

An evaluation of nursing practice models in the context of the Severe Acute Respiratory Syndrome (SARS) epidemic in Hong Kong: A preliminary study

Engle Angela Chan RN, BScN, MA, PhD

Assistant Professor, School of Nursing, The Hong Kong Polytechnic University, Hong Kong SAR China

Joanne W. Y. Chung RN, RNT, BAppSc (Nursing), BA (Hons) Ed., MHA, PhD

Associate Professor, School of Nursing, The Hong Kong Polytechnic University, Hong Kong SAR China

Thomas K. S. Wong RN, Dip T(NEd), BEd(Sociology), GD Instr Uses Comp, MSc(IT), PhD

Chair Professor and Head, School of Nursing, The Hong Kong Polytechnic University, Hong Kong SAR China

Joseph C. S. Yang M.D. F.F.A., R.C.S. Ire. F.H.K.A.M.

Adjunct Professor of Anesthesiology, Columbia University.

Correspondence:

Dr E. Angela Chan

Assistant Professor

School of Nursing

The Hong Kong Polytechnic University

Hong Kong SAR

China

Telephone: (852) 2766 4131

E-mail: hseachan@inet.polyu.edu.hk

Background:

Like other health care workers, Hong Kong nurses had their professional knowledge and skills in patient care seriously challenged during the SARS outbreak. It was questioned whether current nursing practices could support the care of SARS or SARS-like patients in a future epidemic? If they could not, alternative practices would be needed.

Aims:

This paper aims to provide a preliminary understanding as it compares the conventional with different nursing delivery models in a simulated SARS ward, and as it focuses on nurses' efficiency, infection control practice and their views of the two different models.

Methods:

This study was conducted in three phases. First, a baseline understanding of current nursing practices was achieved through four clinical observations. In an eight-hour day, four research assistants observed the nursing activities in medical and fever wards. The data collected were used in the second phase to construct two sets of clinical vignettes, which pertained to the care of SARS patients in both conventional and alternative practice models. At a focus group meeting, these scripts were discussed with nine nurses of various ranks from the hospital under study for their expert validation and input. Moreover, prior to the work-flow observations, there were two focus group discussions on the various nursing models used in Hong Kong hospitals and on infection control practice. In the third phase, nurse-participants and client-actors enacted the vignettes in a simulated setting. Videotaped observations and

four nurse-participant interviews were employed. Observational data were analyzed through descriptive statistics and independent t-tests. Textual data were coded and categorized for common meanings.

Conclusions:

The conventional practice consisted of named nurse and cubicle nursing. While the former reflected modified team and functional nursing, it did not confine patient care within a cubicle as suggested by its name. The latter depicted a modified primary nursing approach in a team, with delegation of care. In phase two, nursing care vignettes for four SARS patients were constructed. The preliminary findings of the last phase revealed that the alternative practice model had an advantage over its conventional counterpart in regards to infection control and nurse satisfaction.

Relevance to Clinical Practice:

Findings from this study lay the foundation for a clinical trial, which would evaluate the significance of patient care quality, cost-effectiveness and better human resource management by restructuring of current nursing practices. These are undoubtedly important considerations and responsibilities for both nurses and nurse administrators.

Introduction:

Since the 2003 outbreak of Severe Acute Respiratory Syndrome (SARS) in Hong Kong, there has been an uncompromising look at what happened, and an evaluation of the impact of the SARS epidemic. In the aftermath of SARS, suggested reforms have ranged from the reorganization of hospital operations to changes in the way that public health information is disseminated to the wider community.

Wherever SARS was found around the world, the virus infected health care workers. Many were gravely ill, and some died. Health care workers accounted for almost 25% of the confirmed cases in Hong Kong (Department of Health, 2003). This percentage was dramatically echoed in Canada where 65% of those afflicted by this disease were health care workers (Health Canada, 2004). Nurses, who care for patients 24 hours around the clock were the most vulnerable group. The vulnerability of nurses has loomed large in Hong Kong where the practice of nursing is often a mechanistic, task-oriented, assembly line approach with an emphasis on efficiency as measured by task completion (Yam & Rossiter, 2000). Work assignments are divided into tasks that then are allocated to an appropriate nurse according to the perceived level of skill required to perform the tasks (Chavasse, 1981; Berry & Metacalf, 1986). The underlying assumption is that the timely completion of nursing tasks is identical to the delivery of comprehensive, appropriate and good care. It is also common for Hong Kong nurses to follow routines and complete the assigned tasks as their priorities (Yam & Rossiter, 2000). The challenges of workload and time constraint that Hong Kong nurses face everyday may reflect global health care austerity. Such austerity has easily led to the practice of functional-team nursing that promotes efficiency and task completion. However, the task-focused assembly line approach may increase the risk of cross-contamination between and among patients and nurses. Also, Minen et al. (2003) have critiqued functional nursing as being focused on task completion and the preservation of ward routine often at the expense of the needs of individual patients.

