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UNITED STATES ARMY

HEALTH CARE STUDIES AND

CLINICAL INVESTIGATION ACTIVITY

Post Anesthesia Care Unit Patient Classification System:
The Direct Care Nursing Time Component
Final Report

Conducted by U.S. Army Health Services Command
U.S. Army Health Care Studies and Clinical
Investigation Activity, Nursing Studies Branch

Investigators:

John L. Carty, LTC, AN
Ruth E. Rea, LTC, AN
Bonnie L. M. Jennings, LTC, AN

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The intent of the study was to quantify the time Post Anesthesia Care Unit (PACU) nurses spend in direct patient care (i.e., that care provided in the presence of the patient). The quantified PACU direct care time would provide one critical component necessary for the development of an acuity based Patient Classification System (PCS). The study was conducted in three broad phases over a period of two years. Phase I, a panel of clinical nursing experts identified 62 direct care nursing tasks that reflected the full range of PACU nursing. The average time (mean time) to complete each of the 62 direct care tasks was established by actual stopwatch timed measurements. In Phase II a PACU data collection instrument was developed that contained the 62 PACU direct care tasks. A pilot test of this 62 task instrument revealed a reliability of r .93 and a validity of r .82. A field study was initiated at six Army Medical Treatment Facilities (MTFs) with 4018 data collection instruments completed over a period of 14 weeks. Analysis of the data revealed three naturally occurring patient acuity categories (category I 0-29 min, category II 30-69 min, and category III 70 min or greater). Regression analysis identified 25 tasks as the fewest best set of direct care predictor tasks.

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In phase III a panel of PACU clinical nursing experts modified the format of the instrument to enhance clarity, conciseness and ease of use. A two week clinical study of this 25 task instrument was undertaken to assess clarity, conciseness and ease of use. A large majority or 87.5% of the clinical staff reported that the instrument was easy to use and 93.8% noted it was concise and clear. Evaluation of the psychometric parameters of this modified 25 task instrument revealed a reliability of r .98 and a validity of r .90.

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INTRODUCTION

Purpose

The Army Nurse Corps (ANC), recognizing the need to objectively determine nursing care and staffing requirements, recommended to the Army Medical Department (AMEDD) Study Board that a patient classification system (PCS) be developed for the Post Anesthesia Care Unit (PACU). As a result, Health Care Studies and Clinical Investigation Activity (HCSCIA), Fort Sam Houston, Texas, was tasked with extending the Workload Management System for Nursing (WMSN) into the PACU area. This study moved into the triservice arena in September 1988. During a meeting at which Office of the Assistant Secretary of Defense, Health Affairs (OASD[HA]), the Joint Healthcare Management Engineering Team (JHMET), and HCSCIA were represented, it was agreed that the methods used in this study would be acceptable even though the study began prior to the existence of the JHMET.

It was also agreed that it was highly unlikely that direct care would vary among the services. In order to move forward with the study, it was deemed acceptable to derive direct care measurements from Army sites only. This part of the study focused on that care provided in the presence of the patient. The direct care measurements obtained would be used in developing the triservice staffing standard for PACU.

Like the Direct care component the Indirect care component of the PACU PCS will be conducted at Army sites. Indirect care reflects patient care activities that occur away from the patient (e.g., preparing medications or charting) as well as activities involved in unit administration. In the end both the direct and indirect parts of the study will be combined to develop the PACU staffing standard. The purpose of this study was to develop the direct care part of the PACU patient classification system based upon quantified direct nursing care times that reflect patient acuity.

Background

The ANC, in order to better identify the nursing resources required to provide safe and high quality care, developed a PCS known as the WMSN (Sherrod, Rauch, & Twist, 1981; Misener, Frelin, & Twist, 1983; Vail, Norton, & Rimm, 1986; United States Army Manpower Requirements and Documentation Agency, 1986). The WMSN is used to collect patient acuity information for the inpatient nursing areas of critical care, medical/surgical, obstetric/gynecology, psychiatric, neonatal (newborn) and pediatric. But the PACU area presented special needs that are not captured by the WMSN. Not having a PCS for the PACU created a problem with determining total nurse staffing requirements. In the past, Army health care personnel requirements were determined by the number of occupied beds, live births, and ambulatory

patient visits (AR 570-5). Nurses recognized that basing personnel requirements on the number of beds occupied, was erroneous (Lewis & Carini, 1984) and often led to inaccurate staffing. For example, the number of beds occupied assumes that the patients in each bed require the same amount of nursing care. Using this unit of workload measurement does not take into account the fact that patients require different amounts of nursing care time, influenced by the seriousness of the patients' illnesses, the patients' responses to the illness, or the patients' responses to treatment interventions. Further, advances in technology such as new anesthesia agents, more complex surgical procedures, and new types of medical equipment, also affect the required nursing care time in the PACU arena.

At the beginning of this study, a careful review of the literature was conducted to identify existing PACU PCSs. The eight PACU PCSs identified in the literature were facility specific, that is, each facility had developed its own PCS from scratch or modified an already existing PCS to fit its own facility. To foster the fit with the present PCS (WMSN) and enhance the empirical bases of the study, it was decided to utilize the most objective method available to develop the PACU PCS. The literature (Shirk & Marion, 1986) identified the factor evaluative method rather than the prototype method as the most objective. The factor evaluative method utilizes a number of critical indicators of direct care that are individually timed then combined to designate a patient's category (Abdellah & Levine, 1965). The prototype method uses predetermined sets of descriptive characteristics of patients for each category as its base. The prototype method by its very characteristics is more subjective than the factor evaluative method.

To ascertain whether any of the existing PACU PCSs could be used to develop a factor evaluative PACU PCS, the researchers used five criteria to guide the evaluation. These five criteria included both psychometric standards and clinical issues. First, the measured nursing activities needed to be operationally defined and as free of subjective interpretation as possible. Second, the tool needed to be based upon a factor evaluative method rather than a prototype descriptive approach. A factor evaluative classification tool would articulate better with the existing WMSN and is cited as having a higher degree of methodological consistency than other techniques (Aydelotte, 1973; Lewis & Carini, 1986; Gallagher, 1987; Lewis, 1988). Also the factor evaluative method provides timed measurement of nursing activities which are more objective than time estimates derived from expert opinion or self-reports. Third, the tool needed to reflect the entire range of direct nursing care activities provided in the PACU. Fourth, data had to be available to support claims of instrument reliability and validity. Fifth, the tool needed to be user friendly in terms of ease of use and time needed to complete.

Eight PACU PCSs plus the WMSN were reviewed and evaluated using the five criteria described in the above paragraph. The existing PACU PCSs were primarily prototype in development with only two of the nine PCSs described as factor evaluative (See Table 1). The WMSN was the only factor evaluative PCS that met all five criteria. Review of the literature reinforced the use of the WMSN as a model for developing the PACU PCS.

TABLE 1

Patient Classification Systems (PCS) Compared on Five Criteria

PCS Name	Operational definitions	Factor evaluative	Domain of practice	Reliability validity	User friendly
STACK & JONES (1981)	NO	NO	NO	NO	YES
ASPAN (1983)	NO	NO	N/C	NO	YES
BEACH (1985)	NO	NO	YES	N/C	YES
SMITH & VANDEVOORDE MACKHAM (1985)	YES	NO	YES	NO	NO
MILLER (1986)	NO	NO	YES	NO	YES
SHIRK & MARION (1986)	NO	YES	YES	NO	NO
ALTEIMER (1986)	NO	NO	N/C	NO	YES
SPADACCIA (1985)	NO	NO	N/C	NO	YES
[a] WMSN Vail,(1986)	Yes	Yes	Yes	Yes	Yes

Note.

NO = not evident in the literature
YES = evident in the literature
N/C = not clear in the literature
WMSN[a] = Factor evaluative patient classification system **"MODEL"**

The WMSN is an objective, factor evaluative, inpatient PCS that provides patient acuity and staffing requirement information in six inpatient clinical areas. The basic data utilized in the development of the WMSN came from the Sherrod, Rauch, and Twist (1981) researc¹ project. They used a factor evaluative approach to study an extensive number of direct care nursing tasks. A total of 357 direct care nursing tasks were operationally defined and measured. The original list of nursing tasks did not specifically identify PACU tasks as a separate segment. However, many of the tasks performed in PACU were present in the critical care and medical/surgical segments of the Sherrod group's study. By using existing data from portions of the study (Sherrod et al. 1981), a Post Anesthesia Care Unit PCS could be constructed that would comply with the selected evaluation criteria.

The changes in nursing practice over the years have not decreased the relevance of the Sherrod et al. (1981) critical care and medical/surgical nursing tasks that were identified as reflecting PACU nursing. But, technology has continued to advance resulting in changes in PACU nursing practic... As a result of practice and technology changes, the PACU relevant tasks from Sherrod et al. (1981) do not reflect the full range of PACU practice. The new tasks specific to PACU were identified requiring development of operational definitions and measurement. This study was designed to incorporate the newly identified PACU tasks by developing a patient acuity tool to reflect direct care time for current PACU nursing practice.

OBJECTIVES

The scope and complexity of this study required that the study objectives be organized into phases to provide a structure for its orderly progression. The study objectives are as follows:

Phase I

1. Identify the full range of tasks relevant to PACU practice;

2. Measure newly identified PACU tasks;

3. Derive mean times for all direct care PACU tasks;

Phase II

4. Develop a valid and reliable instrument to capture direct care time;

5. Determine acuity categories relevant to PACU;

6. Reduce the number of tasks to the fewest and best set of predictor tasks for total direct care time;

Phase III

7. Revise and test the modified instrument in the clinical area for ease of use;

8. Assess the validity and reliability of the modified instrument.

METHODS AND FINDINGS

Overview

It was evident that the objectives of the investigation could be more clearly and concisely managed by organizing them into three separate phases. Consequently, the methods and findings will be addressed by referring to each phase. Analysis was completed on each phase before proceeding to the next phase, since each phase was dependent on information from the preceding phase. All phases were conducted in consideration of the military regulations governing the development of manpower staffing standards.

Phase I of this study replicated the approach used by Sherrod et al. (1981). Phase II was guided by the existing WMSN with the exception that an explicit attempt was made to reduce the number of indicators to the fewest best predictors of direct care time. Phase III focused on tool refinement relative to user friendliness, as well as identifying marketing issues.

Timed studies and all subsequent data were collected from PACUs within U.S. Army Health Services Command (HSC). Site selection was determined by workload. Facilities with high and medium PACU workload were used to facilitate representation of all degrees of complexity of cases. Low workload facilities were not used because their complexity of patient care is already represented in the medium workload facility. Also the absence or decreased frequency of some nursing tasks at low workload facilities would require increased time and resources to obtain the required amount of data. By using only high and medium workload facilities the cost-benefit ratio of collecting data was enhanced.

Phase I Procedures (with Intermediate Results)

Phase I began in February 1988 and continued through August 1988. This phase of the study followed very closely the method used by Sherrod et al. (1981). This approach enhanced the achievement of the Phase I objectives of (1) identifying direct care tasks relevant to PACU, (2) measuring newly identified PACU tasks, and (3) deriving mean times for each task.

