding of how much time RNs spent in value-added care, and whether increasing the combined level of RNs and unlicensed assistive personnel increased the amount of time spent in value-added care compared to time spent in necessary tasks and waste. As background they noted that when front-line nurses were surveyed to assess what specific work environment changes would improve the efficiency of their unit as well as their level of satisfaction, they overwhelmingly indicated that they wanted to spend less time in nonessential activities such as paperwork and locating physicians and supplies (i.e. Capuano et al., 2004 as noted above). They also noted that studies indicate that medical-surgical nurses spend less than half of their shift in direct patient care activities. They noted that as reported in the literature, the percentage of time spent in direct care activities ranged from 30% to 55%, with the average 37% of RN time spent at the bedside. However, in examining processes and systems of practice, authors noted that not all nursing care hours were spent at the bedside nor were they provided by RNs.</p> <p>This study included approximately 40 hospitals (various sizes and affiliations) across the country to collect workflow data utilizing Palm Pilot® technology. The data were collected on medical-surgical and telemetry units. The results revealed a wide range of variability in nursing workload. For the majority of hospitals, value-added care was consistent at approximately 60%, while direct care, which included activities at the bedside (medications, vital signs, wound management, ADLs, etc.) ranged from a minimum of 25% to a maximum of 57.5%; and indirect care activities (chart review, report, communication with care team) ranged from 7.2% to 37%. The authors reported that no data were collected on UAPs to determine how many "pieces of the pie" were allocated to their activities but suggested that these results indicated that there are major opportunities to streamline key work processes and increase the time front-line nurses spend in value-added care, thereby improving workforce and patient outcomes.</p>

Authors	Summary of Key Findings
Walker K, Donoghue J, Mitten-Lewis S. Measuring the impact of a team model of nursing practice using work sampling. Australian Health Review : A Publication of the Australian Hospital Association. Feb 2007;31(1):98-107.	Two work-sampling studies were conducted in a major metropolitan hospital in Australia. The first was undertaken to provide a rationale for changing from the patient allocation model to a team model of care, and the second to evaluate and provide data on the impact of that change. The authors reported that the new model was effective in redistributing certain aspects of care to make better use of each nurses' level of knowledge and skill. They suggest that although "team nursing" is not currently seen as appropriate for contemporary practice, the protracted nursing shortage has led to a need to ensure maximum use of all personnel. The work sampling methodology in this paper identified changes in the pattern of nurses work following changes to skill mix and staffing ratios and supported team based nursing that would best use the skills of an RN while deploying less educated and skilled nurses to support and complement the RN work.

Outputs: Collaboration

Authors	Summary of Key Findings
<p>Ahluwalia, S., & Offredy, M. (2005). A qualitative study of the impact of the implementation of advanced access in primary healthcare on the working lives of general practice staff. <i>BMC Family Practice</i>, 6, 39.</p>	<p>Authors assessed perceptions of advanced access within primary practice settings in the UK. Although practice managers and receptionists saw advanced access as having a positive effect on their working lives, the responses of general practitioners were more ambivalent. Receptionists reported improvements in their working lives with a change in their role from gatekeepers for appointments to providing access to appointments, fewer confrontations with patients, and greater job satisfaction. Practice managers perceived reductions in work stress from fewer patient complaints, better use of time, and greater flexibility for contingency planning. GPs recognized benefits in terms of improved consultations, but had concerns about the impact on workload and continuity of care.</p>
<p>Bower P, Campbell S, Bojke C, Sibbald B. Team structure, team climate and the quality of care in primary care: an observational study. <i>Quality & safety in health care</i>. Aug 2003;12(4):273-279.</p>	<p>Authors explored whether primary health care team practice structure in the UK (for example, list size, number of staff) predicts team processes and whether practice structure and team process in turn predict team outcomes. Team process was assessed through a measure of "climate" which examines shared perceptions of organizational policies, practices, and procedures. The main outcome measures were objective measures of quality of chronic disease management, patient's evaluations of practices, teams' self-reported ratings of effectiveness, and innovation.</p> <p>The authors reported that team climate was better in single-handed practices than in partnerships. Practices with longer booking intervals provided superior chronic disease management. Higher team climate scores were associated with superior clinical care in diabetes, more positive patient evaluations of practice and self-reported innovation and effectiveness. While the authors viewed these results as preliminary because of the limited sample size, the study suggests that there are important relationships between team structure, process, and outcome that may be of relevance to quality improvement initiatives in primary care.</p>
<p>Boyle DK, Kochinda C. Enhancing collaborative communication of nurse and physician leadership in two intensive care units. <i>The Journal of nursing administration</i>. Feb 2004;34(2):60-70.</p>	<p>Recognizing that successful collaboration between nurses and physicians is a key factor in intensive care unit (ICU) outcomes, authors tested an intervention designed to enhance collaborative communication among nurse and physician leaders (e.g., nurse manager, medical director, clinical nurse specialist) in two diverse intensive care units (ICUs). Results suggested that communication skills of ICU nurse and physician leaders improved significantly with the intervention. Leaders also reported increased satisfaction with their own communication and leadership skills. In addition, staff nurse and physician perceptions of nursing leadership and problem solving between groups increased. Staff nurses reported lower personal stress (e.g., more respect from co-workers, physicians, and managers), even though they perceived significantly more situational stress (e.g., less staffing and time).</p>
<p>Eley DS, Del Mar CB, Patterson E, Synnott RL, Baker PG, Hegney D. A nurse led model of chronic disease care - an interim report. <i>Australian Family Physician</i>. Dec 2008;37(12):1030-1032.</p>	<p>This study was an interim report on a prospective randomized trial underway to investigate the acceptability, cost effectiveness and feasibility of a nurse led model of care for chronic conditions in Australian general practice. It explored the perceptions of practice staff from one urban and one regional practice in Queensland, and one Victorian rural practice. The primary benefits of the collaborative care model were reported to be increased efficiency and communication between practice staff and patients. In addition, increased patient self-responsibility was also noted as an important motivational aspect of chronic disease management.</p>

