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## ORIGINAL ARTICLES

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# Nursing Activities and Use of Time in the Postanesthesia Care Unit

*Panagiotis Kiekkas, RN, MSc*  
*Maria Pouloupoulou, RN*  
*Argiri Papahatzi, RN*  
*Christina Androutsopoulou, RN*  
*Marianna Maliouki, RN*  
*Aikaterini Prinou, RN*

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*Specialty areas, such as the PACU, are currently characterized by a shortage of qualified nursing personnel along with the pressure for a most cost-conscious function of services. These, in combination with both the increasing acuity of patients and the advances of science and technology, have rendered necessary the investigation of how existing personnel can be better used. The work sampling approach has been widely used in different clinical settings to offer data about the amount of time nurses devote to specific activities.*

*The aim of the current study was to categorize and quantify the activities of nurses employed in the PACU of the General University Hospital of Patras, Greece, and to identify differences with regard to shifts, varying nurse-patient ratios, and nurses' experiences. In the first phase, a classification form, which included all nursing activities, was constructed. This was based on literature review, researchers' experience, and semistructured personnel interviews. In the second phase, the researchers observed all PACU nurses, and activities were recorded on an hourly check sheet. A total of 4,320 observations were collected from 9/1/2004 to 9/30/2004.*

*Nurses spent 35.2% of their time on direct clinical care, 11.6% on patient assessment, 7.0% on communication with patients, 7.2% on communication with other persons, 8.6% on clerical nursing duties, 9.3% on documentation, 2.3% on non-nursing duties, and 18.8% on personal activities. Variations in the use of time were found between shifts, different nurse-patient ratios, and PACU experience. Methods of decreasing time when the nurse-patient ratio is inappropriate and increasing time allocated to direct care activities are proposed.*

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**THE OPERATION OF** the PACU has greatly evolved and expanded during the past decades.

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*Panagiotis Kiekkas, RN, MSc, is a Grade C Anesthesiology Nurse; Maria Pouloupoulou, RN, is Surgery Director; Argiri Papahatzi, RN, is Head Nurse of the Department of Anesthesiology; Christina Androutsopoulou, RN, is a Grade C Anesthesiology Nurse; Marianna Maliouki, RN, is a Grade B Anesthesiology Nurse; Aikaterini Prinou, RN, is a Grade B Anesthesiology Nurse; Department of Anesthesiology, General University Hospital of Patras, Patras, Greece.*

Since the introduction of the PACU, its aim has been to provide specialized care to surgical patients in the immediate postoperative peri-

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*Address correspondence to Panagiotis Kiekkas, 76 G. Konstantinopoulou Str., Aroi, Patras 263-31, Greece; e-mail: kiekpan@pat.forthnet.gr.*

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1089-9472/05/2005-0004\$30.00/0  
doi:10.1016/j.japan.2005.08.004

od.<sup>1</sup> Over the course of time, PACU patients have become more demanding and this has intensified the tasks of nurses working in the PACU area. Today, in the high-technology environment of the PACU, nurses use modern equipment to monitor and support vital functions of patients. Moreover, when it is considered necessary, nurses use complicated medications to achieve hemodynamic and respiratory stability of patients.

The demands of a contemporary Phase I PACU do not differ greatly from those of a critical care unit.<sup>2</sup> Currently, surgical patients are generally characterized by more severe health problems than in previous years, and they undergo operations of increasing complexity. PACU nurses handle unstable patients under life-threatening conditions daily and are often required to make decisions on a minute-by-minute basis. Thus, they should be competent in the care of patients emerging from anesthesia, including airway management, advanced cardiac life support, and complications commonly encountered in postoperative patients.<sup>3</sup> Moreover, they should possess multiple skills to cover various assignments because they often have to care for patients whose ultimate destination will be the ICU.

Like ICUs, specialty areas such as the PACU are also characterized by a shortage of qualified nursing personnel along with the pressure for a most cost-conscious function of services. The aim of this study was to categorize and quantify the activities of nurses employed in the PACU, and to identify differences with regard to shifts, varying nurse-patient ratios, and nurses' experiences.