Identifying Relevant PACU Tasks (Objective 1)

The critical care and medical/surgical direct care nursing activities from Sherrod et al. (1981) were reviewed by a panel of six PACU nursing experts for their relevance to PACU. The review focused on those tasks and their operational definitions that were most likely to be predictive of direct care time in the PACU area. A list of these (259) tasks can be found in Appendix A to include two new tasks recommended by a group of experienced PACU clinical staff nurses. The PACU nurses advised that the addition of Hypothermia set-up (2704) and Admission to PACU (2703), would better reflect current PACU practice.

Review by Clinical Experts. The list was distributed by mail to six PACU clinical nursing experts (ANCs) who had a threefold responsibility. First, they were asked to determine whether each task was a nursing activity that occurred in PACU and possibly a predictor of direct care time (**relevance**). Second, they were asked to determine whether the operational definition for

each task accurately described the specific task (**specificity**). Finally, they were asked to determine if additions to the list were needed to represent the full scope of current PACU nursing (**completeness**). The results of the mailed survey from the clinical experts identified 86 tasks as pertinent to PACU. There were three criteria for keeping tasks: (a) at least four of six clinical experts selected the task, (b) the task occurred regularly, or (c) took a sufficient amount of time to perform. Twenty-four of the 86 tasks selected by clinical experts received the minimum of four votes.

After the clinical experts reviewed the tasks and operational definitions, the principal investigator conducted a telephone conference to reach consensus regarding (1) tasks to keep on the list; (2) tasks to be added to the list; and (3) task operational definitions which needed minor alterations but would not entail remeasuring. The telephone conference with the six clinical experts resulted in a consensus; five of six clinical experts agreed on 76 of the 86 tasks selected on the survey as encompassing today's PACU nursing practice. A total of 183 tasks were not selected by the panel of nursing experts as representing the domain of PACU practice and were excluded as possible predictors of direct care time. The operational definitions for those tasks identified by the clinical experts as pertinent to PACU can be found in Appendix B.

The clinical experts also reviewed the task list to determine if additional tasks needed to be included. The additional tasks suggested were of two general types: (a) tasks that needed updating because of nursing practice or technological changes and (b) individual tasks that were integrated into sets of direct care tasks routinely done together in the PACU. For example, hypothermia set-up had changed because of the use of timers and the type of heat lamps utilized. Discharge from PACU is an example of an integrated set of direct care tasks that were routinely done together for all patients at discharge and/or transfer from PACU. Altogether the experts agreed that seven new tasks should be added to the list (Appendix C). Operational definitions were written by the clinical experts for the seven new tasks to include the two tasks identified previously by the PACU clinical nursing staff (Appendix C).

Lastly, the clinical experts reviewed the operational definitions from the Sherrod et al. (1981) study to determine whether they remained satisfactorily descriptive of the task. Operational definitions for individual tasks from the Sherrod et al. (1981) study were accepted with only minor changes to enhance clarity. None of the Sherrod et al. (1981) tasks merited remeasurement due to rewording of the operational definitions.

Task Integrations. The nurse researchers decided that selected Sherrod et al. (1981) tasks could be integrated into sets of tasks because they were either performed in conjunction with each other or were mutually exclusive. Integration of these tasks would better reflect PACU clinical practice. The decreased number of tasks would enhance ease of use of the data collection instrument.

Integration of those tasks done in conjunction with each other were identified as being **bundled**. That is, the mean time for each of the individual tasks to be **bundled** were summed to create a new mean time. For example, circulation check and pulse check are two tasks that are routinely performed in conjunction with each other. They were **bundled** into one new task called Circulation/Pulse Check. The mean time for circulation check (.67 minutes) and

the mean time for pulse check (1.03 minutes) were totaled to obtain a new mean time for Circulation/Pulse Check (1.70 minutes). Vital signs, one of the most frequently occurring nursing tasks, was **bundled** with each of the following: Stir-up Routine, Fundal Massage, Neuro Assessment, and Motor/Sensory testing. These tasks are consistently done in conjunction with vital signs (Appendix D1). For example, the mean time for vital signs (2.32 minutes) and the mean time for motor/sensory (1.18 minutes) were totaled to give a new mean time of 3.50 minutes (Appendix D1).

Other tasks that were integrated were those that were mutually exclusive (if one of the tasks was performed the other was not). The mean time for these **combined** tasks were derived by totaling the mean times for each tasks being integrated, then dividing by the number of tasks. For example, the mean times for giving a bedpan (2.60 minutes) and urinal (1.97 minutes) were summed and then divided by number of tasks integrated (2). That yielded a mean time of 2.29 minutes for the new **combined** task of Bedpan/Urinal (Appendix D2).

Final Task Review. To substantiate content validity, the tasks and their operational definitions, which stemmed from the experts' consensus and decisions by the nurse researchers, were sent to four new PACU clinical experts for review. They reviewed the task list with two questions in mind:

(a) Is the full range of PACU practice covered by the task list (**completeness**)?

(b) Are the operational definitions clear and applicable to the task (**specificity**)?

They were in complete agreement that the tasks list encompassed the full range of PACU practice and the operational definitions clearly and accurately described the tasks (Appendix E).

Measuring Select Tasks (Objective 2)

The second objective of Phase I was to measure selected tasks. This objective required: (a) careful assessment of the tasks from Sherrod et al. (1981) in relation to the regulation that govern staffing standards and (b) measuring the newly identified PACU tasks. Utilizing the regulations governing staffing standards, the nurse researchers conducted a careful review of the statistical parameters of the tasks taken from the Sherrod study. Analysis of the data included looking at the sample size (n') required by the staffing standard regulation. The value for n' is congruent with the 95% confidence interval of $\pm$ 10% of the mean task time. The n' was calculated using Air Force Regulation 25-5 dated 16 May 1988, Table 15-1. Utilizing the staffing regulation formula, the sample sizes (n') were large primarily because of the inherent variability in health care (Appendix F).

Selection of Tasks for Measurement. Tasks that were measured in the Sherrod et al. (1981) study were assessed to determine if sufficient measurements had been collected, based on statistical, scientific, and pragmatic criteria. Confidence intervals (CI) of 80% and 95% were constructed for each of the Sherrod et al. (1981) tasks on the PACU list (Appendix F). The lengths of these confidence intervals were examined to assess the precision of the Sherrod et al. (1981) times. Acceptable precision as measured by Confidence Intervals was based on scientific judgment considering the practice

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setting and the requirements of the instrument being developed. It was not reasonable in the clinical setting to use a fixed criterion for all tasks or to use a strict statistical computation. Whenever practical, 95% CI lengths were used. However, in light of practical cost-benefit concerns, 80% CI lengths were judged to be acceptable as precision estimates for tasks more difficult to sample.

In general, tasks with fewer than 30 observations in the Sherrod et al. (1981) study were targeted to be remeasured. However, exceptions were made for the tasks with acceptable precision despite the smaller number of observations; all of the pertinent PACU tasks with fewer than 30 observations were found acceptable. In the absence of any variance estimates for the seven new tasks (unmeasured), a target sample of 30 observations per task was set because this number provided adequate precision in previously measured tasks.

Measurement Techniques

At selected Army sites, stopwatch timed measurements were obtained for the seven newly identified tasks for which no timings were available (Appendix F). The new tasks were timed at selected medical treatment facilities (MTFs) within the U.S. Army Health Services Command (HSC). The PACUs selected had moderate or high workload. Surgical workload data were obtained from Patient Administration System and Biostatistics Activity (PASBA) to identify the moderate and high workload centers (See Figure 1). The use of moderate and high workload MTFs (community size hospitals and large medical centers) provided the full range of patient care complexity and the opportunity to collect the appropriate number of observations within a reasonable time period.

FIGURE 1.

Site Selection for Timed Measurements (Based on Number of Surgeries per Year [1988])

Moderate Workload[a]												High Workload[b]					
		★ ★	★	★	★												
	★ ★ ★★	★	★	★	★			★								
★★★	★★★	★★	★★	★★	★★ ★	★ ★ ★ ★	★			★ ★		★ ★					
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
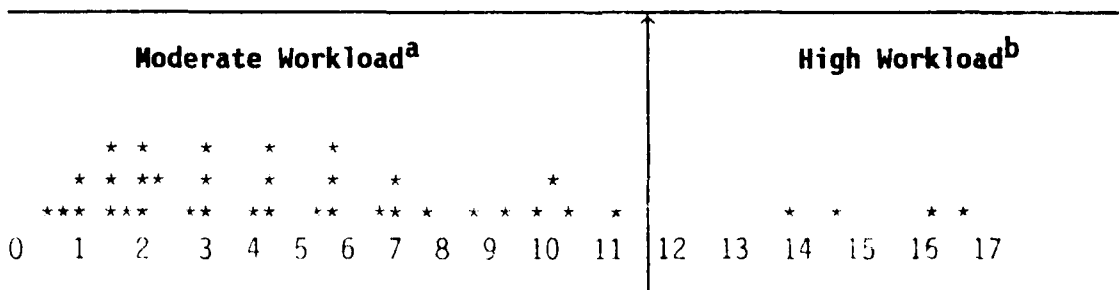
Note.

Each number = 1,000 patients
Each   *   = 1 Medical treatment facility
a = 300 to 11,230 surgeries per year
b = 13,800 to 16,400 surgeries per year

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The goal was, to the extent possible, to collect at least 30 observations of each task at each site. Measurements were collected at each site only for the duration of the specified data collection period (21 days). Thus, there were fewer measurement opportunities for tasks that were done infrequently. The limitations on the data collection time frames were deemed appropriate, considering the cost-benefit issues.

A data collection worksheet was utilized to capture the task information: time to perform the task, the number and type of personnel performing the task, surgical service, type of anesthesia, anesthesia risk assessment, age, gender, type of medications given in PACU, and complications. Data were collected on surgical service, type of anesthesia, anesthesia risk assessment, age, gender, medications, and complications because of potential influence on direct care time. Information on the number and type of staff providing care was collected so that it would be available for developing the staffing standard.

To assure that the times reflected the total number of nursing care providers involved with the task, each timer used more than one stopwatch. If two nursing care providers were involved with the task, two watches were used in the timings. The timings were started and stopped according to when each care provider was at the bedside. The time for each care provider was recorded on the data collection form. The total time used in the analysis was the sum of the time of all care providers involved with the timed task.

Interrater Reliability (data collectors)

Before data collection, all the data collectors were trained in the timing procedures. They were taught to begin and end the timings according to the operational definition of the task. The data collectors were familiarized with the clinical setting, data collection forms, stopwatches, and appropriate method to conduct the timings. This latter element was necessary to assure that the data collectors considered such things as timing each care provider separately. That is using a separate stopwatch for each nursing staff member providing care to the same patient at the same time. Two sets of tasks were used in determining interrater reliability: (1) continuous tasks usually using only one staff and (2) tasks with generally more than one staff who is intermittently involved in tasks. The interrater reliability coefficients ranged from r .92 to r .99 thus suggesting that each of the data collectors were observing the various tasks in a similar manner. This high level of reliability supports the premise that there was consistency in task measurement among data collectors.

