

From Station to Bedside and Beyond: Clinical Nursing Workflow Processes in Cardiovascular and Oncology Units

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Abstract

The efficiency of nurses in spending their time and effort is a substantial facet of service to health consumers. The proficiency of nurses in accomplishing their tasks greatly affects their care to clients. Utilizing a time and motion study, the research provided understanding on how nurses in a selected tertiary private hospital spent their time and space, devoted their efforts, experienced workflow challenges and prospects which were specifically focused in their different activities in the units, station, bedside and other specified settings.

Nurses from a selected tertiary hospital partaken in different research protocols premeditated to assess how nurses spend their time, nurse location and movement, and perceived effort in doing their activities. Categories of activities (nursing practice, unit-related functions, non-clinical activities, and waste) and locations (patient room, nurse station, on-unit, off-unit) were used in the study as its framework. Total distance traveled and the time spent doing an activity in a particular location were also scrutinized. Distance traveled was also evaluated across shifts. Findings suggested that nurses devoted their time to nursing practice but more on documentation, medication administration and coordination of care. Only a miniscule time and effort were exerted to direct patient care activities, patient assessment and vital signs taking. Challenges and prospects were also identified. The study provided valuable inputs to improve the efficiency of nursing care specifically focused on documentation, medication administration, and care coordination. Paradigm shift in the use of technology, workflow processes, unit organization and design is recommended to facilitate efficient use of time and effort of nurses in the delivery of safe and quality of care.

Keywords: Time and motion; Workflow processes; Nursing activities; Medical-surgical

Introduction

With the growing local, regional, national and global competition and increasing client awareness, improving quality in nursing care is becoming increasingly important to the development of health policies and hospital protocols. The significance is related not only to the care nurses provide to the clients at bedside but also to the basic administrative skills that nurses implement every day from client's handling, billing, collection, staffing and even recruitment. Aside from the competition and increasing client demands, hospitals face unnerving challenges, such as progressing technologies and reimbursement health policies, demographic developments, conflicting government and public fiats and an increasing gap between nurse and patient number. Nurses, as the largest group of healthcare professionals, have experienced significant changes in their work life and environment as systems have tried to meet these challenges. As workloads become more substantial and the number of nurses per patient diminishes, patients and healthcare workers across the globe are put increasingly at risk (International Council of Nurses, 2003). But with these challenges, the phenomenological transition provides a unique opportunity to hospitals to recondition and reengineer processes and protocols to improve quality to its system. A reconsideration of hospital design and work processes holds the potential to affect the efficiency and effectiveness of care delivery for the foreseeable future [1]. Audacious changes in the hospital work environment are imperative to guarantee the sustainability and effectiveness of health care services vis-a-vis the client's demands.

Nurses, as the frontline caregivers represent a critical but costly resource in the hospital. Hence, it requires maximization of the efficiency and effectiveness of nurses is essential to the integrity of hospital function and the promotion of safe patient care. Evidences

suggested that an increase in contact or time spent with client's results to better health outcomes and services [2]. But because of swelling nurse workload but derisory nurse-patient ratio, there is a significant reduction in the amount of nursing time available for client care and other related activities [3]. With this, it is very important to determine and understand how nurses spend their time [4]. Suggested that nurse work process and the work environment contribute to the efficiency and safety of client care and the time spent to it should be carefully assessed. It is very clear that there is a need to determine how nurses spend their time to target prospects and settings for nursing care effectiveness through improvements in management, workforce, work processes, and organizational culture (Institute of Medicine, 2004). This study primarily provided understanding on how nurses in a selected tertiary hospital spend their time, specifically focused in their activities in their ward, station, bedside and other related settings. The research aims to specifically determine the amount of time nurses spend on specific activities and their perceived effort specifically focused on direct care activities, indirect-care activities, unit-related activities/non-unit related activities, personal activities, and other forms of time wastage. The study also determined their perceived effort, their identified workflow challenges and prospects. This study was also

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designed to provide baseline data prior to the implementation of a technology that will facilitate and improved documentation of nurses in the said selected health facility.

Methodology

The time and motion study was conducted at tertiary 300-bed capacity private hospital. The study was conducted in the different medical-surgical units of the said hospital. The study utilized various instruments to gather the specific data needed for analysis. The research utilized direct and indirect observation with the aid of speedometer and time-watch noting nurses' actions and time of doing it, interview, survey questionnaire measuring their perceived level of effort in doing their tasks and other related activities. As a correlational and comparative study, the research also determined significance with the profile variables of the nurse subjects employed in the said health facility.

Selected wards with random observation and surveying to the nurse subjects were done. Only medical-surgical wards were included in the study. A qualified medical-surgical unit was defined as a unit in which patients who require less care than that which is available in intensive care units, step- down units, and receive 24-hour inpatient general medical services, post-surgery services, or both general medical and post-surgery services. These units may include mixed patient populations with diverse diagnoses and of diverse age groups who require care appropriate to a medical-surgical unit. From a list of all eligible medical surgical units, nurses were randomly selected.