## Review of the Literature

Nursing personnel shortages can be observed in most hospitals of North America and Europe, and has been recognized as a worldwide problem. This problem has mainly been attributed to difficulties in recruiting and retaining nurses and is not expected to be solved in the foresee-

able future.<sup>4</sup> Because the shortage is believed to seriously affect the quality of health services, health care managers are called on to face inadequate staffing and meet the increasing demand for nursing resources with an efficient supply. In other words, they are called to keep a balance between nursing care hours and the increasing acuity of patients, and ensure safe and high-quality care. This can be possible by developing nurse-staffing models that make efficient use of available nurses.<sup>5</sup>

According to Odom,<sup>6</sup> the current and future nursing shortage is different from that of the past because it is not only about the number of nurses, but the demand for nurses with specific skills and experience as well. This shortage mostly affects specialty areas such as the ICU, the operating rooms, and the PACU. In the PACU, the nursing shortage is a reality expected to worsen.<sup>6</sup> Since 1989, Prescott<sup>7</sup> has proposed that in critical care areas, the shortage problem should be reconfigured from producing more nurses to producing qualified, professional nurses. This shift in focus is based on many factors such as increasing acuity of patients, continuous advancement of knowledge and technological equipment, changes of organization services, and cost containment.

Dexter and Tinker<sup>8</sup> have studied the economics of the PACU and estimated that supplies and medications accounted for only 2% of total charges, whereas personnel salaries were the major component of PACU costs. Although some variations are possible between the PACUs of different countries and hospitals, PACUs require a sufficient number of nurses to be present and care for patients. Therefore, nursing staff costs are responsible for the greatest part of a PACU budget. The cost-conscious climate of critical care services renders necessary the most effective use of qualified staff, so the highest quality of care is provided at the lowest cost.<sup>4</sup> The improvement of planning and cost-effectiveness of facilities and services offers the opportunity of significantly decreasing critical care costs.

To investigate nursing resource needs and consequences of their shortage, researchers have applied two different study methods: workload measurement systems and work sampling studies. Nursing workload measurement systems are patient-centered approaches that quantify patients' requirements for nursing care and estimate the amount of nursing time required to meet these needs. These approaches have generally been used for purposes of predicting staffing needs and assessing costs. In the PACU environment, patient classification and use of care levels have been described within the context of workload measurement systems. The most well-known system used in the PACU for the assessment of workload increase because of adverse postoperative events is Project Research in Nursing.<sup>9</sup> The major disadvantage of workload measurement systems is that, to a greater or lesser extent, they do not take into account the complex and diverse nature of nursing activities, so they cannot provide an accurate reflection of them.<sup>10</sup> Moreover, the accuracy and validity of workload measurement systems have been widely criticized during the past years.<sup>11</sup>

Time is an important element of nurses' work. Nurses interested in improving planning, implementation, and evaluation of their work are concerned about the question of how nursing time should be distributed.<sup>12</sup> Processes in health services are mutually implicated in how much can be achieved within a given timeframe and in the timing of actions.<sup>13</sup> According to Bowers and colleagues,<sup>14</sup> time is the major factor that determines how nurses work, how they feel about their work, and how their work affects patient outcome. Job satisfaction of nurses seems to increase when their time is devoted to tasks which better tally with and utilize their special training.<sup>15</sup>

Work sampling studies derive their origin from methods used in industrial engineering, which classify all behavior of observed persons during a time sampling and assess distribution of time

among tasks.<sup>16</sup> In contrast with workload measurement systems, which aim to quantify the level of care required by patients, these studies seek to quantify the amount of care that nurses have time to offer patients. Work sampling occurs in two steps. First, broad categories of activities that describe the work of nurses are identified and defined. In most studies, these categories are based on the classic work "Methods of studying nurse staffing in a patient unit."<sup>17</sup> Then, observations of the staff at random intervals are recorded. The relative frequency of an activity is presumed to be positively correlated with the proportion of time nurses spend on this activity. These studies have attempted not only to estimate staffing needs, but to elucidate how the available staff could better use their professional time, and for registered nurses, their specific education and skills.