Entree

Prior to data collection, an entree letter was staffed through the Chief of Staff, HSC, to the commanders of the selected MTFs for permission to conduct the study. After permission was obtained, briefings were arranged for the Chief Department of Nursing and PACU staff at each site to explain the purpose and objectives of the study. Upon request entrance and/or exit briefings were provided for the MTF Commander.

Derivation of Mean Times (Objective 3)

After the time measurement data were collected on the seven new tasks, the data collection forms with 970 observations were carefully examined. The investigators examined each of the forms for completeness of data. Further, all questionable notations were clarified with the individual data collectors. Critical decisions about keeping or dropping data were made by the principle investigator in consultation with the coinvestigators. The data were entered and verified by trained data entry operators. Once data entry was completed, mean times were obtained by analyzing the times per task by site and finding the average or mean time for each task. The mean times for all the relevant PACU tasks can be found at Appendix F.

Phase I Findings

To restate, a panel of clinical experts identified the domain of PACU nursing tasks and their operational definitions. Their findings were reaffirmed by a second panel of clinical experts. Those seven new tasks identified by the experts as germane to PACU were timed by stopwatch at selected sites. Analysis of the data yielded mean times for each newly timed task.

Identifying Relevant PACU Tasks (Objective 1)

A total of 970 timed observations was done for the seven new PACU tasks during the hours of operations at all selected sites for a period of 21 days per site. The data were carefully reviewed by the investigators with unusable data being purged. Each data sheet was reviewed for completeness, improper task codes, unlikely times, etc. The principle investigator reviewed each of the identified errors, correcting and accepting where possible and eliminating the unacceptable data.

Measuring Selected Tasks (Objective 2)

Before analyzing the data to derive mean times for the newly measured PACU tasks, data were scrutinized from a number of perspectives to affirm the data base was reliable. Three objectives guided this part of the analysis: (a) examine the data for outliers, (b) review the data for variations among sites, and (c) evaluate whether other variables such as anesthesia type, anesthesia risk assessment, medications, or complications would affect times.

The seven new PACU tasks are:

1. Admission to PACU (n=304);

2. Hypothermia (n=43);

3. Stir-up routine (n=134);

4. Monitor set-up (n=9);

5. Discharge from PACU (n=263);

6. Vital Signs with Stir-up (n=107);

7. Automatic Blood Pressure (n=67) were timed at the different test sites. The newly measured tasks were analyzed across all sites by the possible confounding variables of surgical service, anesthesia risk assessment, age, gender, medications, complications, and anesthesia type.

Analysis of the data revealed no significant difference among sites for Hypothermia, Stir-up routine, Monitor set-up, Discharge from PACU, Vital signs with stir-up routine, and Automatic blood pressure. But the analysis did reveal a significant difference among sites for Admission to PACU. The statistically significant difference in Admission time was further analyzed and were found to be the result of the type of anesthesia the patient had received prior to Admission to PACU. When Admission time was analyzed according to the type of anesthesia it was found that (a) general anesthesia required an average of 18.4 minutes for admission, (b) region/spinal anesthesia required an average of 15.9 minutes, and (c) local, or local with sedation required an average of 12.6 minutes for admission to PACU (Appendix F). When Admission to PACU was analyzed across sites adjusting for type of anesthesia, no significant difference was noted. Appendix F displays the actual mean tasking time in minutes for all nursing activities used in the development of the PACU data collection instrument.

The data were analyzed using analysis of variance (ANOVA) to assess differences among facilities. ANOVA assumes that the distribution follows a normal curve; in this case time could not meet that assumption of normal distribution. Time having a finite (0) start point and an infinite stop point, showed a typically skewed distribution to the right requiring transposing time to more closely approximate the normal distribution (Glass & Hopkins, 1984). Transposition of time was accomplished by dividing 1 by actual time (1/time) which yielded a transposed time (t-time) used for statistical comparisons. By using transformed time it was easier to determine whether a measurement was an outlier (an error in measurement, etc.) or a real but extreme value. In fact, those few measures at the high and low extremes were explained by the clinical situation.

Derivation of Mean Times (Objective 3)

The mean time for each newly measured PACU task was computed on individual observations across sites. The types of anesthesia had to be considered in arriving at a mean time for Admission to PACU. The data were analyzed according to types of anesthesia (general, spinal/regional, local/local with sedation) that yielded three separate mean times for admission to PACU. The mean time for each newly measured task can be found in Appendix F.

Phase II Procedures (with Intermediate Results)

Phase II of the study began in August 1988 as the final work was done on Phase I. Phase II data collection and analysis was concluded in May 1989. Phase II focused on objectives 4, 5 and 6. Objective 4 dealt with development of a valid and reliable instrument that would reflect total direct care time in the PACU. Objective 5 was to determine the acuity categories applicable to PACU. The last, Objective 6 was to identify an optimal parsimonious set of predictors (tasks) of total direct care time. A series of regression models were evaluated and used to identify the optimal PCS tool. The goal of phase II was the development of a tool with the smallest set of predictors that

accurately categorized patients according to acuity and accurately account for total direct care time.

Instrument Development (Objective 4)

Initial Instrument for Measuring Total Time.
A critical step in the development of the PACU instrument was accomplished in Phase I with the identification of individual and combined/bundled tasks for the instrument. Appendix G lists the mean times for each individual and combined/bundled task. Also depicted in Appendix G are the operational definitions for the combined/bundled tasks. At the beginning of Phase II, the focus was on the organization of the tasks into a worksheet format that would enhance ease of use. The aim was to arrange the tasks to foster easy identification and marking of the tasks. To that end the tasks were arranged under subheadings that were similar to the present patient acuity tool (WMSN) (Appendix H). The investigators and two PACU nurses reviewed the arrangement of the subheadings and the tasks under each subheading. A user manual was developed for the data collection worksheet that included operational definitions for each task, instructions for use of the worksheet, and answers to possible questions.

Instrument Reliability and Validity.
A pilot study was initiated to evaluate the validity and reliability of the PACU instrument. In early October 1988, one medical treatment facility with a moderately busy PACU was used as the pilot test area. The PACU staff was provided user manuals for reference, was familiarized with the operational definitions, and was instructed on use of the worksheet. After the staff was trained in the use of the worksheet, reliability and validity were evaluated. Instrument reliability was evaluated by comparing Researcher time with Staff time and validity was evaluated by comparing Stopwatch time with Researcher time (Table 2).

The **Pilot test** plan was to follow a minimum of 30 patients throughout their recovery in PACU. The staff completed a data collection worksheet on each patient upon admission to the PACU. The staff noted the admission and discharge/transfer time on each patient and marked each completed task. Simultaneously, the researcher completed an identical worksheet on each patient and used stopwatches to record actual total direct care time. Upon the patient's discharge from PACU, the worksheet completed by the nursing staff was paired with the researcher's worksheet. Three measurements determined validity and reliability: (a) staff's worksheet that reflected direct care provided; (b) researcher's worksheet that reflected direct care provided; and (c) stopwatch time of total direct care time.

Over a period of 5 days, 34 patients were followed through their PACU recovery period. The data from the worksheets completed by the staff and the nurse researchers were used to evaluate the reliability and validity of the PACU instrument. The focus was to use stopwatch times as the gold standard to validate whether the worksheet times reflected actual direct care time (**concurrent validity**). The stopwatch times and worksheet times were very similar except for Vital Signs. The use of automated vital signs had become the standard technique in PACU nursing. The mean time for the manual process was 2.32 minutes whereas the automated process had a mean time of 1.01 minutes. When the automated vital signs mean time of 1.01 minutes (Stopwatch time) entered the analysis, the instrument's concurrent validity was supported (See Table 2). Content validity had been previously established when the experts had determined the tasks list for PACU.

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TABLE 2

Initial Reliability and Validity of the PACU Instrument.

Comparison	Mean Time	r^a
Reliability		
RESEARCHER INSTRUMENT TIME	40.9	
		.93
STAFF INSTRUMENT TIME	38.4	
Validity		
STOPWATCH TIME	42.3	
		.82
RESEARCHER INSTRUMENT TIME	40.9	

Note. r^a = correlation coefficients

Reliability, the consistency of data across measurements, was determined by comparing the instruments completed by the researchers and the instruments completed by the staff (Table 2). This allowed reliability to be assessed by verifying the consistency of measurement among users (interrater reliability). Table 2 shows the magnitude of the correlation coefficients, with the closeness of the means, supporting the reliability and validity of the instrument.

From suggestions of the **Pilot test** clinical staff and observations by the research team, a number of changes were made in the combined/bundled tasks 1.2 to 1.6 (Appendix G) and in the general format of the instrument. The integration of Vital Signs with other tasks such as Fundal Massage, Stir-Up Routine, Neuro Assessment, or Motor/Sensory Testing did not reflect actual clinical practice. Vital Signs was frequently done alone, not with above mentioned tasks. Fundal Massage, Stir-Up Routine, Motor/Sensory, and Neuro Assessment were also done as independent nursing activities. To capture PACU nursing times more accurately, the integrated tasks were separated into their individual components or separate tasks. Task 1.2 Vital Signs plus Stir-Up Routine was separated into 1.1 Vital Signs and 1.2 Stir-Up Routine. Integrated tasks 1.2 to 1.6 were separated into their individual components (tasks), as shown in Appendix I (1.1 to 1.5). The corresponding operational definitions of these separated tasks were rewritten to reflect the changes. Separating the above integrated tasks enhanced user friendliness because the worksheet better reflected actual PACU nursing practice and made the tasks easier to identify.

To enhance the user friendliness of the worksheet other changes were made in its format. From recommendations of the nursing staff who used the worksheet, the investigators divided the worksheet into three sections. The tasks were arranged so that more of the worksheet could be seen in one glance (Appendix J). In addition the operational definitions for the bundled items of Admission and Discharge/Transfer from PACU were placed on the back of the

worksheet. This quick reference method also improved accuracy. The reformatted worksheet with the new separated tasks (1.1 to 1.5) was used in the data collection part of the study (**field test**).

Determining Acuity Categories and Predictor Tasks (Objectives 5 & 6)

After determination of validity and reliability, the investigators initiated a 14 week period of data collection at multiple sites. This was done to obtain adequate data to determine acuity categories pertinent to PACU (Objective 5) and to identify the optimal set of predictors of total direct care time (Objective 6). The first two weeks of data collection were not used in the analysis but as a time for the staff to familiarize themselves with the worksheet. The investigators used the first two weeks of data to identify patterns of problems or areas of confusion with the worksheet.

Field Test/Data Collection

To enhance accuracy of data collection and staff support, instruction manuals and worksheets were sent to the field test sites two weeks before the start of the study. This allowed the staff enough time to review the manuals and become familiar with the worksheet before the arrival of the HCSCIA nurse researchers. The nurse researchers stayed at each site three days and conducted training sessions for the users of the data collection worksheet. They spent a large segment of time teaching the staff to use the worksheet, reviewing the arrangement of the tasks on the worksheet, and their operational definitions.