Authors	Summary of Key Findings
<p>Fowler, J., Hardy, J., & Howarth, T. (2006). Trialing collaborative nursing models of care: The impact of change. <i>The Australian Journal of Advanced Nursing : A Quarterly Publication of the Royal Australian Nursing Federation</i>, 23(4), 40-46</p>	<p>The impact of a shared-care model of collaborative practice was explored. This model of care was developed in response to a nursing shortage, poor skill mix, low morale and high ward activity and the corresponding need to attract and retain nurses; contain costs; increase nurses' job satisfaction; produce efficiencies in the delivery of care and, maintain a quality service.</p> <p>The collaborative care model included two principles: 1) a dedicated 'care partner' to support less skilled members of staff, and 2) the maintenance of continuity of care for patients while both care partners received handover for their patient group and allocate responsibility for care delivery within the group. The authors reported on a variety of clinical and clinician outcomes, measured by non-participatory observation, staff satisfaction surveys, and staff focus groups.</p>
<p>Hiss RG, Armbruster BA, Gillard ML, McClure LA. Nurse care manager collaboration with community-based physicians providing diabetes care: a randomized controlled trial. <i>The Diabetes educator</i>. May-Jun 2007;33(3):493-502.</p>	<p>These authors studied the potential value of close collaboration at the office level of a nurse care manager with community-based primary care physicians in the care of adult patients with type 2 diabetes, particularly those physicians not affiliated with an integrated care system that some managed care organizations provide. This RTC involved one group receiving individual counseling, problem identification, care planning, and management recommendations by a nurse care manager (individualized intervention) and the other receiving only the basic intervention, which served as the control group to those receiving the individualized intervention.</p> <p>Patients re-evaluated at 6 months using A1C, blood pressure, and cholesterol as outcome measures. The authors reported that significant improvement occurred in mean systolic blood pressure and A1C of all patients in the individualized but not the basic intervention only group. Patients with a systolic blood pressure ≥ 130 mm Hg at baseline showed improvement if they had more than 2 contacts with the study nurse but not if they had less than 2 contacts.</p> <p>The authors concluded that a nurse care manager collaborating at the office level with community-based primary care physicians enhanced the care provided to adult patients with type 2 diabetes. They suggested that for physicians not affiliated with an integrated care system, this type of collaboration could provide the team approach (nurse/patient/physician) for an ambulatory patient with diabetes that is an essential element in a chronic disease model of care for diabetes at the community level</p>
<p>Hudson SV, Ohman-Strickland P, Cunningham R, Ferrante JM, Hahn K, Crabtree BF. The effects of teamwork and system support on colorectal cancer screening in primary care practices. <i>Cancer detection and prevention</i>. 2007;31(5):417-423.</p>	<p>Authors examined whether primary care practices that involve staff in general forms of health education have higher colorectal cancer (CRC) screening rates than practices that do not. They analyzed cross-sectional data from 22 New Jersey and Pennsylvania family medicine practices. The authors report that overall, 31.3% of patients received CRC screening. Practices that reported using nursing or health educator staff to provide behavioral counseling to patients on topics such as diet, exercise or tobacco use were significantly more likely to also have higher CRC screening rates. Their patients had 2.96 times increased odds of CRC screening than those in other practices. Reminder system use was also associated with higher CRC screening. In practices that used reminder systems, patients had 2.57 times increased odds of CRC screening than others.</p>