Nursing time studies have been conducted in several health care environments such as rehabilitation centers,<sup>18</sup> hospital wards,<sup>19-22</sup> and ICUs.<sup>4,23</sup> In these studies, a variety of sampling plans, which included different categories of activities, have been used. This is not surprising considering these studies have been conducted in different environments, and different terms reflect the particular clinical practice and demands of each department. However, descriptions and explanations offered for each activity may allow comparisons between studies. The observations have been conducted in various time intervals (ie, every 5 or 10 minutes). Moreover, in some studies only registered nurses were included,<sup>4,22,23</sup> whereas in others all nursing staff were observed.<sup>19-21</sup> Finally, in some studies, the observation method was replaced by a self-reporting method such as calling participating nurses to record their own activities.<sup>4</sup> Self-reporting by nurses, despite facilitating the collection of a considerable amount of data, tends to result in the omission of activities and can increase bias.<sup>20</sup>

Work sampling studies conducted in hospital wards have revealed important findings for

health care managers. Practical nurses, who have less education and skills, were found to perform most of the direct care activities (tasks performed only in the presence of a patient), whereas a substantial proportion of registered nurses' time was spent on indirect activities (tasks performed away from the patient) such as charting, administrative work, and clerical duties (associated with the maintenance of the clinical environment). Another common finding was that very little time was devoted to communication with patients. However, the two main studies conducted in ICUs,<sup>4,23</sup> which were staffed only by registered nurses, showed that the greatest amount of nursing personnel's time was spent on direct care or patient assessment. These activities are considered to better fit registered nurses' education and skills.

Today, postoperative patients who have undergone major surgical procedures are often discharged to the medical-surgical floor instead of going to the ICU. As a consequence, they now spend more time in the PACU to achieve hemodynamic stability.<sup>2</sup> Thus, a greater number of nurses are required to meet patient needs. As Hodge and others<sup>24</sup> have shown, low nurse-patient ratios affect quality of health services by directly affecting patient length of hospital stay and satisfaction, medication errors, nosocomial infections, and mortality. Yet, there is no evidence to support a minimum threshold for nurse-patient ratios. More specifically, a lower proportion of registered nursing staff and their care hours have been clearly associated with a higher number of adverse patient outcomes.<sup>25-27</sup> In the Standards of PeriAnesthesia Nursing Practice,<sup>28</sup> PACU patient classification is based on patient acuity, and staffing guidelines are recommended. According to these standards, the nurse-patient ratio should be higher than or equal to one nurse for two extubated, stable patients, one nurse for one intubated patient, or a patient at the time of admission, and two nurses for one critically ill, unstable, complicated patient.

## Study Aims

The aims of this study were to:

- Describe, categorize, and quantify nursing activities in the PACU.
- Determine if there are any differences in the use of nursing time among shifts.
- Determine if different nurse-patient ratios and PACU experience of registered nurses affect the use of time.

## Materials and Methods

### *Study Population*

The current study was conducted in the PACU of the General University Hospital of Patras, Greece, which is a 700-bed, tertiary care, academic, public hospital. The 10-bed, Phase I PACU meets the needs of 12 operating rooms for general, orthopedic, urologic, obstetric, ophthalmic, ear-nose-throat surgery, and neurosurgery. On a daily basis during the morning shift, a mean of 10 operating rooms run with elective cases under the administration of general or regional anesthesia (or emergency cases if needed). No outpatients are admitted because all patients are discharged to a surgical ward, where they stay for at least one night. ICU overflow patients are admitted when necessary. The PACU is covered by three 8-hour nursing shifts, morning (7 a.m.-3 p.m., covered by two nurses), evening (3 p.m.-11 p.m., one nurse) and night (11 p.m.-7 a.m., one nurse). In the current hospital, nurses employed in the Department of Anesthesiology cover both the operating rooms and the PACU.

The PACU is staffed only by registered nurses (the operating rooms are covered by both registered and practical nurses), who constituted the population for the study. General University Hospital of Patras has been in operation since 1989. In Greece, it is usual for nurses to be employed at the same department for a long time. As a result, all nurses employed in the PACU have an experience of no more than 15 years. Thus, according to PACU experience, the

nurses were divided into three groups, less than 5 years, 5 to 10 years, and more than 10 years.