As a way of furthering the staff's understanding of the worksheet and its use, written patient scenarios were used as teaching tools. The patient scenarios depicted routine patient care situations. Each staff member completed a data collection worksheet based on a written patient scenario. The staff members corrected their worksheet and used it as a focus for questions. The staff members independently completed a second worksheet using a different patient scenario. A nurse researcher reviewed this work on a one to one basis. Interrater reliability (IRR) was ascertained from the results of the second scenario. To be a data collector, the staff member had to get at least an 85% IRR compared to researcher established results. If a staff member did not score 85% IRR on the second scenario additional training and study time was provided. Then a third different scenario was used to assess IRR. All the nursing staff scored at least 85% IRR. The training scenario process also allowed the nurse researcher to interact on an individual level with each staff member, to clarify confusing issues, and to answer questions.

Approximately 2 weeks after data collection began, a researcher returned to each site to resolve questions and issues that had surfaced while using the data collection worksheet. This was returned to HCSCIA for evaluation. This allowed problems or areas of confusion to be identified and resolved. No major patterns of misunderstanding or areas of confusion were identified.

It was anticipated that approximately 1500 usable data collection sheets would be needed from the field test to reduce the tasks to the fewest best predictors of direct care time and to create acuity categories. To meet this goal, each field test site collected data on as many patients as possible for three months. The worksheets were mailed to HCSCIA weekly in preaddressed, stamped envelopes.

Data for analysis were collected over the next 12 weeks with 4018 separate data collection worksheets completed. The worksheets were evaluated with extreme care to assure that all requested information was provided, that the information was legible and accurate (i.e., that 10 tick marks were correctly recorded as 10 in the total column), and that the information made clinical sense (i.e., that a patient admitted after receiving general anesthesia had stir-up routine marked). At least two different nurse researchers reviewed each worksheet a minimum of three times.

Based upon this preliminary data cleaning, the worksheets were separated into two distinct groups--those that were not usable and those that were usable. The worksheets were judged "usable" or "not usable" using the following criteria. First, worksheets from the first two weeks of data collection from any site were not used (998 worksheets). This decision was based on the belief that the staff needed some time to learn how to use the worksheet. Also it was a final check for patterns of misunderstanding of the worksheet and a way to evaluate the clarity of the user directions. For the remaining weeks of the study, only those worksheets that were complete and did not convey incongruent situations (i.e., patient who was admitted at 1000 and discharged at 0955) were considered usable. Further, all worksheets were checked for logical/clinical sense. For example, when a patient had a Cesarean section (C-section) the worksheet should be marked female and marked as receiving Fundal Massage, whereas a patient who had a prostatectomy the worksheet should be marked male. Head nurses were contacted to retrieve missing information available from records, such as age or sex of the patient. Fifty worksheets were unusable due to missing information, incompatible data, and nonlegible writing. There were 2970 usable data collection worksheet available at the beginning of analysis.

Phase II Findings

Instrument Development (Objective 4)

The strength of the correlation coefficients verified that the instrument was measuring what it purported to measure and there was consistency among the users of the instrument. With validity and reliability supported, the worksheet was used to collect data from multiple sites over a period of three months with 4018 worksheets completed. The data were used to account for direct care time and identify categories of care specific to PACU. Prior to determining acuity categories the data was analyzed for accuracy and decisions made regarding the continuous coding section.

Data Management - Data Accuracy. A double entry approach was used to ensure data accuracy. That is, two individuals entered the data and compared the results for accuracy. Further, a number of approaches were used to validate accuracy after the data had been entered. Based on the raw data print outs that were suggestive of missing values, original data collection sheets were checked to verify the accuracy of the entered data and to make corrections. A random sample of 30 worksheets were compared with the entered data and evaluated for accuracy. After careful review no errors were found in the automated data.

Data Management - Continuous Activities Coding. Through assessing information in the "Continuous Activities'" section of the worksheet (7.1 and 7.2) (Appendix J) made it became evident that the patient specific situations

noted there could often be captured within one of the preexisting tasks on the worksheet. There were some specific patient situations identified that fell into two broad groups of direct care, (a) monitoring and (b) activities of daily living/feeding. The indirect care tasks (those nursing activities done away from the patient) identified as "Continuous Activities" were not considered as they will be captured in the Indirect Care Study.

One task (emesis) that had been written in the "Continuous Activities" Section could not be incorporated into the preexisting task list. Emesis was written in on 26 worksheets with start and end times noted. Also the staff had noted on 85 of the 201 worksheets marked with Oral Hygiene, that they were marked for emesis rather then oral hygiene. Oral hygiene became in effect a proxy for emesis. It was impossible to find out how often emesis really occurred and was not marked in the "Continuous Activities" Section. To clarify this issue, a telephone survey of PACU clinical staffs reinforced the proxy aspect of oral hygiene for emesis. The telephone survey consensus was that Oral Hygiene as defined in the study, would be marked as proxy for emesis 90% of the time because emesis was absent from the worksheet. The other category of patients who normally receive oral hygiene care were those patients who remain overnight in the PACU. In this study only 38 or 1.3% of the total sample remained overnight in the PACU. If, the incidence of nausea and emesis ranged between 10 to 20% as reported in the literature (Drain & Christoph, 1987; Miller, 1986), 302 to 604 patients could have been expected to require emesis care in this study.

The clinical staff agreed that oral hygiene was only part of emesis care. Positioning the patient, holding the patient's head, and holding the emesis basin were also elements of emesis care. Because of the above, Oral Hygiene was removed from the data collection instrument and Emesis added with an operational definition incorporating oral hygiene and specific emesis care elements. A mean time of 6.09 minutes (6.0897) was derived from analyzing the 26 instruments with emesis start and end times. An operational audit of PACU nursing experts provided a range of times from least to most amount of time to perform nursing activities associated with emesis (3 to 13 minutes). The mean time for Emesis (6.09 minutes) was nearly double the mean time for Oral Hygiene (3.24 minutes), which reinforced the clinical staff's comments that oral hygiene was only part of emesis care.

Another concern noted in the "Continuous Activities" section and voiced by the clinical staff was that Pediatric patients (<10 years) should be considered in a special category. The concern was that pediatric patients required longer and more intense nursing care time. Intensity of care was evaluated by determining the number of minutes of care required in an hour per patient. The number of minutes of care per hour was obtained by dividing the patient's total length of stay (LOS) in PACU into total task time (TTT). Fifty percent of the pediatric patients required 32 or fewer minutes of care per hour while 50% of adult patients required 28 or fewer minutes of care per hour. The average LOS for a pediatric patient was 78.2 minutes and the average LOS for an adult was 112.7 minutes. TTT and LOS had the same linear relationship in both age groups. The analysis was not supportive of the concern that on the average pediatric patients require a significantly longer amounts of time or more intense care (See figures 2A and 2B).

FIGURE 2A.

Summary of Length of Stay (LOS) and Total Task Time (TTT) for Adult and Pediatric Patients.

```
Average Minutes                        Average Minutes
LOS                                    TTT

120
110              ++
100              ++
90               ++              45
80     **        ++              40
70     -*        ++              35
60     **        ++              30      **        ++
50     **        ++              25      **        ++
40     **        ++              20      **        ++
30     **        ++              15      **        ++
20     **        ++              10      **        ++
10     **        ++               5      **        ++
0  _____               0  _____
   Peds        Adults                   Peds        Adults
```

Note.
LOS = Length of Stay (time patient is in PACU)
TTT = Total Task Time (time received direct nursing care)

FIGURE 2B.

Distribution of LOS for Adult and Pediatric Patients Compared to TTT

LOS

```
130
125                                              +
120
110
100
90                                    +   *
80                                *
70                            +
60                        *
50
40
30
20               *
10
5         +
   _____
   0   5   10   15   20   25   30   35   40   45   50   55   TTT
          Pediatric and Adults at 25%, 50%, and 75% Quartiles
```
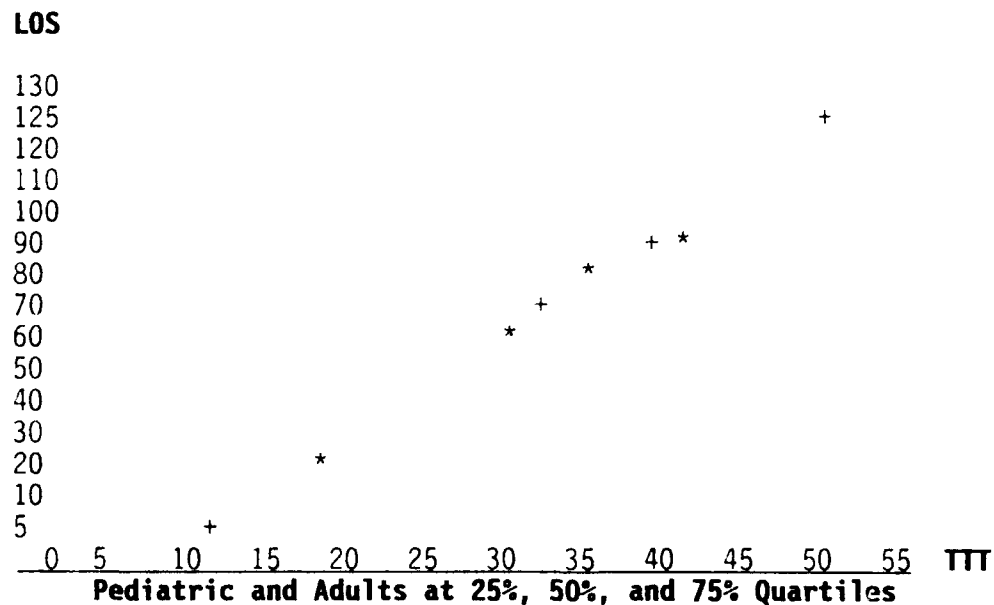
Note.
* = Pediatric patients (<10 years)
+ = Adult patients (10> years)

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Computation of Total Direct Care Time From Instrument. One of the essential elements of the analysis was determining the total direct care time for each data collection instrument. Each instrument reflected a 24 hour period starting at 0001 and ending at 2400. There are a variety of operating hours for different PACUs. A few are open for 24 hours; patients may stay an entire 24 hours or just a portion of it. Length of stay became important in this study because of the varying hours of PACU operation. A continuation data collection worksheet was used when a patient stayed beyond 2400; each continuation sheet reflected a new 24-hour period. The total hours for each patient could be derived by using the following formula:

$$P = \sum_j n_j X_j \quad \text{where}$$

P = total direct care time for each patient
j = 1 to 62 tasks on worksheet
n_j = 0 to n (frequency of task $_j$)
X_j = mean time for task $_j$

A variety of descriptive statistics was computed to obtain a sense of the distribution of data. Distributions were evaluated based upon total direct care time per instrument and length of stay using scatter plots and bar graphs. Correlation matrices were evaluated to ascertain if any of the variables were so highly correlated that they suggested multicollinearity. The correlation matrices also were reviewed for tasks (variables) that might be very highly correlated with the total instrument time. No evidence of multicollinearity was found nor could any one or two tasks be identified as highly predictive of total direct care time.