Nurses at each participating unit meeting the eligibility criteria were invited to join the study and the participation was voluntary. To be eligible, nurses were required to be licensed and to provide direct nursing care for patients on the study unit for more than eight weeks. Ineligible nurses included were float nurses; nurse preceptors and those in training; master's degree holders, and nursing supervisors, charge nurses, or other nurse specialists, unless they rendered direct nursing care with the same acuity and patient load as other participants. The research was under the direct supervision of the Chief Nursing Officer of the said facility. The researchers defined and document the nursing practice and further divide the nursing task into work elements and location. The time and location of the work elements were obtained during the observation. The researchers evaluated the nurse's pace relative to standard performance (performance rating) to determine the normal time. The research also identified psychological responses of nurses to usual workflow process through perceived effort inventory.

Research Protocol

The study was initially consisted of 6 protocols. Because of ethical considerations, hospital policies and logistical limitations the study was composed of four research protocols: A, B, C and D (Table 1). Nurses who consented to participate were randomized to either protocol A or protocol B. All nurses were asked to participate in protocol C, and nurses were also randomized to take part in protocol D. For each protocol, the researchers collected data for seven consecutive days, 24 hours a day, except for protocol D. After the collection of the data, the six-sigma approach was utilized to further analyze the findings of the study.

Protocol A: nursing time

To monitor nurse location and movement, nurses in research protocol A were continually monitored where they were, how far they traveled, and the duration of activity in one location. The nurses in the randomly selected ward were observed for one week in random shifts in

different wards. A stopwatch was utilized to determine the time allotted in relation to the activity of the nurse. Each member of the team observes a nurse in the performance of activities. The researcher documented their observation of the nurses into a data sheet. The activities that were included in the study was based from the classifications and clustering of how much time nurses spend on activities in nursing, nonclinical, unit-related and waste. The categories and subcategories were presented in Table 2 and were used to cluster sufficient increments of time to make strong comparisons activities related to client care. The activities were clustered to sufficient increments of time to make strong comparisons and to identify important targets for change. The goals were to reveal drivers of inefficiency in how nurses spend their time and to identify opportunities to improve efficiency through changes to unit design and/or organization.

The subcategory of patient care activities does not represent a comprehensive accounting of all activities related to patient care. Other care-related subcategories, such as medication administration care coordination, and documentation were separated from patient care activities to help identify what activities consume nurses' time. These categories, therefore, are intended to be utilitarian rather than absolute [5].

It is important to note that activities related to nursing practice were providing care or treatment to the integumentary system; providing specific education about the patient's condition and nursing needs; loss of bowel or bladder control in which the nurse cleans the patient, linens, or floor; participating in general discussion with the patient; conducting intervention activities such as intravenous site changes and urinary catheter insertion; preparing the patient for

Research Objectives	A	B	C	D
Purpose	Time	Location and Movement	Psychological Response	30 minute Snap-shot
Data Collection	Work Activities	Distance, Location	Level of Stress	All activities
Device	Stopwatch Field notes	Pedometer Field Notes	Effor Survey	Stopwatch Field notes
Method	Observation	Observation	Survey Form	Observation
Participation	Random	Random	Purposively chosen	Random
Time	7 Days	7 days	Every after duty	30 minutes
Participating Nurses	30	30	30	5
Nursing shifts	15	15	30	5

Table 1: Description of research protocol.

Nursing Category	Nursing Activity Subcategory
Nursing Practice	Patient care Activities
	Care Coordination
	Medication Administration
	Documentation
	Reading vital signs
	Unit-related
Non Clinical	Unit-Related functions
	Personal time
	Family care
Waste	Administration
	Waiting
	Looking
	Delivering

Table 2: Categories and subcategories of nursing time.

hospital admission or discharge; helping the patient with activities of daily living; providing specific education about the patient's condition and nursing needs; assessing patient while off unit; conducting nursing or medical intervention while off unit. Medication Administration encompassed the drug history, literature review, its preparation, delivery and administration. Documentation encompasses those related to this from the use of computer system (admission, concurrent and discharge), traditional charting (use of papers) and other specific documentations (Diabetic Client Chart, Risk Documentation etc.) presented in the host facility.

Unit-related functions included those activities such preparing of equipment, transporting of equipment, transporting of patient, reviewing & updating patient's status, texting members of the team, calling via phone members of the team, request for supply and food and assisting colleagues. Non-clinical activities are comprised of personal time hygiene, eating food, going to comfort room and talking personally with colleagues with topics which are unrelated to direct client care. Waste activities included were waiting, looking/retrieving documents, looking/retrieving supply, delivering and running in the hallway by the nurses.

Protocol B

Location was selected by the nurse from four categories: patient room, nurse station, on the unit, and off the unit. Data were normalized to a 10-hour shift (600 minutes). Using a pedometer, the nurses were monitored based on their number of steps. To find distance, the researchers first measured the stride length of the nurse in protocol C. The researchers marked off a starting point on the sidewalk with a marker, took two more steps, and mark where the nurse stopped. The distance between was measured in inches and was divided by two to get the distance of one step. With a calculator, the step distance was multiplied by the number of steps reflected in the pedometer and was divided by 63,360 to miles walked.