Undoubtedly, the daily care of patients requires nurses to engage in a set of routine activities; however, the emergence of an infectious disease, such as SARS, inevitably

created a work environment that was both overwhelming and unfamiliar for them. When it became clear that the primary mode of transmission was through respiratory droplets, the importance of using personal protective equipment and of hand washing was underscored. Appropriate hand washing and the proper use of the personal protective equipment became paramount in the fight to contain the infection.

When the time used to ensure proper hand washing and proper use of personal protective equipment was coupled with the original requirements to carry out nursing routines, frontline nurses experienced great stress in performing their jobs. They faced not only the various physiological and psychological needs of SARS patients but also their own fear of the increased risk of contagion due to close contact. Hence, questions were raised about the efficacy of our current nursing practices in the management of future patients with SARS or SARS-like infections.

A nursing delivery system provides a structure for nursing activities. It is also an integral means of planning cost-effective care. Attention to the demands of patients and the activities of front-line nurses within the context of an epidemic such as SARS is fundamental to good leadership and management. The process of reassessing the utility of a nursing model opens an opportunity for nurse administrators to work with nurses in developing a nursing care structure (Hepner et al., 2000). Such an improved structure would increase nurses' confidence and allow them to deliver competent care to patients, afflicted by SARS or another SARS-like infection. This might ultimately improve patient outcomes in highly vulnerable situations.

Literature Review:

Nursing models have long been employed to understand systematic and coherent care delivery. They enable each nurse to follow prescribed patient care. They have evolved as a part of the nursing professional. Seago (1999) asserts that a movement evolved in the 1990s, which centred on redesigning how nurses organize and deliver patient care. However, what remains unclear is what the impetus for the changes to nursing care practice was and whether the redesigned nursing care practice model was ever evaluated. Nursing practice is vulnerable to system changes that lack carefully planned scientific evaluation that compare models of care (Nelson, 2000).

A nursing practice model enables nursing values to be implemented into practice. Models can reflect the structural, contextual and essential features of nursing practice. In tracing the development of different nursing practice models, it is clear that different eras of nursing care (Hegyvry, 1982) were influenced by the historical time periods in which they were developed. Similarly, nursing delivery styles were affected by the corresponding industrial production styles of the period. Generally, four theoretical nursing models prevail in the hospital setting. They are the functional, team, primary nursing and case management models. Studies have shown that hospital wards usually do not organize their nursing activities in accordance with one particular delivery model (Anderson & Choi 1980; Adams & Hardey 1992; Ryan & Logue, 1998). This phenomenon is also found in Hong Kong where various nursing practice models are used in different wards in the same hospital and also in varying combinations (HA, 2003).

An Alternative Framework:

The concept known as modular nursing is based on the convergence of team and primary nursing within a geographical area (Tomey, 2000). This concept underpins the alternative model investigated here. Within this model, the module, as a patient unit, is geographically organized with a team of nurses permanently assigned to the unit and providing total care for the patient group. In this model, a ward is divided into modules, each with a certain defined number of patients. A team of nurses, including the primary nurse and other associate nurses, is responsible for the total care of the patients within a designated module. Patients are allocated to a module when they are admitted to the ward. One nurse within the team is appointed the primary nurse for each patient from admission to discharge or to transfer from the designated module. The nurses within the team rotate as the primary nurse. The associate nurses will deliver prescribed care to an assigned group of patients in the absence of the primary nurse. This proposed practice model should have inherent benefits from primary nursing that foster greater knowledge of patients. It should provide total care, continuity, a patient-focused orientation and direct communication patterns (Thompson, 1990). Knowing the patient through total and continuous care in a modular design has been shown to decrease the time required to meet individualized needs (Anderson et al., 1993). Hence, it may reduce the number of nurse-patient contacts, enabling better efficiency in care and, possibly, in infection control. Additionally, by limiting the number of nurses involved in the care of a designated group of patients, cross-contamination from nurses to patients is less likely. Moreover, this model may promote Tanner et al's (1993) notion that nurses' engagement with patients results in patients' feeling of being cared for and cared about. Apart from providing patient-centred care, nurses that work closely with each other within a

module may also develop a more collegial relationship, which would provide a stronger source of mutual support. Strong support was of utmost importance during the SARS outbreak when nurses' emotional health was at a breaking point.

The proposed alternative model is more than a mere restructuring or redeployment of responsibilities. It is hoped that further thought will be given to the development of nursing practice that is based on the standard infection control precautions. Such practice should be consistent with medical advances that limit the dangers of future emerging infectious diseases.