Three concerns guided the analysis: (a) accuracy in predicting total direct care time and in acuity categorization, (b) identification of an optimal parsimonious set of predictors, and (c) enhancement in ease of use of the tool. The primary concern was accuracy in predicting direct care time and in categorization.

Acuity Category Development. The total sample of 2970 was evaluated for naturally occurring breaks points in the frequency distribution of direct nursing care time required for certain groups of patients. The direct care time ranged from 10 minutes to 172 minutes. The extremely low and high direct care times could be explained clinically and therefore were not eliminated. The most definitive, naturally occurring break in the distribution occurred between 29 and 30 minutes. There were two less definitive but similar breaks in the distribution noted between 65 and 66 minutes and between 69 and 70 minutes (See Figure 3).

A frequency distribution of the total sample revealed at 29 minutes of direct care time a frequency of 101 cases and at 30 minutes a jump of 57 to 158 cases. There were two areas, one between 65 and 66 minutes and a second area between 69 and 70 minutes, which showed similar change from double to single digit frequency (Figure 3). To clarify where the break point should be, two clusters of patients, one below and one above the two break points, were analyzed. The first cluster of patients between 56 and 57 minutes (36 patients) were compared to the patients at the second break points of 65 and 69 minutes. Another cluster of patients between 75 and 85 minutes (35 patients) were also compared to the break points at 65 and 69 minutes. Analysis revealed that the patient cluster between 56 and 57 minutes were most similar to the

patients between 69 and 70 minutes. The 75 to ⁿⁿ minute patient cluster was also most like those patients at 69 to 70 minuₓ ⸱ of care. The second break point of 69 minutes was selected based upon the siₘilarity between the 56-57 minute cluster and the 75-85 minute cluster with the 69 minute break point.

Figure 3.

Naturally occurring Breaks Points in Frequency Distribution.

```
FREQUENCY
200              |                              |
190              |                              |
180              |                              |
170              |                              |
160              |    *                         |
                 |                              |
150              |   *    *                     |
140              |                              |
130              |                              |
120              |                              |
110              |                              |
                 |                              |
100            * |      *                       |
90               |                              |
80               |                              |
70   CATEGORY Iᵃ |        *   CATEGORY IIᵃ      |  CATEGORY IIIᵃ
                 |                              |
60            *  |                              |
50               |           *                  |
40               |                              |
30               |                              |
                 |                              |
20       *       |              *               |
10               |           *    * *           |
5*      *        |                          *  *   *   *    *
 0  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
                 |                              |         MINUTES
                 |                              |
```
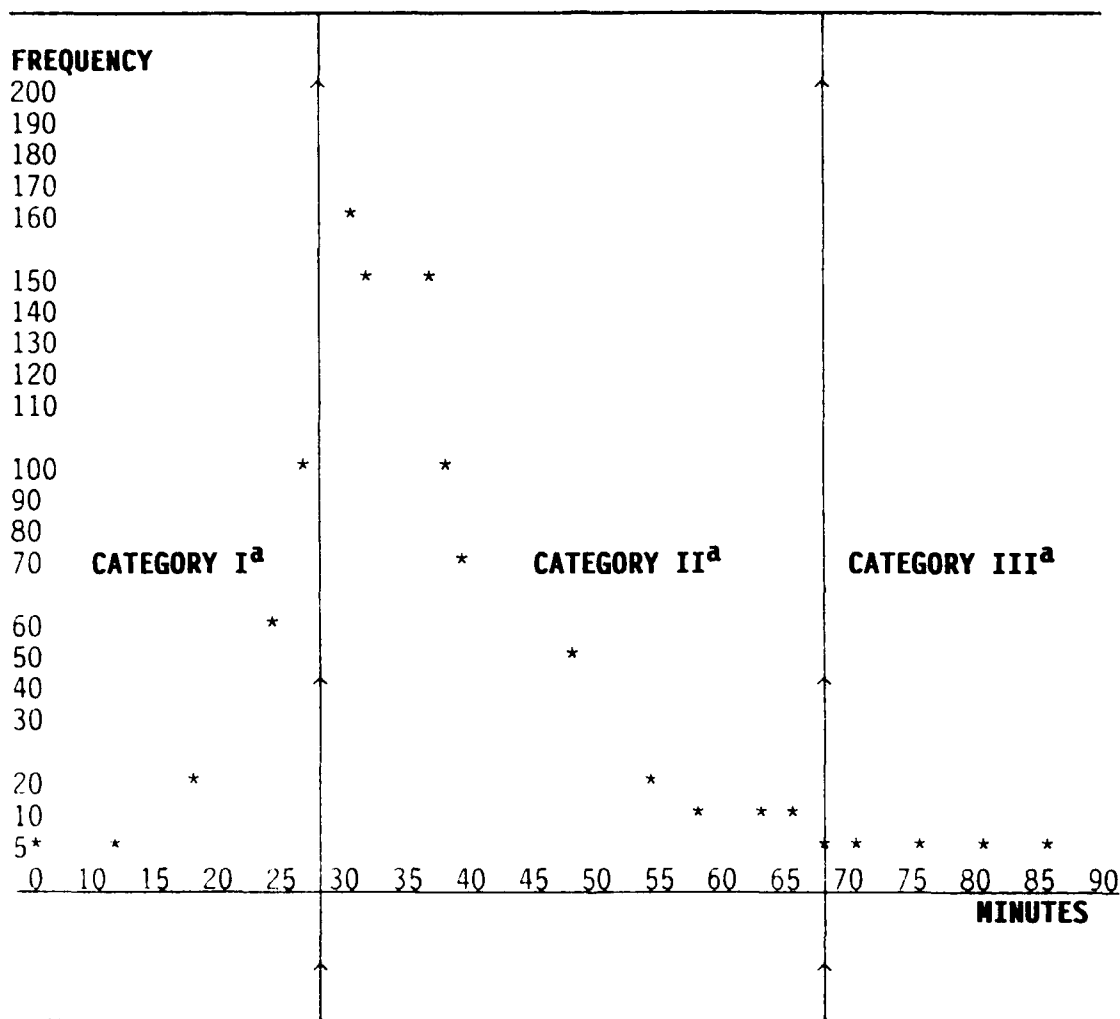
Note.

ᵃ Category I=8.6%   Category II=84.7%   Category III=6.6%
  0-29 Minutes   30-69 Minutes   ≥ 70 Minutes

    These naturally occurring breaks in the time of care distribution, effectively identified three acuity categories of direct care time. The first patient acuity cateᵍory was between 0 and 29 minutes and accounted for 8.6% of the total patients. A second patient acuity category between 30 and 69 minutes

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accounted for 84.8% of the patients. The third and final acuity category required 70 or more minutes of care and included 6.6% of the patients (Figure 3).

The outliers for the total sample were evaluated for appropriateness (i.e., not measurement error or illogical for the situation). None of the extreme values from the high or low end were thought to be errors of measurement or illogical times for PACU. No outliers were removed from the analysis. However, as the regression models were developed and evaluated, the extreme values were evaluated for their effect on the analysis.

Two extreme discontinuities were identified between short lengths of stay (LOS) and very large total task time (TTT). One discontinuity required a total task time of 30.72 minutes with only 5 minutes of stay (LOS) in the PACU. This meant that the patient required a six to one (staff to patient) ratio of care. This patient was transferred to the Surgical Intensive Care Unit for complications within five minutes after admission to PACU. The second discontinuity had a total task time (TTT) 28 minutes with a total LOS of 10 minutes. This patient required a three to one ratio of care. After 10 minutes this patient returned to the Operating Room for bleeding problems. For both situations the total LOS in PACU and the total task time (TTT) were correct and not measurement error; therefore each was retained for analysis. After the categories were identified, the data were re-examined by univariate plots of the distribution for each of the three categories. Table 3 presents the descriptive statistics for each category.

TABLE 3

Descriptive Statistics for PACU Acuity Categories.

	Category I (0-29 min.)	Category II (30-69 min.)	Category III ($\geq$ 70 min.)	Total Sample
Mean	25.48	42.56	89.92	44.02
Median	26	41	81.50	40
Mode	29	39	70	39
SD	3.47	8.88	22.20	16.21
n	263	2521	186	2790
% of Sample	8.60	84.8	6.60	100.00

Note. Range between 10 and 172 minutes

Derivation of Predictor Subset

Because the sample was large enough (2970), a **split-half cross validation procedure** was used. The data were separated into two subsets using a computer

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generated random number program. One subset (classification subset) of [n = 1459] was used to identify the optimal parsimonious set of predictors for acuity categorization and to account for variance of total direct care time. The second subset (validation subset) of [n= 1511] was used to validate the stability of the regression solution. Using this approach, a number of models were used to arrive at the best solution. The decision to include or exclude tasks (variables) in the model development was based on the following general criteria: (a) the task occurred frequently, (b) the task required a large segment of time to complete, and (c) the task was judged to be clinically important. The adequacy of a model was guided by accuracy of accounting for total direct care time, accuracy in categorization, and the number of predictors. Also careful attention was given to patients miscategorized by more than one category (e.g., category I patient miscategorized as a category III).

The first model incorporated 33 predictors (Appendix K) that yielded an adjusted R^2 of .90; that is, the model accounted for approximately 90% of the variance of total time. This model with 33 predictors miscategorized 53 (3.6%) patients one category higher, 31 (2.1%) one category lower and categorized 1376 (94.3%) correctly. None of the patients were miscategorized by more than one category.

Age was evaluated as a factor in predicting acuity category in this model. Four age groups were established: Infants (< 2 years), Children (2 to 11 years), Adult (12 to 63 years) and Senior (64 years or older). The age groups were evaluated against acuity categories. No association of specific age groups with any particular acuity category was found. That is, age was not a significant influence in predicting acuity categories. Model 1 (See Table 4) was not considered adequate, because it was believed that a more parsimonious set of predictors could be identified.

Using the same general inclusion criteria, a series of models (Models 2, 3, 4, 5) were developed and analyzed. For all models analysis showed that no patient was miscategorized more than one category higher or lower. Analysis of Model 2 with 31 predictors (Appendix L) revealed an increase in the accuracy of accounting for the variance in total time and acuity categorization. Table 4 depicts the adjusted R^2 and the accuracy of acuity categorization. Overall Model 2's accuracy in accounting for variance in time and categorization was excellent. However, a smaller set of predictors tasks was desired with equal or better accuracy in accounting for variance of time and categorization.

Model 3 was the first to incorporate Emesis as one of the 25 potential predictors (Appendix M). As shown in Table 4 there was a slight decrease in the accuracy of accounting for time variance and acuity categorization. This model was rejected as a greater accuracy was desired.

Before initiating Model 4, the researchers reviewed the possibility of integrating two tasks into one combined task to reduce the total number and maintain accuracy. Tasks 2.6, Output Drainage Bottle, and 2.7, Output Other than Drainage Bottle, were combined into a new task 2.67, Combined Output. A new mean time was developed for task 2.67 by averaging the mean times of 2.6 and 2.7 (1.70 + .90 = 2.60/2 = 1.30 minutes).