Protocol C

The researchers utilized a tool that measure the perceived effort of the nurses in doing activities that were mentioned in protocol B. Nurses were asked to answer a four-point scale questionnaire intended to measure the level of effort or stress to validate the findings related to the observation of the researchers.

Protocol D

The researchers also randomly selected nurses to include in an incidental observation monitoring their activities for 30 minutes. The researchers recorded their activities and the time spent for the activities. The activities were clustered according to the categories presented above. This is the 30-minute snap shot protocol that enumerated the list of activities that the nurses do during the said randomized and incidental time.

Unit-assessment and data collection tools

Aside from the tools stated above, the researchers utilized set of tools to measure the activities and related demographic, technologic and architectural set-up of the hospital. Demographic unit characteristics include the number of patients and nurses on duty during a shift. Technologic unit characteristics are related to the presence of computer, cellphone and other technology-related units in the nurse station and ward (except client's owned set of technology). Architectural variables include those estimated distance of the rooms from each other, nurse station to the rooms, unit to unit, storage

units for equipment and documents and presence of equipment (wheelchairs, E-Cart, IV stand/poles, oxygen and other supplies. These variables were used to interpret unit and nurse variation, as well as cluster relationships that correlated or explained the difference in efficiency and nursing time spent with patients.

Data management and statistical analysis

The statistical and technical methods used in this study will be reported in detail in a separate publication. In brief, each researcher generated their reports for data preparation and tabulation using Microsoft Excel and was further translated to PASW (Predictive Analytic Software version 14) for inferential and descriptive analysis. Microsoft PowerPoint and Word were used to graphically enhance PASW generated results. Descriptive (frequency, percentage distribution, mean and inferential (non-parametric e.g. Kendall tau) statistics were utilized.

Study Results

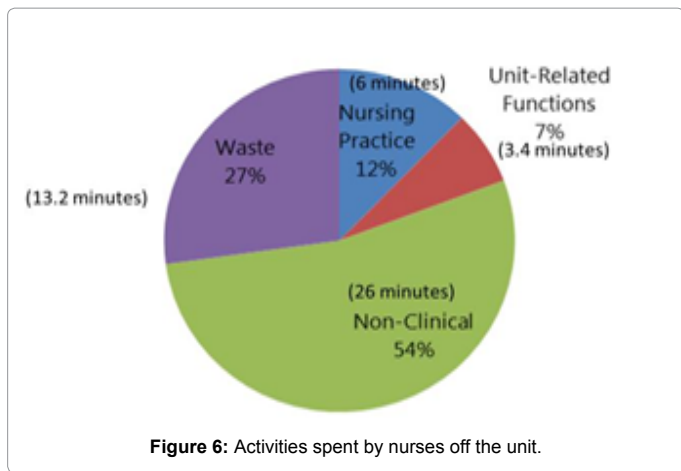
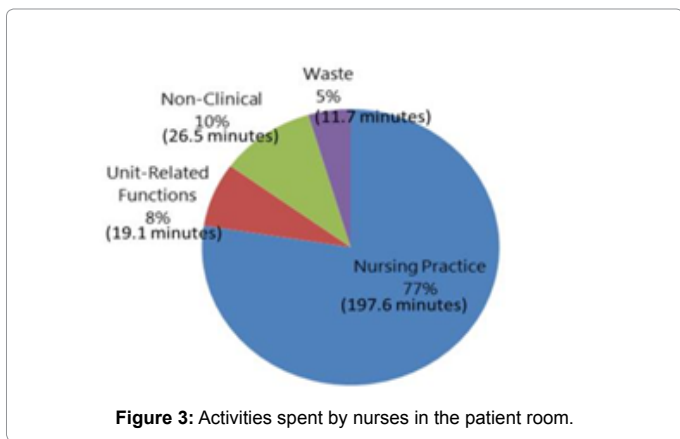
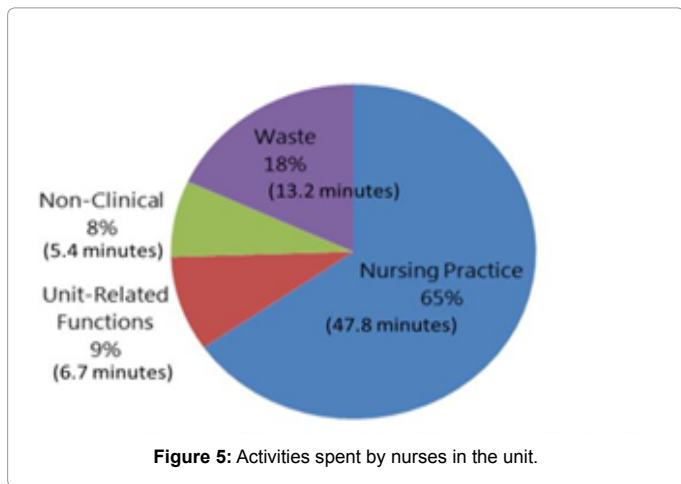
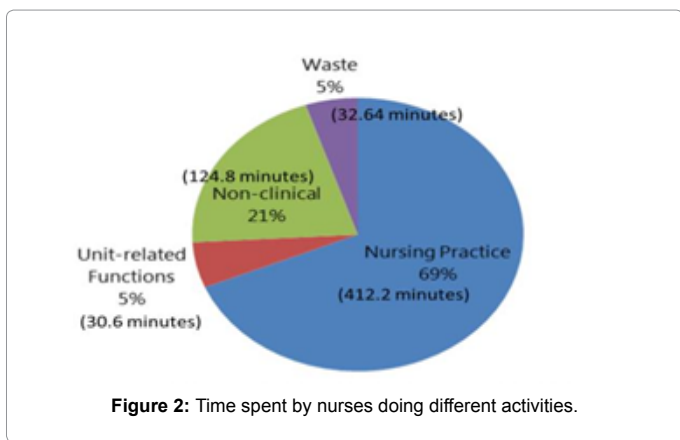
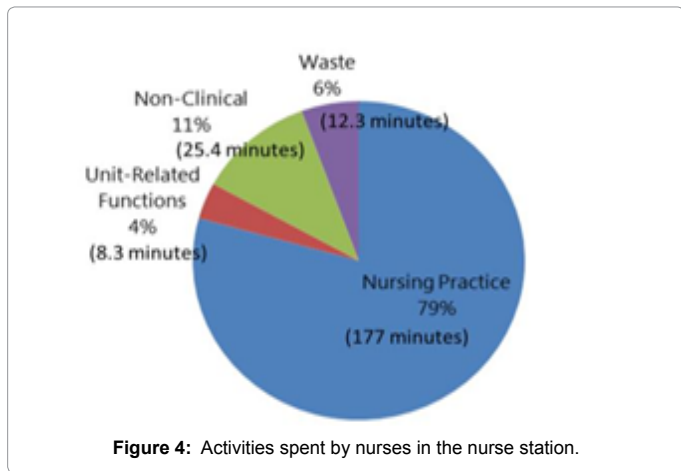
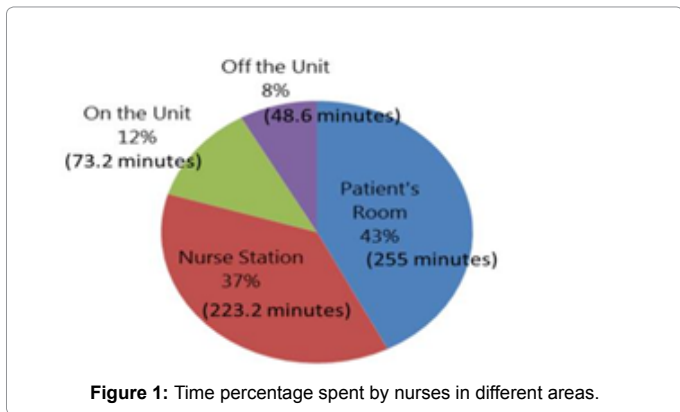
A total of 26 nurse participants were included in the study. Nurses included in the study were in their 20s (21-29 \pm 2.002), been a professional nurse for an average of 3 years (\pm 2.23), females (69.2%) and mostly from orthopedic (26.9%), oncologic (23.1%) and cardiac (19.1%) medical surgical units and provided service during AM shifts (46.2%) with an average shift length of 10.23 (+1.56) hours.