Authors	Summary of Key Findings
<p>Jones AM. Changes in practice at the nurse-doctor interface. Using focus groups to explore the perceptions of first level nurses working in an acute care setting. <i>Journal of clinical nursing</i>. Jan 2003;12(1):124-131.</p>	<p>Focus groups were used to explore the consequences of changing practice at the nurse-doctor interface, as perceived by first level nurses working in an acute care setting in the UK. Findings suggest that role change to these nurses is represented by a shift in the practice of technical activities from junior doctors and a corresponding delegation of nursing activity to care assistants. It was suggested that the wholesale incorporation of technical interventions into the role of the nurse without an increase in the number of qualified nurses is turning nursing back to a task system of care delivery and has the potential to depersonalize patients and reduce work satisfaction for nurses.</p>
<p>Jones, M. L. (2005). Role development and effective practice in specialist and advanced practice roles in acute hospital settings: Systematic review and meta-synthesis. <i>Journal of Advanced Nursing</i>, 49(2), 191-209.</p>	<p>This literature review identified 14 relevant studies, mostly from the United Kingdom. They described a range of barriers and facilitators affecting specialist and advanced nursing practice. These related to the practitioner's personal characteristics and previous experience, professional and educational issues, managerial and organizational issues, relationships with other health care professionals, and resources. The factors most widely identified as important were relationships with other key personnel, and role definitions and expectations</p>
<p>Mudge A, Laracy S, Richter K, Denaro C. Controlled trial of multidisciplinary care teams for acutely ill medical inpatients: enhanced multidisciplinary care. <i>Internal Medicine Journal</i>. Sep 2006;36(9):558-563.</p>	<p>Study of the impact of introduction of patient-centered multidisciplinary teams providing assessment, communication, care and discharge planning on costs, discharge destination, length of stay, and patient functional outcomes. Access to allied health services was significantly enhanced. There was a trend to reduced length of stay in the intervention units, with no change in 6-month readmissions. In-hospital mortality was reduced; less patients experienced functional decline in hospital and patients' ratings of health status improved. Additional staffing costs were balanced by potential bed-day savings.</p>
<p>Sellors J, Kaczorowski J, Sellors C, et al. A randomized controlled trial of a pharmacist consultation program for family physicians and their elderly patients. <i>CMAJ</i> : Canadian Medical Association, Jul 8 2003;169(1):17-22.</p>	<p>In a study of the effectiveness of pharmacists as consultants to primary care physicians, the authors examined whether an intervention by a specially trained pharmacist could reduce the number of daily medication units taken by elderly patients, as well as costs and health care use. In the intervention group, pharmacists conducted face-to-face medication reviews with the patients and then gave written recommendations to the physicians to resolve any drug-related problems. Process outcomes included the number of drug-related problems identified among the senior citizens in the intervention arm and the proportion of recommendations implemented by the physicians.</p> <p>After 5 months, there were no statistically significant differences in drug use, health care use or costs between groups, suggesting that the use of pharmacists as primary care consultants did not have a significant effect on patient outcomes. However, physicians were receptive to the recommendations to resolve drug-related problems, suggesting that collaboration between physicians and pharmacists was feasible.</p>