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Model 4 had 26 variables (Appendix N); it contained those predictors from Model 3 plus the new Task (2.67) (Combined Output). Table 4 displays the increased accuracy in accounting for variance in total time and in acuity categorization. It was believed that this model could be improved by integrating two other tasks, 3.3 Changing Patient Position in Bed and 5.17 Positioning Patient for X-Ray, into a combined task (3.17).

TABLE 4

Parameter Estimates for Regression Models 1 to 6 n=1459 (based on Classification Subset n = 1459).

| Model | Tasks | Adj.R^2 | Categorization | | |
			Accuracy	Higher	Lower
1	33	89.55%	94.25%	3.6%	2.1%
2	31	95.60%	95.62%	3.2%	1.2%
3	25	93.44%	94.80%	3.3%	1.9%
4	26	94.96%	95.41%	3.2%	1.4%
5	26	94.96%	95.06%	3.4%	1.5%
6	25	95.65%	95.13%	3.7%	1.2%
6 [a]	**25**	**95.37%**	**95.65%** (n=2841)	**3.1%** (n=93)	**1.2%** (n=36)

Note.

See appropriate appendix for more detail on tasks included and excluded.
[a] Total sample 2970.

Model 5 was used to evaluate the impact of task 3.17, Patient Position Change with a new mean time based on the average of tasks 3.3 and 5.17 (2.13 + 3.75 = 5.88/2 = 2.94 minutes). Also task 6.4, Oxygen Administration was added because of its high frequency of occurrence. Model 5 with 26 variables (Appendix O) yielded approximately the same fit as Model 4 in accounting for variance in total time and in acuity categorization (Table 4). At this point Model 5 with 26 predictors provided the best balance between accuracy of accounting for variance of total time, accuracy of categorization, and the parsimony of predictors. But with the inclusion of Emesis in model 3, there was the concern that Oral Hygiene was acting as proxy for Emesis.

It was evident from the analysis that Oral Hygiene was being used as a proxy for Emesis care. Oral hygiene was marked 201 times: out of that 201, 42% (85) of the staff had written that Oral Hygiene was marked because Emesis was

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not on the instrument. Also, as was noted in Model 3, 26 instruments were specifically marked with start and end time for Emesis. In addition, the follow-up telephone survey confirmed that Emesis was the leading reason for giving Oral Hygiene care. The operational definition of Oral Hygiene incorporated only part of the required care for Emesis. Therefore, the mean time for Oral Hygiene of 3.24 minutes was inadequate to capture the direct nursing care time involved in Emesis care (6.09 minutes). Oral Hygiene was excluded in the development of Model 6 and Emesis (task 8.1) was included.

Model 6 incorporated 25 potential predictors (Appendix P) to include Emesis (task 8.1), Combined Output (task 2.67), and combined Positioning of Patient (task 3.17). These 25 predictors accounted for 96% (adj. R^2) of variance in total time (Table 4). Fifty-four patients (3.7%) were miscategorized one category higher and 17 (1.2%) were miscategorized one category lower. A total of 1388 (95%) was correctly categorized. Model 6, with 25 predictors, achieved the best balance between accuracy in accounting for variance in total time, accuracy in categorization, and optimal set of predictors.

The stability of the solution was checked by using the validation subset (n=1511). Using the model derived beta weights from the classification subset of Model 6, there were 67 patients (4.4%) miscategorized one category higher; 23 (1.5%) miscategorized one category lower and 1421 (94%) correctly categorized. The similarity between the results from the classification (n=1459) and validation (n=1511) subsets offered firm support for the stability of Model 6.

To achieve the most precise regression coefficients (beta weights) for each predictor, the total sample (2970) was used with the parsimonious set of 25 predictors (See Tables 4 and 5). The differences between the results of Model 6 (split-half cross validation subset) and the total sample was minimal (Table 4). The results of the total sample analysis continued to show a balance between high and low miscategorization. The accuracy in acuity categorization and accounting for variance in time (R^2) remained very high (See Table 6).

Phase III Procedures (with Intermediate Results)

The third phase of the study began in May 1989 and continued through November 1989. The goal of this phase was to develop a first generation PACU data collection instrument. Objectives 7 and 8 were the focus of Phase III. Objective 7 dealt with revising and testing the instrument in the clinical area to evaluate the instrument's ease of use. Clinical experts were used to format the worksheet, to evaluate the user instructions, and to assess the worksheet's ease of use in the clinical area. Objective 8 focused on verifying the reliability and validity of the revised instrument. Reliability and validity were re-evaluated by comparing the final instrument, with 25 tasks, with the original instrument of 62 tasks.

Table 5

Final Regression Model Statistics for Total Sample (Test of Model).

Source	DF	Sum of Squares	Mean Square	F Value	Probability
Model	25	78190.93	31407.64	2445.81	0.0001
Error	2944	37805.12	12.84		
C Total	2970	822996.06			

Root MSE	3.58
Deep Mean	44.57
C.V.	8.04
R-Square	0.95
ADJ R-SQ	0.95

Revision of Instrument (Objective 7)

A panel of PACU expert nurse clinicians (n=6) convened to format the worksheet and to evaluate the user manual. The clinicians being the actual users of the worksheet were the most logical group to arrange the tasks and instrument information to enhance ease of use. The specific tasks for the PACU instrument had been identified in Phase II, but their arrangement on the worksheet was open to modification.

The PACU expert nurse clinicians from the Phase II data collection sites gathered in San Antonio for 2 1/2 days. They considered all aspects of the worksheet design (i.e., the location of patient identification area, items to be boldfaced or underlined, arrangement of the tasks, etc.) (Appendix Q). They also evaluated the user instructions for appropriateness, accuracy, and clarity (Appendix R).

Finally, the PACU expert nurse clinicians were tasked to train their staffs concerning the revised data collection worksheet. The clinical staffs were to review the user manual for clarity and accuracy and to use the worksheet for two weeks. After two weeks the clinical staffs were to critique the ease of use and clarity of both the revised worksheet and user instructions.

TABLE 6

Statistical Parameters of Total Sample with Final Solution (25 Tasks with Beta Weights).

Variable		DF	Beta Weight	SE	PROB> T	TOLERANCE
	Intercept		10.20	.6181	.0001	
[*]	Rec Gen Anesth	1	12.51	.6060	.0001	.0591
[*]	Rec Spinal/Reg Anesthesia	1	10.44	.6418	.0001	.0766
[*]	Rec Local &/or Local with Sedation	1	7.12	.6439	.0001	.1187
[1.1]	Stir-up Routine	1	1.73	.0360	.0001	.5261
[1.2]	Vital Signs	1	1.28	.0417	.0001	.4457
[1.3]	Motor Sensory test	1	1.25	.0457	.0001	.4244
[1.4]	Neuro Assessment	1	3.61	.0663	.0001	.8488
[1.5]	Circulation/Pulse Check	1	1.80	.0446	.0001	.7281
[1.6]	Monitor Adjustments	1	1.49	.0516	.0001	.8126
[1.7]	Combined Output	1	1.70	.0648	.0001	.7623
[1.8]	Emesis	1	6.41	.1648	.0001	.9458
[2.1]	Chg IV-Adj Rate	1	3.16	.1232	.0001	.8128
[2.2]	Meds, IV	1	1.92	.0795	.0001	.8530
[2.3]	Start IV	1	10.16	.6257	.0001	.9735
[2.4]	IV Arterial Sample	1	6.72	.2811	.0001	.9126
[3.1]	Oxygen Adm. Init and Adjustment	1	1.25	.1048	.0001	.8609
[3.2]	Suctioning	1	1.98	.1588	.0001	.9643
[3.3]	Urinary Cath.	1	7.73	.5151	.0001	.9796
[3.4]	Venipunct-Blood Sample	1	6.16	.3069	.0001	.9239
[3.5]	Dressing Chg Small	1	6.58	.2101	.0001	.9557
[3.6]	Dressing Chg Large	1	12.70	.9208	.0001	.9494
[3.7]	EKG-12 Lead	1	9.82	.5848	.0001	.9708
[4.1]	Patient Position Change	1	3.52	.0810	.0001	.8595
[4.2]	Incontinent Care	1	8.74	.5750	.0001	.8514
[4.3]	Chg Occupied Bed	1	10.08	.9471	.0001	.7983

Note. Bracketed numbers corresponds to tasks on final worksheet that occur more than once. Bracketed [*] corresponds to tasks on final worksheet that occur only once for each patient. Three (3) Categories of patients with 25 tasks/predicators yielded a correct categorization of 96.0%, miscategorized high of 3.1%, miscategorized low of 1.2%, and an adjusted R^2 of 95.0%.

Revised Instrument Reliability and Validity
(Objective 8)

The second objective of Phase III was to verify the reliability and validity of the revised instrument. The 25 task instrument had been changed moderately from its original form of 62 tasks; it was necessary to establish how the psychometric properties were affected. Reliability and validity were examined by recomputing the values of the patient data from the pilot test (62 tasks) on the Phase II subset of 25 tasks (Table 7).

Phase III Findings

Revised Instrument Utility
(Objective 7)

The results of the two week study revealed that 97.7% of the clinical staff found the worksheet to be moderately to extremely clear, concise and easy to use. The organization of the sections, subheadings, and tasks were judged by 97.6% of the staff to enhance ease of use. According to 93.3% of the staff, the guidelines for using the PACU instrument were clear and easily understood. The scope and clarity of the operational definitions were found by 97.7% of the clinical staff to be moderately to extremely easy to use.

In contrast, the majority of the clinical staff noted one consistent concern: the final set of 25 tasks (predictors) on the worksheet did not reflect the full range of PACU nursing. Of the suggestions made by the staff to increase clarity and ease of use, 69.7% of the suggestions related to the worksheet not reflecting the full range of PACU nursing practice. This concern is both an issue of marketing the instrument and educating the staff. The critical teaching point is that the 25 tasks are now predictor tasks used to identify acuity categories, and accurately account for total direct care time; they **do not denote** all the tasks done in PACU nursing (DeGroot, 1989).

Revised Instrument Reliability and Validity
(Objective 8)

The final instrument with 25 predictor tasks was statistically derived from the original pilot test instrument of 62 tasks. The original pilot test data was used to verify reliability and validity of the 25 task instrument. Reliability, the **consistency** of data across measurements, was determined by comparing the researchers time as derived from the short 25 task instrument and the researchers time from the long 62 task instrument. To assess validity **(concurrent validity)** the short 25 task instrument time was compared to the long 62 task instrument stopwatch time. The 25 task instrument maintained significant reliability (r .98) and validity (r .90) coefficients (See Table 7). With reliability and validity of the revised instrument strongly supported, the PACU instrument became a first generation patient acuity instrument.

TABLE 7

Recalculation of Reliability and Validity (based on the 25 Task Instrument and the 62 Task Instrument)

COMPARISON	MEAN TIME MINUTES	r^a
[b]RELIABILITY		
LONG FORM (62 TASKS) RESEARCHER TIME	40.9	
		.98
SHORT FORM (25 TASKS) RESEARCHER TIME	41.2	
[c]VALIDITY		
SHORT FORM (25 TASKS) RESEARCHER TIME	40.9	
		.90
LONG FORM (62 TASKS) STOPWATCH TIME	42.3	

Note.
r^a = correlation coefficients
[b]**Reliability** = Time obtained from 62 task form (researcher time) compared to Time from 25 task form (researcher time).
[c]**Validity** = Time obtained from 25 task form compared to Stopwatch time from 62 task form.