Time spent

Figure 1 elucidates the average time spent by nurses in every location category (patient room, on the unit, off the unit, nurse station); It is accounted that nurse frequently spend their time in patient's room (255 minutes per shift, 43% reported time per shift) instantaneously followed by nurse station (223 minutes per shift, 37% reported timer per shift). Figure 2 explains how nurses spent their time by activity category. More than three-quarters of nurses' time was devoted to nursing practice (412 minutes, 69.9% reported time per shift). Activities considered to be waste consumed 32.64 minutes, or 5%, of reported time per 10-hour shift. Nurses' time was further analyzed according to activity by location, and by subcategory. Figures 3-6 illustrates the amount of time per activity category in each of the four locations. Nursing practice accounted for the majority of time in all locations except off the unit. Waste and nonclinical activities accounted for larger proportions of time spent by nurses on the unit (excluding patient room and nurse station) or off the unit, compared to the patient room and nurse station. Time devoted to nonclinical activities was approximately equivalent for nurse station (26.5 minutes), on the unit (25.4 minutes), and off the unit (26 minutes); nonclinical activities accounted for only 5.4 minutes of time spent in the patient room.

Nursing practice: locations and subcategories

Most of the nursing practice activities time was primarily spent in the client's room (197.6 minutes) and nurse's station (177 minutes) (Figure 7). Within nursing practice, the greatest fraction of time was devoted to documentation (167.1 minutes, 39%). Coordination of care, communication with team members or other departments—accounted for 107.1 minutes (25% of nursing practice). Patient care activities accounted for less than one-fifth of total nursing practice time (77.1 minutes, 18%); time devoted on assessment and obtaining vital signs was least among subcategories of nursing practice (34.3 minutes, 8%). The subcategories such as car, coordination and documentations were further analyzed by dividing each according to nurses' location (Figures 8 and 9). Both were accomplished chiefly at



the nurse station (documentation: 107.4 minutes, 64% documentation time; care coordination: 96.3 minutes, 90% care coordination time). Only a marginal portion of care coordination (2.1 minutes, 2%) and documentation (16.7 minutes, 10%) took place in the client's room.