Porters and cleaning staff, who are employed in the Surgery Department, are responsible for covering PACU needs in transferring patients or cleaning spaces and equipment. No unit clerks or secretaries are employed in this PACU.

#### *Categories of Nursing Activities*

A descriptive approach was used to answer the research questions. Categories and subcategories of nursing activities in the PACU were constructed based on a review of similar instruments described in the literature,<sup>4,16,18-23</sup> the experience of the researchers, and the descriptions of a typical day's workflow. These descriptions were obtained through semistructured interviews between the researchers and the rest of the PACU nursing staff. The researchers (the 6 authors) are all registered nurses employed in the PACU of the General University Hospital of Patras, with PACU experience ranging between 4 and 15 years. To increase the accuracy of the data collection tool, care was taken so that subcategories of activities were precisely defined. After development of the classification form, all PACU nurses were consulted to check for appropriateness, completeness, and clarity. After the final classification form was developed, a code number was given to each category and subcategory of activities.

Categories and subcategories of activities, as well as their definitions, are presented in Table 1. Direct care (tasks performed only in the presence of a patient) was divided into direct clinical care, patient assessment, and communication with patients. Indirect care (tasks not necessarily performed in the presence of a patient) was divided into clerical nursing duties, documentation, communication with other persons, and non-nursing duties. Although some of the documentation tasks are associated with the patients' presence (ie, recording vital signs and administering medications), this category is traditionally not included in direct care (these tasks are performed away from the patient).

#### *Data Collection and Analysis*

The observation method was preferred for this study because it was considered more precise. The observations were made and recorded by the researchers at fixed 5-minute intervals by writing down the activity code number in the appropriate box of the hourly check sheet. On the same sheet, the researchers also recorded the kind of shift, the nurse-patient ratio for each 5-minute interval, and the years of PACU experience of the nurse under observation. According to ASPAN recommendations,<sup>28</sup> the nurse-patient ratio was considered appropriate when it was higher than or equal to one nurse for two extubated patients or one nurse for one intubated patient, and inappropriate when it was lower than those.

The observations were made from 9/1/2004 to 9/30/2004, and 360 hourly check sheets (45 8-hour observations) were completed during this 1-month period, which represented approximately 37.5% of the whole time equivalent staff in the PACU (37.5% of the whole time of PACU nurses during this 1-month period). Work sampling at 5-minute intervals provided 12 observations for each subject during an hour, or 96 observations for the whole 8-hour shift. Thus, it permitted the collection of a relatively large number of activities per day of observation and limited the number of observation days to a practical number. A stratified, random sampling procedure was used so that an equal number of hourly check sheets were surveyed per shift (120) and each day of the week, from Monday to Friday (72), whereas weekends were excluded. At the end of the study, a total of 4,320 observations were collected during the 30-day period. During the observation, the nursing personnel performed their usual functions. The researchers did not participate in patient care. To allow comparisons with other PACUs, the number of patients present in the PACU during each shift and their length of stay were also recorded.

SPSS 12 for Windows (Chicago, IL) was used for the statistical analysis of the collected data. Per-

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**Table 1. Categories, Subcategories, and Definitions of Nursing Activities**


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**Direct Clinical Care**

- Connecting patients to monitors: electrocardiogram, arterial blood pressure (invasive or not), central venous pressure, pulse oximetry, capnography, body temperature.
- Preparation and administration of drugs.
- Preparation and administration of blood or blood products.
- Assisting doctors with invasive techniques: placing a central venous, arterial, epidural, or urine catheter; placing or removing an endotracheal tube; obtaining blood samples for laboratory tests.
- Tasks associated with oxygenation of patients: preparing and placing a simple, Venturi, or Aerolin mask, connecting to ventilator, performing suctioning.
- Tasks associated with fluid balance of patients: administering crystalloids or colloids, placing a new urine bag or drain bottle, measuring urine or drain output.
- Tasks associated with temperature of patients: placing a thermometer (axillary, esophageal, or tympanic membrane); placing a cotton, reflective, or forced-air blanket.
- Tasks associated with level of consciousness of patients: instigating somnolent patients to breathe or anxious patients to calm down, protecting from injury (fall, pulling a catheter), assisting to move on the stretcher.