Authors	Summary of Key Findings
<p>Soklaridis S, Oandasan I, Kimpton S. Family health teams: can health professionals learn to work together? Canadian family physician Medecin de famille canadien. Jul 2007;53(7):1198-1199.</p>	<p>The aim of this study was to learn what educators across the health professions involved in primary health care thought about the use and development of academic family health teams to provide, teach, and model interprofessional collaboration and about the introduction of interprofessional education within structured academic primary care. Three major themes were identified: the lack of consensus on opportunities for future academic family health teams to teach interprofessional working, the lack of formalized teaching of interprofessional collaboration and the fact that what little has been developed is primarily for family physicians and hardly at all for other health professionals, and the confusion around the definition of interprofessional education across health professions.</p>
<p>Willard C, Luker K. Working with the team: strategies employed by hospital cancer nurse specialists to implement their role. Journal of clinical nursing. Apr 2007;16(4):716-724.</p>	<p>In the UK, cancer services were reorganized to ensure care is delivered by collaborative multi-professional teams: nurse specialists are considered core team members. While role ambiguity and conflict are acknowledged as barriers to the successful introduction of new roles, little was known about the strategies used by individuals to facilitate role implementation. Authors described the strategies used by cancer nurse specialists to implement their role within the multi-professional team. Analysis of interviews with twenty-nine cancer nurse specialists from five hospitals indicated that acceptance, especially by doctors, was the main problem facing cancer nurse specialists. In addition, they experienced insufficient organizational support for their role. Difficulties with acceptance impaired nurses' ability to provide supportive care to cancer patients. Nurse specialists responded by employing several strategies including building relationships and establishing role boundaries.</p>
<p>Wilkinson CS, Hite KJ. Nurse-physician collaborative relationship on nurses' self-perceived job satisfaction in ambulatory care. Lippincott's case management : managing the process of patient care. Mar-Apr 2001;6(2):68-78.</p>	<p>The authors examined the relationships of nurses and physicians in the ambulatory care setting to determine if a relationship existed between the nurse-physician relationship and nurses' self-perceived job satisfaction. While study findings demonstrated there was no significant relationship between the nurse-physician relationship and nurses' self-perceived job satisfaction in the ambulatory care setting, it did confirm that registered nurses working in the ambulatory setting have a moderate level of job satisfaction. The authors suggested that the lack of correlation between the nurse-physician relationship and job satisfaction may have been attributed to limitations such as a limited sample size and the nurses having a relationship with a smaller number of physicians in the ambulatory care setting.</p>
<p>Wilson A, Pearson D, Hassey A. Barriers to developing the nurse practitioner role in primary care-the GP perspective. Family practice. Dec 2002;19(6):641-646.</p>	<p>Focus groups were used to explore the views of British GPs regarding their attitude towards developing an advanced nursing role in general practice. The results highlighted significant concerns by GPs. These included threat to the GP status, including job and financial security, nursing capabilities, including training and scope of responsibility; and structural and organizational barriers.</p>

Authors	Summary of Key Findings
Xyrichis, A., & Lowton, K. (2008). What fosters or prevents interprofessional teamworking in primary and community care? A literature review. <i>International Journal of Nursing Studies</i> , 45(1), 140-153.	This literature review aimed to explore the factors that inhibit or facilitate interprofessional teamworking in primary and community care settings, in order to inform development of multidisciplinary working at the turn of the century. Following a thematic analysis of the literature, two main themes emerged that had an impact on interprofessional teamworking: team structure and team processes. Within these two themes, six categories were identified: team premises; team size and composition; organisational support; team meetings; clear goals and objectives; and audit. The complex nature of interprofessional teamworking in primary care meant that despite teamwork being an efficient and productive way of achieving goals and results, several barriers exist that hinder its potential from becoming fully exploited; implications and recommendations for practice are discussed.