In the 30-minute snapshot of the nursing activities, nurses spent approximately half the 30 minutes documenting, followed by medication administration and coordination of care (e.g. communication with physician via phone and personal), patient care activities and assessment/vital signs. Most of the nurses (n=30) observed during the 30 minute snapshot spent their time documenting the care rendered to their clients (e.g. after drug administration, nursing procedure or accomplishment of orders from the physician) (Table 3). Through observation and measurement with the aid of a pedometer, individual

nurses across nursing wards traveled for approximately 1-3 miles per 10-hour shift. In the morning duty, the average distance traveled by the nurse was between 2 and 4 miles (+0.5) per 10 hours. Nurses traveled less distance during nighttime shifts when most activities and patient tasks change (patients were less mobile, pain often increases). On night shifts average distance traveled ranged between 1.5 and 2.5 miles (+0.5) per 10 hours. There was a significant decrease in the distance travel by nurses by 1.5 miles.

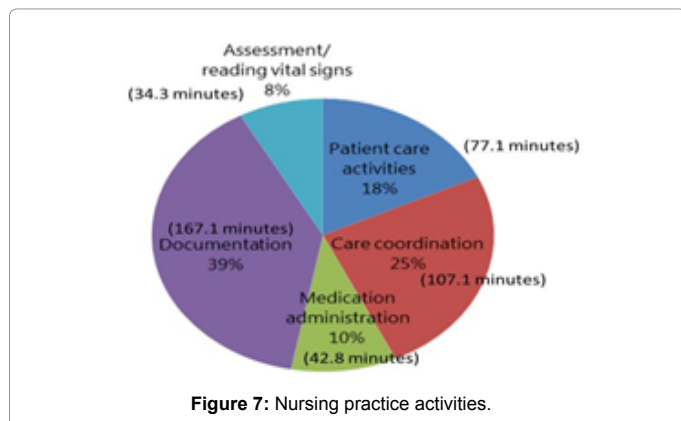


Figure 7: Nursing practice activities.

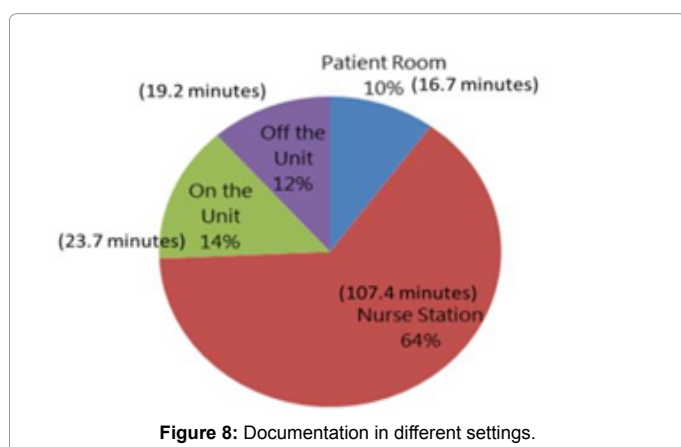


Figure 8: Documentation in different settings.

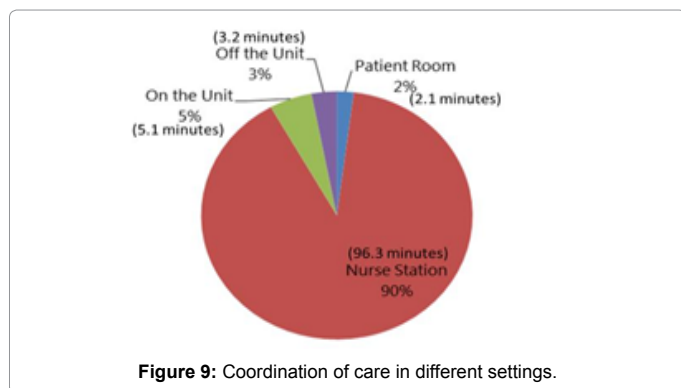


Figure 9: Coordination of care in different settings.

Perceived effort

Nurses were given a set of questionnaire measuring their level of effort after a shift. Nurses said that they were more likely to exert more effort in doing nursing-related activities ($X=3.66$) compared with other activities (coordination of care: 3.18; unit-related: 3.36; non-clinical:3.38; waste: 3.15). Among the nursing activities, nurses exert the most effort in documentation ($X=3.54$) and coordination of care ($X=3.44$).

Physical characteristics of units

Every unit in the said hospital has a storage site 2-3 meters away from the nurse station. Computer terminals were present in every unit. Chart rack, IV stand poles, E-cart, oxygen tanks and other pertinent supplies were evident in the unit and storage room. However, the

Documentation
Medication Administration
Patient Care Activities
Assessment Vital Signs
Talking with Colleagues
Looking
Family care
Preparation of Equipment
Waiting
Personal Time
Delivering

Table 3: Leading activities of nurses during the 30-minute snap shot.

distances between rooms and stations were considered one of the challenges of the nurses in the units.