**Patient Assessment**

- Continuous observation of patients and monitors, evaluation of physiological parameters, estimation of laboratory results and psychological needs of patients.

**Communication with Patients**

- Providing information and psychological support to patients.

**Clerical Nursing Duties**

- Checking and troubleshooting general equipment: oxygen bottles and supplies, suction devices, intubation trays.
- Checking and troubleshooting technological equipment: ventilators, monitors, infusion pumps, blood gas analyzers.
- Checking stocks and providing with expendable material and drugs.

**Documentation**

- Documentation directly related to patients: charting, administration of drugs, patient record.
- Documentation of expendable material and stock of drugs.

**Communication with Other Persons**

- Communication with medical-nurse staff: gathering information about arriving patients, informing about alterations of patient status, arranging a patient transfer to another unit or ward, shift change.
- Managerial and administrative tasks: providing guidance to less experienced nurses, nurse assistants, cleaning staff, stretcher-bearers, radiological equipment operators.
- Tasks accomplished through telephone: communicating with medical-nurse staff of other units or wards, searching for laboratory results, providing information to patient relatives.

**Non-nursing Duties**

- Transferring patients or equipment or cleaning PACU spaces.

**Personal Activities**

- Attending training, breaks (coffee, meals), personal use of telephone or staying in PACU without performing any duties.
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**Table 2. Percentage of Categories of Activities: Total Staff Time**

Categories of Activities	Total Time (%)
Direct clinical care	35.2
Patient assessment	11.6
Communication with patients	7.0
Clerical nursing duties	8.6
Documentation	9.3
Communication with other persons	7.2
Non-nursing duties	2.3
Personal activities	18.8

cent occurrence of each activity was calculated for each shift, nurse-patient ratio, and years of PACU experience of nurses under observation.

#### *Ethical Considerations*

Permission to conduct this study was obtained from the Nursing Agency and the Ethics Committee of the hospital. The purpose and method of the study were explained to all nursing staff and their verbal consent was obtained before they were observed by the researchers. To guarantee the best possible anonymity of all nurses, no name was put on the check sheet. To assure confidentiality, data related to the identification of personnel were not transferred to or discussed with other staff members. Because the study was centered on nursing staff activities (not on interventions or outcomes associated with the patient), no consent of patients was considered necessary.

## **Results**

### *Number of PACU Patients*

From 9/1/2004 to 9/30/2004, 1,103 postoperative patients were admitted to the PACU, which corresponded to a mean of  $35.8 \pm 5.0$  patients per day. During the morning shift  $23.9 \pm 2.9$  patients stayed in the PACU (remaining patients from the previous night shift and new arrivals). During the evening and the night shift  $11.9 \pm 2.7$  and  $3.3 \pm 1.3$  patients stayed in the PACU, respectively. The mean length of stay was  $80.9 \pm 25.5$  minutes (no significant variations existed among shifts). It is also worth noting that

during the data collection period, three ICU overflow patients were admitted in the PACU with a mean length of stay of  $12.8 \pm 3.5$  hours.

### *Total Allocation of Time and Direct Clinical Activities (Tables 2 and 3)*

The percentage of time allocated to main categories of activities is shown in Table 2. Within a typical 8-hour shift, 35.2% of time was spent on direct clinical care. Much time was also spent on personal activities (18.8%) and on patient assessment (11.6%). On the other hand, little time was spent on non-nursing duties (2.3%) and on communication, either with patients (7.0%) or with other persons (7.2%). Finally, nurses spent an average of 8.6% of their time on clerical nursing duties and 9.3% on documentation. The percentage of time allocated to direct clinical activities is shown in Table 3. Preparation and administration of drugs accounted for more than a quarter of the total direct care time (26.8%). Connecting patients to monitors also required a significant amount of time (17.5%).