The Study:

To evaluate the differences between the proposed alternative and current conventional nursing practices in the management of SARS patients in Hong Kong, a preliminary study was conducted in a simulated setting. One hospital, previously designated as a SARS hospital during the outbreak, was chosen to provide basic data for the construction of the clinical simulation. Basic data were collected from both medical and fever wards since these would be used to treat patients admitted with SARS or SARS-like symptoms in the future. In both the medical and fever wards, nursing activities were characterised by various procedural rounds, such as a breakfast round, bedmaking round, dressing round, etc. Moreover, these activities were structured within certain time periods. The difference however, between the fever and the medical wards lay primarily in the types of patients admitted. That is, patients in the fever wards would manifest fever as their prime concern. In this study, there were three phases. Phase One consisted of field observations used as baseline data on nursing care delivery. Phase Two involved the construction of vignettes on the care

of SARS patients that were based on the conventional and alternative models. In Phase Three, the vignettes were implemented in a simulated setting.

Phase One:

Clinical field observations were conducted to understand conventional nursing practice workflow. The procedure involved senior nursing students as research assistants, conducting four independent, direct and continuous observations of four nurses working in medical and fever units from 0700 to 1100. Orientation to the data collection procedure was given to decrease observer influence. Each observer recorded the nursing activities, as well as the time it occurred and when it was completed on a workflow observation sheet. This phase was designed to ascertain the ecological validity of the simulated clinical vignettes. The particular time interval, i.e. 0700 to 1100, was selected based on the nurse researchers' experiences and from other nursing studies (Hale, 1988; Carr-Hill et al., 1992) that state that patient demands for nursing care activities occur most often during the morning care periods. Communication with other health care workers, such as physicians, is also more common during that period.

Results:

The workflow observations revealed a mix of cubicle nursing and named nurse nursing. The cubicle nursing used a modified team and functional nursing approach within a cubicle, though it also extended to certain tasks carried out for a few patients outside the cubicle. The named nurse approach consisted of a modified primary nursing approach with a team, though the primary nurse also delegated tasks to others.

Phase Two:

Nursing work-flow data were transcribed and compiled to construct a four-hour clinical vignette for the two modes of practice. Within the four-hour period, specific nursing activities were written into the scripts of both the conventional and the modular nursing practices in accordance with the observed work-flow for the designated time. Four patients with different clinical courses and levels of complexity formed the basis for the simulated nursing care vignettes. The World Health Organization's (WHO) guidelines to diagnose SARS, which place emphasis on fever and respiratory tract symptoms, such as cough, shortness of breath and breathing difficulty, were adopted as the criteria for the selection of the various clinical courses.

Results:

While the conventional model depicted a task-oriented nursing delivery approach, focusing on task rounds and without the geographical confinement of patient assignment, the modular delivery practice reflected patient-centred care and the geographical confinement of patient assignment. The first patient was a newly admitted SARS case; the second, was an individual with a respiratory condition that had deteriorated and was possibly a candidate for transfer into the intensive care unit; the third patient had recently developed symptoms of diarrhoea along with a respiratory condition, and the last individual was under observation but his respiratory status was stable. All patients received oral and/or intravenous medications. Each scenario required different levels of clinical complexity and infection control practice.

After the scripts were constructed, they were shared and discussed at a focus group meeting. The focus group consisted of nine nurses of various ranks from the same

hospital mentioned above. Input was solicited from the nurse experts. This expert feedback allowed the research team to further revise the constructed vignettes in order to depict a more authentic clinical flow of nursing activities. The research team and focus group had three meetings. At the first and second meetings, there was a general discussion of the various nursing models used in Hong Kong hospitals and of the infection control practice prior to the work-flow observations. The last meeting was used to validate the content of the clinical vignettes, and to discuss the set-up of the simulated ward.

Phase Three:

The vignettes became the scripts for the care the nurse-participants gave the patient-actors in the hospital's nursing laboratory, the simulated setting for the comparison study. Four nurse-participants were recruited from this hospital by convenience. They were registered nurses with at least four years of experiences in medical units or nursing. All of them had some experience working with SARS patients. They were all locally educated in Hong Kong. The team believed that any process of change begins with nurses' perceptions and the values that they hold. Hence, the recruited nurse-participants were invited to comment on any issues that arose from the scripts. Individual nurse-participants were randomly assigned to either model A, the conventional in the morning or model B, the alternative in the afternoon. They were informed of their assignment prior to the first day of the simulation. Each day for four days two nurse-participants took part in the simulated situations. Each nurse-participant was then assigned to the other mode of nursing practice for the next day. In a four-hour shift, the nurse-participant provided nursing care to four patient-actors suffering from SARS and having different levels of acuity, and in the case of the

conventional model, two manikins were used to simulate patient care outside the cubicle as found in the existing practice. A briefing session was also provided before the engagement of care. This session entailed a brief orientation to the scripts for models A and B and the simulated ward. The script depicted a morning shift of nursing activities from 0700-1100. Information about the patient's name, age, a brief health history, clinical symptoms, treatments and the day and time of the event were provided.