DISCUSSION

Extending the WMSN into the PACU was accomplished over a period of two years in three phases. The phases provided an organizational framework for the study objectives. The primary goal of this study was to develop an instrument that accurately reflects total direct nursing care time in the PACU.

The regulations that govern manpower staffing for the triservices (AR 570-5, AFR 25-5, and Navy Shores Manpower Requirement Handbook) stipulate specific psychometric parameters that were developed outside the health care arena. These parameters were derived for situations where variability is the exception rather than the expected. To meet these parameters in the health care arena would have impacted adversely on the study's cost-benefit ratio. The balance

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between cost and benefit was achieved by linking scientific accuracy and clinical reality.

The concept of variance is an important issue for all measurement done in the health care arena. In contrast to production lines and other industrial-based models with a mechanistic process, health care has an inherent high degree of variability. That is, factories are responsible for producing objects with little variation. In fact, the goal is to produce like things (i.e., duplicates of one another) to the point that the objects produced are interchangeable. On the other hand, in the health care milieu, variation is normative and to be expected. Health care delivery is not at all mechanistic; there is considerable variation among patients and health care providers. Although two individuals of the same age, sex, type of anesthesia, and surgical procedure are admitted to the PACU, the amount and extent of care required is determined by the patient's individual responses. The patient's responses are influenced by their condition prior to surgery, their biopsychosocial responses to anesthesia, surgery, and recovery experience. Because of the individuality of the patient's responses, variation is an expected part of health care.

Based on the expected variance in health care delivery, as well as considering the infrequent occurrence of certain tasks, the researchers recognized a priori that the degree of precision stipulated in the regulations would be costly to achieve. For example, to get the desired sample size according to regulations (AFR 25-5, May 1988) for the nursing care task Hypothermia (2704), a total sample of 1467 timed measurements would be needed (Appendix F). The sample size dictated to achieve an accuracy within 10% of either side of the mean would often be quite large considering the inherent variance in health care. Even for tasks done frequently, the extremely large sample sizes suggested from calculations would require an unreasonable amount of time and resources to achieve. Because of the variation inherent to health care, the benefit of acquiring such extremely large samples would be negligible. Also tasks like Hypothermia that takes .63 minutes with even highly imprecise measurement wouldn't affect staffing. In the end, the driving force for decisions was to couple scientific accuracy with an understanding of clinical reality (balancing cost and benefit).

Phase I of the study encompassed three objectives. The first objective identified the full range of PACU nursing. Using the Sherrod et al. (1981) study, professional literature, and recommendations from PACU nursing experts relevant PACU tasks were identified. The tasks relevant to PACU were reviewed for their regular occurrence in PACU. These tasks that occurred on a regular bases in PACU and consumed a significant amount of time were considered for inclusion as potential predictors of direct care nursing time.

The second objective was accomplished by measuring those tasks requiring measurement at multiple sites. Statistical analysis revealed that none of the Sherrod et al. (1981) tasks required remeasurement because their values fell within acceptable boundaries of precision. However, seven new tasks were identified by the clinical experts and required measurement. Over a period of several months, the researchers timed the new PACU tasks at various MTFs.

The third objective of Phase I, deriving the mean time for tasks relevant to PACU direct care nursing, was dependent on the successful completion of the first two objectives. The mean times for all identified relevant PACU tasks can be found in Appendix F.

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Three objectives guided Phase II of the study. The first objective was the development of a valid and reliable instrument to capture PACU total direct care time. The second objective was the identification of patient acuity categories for PACU. The third objective was to derive an optimal parsimonious set of total direct care predictor tasks.

The reliability ($\underline{r}$ .98) and the validity ($\underline{r}$ .90) of the instrument was strongly supported (Table 7). Three distinct patient acuity categories were identified. These categories were naturally occurring breaks in the distribution. A split-half cross validation approach was used to divide the total sample (n=2970) into two subsets. The first subset (n=1459) was used to identify an optimal parsimonious set of predictor tasks. The second subset (n=1511) was used to check the stability of the identified solution. The final set of 25 predictor tasks (Table 6) when applied to the total sample (2970) was 96% accurate in acuity categorization and accounted for 95% of the variance of total direct care time. No patient was miscategorized more then one category either high or low. As seen in Table 8, the parameters of this study far exceed the statistical parameters specified in the regulations for a type I staffing standard.

TABLE 8

Regulatory (Air Force Reg 25-5) Parameters Compared with HCSCIA PACU Data.

Regulation Requirement	PACU Model
$R^2 \geq .750$	.95
$V \leq .150$	.08
$F_c \geq F.95,\ m-1,\ n-m$[a]	2445.80; p < .0001
$t_c > t\ .90,\ n-1$[b]	all p < .0001[c]

Note.

[a] Equivalent to p<.05 for PACU model
[b] Equivalent to p<.10
[c] Details in Table 5

Another point of discussion in Phase II was the use of acuity categorization as the way to determine nursing care time. The present WMSN

uses acuity categorization to determine the direct nursing care time. The PACU study has two ways to determine direct nursing care time: (1) acuity categorization and (2) a regression formula with beta weights (Table 6). With the beta weight approach it is not necessary to convert the continuous data (actual nursing care time) into categorical data (acuity categories) to ascertain staffing requirements. It is recommended that continuous data be considered in the development of the PACU staffing standard. The use of beta weights requires an automated method for calculating direct nursing care time. The mathematics are not complicated, but the calculations are time consuming and susceptible to errors when done manually. The calculations would be done quickly and more accurately with a computerized system. However, use of acuity categories could be maintained for assessment of interrater reliability.

In Phase III there were two main objectives. First, the clinical staff evaluated the modified worksheet and instruction manual for ease of use in the clinical area. Most of the clinical staff concluded that the instrument and user instructions were clear, accurate and easy to use. The staff noted one concern that the instrument did not reflect all of the PACU nursing tasks. This is a staff educational issue that could affect the acceptance of the PACU instrument by the nursing staff. It is necessary that the clinical staff be educated, that fewer predictor tasks are a justifiable and statistically accurate way to identify total direct care time. Further, it is easier and less time consuming to use 25 predictor tasks than 62 tasks.

The second objective was to establishe the reliability and validity of the modified instrument. The modified 25 task instrument (Table 7) had a reliability of r .98 and a validity of r .90. The high reliability and validity coefficients supports the use of the modified 25 task instrument.

An additional issue that needs to be considered in the development of the staffing standard is the fluctuation in intensity of workload. Intensity, in this sense means the amount of time required to provide direct nursing care. Workload intensity can be demonstrated by dividing direct nursing time by LOS for each patient (nursing time/LOS = intensity). For example, a patient who develops a complication such as bleeding may require 240 minutes of care in 60 minute LOS. This means that the patient would require more than four staff members to provide care in that one hour time frame. The intensity of the workload may vary from hour to hour leading to periods when the available staff cannot meet the needs of the patients. Staffing the PACU for average workload may not provide adequate resources for those periods of high intensity workload. To meet the needs of patients, fluctuation in workload intensity should be considered in the development of the PACU staffing standard. Queuing theory is one approach that may provide a methodology to balance productive and nonproductive staff time (deal with the fluctuation in workload).

CONCLUSIONS

The PACU Patient Classification Direct Care Instrument sets the stage for a quantitative approach to nursing resource allocation. It is a factor evaluative patient classification system, compatible with the present WMSN. The PACU study followed closely the regulations (AR 570-5 & AFR 25-5) pertaining to the development of staffing standards. The regression model fulfills the standards required by regulations and accomplished four goals: (1) an instrument that accurately account for total direct care time, (2) an

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instrument that categorizes patients accurately according to their acuity, (3) an instrument that has an optimal parsimonious subset of direct care tasks, (4) an instrument that is easy to use in the clinical setting.

The results of this study denote a balance between scientific accuracy and clinical reality in the health care arena. By balancing the precision of science and the reality of health care the results are acceptable from both a scientific and clinical perspective. As direct care does not vary among the branches of service (i.e., taking a blood pressure in the Army is the same as in the Air Force and Navy) the results of the study are applicable to all three services.

RECOMMENDATIONS

There are five basic recommendations put forth at this time. The first and most fundamental recommendation is that the results of this study be accepted for a Type I staffing standard. Second, the PACU instrument developed in this study should be used as soon as possible in the triservice arena to collect the direct care data required to establish the staffing standard. Third, the direct care data should be combined with the indirect care proportion to develop the PACU staffing standard. Fourth, the issue of workload intensity be considered in the development of the staffing standard. Fifth, it is recommended that queuing be considered as one option in staffing for fluctuation in workload intensity.

The following are recommendations related to marketing, education, and automation. Those individuals charged to implement the marketing, educational, and automation programs should be extremely knowledgeable about the PACU research. It is very important that these individuals have an extensive understanding of how the instrument was constructed. Further, this knowledge will be necessary to provide accurate and clear information to the users of the instrument. If the users of the instrument are not well informed, then the data obtained will have less meaning and be less useful. It is essential that marketing of the PACU instrument be started as soon as possible and that the education program be part of marketing. The marketing and educational programs must be consistent across all three services. It is imperative that points of contact be identified for each service to insure consistency across the services in problem solving and decision making.

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Appendix A

List of Nursing Task Considered for PACU from Sherrod, Rauch, and Twist, 1981 plus two New Tasks

NUMBER	TASK
0101	Bathing, Complete
0102	Bathing, Assist with Back and Legs
0103	Oral Hygiene
0104	AM Care
0105	PM Care
0106	Nail Care
0107	Shampoo
0108	Shaving
0109	Occupied Bed
0110	Unoccupied Bed
0111	Changing Bottom Sheet
0112	AM Care, Utensils Provided
0113	Bathing, Utensils Provided
0114	AM Care, Partial
0115	Sitting Shower/Shower with Assistance
0116	Tub Bath
0117	Changing Top Sheet
0118	Changing Bed Linen Protector/Chux
0201	Feeding
0202	Fluid
0203	Snack
0204	Serving Meal Tray, Preparation Required
0205	Special Feeding - Nasogastric
0206	Special Feeding - Gastrostomy

0207	Special Feeding - Hyperalimentation, Intravenous
0208	Measuring and Recording Intake
0209	Special Feeding - Nasogastric, Continuous with Infusion pump
0210	Special Feeding - Nasogastric, Continuous with Gastric Feeding Equipment
0211	Serving Meal Tray, No Preparation
0301	Measuring and Recording Output - Urine
0302	Measuring and Recording Output - Liquid Feces
0303	Measuring and Recording Output - Vomitus
0304	Measuring and Recording Output - Drainage Bottles, All Types
0305	Giving a Bedpan
0306	Giving a Urinal
0307	Incontinent Care
0308	Output Weight - Diapers/Bed Linen
0401	Mobility - Ambulating First Time
0402	Mobility - Bed to Floor
0403	Mobility - Bed to Chair
0404	Mobility - Bedside Commode
0405	Mobility - Assistance While Walking
0406	Mobility - Setting on Side of Bed
0501	Changing Patient's Position in Bed
0502	Adjusting Position of Bed
0503	Turning Frame, All Types
0504	Mobility - Bed to Stretcher
0505	Adjusting Siderail
0506	Adjusting Restraint
0507	Fowler/Trendelenberg Position
0601	Exercise - Active