### *Differences Between Shifts (Table 4)*

Variations in the use of time were obvious between shifts. Direct clinical care (42.2%), docu-

**Table 3. Percentage of Subcategories of Activities: Direct Clinical Care Time**

Direct clinical care: Subcategories	Direct Care (%)	Total Time (%)
Connecting patients to monitors	17.5	6.2
Preparation and administration of drugs	26.8	9.4
Preparation and administration of blood or blood products	9.3	3.3
Performing or assisting doctors with invasive techniques	8.1	2.9
Tasks associated with oxygenation of patients	10.8	3.8
Tasks associated with fluid balance of patients	9.6	3.4
Tasks associated with temperature of patients	9.2	3.2
Tasks associated with level of consciousness of patients	8.7	3.0

**Table 4. Time Percentage of Categories of Activities: Differences Among Shifts**

Categories of Activities	Time (%)		
	Morning Shift	Evening Shift	Night Shift
Direct clinical care	42.2	35.6	27.9
Patient assessment	10.4	11.5	12.8
Communication with patients	7.5	8.2	6.9
Clerical nursing duties	8.0	12.4	5.4
Documentation	11.3	9.8	6.7
Communication with other persons	8.5	7.2	5.9
Non-nursing duties	2.1	3.2	1.6
Personal activities	10.0	12.1	34.4

mentation (11.3%), and communication with other persons (8.5%) reached their highest percentage during the morning shift. On the other hand, more nursing time was spent on patient assessment (12.8%) and personal activities (34.4%) during the night shift. Finally, communication with patients (8.2%), clerical (12.4%), and non-nursing duties (3.2%) increased during the evening shift.

#### *Differences According to Nurse-Patient Ratios (Table 5)*

When nurse-patient ratio was inappropriate, time for direct clinical care showed an increase (from 29.8% to 49.8%), whereas time for clerical duties and personal activities showed a great decrease (from 9.6% to 5.9% and from 23.5% to 6.0%, respectively) compared with appropriate nurse-patient ratio periods. Patient assessment, communication with other persons or with patients, documentation, and non-nursing duties showed only a small variation (or none) according to nurse-patient ratios.

#### *Differences According to PACU Experience of Nurses (Table 6)*

PACU nursing experience was related to some variations in the use of time. Time spent on communication with patients

**Table 5. Time Percentage of Categories of Activities: Differences According to Appropriate or Inappropriate Nurse-Patient Ratios**

Categories of Activities	Time (%)	
	Appropriate Nurse-Patient Ratio	Inappropriate Nurse-Patient Ratio
Direct clinical care	29.8	49.8
Patient assessment	11.5	11.9
Communication with patients	7.0	7.0
Clerical nursing duties	9.6	5.9
Documentation	9.2	9.6
Communication with other persons	6.9	8.0
Non-nursing duties	2.5	1.8
Personal activities	23.5	6.0

(8.2%) and direct clinical care (36.4%) was higher among less experienced nurses and decreased as the years of experience increased. On the contrary, time for patient assessment (12.2%), clerical duties (9.2%), documentation (9.6%), and personal activities (19.1%) was higher among more experienced nurses and increased as the years of experience increased.

**Table 6. Time Percentage of Categories of Activities: Differences According to Years of PACU Experience of Nurses**

Categories of Activities	Time (%)		
	<5 Y	5-10 Y	>10 Y
Direct clinical care	36.4	34.6	34.3
Patient assessment	11.1	11.7	12.2
Communication with patients	8.2	6.7	5.6
Clerical nursing duties	8.0	8.8	9.2
Documentation	8.5	9.9	9.6
Communication with other persons	7.1	6.9	7.8
Non-nursing duties	2.4	2.3	2.2
Personal activities	18.3	19.1	19.1



## Discussion

Because no work sampling studies have ever been conducted in the PACU, findings of similar studies conducted in ICUs have been considered the most comparable to this study. Both of these settings provide care for patients in critical condition who need intensive observation and therapy. Therefore, many more similarities exist between these two environments than between the the PACU and medical or surgical wards. However, important differences undoubtedly exist between PACU and ICU, and these are primarily related to the length of patient stay. Mean length of stay in PACU is estimated in minutes or hours, whereas in ICU it is estimated in days or even months. In contrast with the ICU, where there are usually few patient transfers during a 24-hour period, there is a constant patient flow in PACU, both admissions and discharges to wards. This is expected to result in differences of nursing time allocation, with respect to direct clinical care (ie, connecting and disconnecting patients to monitors) and indirect activities (ie, communication with medical staff for arranging a patient transfer to the ward).