Based on the scripts, the nurse-participants cared for their "patients within their particular designated practice model for the four-hour period. The patient-actors were professional entertainers hired to play the patient roles. They received an orientation to their individual scripts. They were instructed to follow the sequence of events in the scripts, which corresponded with the nurse-participants' scripts. The patient-actors were blinded to the model except for the vignette scripts. All the nurse-participants and the patient-actors were informed that the whole process of their activities would be videotaped via closed-circuit television. The aforementioned series of steps is illustrated in the flow chart (figure 1).

Ethical Procedure:

Participants were recruited voluntarily after a full explanation of the research's purpose. They had full knowledge that they could withdraw from the study at anytime. They were informed about their rights. Written consent from the nurse-participants was obtained prior to the study. Confidentiality and anonymity were assured. The participants were informed that their performance data would not be revealed to anyone except the research team. They were also told that findings from this

investigation would be used for a larger clinical study. Verbal consent was received from the patient-actors as well.

Data Collection:

All data were collected through observations of the nurse participants' performance in the two different nursing practice models. There were videotaped observations of nurse-participants' and the patient-actors' interactions. The observations included mistakes made during hand washing and the donning of personal protective equipment, locations where these mistakes occurred and time-tape measurements along with t-tests for the efficiency of the measures. Qualitatively, nurse satisfaction data were collected through short semi-structured interviews, which elicited the views of nurse-participants on both models.

Data Analysis:

Data from the interviews were coded for the categories of work efficiency, infection control, nurse-patient interactions and others. Two research assistants experienced in infection control audit reviewed all the videotapes. They noted mistakes made in hand washing practice, personal protective equipment use and infection control practice during the simulated nursing care situations in the two models. Criteria from the hospital's operational manual for SARS management were adopted to determine whether mistakes were made. Ten percent of the coded data was randomly selected for a reliability check by the team's senior researcher. Independent t-tests and videotaped viewing were employed to discern differences in efficiency and to determine the number of mistakes by location, on nursing actions and nurses' hand washing for infection control evaluation.

Findings:

Data were collected through semi-structured interviews with the nurse-participants and through videotaped observations of nurse-participants' and patient-actors' interactions. The former obtained the nurse-participants' views on the two models and the latter aided in evaluating nursing efficiency in time and nurses' infection control practice.

For nursing efficiency, the only statistical differences were found in the time taken to prepare and administer IV medications and the time taken for the bed-bathing round ($p = 0.02$ and $p = 0.01$, respectively).

There were no statistical differences in the total number of mistakes by location between the two models (Figure 2). Interestingly, however, there were also no significant differences between the nurses' station and the rest of the areas. In terms of overall mistakes made during eleven identified nursing actions, only the category "changing gloves" was found to have a statistical difference, ($p=0.01$) between the two models, which was higher than in conventional practice (figure 3). From the videotapes, it was clear that more pairs of gloves were used in the conventional practice model. We believe that the difference stems from the nature of the model, with frequent glove changing needed for task rounds in the conventional model. This increases potential risks because more frequent glove changing increases the chance of cross-contamination. It is also worth noting that no mistakes were found during nurses' documentation or handling of the medicine trolley in the modular mode. Most of the mistakes made in the conventional nursing model were related to nurses'

forgetfulness when changing their masks and degowning before heading to the nurses' station (clean area) for documentation. Nurses in the conventional model also made mistakes in moving the medication trolley back and forth from the nurses' station to the degowning area.

Hand washing, as another observed variable, revealed a relatively fewer number of mistakes in the modular mode. The mistakes were confined to insufficient time taken to wash hands (i.e. less than 10 seconds), hand washing technique (i.e. not covering all designated surface areas), timing of hand washing and contamination of clean hands through touching the tap without any awareness. Since the nurse-participants did not all start with the same model, their chances of making a mistake due to the novelty of the simulation is low. Although a relatively fewer number of mistakes was made in the modular mode, there was no statistically significant difference in the number of hand washing mistakes between two models ($p = 0.973$).

Coupling qualitative and quantitative data, semi-structured interviews were conducted with the nurse-participants to provide the researchers with a glimpse into the nurse-participants' perceptions of the differences between the conventional and the alternative nursing practice models. The conventional model reflects a blending of functional, team and primary nursing under the categories of cubicle nursing (i.e. modified team and functional nursing within a cubicle though also extended to certain tasks carried out for a few patients outside the cubicle, such as medication administration) and named nurse nursing (i.e. modified primary nursing with a team, where the primary nurse does not carry out certain tasks, such as vital signs measurements, which are delegated to health care assistants).

Some nurse-participants described the merits of conventional practice, stating that “it is a more efficient model to carry out nursing care” and that it allows “the nursing procedures to be carried out smoothly, increasing the efficiency of particular tasks such as the administration of medications and dressing change.” Other nurse-participants, however, commented that “the alternative nursing practice would allow the care of patients to run more smoothly, since the nursing procedures would not be interrupted in-between for the care of other patients outside of one’s designated cubicle.” Interestingly, however, the time measurement for the administration of medications did not show any statistically significant difference in efficiency for the two models. However, the time required for the preparation and administration of intravenous medications was shorter for the alternative model. More attention to this area during the clinical trial will perhaps shed further understanding on this phenomenon.