Outputs: Expansion of Roles

Study	Summary of Key Findings
<p>Arnopolin SL, Smithline HA. Patient care by physician assistants and by physicians in an emergency department. JAAPA : official journal of the American Academy of Physician Assistants. Dec 2000;13(12):39-40, 49-50, 53-34 passim.</p>	<p>This study compared emergency physicians with emergency department physician assistants (PAs) to determine whether PAs were an appropriate option for providing services rendered by physicians in this setting. This observational retrospective review of a hospital database (July 1995 to June 1996) resulted in 1601 patient encounters being analyzed. They noted that PAs and physicians had a similar distribution of diagnostic groups. Overall all visits were 8 minutes longer and total charges \$8 less when a PA treated a patient. They concluded that despite a few large differences in some diagnostic groups, the two types of providers had overall small but clinically insignificant differences and suggested that PAs were a viable staffing option.</p>
<p>Christmas AB, Reynolds J, Hodges S, et al. Physician extenders impact trauma systems. The Journal of trauma. May 2005;58(5):917-920.</p>	<p>The integration of two nurse practitioners into the trauma service of a teaching hospital to work as health care extenders was described and their effectiveness of in meeting the goals of the work hour restrictions and whether they impacted other hospital and patient outcomes was assessed. The number of admissions, hospital length of stay, intensive care stay, floor length of stay, mortality, direct cost per case, and weekly resident work hours on 44 residents at all levels was examined. Statistically significant reductions were reported in floor, intensive care unit, and overall hospital lengths of stay. Patient mortality and cost per patient remained unchanged. Furthermore, the average number of hours worked per resident on the trauma service decreased from 86 hours to 79 hours per week.</p>
<p>Fitzsimmons D, Hawker SE, Simmonds P, George SL, Johnson CD, Corner JL. Nurse-led models of chemotherapy care: mixed economy or nurse-doctor substitution? Journal of advanced nursing. May 2005;50(3):244-252.</p>	<p>A UK study exploring the perspectives of people affected by cancer (service users) and health care professionals' about current medical consultant-led services and the acceptability of a <i>proposed</i> nurse-led ambulatory chemotherapy service. This qualitative study included a semi-structured interview schedule to solicit from patients their perceptions of current chemotherapy services and the potential of a nurse-led service. The authors identified three sub-themes during these interviews: contextualizing roles, defining therapeutic outcomes, and demonstrating effectiveness. All interviewees saw this role as different but complementary to the role of medical staff. There were mixed opinions from service users and professionals on the acceptability of nurse led chemotherapy provision. In defining potential outcomes of nurse-led care, service users described benefits in terms of service and economic outcomes. Professionals saw additional benefits in terms of patient-based outcomes. Professionals and service users expressed the need for appropriate education of nurses for this role and rigorous evaluation of any new service before widespread implementation.</p>
<p>Hooker RS, McCaig LF. Use of physician assistants and nurse practitioners in primary care, 1995-1999. Health affairs (Project Hope). Jul-Aug 2001;20(4):231-238.</p>	<p>The authors analyzed primary care physician office encounter data from the 1995–1999 National Ambulatory Medical Care Surveys. About one-quarter of primary care office based physicians reported using physician assistants (PAs) and/or Nurse practitioners (NPs) for an average of 11 percent of visits. The mean age of patients seen by physicians was greater than that for PAs or NPs. NPs provided counseling/education during a higher proportion of visits than did PAs or physicians. Overall, this study suggested that PAs and NPs provided primary care in a way that is similar to physician care.</p>

Study	Summary of Key Findings
<p>Hughes, C. M., Wright, R. M., & Lapane, K. L. (2006). Use of medication technicians in US nursing homes: Part of the problem or part of the solution? <i>Journal of the American Medical Directors Association</i>, 7(5), 294-304.</p>	<p>This US study examined the use of Medication Assistants (MA) in 6344 certified nursing homes in the US, in relation to the administration of an antiosteoporosis medication. They noted that their use varied by state and that homes with greater nursing staff levels per 100 beds were less likely to use MAs, while larger homes using physician extenders and contracting pharmacy services were more likely to use MAs. Homes with MAs were more likely to have error rate of at least 5% than homes with out MAs. After adjustment for resident and facility factors, residents in MA facilities were not more likely to receive antiosteoporosis treatment relative to those homes without MAs. The author conclude that the data call into question the use of MAs in nursing homes given that they may lead to more errors yet not increase the use of medications that are labor intensive to administer.</p>
<p>Jennings N, O'Reilly G, Lee G, Cameron P, Free B, Bailey M. Evaluating outcomes of the emergency nurse practitioner role in a major urban emergency department, Melbourne, Australia. <i>Journal of clinical nursing</i>. Apr 2008;17(8):1044-1050.</p>	<p>As part of a state-funded initiative to improve patient outcomes in Victoria, Australia, the role of the Emergency Nurse Practitioner was developed. This study evaluated outcomes associated with this emergency nurse practitioner role. The aim was to evaluate the impact of the introduction of Emergency Nurse Practitioner Candidates (ENPC) on waiting times and length of stay of patients. The authors undertook a retrospective case study of emergency department (ED) patients and reported that the implementation of the ENPC was associated with significant reductions in waiting times and length of stay in the ED. They concluded that that the role could be expanded into other defined areas of emergency care.</p>
<p>Jones, A. M. (2003). Changes in practice at the nurse-doctor interface. using focus groups to explore the perceptions of first level nurses working in an acute care setting. <i>Journal of Clinical Nursing</i>, 12(1), 124-131.</p>	<p>Within the context of a rapid change in the clinical practice of nurses in the UK, the consequences of changing practice at the nurse–doctor interface were explored, as perceived by first level nurses working in an acute care setting in the UK. Qualitative data were collected using focus group interviews and analyzed thematically. The findings suggested that role change to these nurses is represented by a shift in the practice of technical activities from junior doctors and a corresponding delegation of nursing activity to care assistants. The authors also observed that the wholesale incorporation of technical interventions into the role of the nurse without an increase in the number of qualified nurses is turning nursing back to a task system of care delivery, which had the potential to depersonalize patients and reduce work satisfaction for nurses.</p>
<p>Kleinpell RM, Ely EW, Grabenkort R. Nurse practitioners and physician assistants in the intensive care unit: an evidence-based review. <i>Critical care medicine</i>. Oct 2008;36(10):2888-2897.</p>	<p>Reviewed over 145 published studies on the role of nurse practitioners and physician assistants in acute and critical care using non-quantitative methods and provided a summary of the results to date. They observed that although existing research supported the use of nurse practitioners and physician assistants in acute and critical care settings, a low level of evidence was found with only two randomized control trials assessing the impact of nurse practitioner care. They suggested that further research that explores the impact of nurse practitioners and physician assistants in the intensive care unit setting on patient outcomes, including financial aspects of care was needed. They also suggested that information on successful multidisciplinary models of care were needed to promote optimal use of nurse practitioners and physician assistants in acute and critical care settings.</p>