In previous work sampling studies from ICUs, nurses were found to allocate a great percentage of their time in direct care and patient assessment, 41% and 22% in Norrie's study<sup>23</sup> and 24% and 38% in Harrison and Nixon's study,<sup>4</sup> respectively. In the current study, this percentage is somewhat smaller, 35.2% in direct clinical care and 11.6% in patient assessment, but significantly higher when compared with studies not conducted in critical care settings. ICU and PACU patients are characterized by instability of vital functions and require astute, constant observation. The high percentage of time devoted to patient assessment corresponds with the routine needs of critical care patients and should never be considered wasted time. The ability to correctly assess patient status and recognize the risk of a life-threatening complication before its manifestation allows for the proper intervention.<sup>29</sup>

In most ICUs, the number of patients does not vary significantly among shifts, whereas in the Surgery Department, most cases are generally scheduled for the morning shift and only emergency cases are admitted during the evening or night shift. In Harrison and Nixon's study,<sup>4</sup> no important differences were found in the profile of activities among shifts, with the only exception of non-nursing duties (doubled at the evening shift). In Norrie's study,<sup>23</sup> variations were investigated on an hourly basis (during a 12-hour day) instead of a shift basis. Three peaks of increased direct care and clerical duties, with the average of 34% and 15% respectively rising to 44% and 25%, were observed. These peaks mainly represented transferring of patients to the wards or admission of postoperative patients. A remarkable increase in indirect care, including clerical or administrative duties and dealing with doctors or relatives, has also been confirmed in the ward settings during the evening shift.<sup>19</sup> In the current study, important variations were observed among shifts. High percentages of direct clinical care, documentation, and communication with other persons during the morning shift can obviously be attributed to elective surgery admissions. On the contrary, high percentages of personal activities during the night shift are an expected finding, which further constitutes a point of difference between PACU and ICU.

In 2001, Bowers and others<sup>14</sup> investigated the way nurses manage their time and activities in long-term care by using grounded dimensional analysis instead of the work sampling method. According to their findings, when working under limited time conditions, nurses develop strategies that enabled them to meet the minimum requirements, such as reprioritizing their tasks based on perceived necessity and changing the pace of their work based on the acuity of patients and tasks. In the current study, when nurse-patient ratio was inappropriate, time seems to have been subtracted from personal activities and clerical duties and added to direct clinical care and communication with other

persons. This alteration of priorities aims at meeting increased patient care needs. With regard to years of experience, less experienced nurses allocate more time to direct clinical care and communication with patients. Similar to this, Bowers and others<sup>14</sup> have stated that early in their careers, nurses considered meeting patients' psychosocial needs as necessary. However, as years of experience increased, this emotional work became less important for them and they considered being competent in administrative and clerical tasks more important. Moreover, Norrie<sup>23</sup> also found that ICU D-grade staff (less experienced) more actively undertake direct care activities.

### Implications for Nursing Practice

Suggestions for improving delivery of services by registered nurses in the PACU should focus on decreasing the time during which the nurse-patient ratio is inappropriate and increasing the time allocated to direct clinical care, patient assessment, and psychological support. According to Neatherlin and Prater,<sup>18</sup> the traditional three-shift staffing system should be adjusted to increasing staffing needs. The establishment of an intermediate shift between 11 a.m. and 7 p.m., when the majority of elective surgery patients arrive in the PACU (and inappropriate nurse-patient ratios predominantly occur), could offer important assistance to morning and evening shift nurses. The addition of an extra nurse during these hours could significantly increase the daily percentage of time with an appropriate nurse-patient ratio. In combination, a solution to increased workload during the night shift, ie, as a result of unexpected emergency cases, could be the on-call system, that is, a nurse could be on call at home and be asked to help when increased staff demands appear.