Difference based on nurse profile and in-between shifts

The time, distance and effort traveled by nurses do not vary widely according to their profile. Regardless of their gender and area, nurses spent the same amount of time (U-test: 0.752; NS/ H-test: 0.542; NS, respectively), distance traveled (U- test: 0.078; NS/ H-test: 0.542; NS, respectively) and effort (U- test: 0.128; NS/ H-test: 0.542; NS, respectively) exerted in the above stated nursing and related activities. Glaringly, nurses who have been in the service for a longer period of time manifested higher degree of effort (tau value: 0.133; sig value: 0.045), longer the time (tau value: 0.987; sig value: 0.003) and distance (tau value: 0.720; sig value: 0.032) spent doing activities. Nurses who were in the nocturnal shift manifested the least degree of effort, time and distance traveled in a duty. Nurses who were in the morning shift have a higher degree of effort, time and distance consumed in the performance of care.

Challenges and opportunities

Nurses were interviewed and expressed challenges and prospects in their job performance because of different reasons. They said that they experience inadequate nurse-patient ratio and required additional staff and nursing aids. The understaffing leads to increased exerted effort, time spent and distance traveled for them [6]. They also verbalized displeasures in the lack of supplies and equipment during the night shifts. On the other hand, they found that the health facility has a wide array of facilities that help them during the delivery of their care. Teamwork and fairness were evident in their units. Proper and fair distribution of tasks, collaboration with the colleagues and members of the health team are good indicators of their working environment [7].

Discussion

The findings establish that nurses included in the study spent most of their time on nursing practice-related activities but only a small portion of their activities were spent specifically intended for patient care. It was noted that most of the nurses spent their time in documentation and coordination of care. Lesser time were spent for direct patient care such as assessment, vital signs recording and medication administration. It is also important to note that these nurses spent substantial time to waste. Waste time of nurses include retrieving of data, walking and running down the hallway and delivering equipment and other related items from one place to the other. These wastes should be considered as one of the target areas for improvement. It was also evident with the data presented that

most of nurses devoted most of their time to care coordination and documentation. Documentation has a conspicuous effect to the time spent by nurses. This prompts the administration to provide process improvement strategies such as provision of technology in documentation that is mobile and efficient.

Further, nurses spend most of their time in the nurse's stations. It is considered an expected phenomenon because most of the equipment and tools for documentation and care coordination can be accessed only in the said nurse's station. Meanwhile, the time spent in the client's room was spent mostly to nurses' practice and other locations of practice were spent to other activities of the nurses – practice-related, non-clinical, unit related and waste. The physical set-up of the unit of the health facility is well arranged but the distance of the nurse station to the rooms is quite distant. However, it was suggested with the findings that the distance and the level of effort doesn't affect each other because of the ability of the nurse to adjust to different work environments. The nurses' ability to establish and organize their schedule, work and staffing assignments has greater influence on these procedures than what physical and architectural design do by itself. This finding suggests that process and policy, as well as relatively minor physical changes within a unit (such as distribution points of supplies or medications) have a major impact on nurse workload [8]. Nurses' adaptability may allow them to compensate for limitations imposed by the physical design of the unit. The negative side of this experience was that it may mask potential effects of unit layout on distance traveled and time spent per activity [9]. Hence, it required that advanced statistical analyses of the time and motion data be considered in future researches. Since working environment is interplay of different contextual factors must also change. Technological interoperability, nurse-patient ratio, and work processes should also be considered. Previous research provides enthralling evidence that poorly organized practice environments can negate the benefits of excellent staffing and positive patient outcomes. There should be a harmonious holistic interplay of people, process and technology to maximize the nursing units. Moreover, the findings of the study provide a clear description of the usual activities of the nurse. It was evident esp. in the 30 minute snap shot of nurses activities that they constantly travel from one room to the other, nurse station to other rooms, to storage rooms and back to nurses' station. Unfortunately, there was a very minute time spent to direct patient care and greater amount of time was spent to documentation and even just for movement around the ward. The distance traveled by nurses in every shift was considerably lengthy. Nurses spend most of their time traveling from one location to the other. The said findings were in line with the claim of who identified that majority of time of nurses was spent walking and running around the station and suggested that the time spent in this waste can be transformed to a more meaningful patient care experience. The said phenomenon has a significant impact to the level of stress and burnout of nurses. Shindul-Rothschild said that increased in the physical activity required in nursing such as the distance travel and physical requirement to increased workload pressure to nurses that will eventually lead to burnout. It is expected that there will be increased in turn-over rate among nurses if such persists What nurses can do now even without technological and workflow changes is to spend the time though, with the client with compassion and of quality.