With regard to the views of nurse-participants on infection control practices, all nurse-participants concurred that the alternative model would lower the infection control rate. Presumably, by decreasing the number of patients that a nurse attends to and by individualizing the care pattern, cross-infections resulting from nurse interactions among patients would be minimized. As one nurse-participant commented, “The infection control rate would be significantly reduced with individualized patient care.” She clarified, “This is because the chances for cross-patient contacts would be decreased.” Her statements were reiterated by other nurse-participants, who commented that decreasing the nurse-patient ratio would serve as an infection control measure. One nurse-participant expressed an infection control concern over the

involvement of health care assistants in the care of SARS patients. This raises questions about the use of health care assistants in infectious disease wards vis-à-vis the number of personnel involved and their competence with regards to infection control knowledge. Another nurse-participant expressed concern about current conventional practice routines that might increase the potential for cross-contamination, and hence, poor infection control. These routines include rounds for napkins/diapers and haemoglucose-stix testing. Despite perceptions that the routinized, task-oriented team approach is efficient, it is clear from the nurse-participants' responses that the conventional mode has a poorer infection control efficacy. Hence it is less suitable for a ward that cares for victims of droplet infectious diseases.

Also all nurse-participants expressed that in the conventional practice model, they found it difficult to carry out care beyond the physical aspects. As one said, "With the alternative nursing model, patient-nurse interactions could be improved. Nurses should not only focus on patients' physiological aspects, but they should also focus on their psychological needs, particularly the bedside counselling provided to SARS patients as in the script." Another nurse-participant commented, "Increased patient-nurse contact would allow the adoption of a holistic approach, which would underpin the establishment of a nurse-patient relationship." The word "increase" was further validated to connote communication through listening rather than through the physical care of the patient. Her sentiment was echoed by yet another who indicated, "In conventional nursing, nurses are driven by routines. They are not familiar with the names and the histories of the patients since different nurses deliver care. There is a lack of continuity, but this situation could be reversed in the alternative model." This nurse-participant believed that the alternative nursing model could provide a structure

for nurses to know the patients better through continuity of care, thereby enhancing care. Their views are consistent with those found in the literature.

Unanimously, the interviewed nurse-participants commented that the cost and human resource implications involved in adopting the alternative nursing practice model given the perceived fewer number of patients cared for by each nurse in the total care model. One nurse-participant preferred the alternative model with a combination of primary and team nursing. However, she expressed concern about role confusion, and hence, the duplication of work. This may underscore the importance of delineating roles and responsibilities. Another nurse-participant believed that a purely theoretical model is difficult to adopt in a complex clinical setting, and that currently used nursing models in Hong Kong's hospital wards are already of a combined nature. The most frequently used are the cubicle nursing and named nurse models, which translate into the functional, modified primary and team nursing approaches. These comments may reveal the insignificance of a practice label in comparison to, more importantly, the fact that a label reveals how nursing practice is modified in accordance with the actual nursing work in the context of SARS.

Discussions:

In post-SARS Hong Kong, there has been an increased awareness towards the restructuring of the nursing delivery system in various hospitals. While literature abound about which nursing model to use, little research has been conducted comparing the existing models with any alternatives. The availability of these results is important for nursing to express its professional role (Nelson, 2000) and quality care. In addition, there has been an increased emphasis on measuring outcomes

associated with the implementation of evidence-based practice changes by the health care disciplines. Hence, a purposeful evaluation of redesigned nursing care practice is needed for nursing to assert its professional role and quality patient care from an evidence-based approach. More importantly, however, the goal is to provide changes that are meaningful to the institution and the nurses through an opportunity not only to compare outcomes but also to gain understanding of the process that demonstrates care improvements (DeLise et. al 2001).

Findings from this preliminary study point to the need for further inquiry into the areas of efficiency, infection control and nurse satisfaction in a real setting. The possible lack of congruence between the actual and perceived efficiency of the conventional mode over the alternative for a small group of nurse-participants may merit our attention in a clinical trial to determine the ideal nurse-patient ratio. Further investigation may provide a clearer picture of the cost and human resource implications of adopting the alternative nursing model.