Study	Summary of Key Findings
<p>Mackenzie M. Benefit or burden: introducing paraprofessional support staff to health visiting teams: the case of Starting Well. Health & social care in the community. Nov 2006;14(6):523-531.</p>	<p>This study evaluated the introduction of paraprofessional health support workers to bring about improvements in child health within deprived communities in Glasgow. Two main types of challenge were identified: deploying potentially vulnerable members of staff; and co-management of paraprofessionals by the health service and a voluntary-sector organization. The study demonstrated successful use of low-skilled workers to take over basic tasks normally undertaken by professional staff.</p>
<p>Martin, K. A rural urban companions of patters of physician's assistant practice. JAAPA, 13 (7), 2000.</p>	<p>This study was undertaken to learn about differences in physician assistant practice in urban versus rural environments. Its findings suggested that physician assistants prefer to practice in urban environments. In rural environments, physician assistants are more likely to practice in a primary care setting, see more patients a week, serve as the patients primary providers, and practice in facilities that traditionally see lower income patients.</p>
<p>Norris , T.; Melby, M. The Acute Care Nurse Practitioner: challenging existing boundaries of emergency nurses in the United Kingdom. Journal of Clinical Nursing, 15, 253-263</p>	<p>This study aimed to explore the opinions of nurses and doctors working in emergency departments towards the development of an Acute Care Nurse Practitioner (ACNP) service in the UK. Two principal objectives directed by the study were to ascertain emergency nurses' and doctors' perceived boundaries of the ACNP role, and to establish the opinions of emergency nurses and doctors of the potential introduction of an ACNP service in the emergency department. Although the study reported that nurses and doctors identified a need for the Acute Care Nurse Practitioner, it also suggested that the blurring of boundaries between doctors and nurses can result in inter-professional conflict unless this is addressed prior to the introduction of such advanced practitioners.</p>
<p>Roblin DW, Becker ER, Adams EK, Howard DH, Roberts MH. Patient satisfaction with primary care: does type of practitioner matter? Medical care. Jun 2004;42(6):579-590.</p>	<p>The level of patient satisfaction with type of practitioner attending visits in the primary care practice of a managed care organization (MCO) was evaluated. This retrospective observational study examined 41,209 patient satisfaction surveys randomly sampled from visits provided by the pediatrics and adult medicine departments from 1997 to 2000. The authors reported that adjusted for patient and visit characteristics, patients were significantly more likely to be satisfied with practitioner interaction on visits attended by physician assistant/nurse practitioners than visits attended by MDs in both the adult medicine and pediatrics practices. Patient satisfaction with care access or overall experience did not significantly differ by practitioner type. In adult medicine, patients were more satisfied on diabetes visits provided by MDs than by PA/NPs. Otherwise, patient satisfaction for the combined effects of practitioner type and specific presenting condition did not differ.</p>

Study	Summary of Key Findings
Stanmore E, Ormrod S, Waterman H. New roles in rehabilitation--the implications for nurses and other professionals. Journal of evaluation in clinical practice. Dec 2006;12(6):656- 664.	Studied the implementation of the rehabilitation assistant (RA), a generic support worker trained at a basic level in nursing, physiotherapy, occupational therapy and social work working under the supervision of the referring professionals, to deliver integrated rehabilitation programs. This empirical qualitative study was undertaken to evaluate the impact of the RAs from the perspectives of patients and associated nurses, therapists, managers and the RAs. Based on analysis of data from fifty-five semi-structured interviews the study examined variations in role, benefits of role, acceptance and integration of role, difficulties with role, training and retention. The authors reported that although patients, professionals and the RAs expressed great satisfaction with the new role, a number of barriers to effective rehabilitation were reported, such as ward routines and organizational systems that interrupted and caused inconsistencies with the rehabilitation care programs for patients.