Documentation

It is also important to note that nurses spent their time mostly in the documentation process. The Philippine healthcare has long beyond delayed from the demands of the time. It is true that the

selected hospital was one of the leading facilities in providing a highly technological health care delivery, the processes, especially in documentation is still considered inefficient. It was apparent that nurses spend their time writing and transferring these write ups to unit accounting for increase nursing time that will eventually lead to errors in documentation. It is considerable to have a technology that will let the nurse document in a transient manner or process that will not require them to stay in the nurse's station. An e-chart can be considered as an alternative way of documentation. Technology allows the nurse to document care anywhere, anytime. There was considerable redundancy of documentation in between departments and professional discipline because of the lacking centralized system that will compile all client data. The result of the lack of technology to support centralization is dehumanizing and segmented care, and immeasurable health care outcomes. Phil health requirements and other health policy requirements for documentation and flowchart processes may be considered a factor that aggravates the situation (Center for Medicare and Medicaid, 2008). The problem in the said facility on documentation is not domestic. Some facilities may pose more challenges in documentation. Because of its complex nature, solutions to documentation problem are still intangible. Health care facilities or the entire health care system must provide strategies that will improve this condition. It is always been a dream of every health care system to have a systematic and centralized electronic health record that will improve time efficiency [10,11]. The facility where the study was conducted started its unrelenting effort towards standardization and modernization through computerization.

Medication Administration

Most of the nurses in the study dedicate considerable effort and time to medication administration. Because of the vast distance traveled by nurses just for the delivery of drug to different units, substantial time was wasted. Further, medication administration is also linked with the documentation problems presented above. Nurses immediately document their traditional charts medication given which entails a lot of effort, movement and time. Medication administration should be emphasized in any hospital process improvement because it is one of the leading sources of operational failures. Medication administration is one of the victims of segmented care. Ideally, medication process should be considered a closed-loop system that provides a continuous process of patient identification, drug verification, sensitivity and potential reactions and preferences. Problems with drug preparation, administration and evaluation will always prompt the nurse to provide extra time and effort. It is recommended that the nurses in the said hospital must have an advanced automated dispensing systems and documentation technology that will help them monitor and file medication processes. Locked small cabinets inside the client's room can also be considered. Carts should not be just for emergencies. Medications carts may be allotted for those clients with predictable conditions. Medication administration is one of the causes of hospital errors and therefore requires an interdisciplinary effort, effective nursing informatics, and platform integration for all members of the health team.

Coordination of Care

Collaboration of care is one of the essential functions of nurses in the hospital or any health care setting. It is a must for the nurses to have a timely and efficient communication among health team members to facilitate care to the client [12-14]. However, inefficiencies in communication may consume nurses time and put patients at risk.

Failure to rescue – death following the occurrence of an adverse event – is a nurse sensitive consequence that has been associated with nurse-patient ratios, communication, patient surveillance and others. As a result, the many hospital errors or failure to respond situations can be traced back from communication barriers, delays or omissions. The efficient flow of patient information and status updates could reduce wasted time and the potential for errors. Nurses in the hospital being chosen as the setting of the study verbalized some challenges in contacting physicians about client's care, billing and evaluation. Other nursing attendants and assistant are sometimes nowhere to find. Nurses manifested some concern on the lack of staff in the units to facilitate nursing care. Since coordination of care is not efficiently done because of the lack of tracking system to members of the health team, this can lead to adverse events [15]. Each unit owns a set of telephone, call bell system, cellphones or handheld and ear devices as part of the communication and coordination processes. However, there should be a search for automatic ways when nurses can coordinate care to reduce the time needed for hand-off communication. Improved communication workflows result in greater overall efficiency, reduced costs, and staff satisfaction [16]. Technology solutions to promote efficient coordination of care include wireless networks through an aid of an intelligent system that will update and track the health team about the physical location of a particular member. A simple board with pins representing each member of the team and their location is a good strategy to easily locate a member of the unit. Since most if absolutely not all care coordination time is spent at the nurse station, the nurse station should be designed and improved to facilitate communication even outside the station [17]. This could reduce walking time between patient rooms and the nurse station, and increase the amount of time available for direct care to the client. The system that shall be developed should include written policies and procedures, role descriptions of all nursing positions, appropriate and sufficient staff, care delivery structures and processes, such as staffing and a care delivery model, continuous quality improvement measures, such as monitoring patient outcomes, communication systems, such as effective, documentation systems and daily reporting, mechanisms to discuss care needs, and professional development systems, such as continuing education, skills maintenance and development, and performance appraisal [18]. Other hospitals and other providers who are not adopting best practices or advancement in workflow processes should be encouraged to do so with information, technical assistance, incentives, and pressures.

Limitations

One of the limitations of the study encountered during the data collection was the overlapping and interfering factors during the study. Some activities being observed to the nurses if considered overlapping with one activity to the other were deliberately removed from the database. Those nurses who experienced interference in their activity were also removed. The challenge study nurses faced in continuing their jobs without interference from the time and motion study (both with respect to patient needs and ensuring study validity) might have led to problems in the data collected. Inter-observer validity was also considered as one of the limitations of the study. The researchers were assigned to two nurses per shift and no parallel observer was observed. The categorization of the activities was based from the concept earlier introduced. There may be some debates on the categorization but because of the lack of article providing concrete and distinct activities obliged the researchers to utilize the categories mentioned in the study. The category of patient care activities, for example, does not include activities, such as medication administration, that have obvious and direct impact on patient safety and outcomes. The different activities

under each of the category were limited by the definition presented at the early part of the document [19]. The use of speedometer as a tool to measure effort and distance was limited by its functionality and interpretation. The possibility of Hawthorne effect in the study was a highly debatable aspect of the study. Statistically, non-parametric test were used such as Kruskal-Wallis Test (H-test), Whitney-Mann U-test. Additional sample and advanced statistics should be considered for future researches. There were no contact to the recipients of care during the conduct of the study because of ethical and protocol limitations. No interventions were done to facilitate change to the processes of the facility.