One perception of the nurse-participant emerging from the findings is the relative effectiveness of the alternative nursing model for an infectious disease ward in relation to infection control and better psychological care of patients. As with any change, it is imperative to consider nurses' values and beliefs about the change. For, when a restructuring of nursing care delivery is not implemented as planned, often the issue rests with nurses not being convinced that the changes are beneficial (Bradford et al., 2003). Consequently, though the findings reported here are preliminary, the interview responses of the nurse-participants concerning the implementation of the alternative model were certainly positive. Additionally, changing the nursing delivery

system with the nurses' input would impact how nurses conceive their work, which would in turn inform their actions and would also shape the particular skills and knowledge development required for competence (Lundgren et al., 2002). Put simply, because of the nurse-participants' perceptions of the improved quality of care that would be possible by adopting the alternative model, a clinical trial of this model would be worthwhile to determine whether going beyond task orientation would render better infection control and patient care. Therefore, given the learning reaped from the SARS experience, such a trial would not only focus on the delivery of nursing care through various nursing models but it would also focus on the gradual change of the industrialized approach inherent in functional nursing to a more individualized patient-focused approach with a team element.

Given the fact that the alternative nursing model fuses primary and team nursing with a geographical component, it would be well suited to the existing structure of cubicles in Hong Kong hospitals. While, currently there has been a conceptual shift from primary task orientation to named nurse and the cubicle nursing approaches, the entrenched efficiency-based task-oriented culture remains. Nonetheless, since this shift seems to conceptualize a vertical approach to individualized patient care rather than a horizontal one that focuses on task completion across a number of patients, the shift might facilitate easier transition.

The nurse-participants' knowledge of and skills in infection control practice, and their variations can be quantified through the videotaped observations. The observations reveal that there is a need to educate nurses on infection control in a supportive environment. The use of only registered nurses in high-risk wards to minimize the

number of contacts and to enhance the effectiveness of infection control practice may also be a question that needs further investigation. Hall et al. (2004) have suggested that a higher proportion of registered nurses in the staff mix is associated with a lower risk of adverse occurrences, such as nosocomial infections.

From the literature, the research team knows of no apparent disadvantage of the modular delivery model. Possible shortfalls, however, may be anticipated if it is adopted without good support for overall coordination. A focus on each individual module may lead to the fragmentation of the ward because nurses within each module will only be familiar or focus on their own individual cubicle. One plausible solution to this would be to introduce regular modular care planning rounds, according to the patient turnover rate of the particular ward, e.g. every 2 weeks. This would enable all modular members on duty to share information about their patients with one another. Thus, nurses would have an overall understanding about patients of the other modules as well.

Limitations:

Undoubtedly, the simulated nature of this study with nurse-participants and patient-actors enacting clinical scenarios limits this study's generalizability. Additionally, the complexity of the care and the development of the nurse-patient relationship in hospital wards cannot be captured in a controlled, simulated environment. The findings are derived from observations and perceptions of a small convenient sample taken from one hospital. However, this is only a pilot investigation, which is meant to provide understanding for further modifications before a clinical trial.

Conclusion:

It is important that any redesign of the nursing practice model should be made with a clear purpose, an understanding of the daily workflow of nurses and their views on existing and alternative practices. Findings from this preliminary study has enabled the research team to raise further questions regarding the perceived efficiency of a task-oriented approach over primary care in the ward. The findings further affirm the value of a modular concept as an alternative to promote infection control. A modular concept does this by decreasing exposure as it lowers the number of patients for which a nurse must care. While hospitals have strongly emphasized educating nurses on infection control standards and procedures, in this study apparent variations in nurses' infection control practice underscore the need to understand how nurses integrate their renewed understanding into their everyday routines in complex clinical situations. In addition to infection control, in order to satisfy nurse-patient expectations, caring for patients in a mechanistic and ritualistic way can no longer be justified in our continuously changing health care service environment. Nurses and nurse leaders should, therefore, use an evidence-based approach to ascertain the provision of best quality care for future patients of SARS and SARS-like infections in Hong Kong. (5000 words)

Acknowledgements:

This study was initially supported by funds from the Dean's reserve (1.53.09.87E6) at The Hong Kong Polytechnic University, School of Nursing. Subsequently, it was

under the Research Fund for Control of Infectious Disease (RFCID) project funded by The Hong Kong Health, Welfare and Food bureau.

The authors would like to thank the hospital and the nurses who participated in this pilot study. Without the nurse-participants, this pilot would not have been possible. For the figures and videotaping, we express our gratitude to Ms. Rosita Au.

Contributions:

Study design: EAC, JWYC, TKSU, JYSY

Data analysis: EAC, JWYC

Manuscript preparation: EAC, JWYC

References

- Adam A & Hardey M (1992) Primary panacea? *Nursing Times* **88**, 34-35.
- Anderson M & Choi T (1980) Primary nursing in an organization context. *Journal of Nursing Administration* **10**, 26-30.
- Anderson C & Hughes E (1993) Implementing modular nursing in a long-term care facility. *Journal of Nursing Administration* **23**, 29-35.
- Berry A & Metcalf C (1986) Paradigms and practices: The organization of the delivery on nursing care. *Journal of Advanced Nursing* **11**, 589-597.
- Bradford R, Sutton M. & Byrd N (2003) From Survival to Success: It Takes More Than Theory. *Nursing Administration Quarterly* **27**, 106-119.
- Carr-hill R, Dixon P & Gibbs I (1992) *Skill mix and the effectiveness of nursing care*. University of York, Centre for Health Economics, York.