The second aim is feasible only by reducing time allocated to activities that do not require specific knowledge and skills, such as clerical duties, paperwork, and communication with other persons. The development of assistant staff could relieve registered nurses from spend-

ing their time in the performance of clerical duties and help them better organize their practice, provided assistants will operate under the supervision of nurses and no direct care tasks will be delegated to them. The presence of a unit service clerk to maintain technological equipment or a pharmacy technician to assist in the preparation of drugs has long been proposed.<sup>16</sup> The results of a recent questionnaire-based study<sup>29</sup> conducted among ICU registered nurses strongly supported the introduction of health care assistants, but there was conflict with regards to the functions they could serve. Most nurses believed that assistants should perform activities that do not carry risk to the patient, ie, ordering or stocking expendable material, unpacking pharmacy, and removing or gathering equipment.

Although documentation has traditionally been a nursing responsibility, secretarial support could be beneficial given the relatively great amount of time spent on daily and routine paperwork. The presence of a secretary in the PACU could also relieve nurses from answering the telephone, communicating with medical staff, searching for laboratory results, providing information to patients' relatives, and arranging a patient transfer. Moreover, technology could offer a solution to time wasted dealing with paperwork.<sup>30</sup> The use of clinical information systems to record and save data electronically has been proven to offer important benefits in ICU settings by saving time, reducing errors, and enhancing communication. A computerized database containing demographic details, diagnosis, and medical-nursing procedures can be constructed, which is then automatically informed with new monitoring parameters, laboratory data, and administered drugs. These systems could also be applied in the PACU setting, and although the initial cost of them is high, their cost-effectiveness is worth studying.

The above-mentioned suggestions have already been applied in some PACUs. Thus, the results of the current study support the spread of their

application to more hospitals so that the knowledge and skills of the available staff can better be used.

## Limitations

Limitations of this study included the following:

- Time devoted to patient observation or psychological support was decreased during the morning shift or when the nurse-patient ratio was inappropriate. This finding may reflect reality or represent a major limitation of work sampling studies. In these, the data collection method is based on the identification of only one activity per 5-minute period, whereas under real conditions several activities may be undertaken simultaneously, ie, an experienced nurse may be able to observe monitors while administering medications, or doing paperwork while communicating over the telephone. Activities conducted simultaneously are impossible to distinctly

record and the researchers are obliged to make a choice between them.

- In work sampling studies, nurses are informed about being observed. This may lead to the Hawthorne effect, which is the alteration of their real-conditions behavior as a result of the knowledge of observation, ie, they may try to appear more conscientious or allocate more time than usual to direct care activities.
- It is possible that the official tasks of PACU nurses differ significantly among different hospitals or countries. For example, in Greece, nurses are not legally authorized to intubate or extubate patients and they administer drugs or blood products only after a physician's order. Considering fitness for discharge of patients from the PACU is primarily decided by medical staff as well. In other countries, more autonomy may be granted to PACU nurses in regard to such tasks.

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### CALENDAR OF EVENTS

**October 21-23, 2005.** FLASPAN's 36th Annual Conference, "Staying Alive in 2005 . . . Bringing Back the Magic," Grosvenor Resort, in the Walt Disney World Resort, 1850 Hotel Plaza, Lake Buena Vista, Florida. For further information, contact: Linda Boyum at 386-756-0405, [lboyum@earthlink.net](mailto:lboyum@earthlink.net) or Ida Goldstein at 941-924-7604, [cckookie1@msn.com](mailto:cckookie1@msn.com).

**October 21-22, 2005.** PANAC (PeriAnesthesia Association of California) will hold its 26th annual meeting and seminar at Horizon Casino and Resort in Lake Tahoe. For information click on [www.panac.org](http://www.panac.org). In California call toll free at 1-866-321-3582 or write to PANAC, PO Box 86, Newcastle, CA 95658.