Conclusion

Hospitals across the country are searching for ways to improve quality of care and promote effective quality improvement strategies. But before developing those strategies, it is a must to understand the gray areas for improvement. The study provided understanding on how nurses in a selected tertiary hospital spend their time and space, devote their efforts, workflow challenges and prospects specifically focused in different activities in their ward, station, bedside and other related settings. Findings provided that there was large fraction of time, effort and space was devoted to documentation, medication administration and care coordination. The findings were quite disturbing because it indicates lesser time was spent to direct care activities to patients. Profile variables does not significantly affect their effort, time and distance in performing nursing care and other activities to the client. Nurses travel significantly larger distances and exert more energy during daytime shifts compared to other shifts. The findings suggested that the hospital working environment provides challenges and opportunities to improve the efficiency of nursing work. Significant changes to the workflow processes and technology during the documentation processes, care coordination, and medication administration, as well as the physical design of units, could benefit nursing efficiency and promote increase nurse-patient interaction. There will be a complete paradigm change if the health care facility will facilitate improvement to its work processes. A technology-driven approach is needed to bring about substantial changes to all the members of the health team. There is a great need to further investigate the implications of possible changes, not only in terms of clinical outcomes but also other holistic factors that affects the delivery of nursing care.

References

1. Hendrich A, Chow M, Skierczynski B, Lu Z (2008) A 36-hospital time and motion study: how do medical- surgical nurses spend their time. *Perm J* 12: 25-34.
2. Aiken L, Clarke S, Sloane D, Sochalski J, Silber J (2002) Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *JAMA* 288: 1987-1993.
3. Reiter KL, Harless DW, Pink GH, Mark BA (2012) Minimum nurse staffing legislation and the financial performance of California hospitals. *Health Serv Res* 47: 1030-1050.
4. Tucker A, Spear S (2006) Operational failures and interruptions in hospital nursing. *Health Serv Res* 41: 643-662.
5. Aiken L, Smith H, Lake E (2000) Lower Medicare mortality among a set of hospitals known for good nursing care. *Med Care* 32(8): 771-787.
6. McCue M, Mark BA, Harless D (2003) Nurse staffing, quality, and financial performance. *J Health Care Finance* 29: 54-76.
7. Needleman J, Buerhaus P, Mattke S, Stewart M, Zelevinsky K (2002) Nurse staffing levels and the quality of care in hospitals. *N Engl J Med* 346: 1715-1722.
8. Tucker A (2004) The impact of operational failures on hospital nurses and their patients. *Journal of Operations Management* 22: 151-169.

9. Hendrich A, Fay J, Sorrells A (2002) Courage to heal: Comprehensive cardiac critical care. *Healthcare Design*.
10. Ulrich R, Quan X, Zimring C, Joseph A, Choudhary R (2004) The role of the physical environment in the hospital of the 21st century: a once-in-a-lifetime opportunity. *The Center for Health Design*.
11. Lang T, Hodge M, Olson V, Romano P, Kravitz R (2004) Nurse-patient ratios: A systematic review on the effects of nurse staffing on patient, nurse employee, and hospital outcomes. *J Nurs Adm* 34: 326-337.
12. Sexton J, Thomas E, Helmreich R (2000) Error, stress, and teamwork in medicine and aviation: cross sectional surveys. *BMJ* 320: 745-749.
13. McCauley K, Irwin S (2006) Changing the work environment in ICUs to achieve patient-focused care: the time has come. *Chest* 130: 1571-1578.
14. Pronovost P, Wu A, Sexton J (2004) Acute decompensation after removing a central line: practical approaches to increasing safety in the intensive care unit. *Ann Intern Med* 140: 1025-1033.
15. Hurst K (2003) Selecting and applying methods for estimating the size and mix of nursing teams. Leeds. World Health Organisation, Geneva.
16. Adams A, Bond S (2003) Staffing in acute hospital wards: part 2. relationships between grade mix, staff stability and features of ward organizational environment. *J Nurs Manag* 11: 293-298.
17. Hall-McGillis L, Doran D (2004) Nurse staffing, care delivery model, and patient care quality. *J Nurs Care Qual* 19: 27-33.
18. Forster D, McLachlan H, Yelland J, Rayner J, Lumley J, et al. (2006) Staffing in postnatal units: Is it adequate for the provision of quality care? staff perspectives from a state-wide review of postnatal care in Victoria, Australia. *BMC Health Serv Rev* 6: 83.
19. Sexton J, Holzmüller C, Pronovost P, Thomas EJ, McFerran S, et al. (2006) Variation in caregiver perceptions of teamwork climate in labor and delivery units. *J Perinatol* 26: 463-470.