Outputs: Staffing models

Authors	Summary of Key Findings
<p>Crossan F, Ferguson D. Exploring nursing skill mix: a review. <i>Journal of nursing management</i>. Jul 2005;13(4):356-362.</p>	<p>Authors observed that despite 20 years of research and skill mix management in practice, there continues to be a tension between the use of qualified and unqualified staff, particularly, the cost and quality dimensions. They suggested that evidence which currently exists offers some limited support for redistribution of certain tasks in nursing but also warned that reallocation of tasks and substitution of qualified by unqualified staff should be based on sound evidence and not merely on staff availability, service demand or apparent costs.</p>
<p>Jorgenson-Huston C. Contemporary staffing-mix changes: the impact on postoperative pain management. <i>Pain management nursing : official journal of the American Society of Pain Management Nurses</i>. Jun 2001;2(2):65-72.</p>	<p>The author used a retrospective descriptive study of two surgical units in two hospitals to examine correlations between different ratios of unlicensed assistive personnel and decreased RN and LVN staffing mix with pain management. Statistically significant increased numeric pain scores were found for patients who were dependent on nurse-administered analgesia (NAA) and for those patients given epidural or spinal analgesia. Pain scores for patients with patient-controlled analgesia tended to decrease, as did the scores of patients using a combination of patient-controlled analgesia and epidural/spinal anesthesia. A fair degree of relationship was found between increased registered-nurse staffing as a percentage of staffing mix and lower numeric pain scale scores for the NAA subgroup. Similarly, increased unlicensed assistive personnel staffing as a percentage of the staffing mix was found to be related to increased pain scale scores in the NAA subgroup</p>
<p>Mark BA, Salyer J, Harless DW. What explains nurses' perceptions of staffing adequacy? <i>The Journal of nursing administration</i>. May 2002;32(5):234-242.</p>	<p>Authors examined the impact of hospital characteristics, nursing unit characteristics, nurse characteristics, and patient characteristic on nurses' perceptions of staffing adequacy. Perceptions of adequacy of staffing were influenced significantly by the hospitals case mix index and growth in hospital admissions, by the number of beds on a unit, and by patient acuity. Further, current perceptions of staffing adequacy were significantly affected by prior perceptions.</p>
<p>Mark, BA, Harless, DW, McCue, M, Xu, Y. A longitudinal examination of hospital registered nurse staffing and quality of care. <i>Health Services Research</i> 39:2 (April 2004)</p>	<p>This study examined the effects of change in registered nurse staffing on change in quality of care. The authors report that increasing registered nurse staffing had a diminishing marginal effect on reducing mortality ratio, but had no consistent effect on any of the complications. Selected hospital characteristics, market characteristics, and financial performance had other independent effects on quality measures.</p>
<p>Mark, B.A., Harless, W.; McCue, M. The impact of HMO penetration on the relationship between nurse staffing and quality. <i>Health Econ</i>. 14: 737-753 (2005)</p>	<p>This study of structural of structural differences in the relationship between nurse staffing and quality as measured by the level of managed care penetration provided evidence of significant differences in the relationship between nurse staffing and both mortality and length of stay depending upon the level of HMO penetration in the hospital's market.</p>