- Chavasse J (1981) From task assignment to patient allocation: A change evaluation. *Journal of Advanced Nursing* **6**, 137-147.
- DeLise D, Leasure M & Renee A (2001). Benchmarking: Measuring the outcomes of Evidence-based practice. *Outcomes Management for Nursing Practice* **5**, 70-74.
- Department of Health, The Government of Hong Kong Special Administrative Region (2003) Atypical pneumonia Available at: www.info.gov.hk/info/sars/e_news_may03.htm (accessed 1 May 2003).
- Hall L & Doran D (2004) Nurse Staffing, Care Delivery Model, and Patient Care Quality. *Journal of Nursing Care Quality* **19**, 27-33.
- Hale C (1988) *Innovations in nursing care: A study of a change to patient-centered care*. Royal College of Nursing, London.
- Hegyvary S (1982) *Foundations of Primary Nursing: A Cross-Cultural View of Professional Nursing Practice*. Mosby, St. Louis, MO.
- Hepner L & Hopkins L (2000) Partnership 2000: A journey to the 21st century. *Nursing Administration Quarterly* **24**, 34-44.
- Hospital Authority (2003) *Medical Services Development Committee, Post-SARS Nursing Service Direction and Development (MSDC) Paper No. 173*. Hospital Authority, The Government of Hong Kong Special Administrative Region.
- Lundgren S & Segesten K (2002) Nurses' altered conceptions of work in a ward with all-RN staffing. *Journal of Clinical Nursing* **11**, 197-204.
- Minen A, Kivimi M, Elovainio M & Virtanen M (2003) Organization of nursing care and stressful work characteristics. *Journal of Advanced Nursing* **43**, 197-205.
- Nelson J (2000) Models of nursing care: A century of vacillation. *Journal of Nursing Administration* **30**, 156-185.

- Population and Public Health Branch (PPHB) Health Canada (2003). Summary of severe acute respiratory (SARS) cases: Canada and International Available at: www.hc-sc.gc.ca/pphb-dgsp/sars-sras/eu-ae/sars20030501_e.html (accessed 1 May 2003).
- Ryan A & Logue H (1998) Developing an audit tool for primary nursing. *Journal of Clinical Nursing* **7**, 417-423.
- Seago J (1999) Evaluation of a hospital work redesign: Patient focused care. *Journal of Nursing Administration* **29**, 31-38.
- Tanner C, Benner P, Chelsa C & Gordon D (1993) The phenomenology of knowing the patient. *IMAGE: Journal of Nursing Scholarship* **25**, 273-280.
- Thompson D (1990) At the heart of caring. *Nursing Time* **86**, 70-71.
- Tomey A (2000) *Guide to Nursing Management and Leadership* (6th edn.). Mosby, St. Louis, MO.
- Yam B & Rossiter J (2000) Caring in nursing: Perceptions of Hong Kong nurses. *Journal of Clinical Nursing* **9**, 293-302.

Key words: SARS; nursing delivery models; infection control practice and education; nurses' views; Hong Kong

Phase Three Flow Chart (Figure 1)