Authors	Summary of Key Findings
<p>Numata Y, Schulzer M, van der Wal R, et al. Nurse staffing levels and hospital mortality in critical care settings: literature review and meta-analysis. Journal of advanced nursing. Aug 2006;55(4):435-448.</p>	<p>In a review of the studies on the impact of nurse staffing on hospital mortality within critical care settings, only 11 published studies and 1 conference abstract were identified that met inclusion criteria. Authors reported that the association was not evident on the studies reviewed.</p>
<p>Robertson RH, Hassan M. Staffing intensity, skill mix and mortality outcomes: the case of chronic obstructive lung disease. Health services management research : an official journal of the Association of University Programs in Health Administration / HSMC, AUPHA. Nov 1999;12(4):258-268.</p>	<p>Referenced the hospital reengineering movement as a rationale of their study of the impact of the intensity and skill mix of a number of different providers on outcomes of patients with chronic obstructive pulmonary disease (COPD). They reported that the only group of health care workers that showed staffing intensities positively associated with better outcomes was respiratory care practitioners, respiratory therapists, and respiratory therapy technicians. The results of skills mix were inconclusive.</p>
<p>Sibbald B, Shen J, McBride A. Changing the skill-mix of the health care workforce. Journal of health services research & policy. Jan 2004;9 Suppl 1:28-38.</p>	<p>A UK literature review reported retrieving 9064 publications, of which only 24 met inclusion criteria. It was observed that there was a general dearth of good evidence on the scope, effectiveness and efficiency of most types of skill-mix change. Moreover, available research was difficult to locate, even for expert researchers, and therefore largely inaccessible to health care managers. Authors suggested that while existing reviews were heavily biased towards skill-mix changes that were already well established, there was an absence of reviews addressing newer changes, particularly those involving health care workers other than doctors or nurses.</p>

Authors	Summary of Key Findings
<p>Sovie MD, Jawad AF. Hospital restructuring and its impact on outcomes: nursing staff regulations are premature. The Journal of nursing administration. Dec 2001;31(12):588-600.</p>	<p>Authors examined the impact of acute care hospital restructuring on the delivery of patient care and the effects of nursing structure and processes. They reported fewer RNs and an increase in unlicensed assistive personnel as a result of the restructuring actions and that patient outcomes were affected by registered nurse hours worked per patient/day and hours worked per patient day by all staff and their interactions with processes. Increased registered nurse hours worked per patient/day were associated with lower fall rates and higher patient satisfaction levels with pain management. Increased hours worked per patient day by all staff were associated with lower urinary tract infection rates.</p> <p>However, the authors also suggested there was a critical blend of staff required to deliver quality patient care, but no exact specifications could be culled from the data.</p> <p>The authors suggest that these findings support the conclusion that value in patient care, defined as the relationship between quality and costs, does not come in one size. No single staffing pattern resulted in best value. Patterns for value were tailor made for each institution/unit. Organization and unit cultures, nursing and medical leadership, collaborative relationships with physicians and other staff, sufficient numbers of nurses and assistive staff, and adequate support services interact to produce desired outcomes at controlled costs. They note that these organizational characteristics are similar to findings reported in the Magnet Hospital research.</p> <p>Finally, they noted that the Case Mix Index (CMI) was currently calculated at the hospital level and that it also should be calculated at the unit level for risk adjustment purposes. They also suggested that state and federal policy makers should defer developing nursing staff regulations, given the necessary and sufficient research findings were not available for such regulations to be evidence-based.</p>
<p>Tourangeau AE, Cranley LA, Jeffs L. Impact of nursing on hospital patient mortality: a focused review and related policy implications. Quality & safety in health care. Feb 2006;15(1):4-8.</p>	<p>Authors summarized 15 studies that addressed the impact of a range of nursing-related conditions on hospital patient mortality. Authors suggested that there is incomplete and sometimes conflicting evidence of the determinants of mortality for patients in acute care hospitals, although there is some consistency in findings about what are several determinants of mortality for hospitalized patients, with nurse staffing characteristics and physician characteristics being the strongest predictors. They reported that several reasons for the inconsistency of findings across studies have been cited, including differences in indicators used to measure common concepts, inadequate risk and case mix adjustment strategies used to account for the effects of patients' own characteristics and case mix of patients in hospitals, and lack of attribution theory that explains relationships among variables used to explore determinants of mortality.</p>

Authors	Summary of Key Findings
<p>Van den Heede K, Clarke SP, Sermeus W, Vleugels A, Aiken LH. International experts' perspectives on the state of the nurse staffing and patient outcomes literature. <i>Journal of nursing scholarship</i> : an official publication of Sigma Theta Tau International Honor Society of Nursing / Sigma Theta Tau. 2007;39(4):290-297.</p>	<p>Authors examined the key variables used in research on nurse staffing and patient outcomes from the perspective of an international panel. They suggest that their results provide a snapshot of the state of the science on nurse-staffing and patient-outcomes research as of 2005 and that they portray an area of nursing science in evolution and an understanding of the connections between human resource issues and healthcare quality based on both empirical findings and opinion.</p>