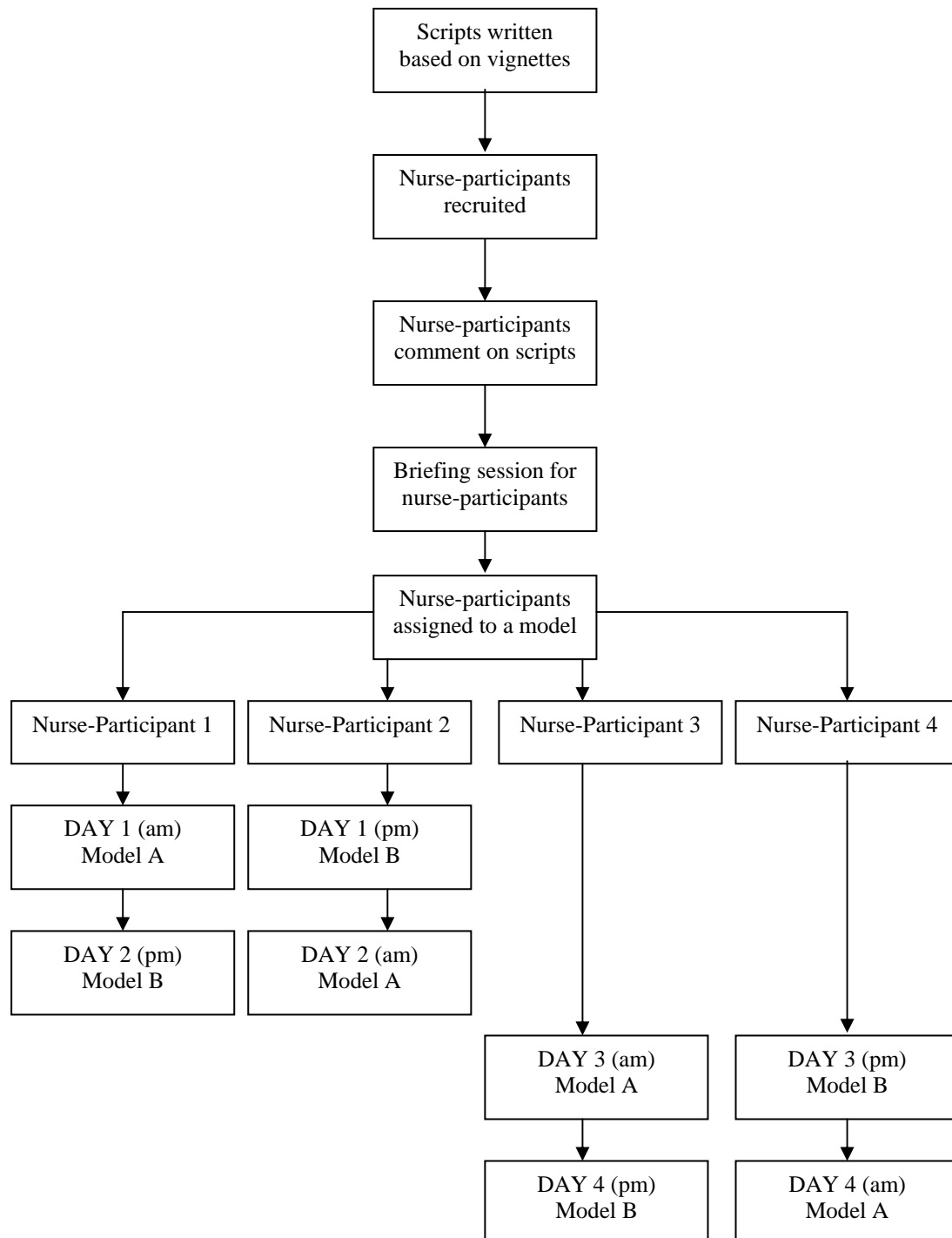


Figure 2: Number of mistakes by locations

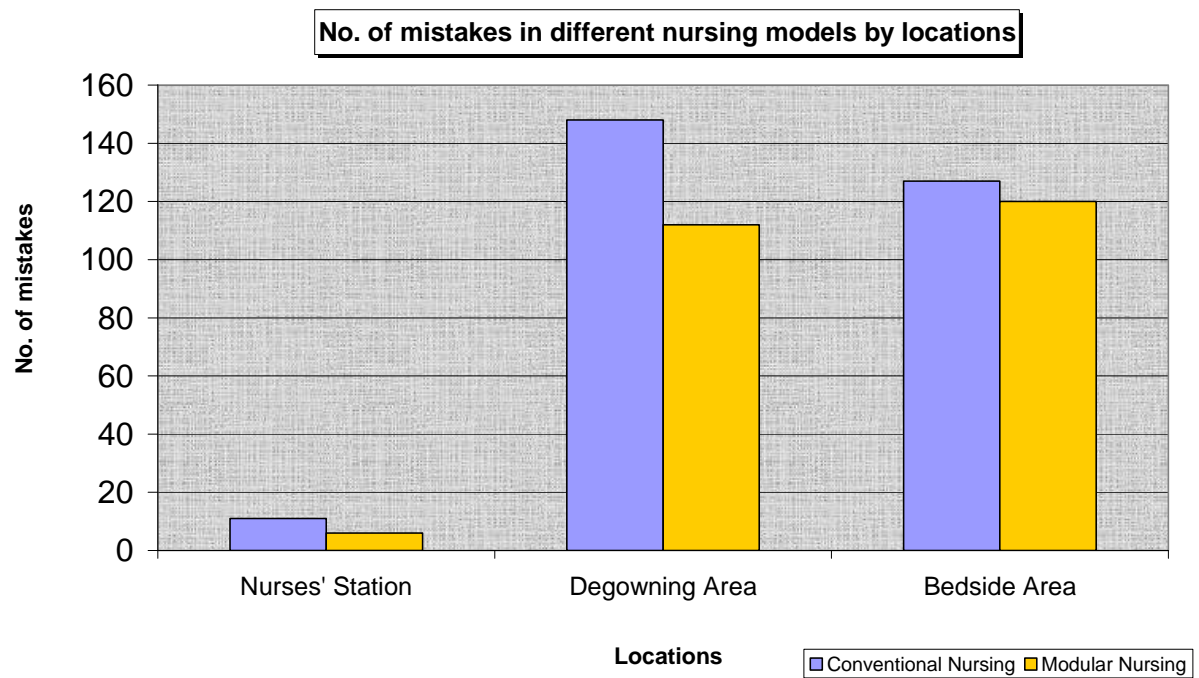


Figure 3: Number of mistakes by nursing actions