0602	Exercise - Passive
0701	Orientation to Clinical Unit
0702	Explanation of Procedures and Tests
0703	Answering Patient's Question
0704	Visiting with Patient/Purposeful Interaction
0801	Blood Pressure, Manual
0802	Pulse - Radial/Brachial
0803	Pulse - Apical
0804	Respirations
0805	Temperature - Oral, Electronic/Mercury
0806	Temperature - Rectal, Electronic/Mercury
0807	Temperature - Axillary, Electronic/Mercury
0808	Oral Temperature, Pulse, Respirations
0809	Pulse - Pedal/Femoral/Popiteal
0810	Pulse - Doppler
0811	Rectal/Axillary Temperature, Apical Pulse & Respirations
0901	Ambulatory Weight
0902	Bed Scale Weight
0903	Abdominal Girth Measurement
0904	Extremity Circumference Measurement
1001	Monitor Leads Application/Exchange
1002	Rhythm Strip - Monitor
1003	12 Lead ECG
1004	Central Venous Pressure
1005	Heart Sounds Assessment
1006	Pulmonary Artery Pressure Wedge
1007	Pulmonary Artery Pressure

1008	Monitor Reading - Blood Pressure/Heart Rate Pulmonary Artery Pressure/Central Venous Pressure
1009	Rhythm Strip Measurements
1010	Rhythm Strip - ECG Machine
1011	Cardiac Output Measurement
1012	Adjusting Cardiac Monitor/Connecting Leads/Reset Alarm
1101	Pupil Reflexes
1102	Mental Alertness
1103	Sensory Discrimination
1104	Orientation
1105	Motor/Sensory Testing
1201	Vital Capacity
1202	Pulmonary Assessment
1301	Nasogastric Tube Insertion
1302	Nasogastric Tube Irrigation
1303	Nasogastric Tube Removal
1304	Enema - Cleansing
1305	Enema - Retention
1306	Colostomy - Irrigation
1307	Colostomy - Dressing Change
1308	Lavage
1309	Paracentesis
1310	Dressing Change - Ileostomy/Ileoconduit
1311	Nasogastric Tube - Instillation
1312	Fecal Impaction Assessment/Removal
1313	Endoscopy
1314	Saline Irrigation - Gastric
1315	Proctoscopy

1316	Rectal Tube Insertion
1317	Rectal Tube Removal
1401	Oxygen Administration - Nasal
1402	Oxygen Administration - Mask
1403	Oxygen Administration - Prongs
1404	Endotracheal/Tracheostomy Tube Pressure Cuff
1406	Chest Tube - Care
1407	Chest Tube - Change Bottles
1408	Tracheostomy - Cleaning Cannula
1409	Chest Pulmonary Therapy - Frappage with Postural Drainage
1411	Suctioning - Oral
1412	Suctioning - Tracheostomy
1413	Suctioning - Nasotracheal
1414	Suctioning - Endotracheal
1415	IPPB Treatment
1416	Respiratory Resuscitation
1417	Thoracentesis
1418	Blow Bottles
1419	Cough and Deep Breathe
1420	Incentive Spirometer
1421	Intubation
1422	Positioning for X-Ray
1423	Tracheostomy - Dressing Change
1424	Oxygen Administration - Mist with Collar/Face Tent
1425	Croup Tent
1426	Suctioning Bulb Syringe
1427	Maximist Treatment
1428	Chest Tube - Insertion

1429	Chest Tube - Removal
1430	Extubation
1431	Bronchoscope
1501	Venipuncture - Blood Sample
1502	Venipuncture - Blood Culture
1503	Arterial Puncture - Blood Gases
1504	Intravenous Infusion - Flow Rate
1505	Intravenous Infusion - Initiating
1506	Intravenous Infusion - Changing IV Bottle
1507	Intravenous Infusion - IV Push Medication
1508	Intravenous Infusion - IV Catheter Care
1509	Intravenous Infusion - Piggy-Back Medication
1510	Intravenous or Arterial Line Termination
1511	Intravenous Infusion - Infusion Pump Setup
1512	Elastic Stockings
1513	Ace Bandage
1514	Intravenous Infusion - Blood
1515	Intravenous/Arterial Line - Blood Sample
1516	Arterial Line - Transducer Exchange
1517	Arterial Line - Arterial Line Setup
1518	Arterial Line - Swan Ganz Catheter Setup
1520	Intravenous Infusion - Platelets/Plasma
1521	External Pacemaker
1522	Cardiopulmonary Resuscitation
1523	Cardioversion
1524	Rotating Tourniquets
1525	Arterial Infusion - Medication

1526	Swan Ganz Catheter Initiation
1527	Swan Ganz Catheter Removal
1528	Arterial Line - Initiation
1529	Surgical Intravenous initiation, Cut Down
1601	Decubitus Care
1602	Skin Care
1603	Suture/Skin Clip Removal, > 15
1604	Small Dressing Change, < 4" x 8"
1605	Large Dressing Change, > 4" x 8"
1606	Reinforcing Dressing
1607	Wound Irrigation
1608	Soaking Hand
1609	Soaking Feet
1610	Hot Compress
1611	Cold Compress
1612	Sitz Bath
1613	Surgical Prep, Local
1614	Surgical Prep, 3-way
1615	Wound Culture
1616	Heat Lamp
1617	Back Rub
1618	Hot Compresses Continuous Application
1619	Air Flotation/Alternating Pressure Mattress
1620	Isolation Gowning and Gloving
1621	Death Care
1622	Suture/Skin Clip Removal, < 15
1623	Application of K-Pad
1701	Eye Care

1702	Irrigation - Eye
1703	Irrigation - Ear
1704	Irrigation - Throat
1705	Instillation of Drops - Eye
1706	Instillation of Drops - Ear
1707	Instillation of Drops - Nose
1708	Culture - Nose
1709	Culture - Throat
1710	Culture - Sputum
1801	Pin Care
1802	Head Tongs Care
1803	Bed Cradle
1804	Foot Board
1805	Ice Pack
1806	Extremity Traction - Application
1807	Extremity Elevation
1808	Cast Care
1809	Extremity Traction - Adjust
1810	Seizure Care
1811	Circulation Check
1901	Catherization - Foley
1902	Catherization - Straight
1903	Foley Catheter Care
1904	Urine Specimen - Routine
1905	Urine Specimen - Clean Catch/Foley
1906	Perineal Care
1907	Foley Catheter Removal

1908	Douche
1909	Dilatation and Curettage
1910	Vaginal/Pelvic Examination
1911	Urinary Bladder Training
1912	Condom Catheter Application
1913	Peritoneal Dialysis - Initiation
1914	Peritoneal Dialysis - Exchange of Dialysis Solutions
1915	Peritoneal Dialysis - Removing Dialysis Catheter
1916	Bladder Irrigation
2001	Sponging
2002	Hypothermia/Hyperthermia Treatment
2101	Oral Medication
2102	Intramuscular Medication
2103	Subcutaneous Medication
2104	Suppository, Rectal/Vaginal Medication
2105	Topical Medication
2106	Sublingual Medication
2201	Bone Marrow Aspiration
2202	Lumbar Puncture
2204	Urine Testing - Protein
2206	Urine Testing - Specific Gravity
2207	Urine Testing - Sugar and Acetone
2208	Liver Biopsy
2209	Guiac Testing - Feces/Vomitus/GI Drainage
2210	Collection of Feces Sample
2211	Hematocrit
2301	Teaching - Medication Administration
2302	Teaching - Colostomy Care

2303	Teaching - Postural Drainage
2304	Teaching - Urine Testing
2305	Teaching - Blow Bottles/Incentive Spirometer
2306	Teaching - Dietary Explanation
2307	Teaching - Preoperative Instructions
2308	Teaching - Diagnostic Test
2309	Teaching - Disease/Condition Related
2311	Teaching - Dressing Change
2312	Teaching - Insulin Administration
2313	Teaching - Diabetic
2314	Teaching - Ileostomy/Ileoconduit
2416	Fundal Massage
2417	Changing Perineal Pad
2701	Bowel Sound Assessment
*2703	Admission to PACU
*2704	Hypothermia set-up

* Tasks suggested by clinical PACU nurses and not previously measured by Sherrod et al. (1981).

Operational Definition of Nursing Tasks Selected
by Experts as Relevant to PACU

ACTIVITIES OF DAILY LIVING

HYGIENE:

0103 <u>ORAL HYGIENE</u>: Place equipment at bedside, turn patient to his/her side, cleanse gums, teeth and mouth with applicators and then remove equipment from area.

0109 <u>OCCUPIED BED</u>: Place linen at bedside; turn patient on side, roll linen to one side of bed, replace with clean linen, turn patient to freshly made side of bed, remove soiled linen and complete bed making and then remove soiled linen from area.

0111 <u>CHANGING BOTTOM SHEET</u>: Place linen at bedside, remove bottom sheet, replace with clean sheet, straighten top sheet and then remove soiled linen from area.

0118 <u>CHANGING BED LINEN PROTECTOR/CHUX</u>: Upon arrival at bedside, position patient, remove soiled chux, place clean chux under patient, straighten bed and then remove used chux from area.

NUTRITION:

0208 <u>MEASURING AND RECORDING INTAKE</u>: Place calibrated cylinder/container at bedside; measure or calculate fluids and record amount on intake and output record and then remove used equipment from area.

ELIMINATION:

0301 <u>MEASURING AND RECORDING OUTPUT - URINE</u>: Place calibrated cylinder at bedside; measure or calculate volume, record amount on intake and output record and then remove equipment from area.

0303 <u>MEASURING AND RECORDING OUTPUT - VOMITUS</u>: Remove emesis from patient's bedside, measure vomitus in calibrated cylinder and record amount on intake and output record.

0304 <u>MEASURING AND RECORDING OUTPUT - DRAINAGE BOTTLES, ALL TYPES</u>: Place calibrated cylinder at bedside, pour contents from drainage bottle into calibrated cylinder, measure or calculate volume, replace drainage bottle, record amount on intake and output record and then remove equipment from area.

0305 **GIVING - BEDPAN**: Place bedpan at bedside, place patient on bedpan, provide toilet tissue, remove patient from bedpan, cover bedpan, and remove bedpan from area.

0306 **GIVING - URINAL**: Place urinal at patient's bedside, remove cover, adjust patient's pajamas for placement of urinal, remove urinal from patient, replace cover and then remove urinal from area.

0307 **INCONTINENT CARE**: Place equipment at patient's bedside, bathe buttocks, perineum and thighs; change bedding and then remove equipment and soiled linen from area.

CHANGING POSITION:

0501 **CHANGING PATIENT'S POSITION IN BED**: Remove support pillows, reposition patient; apply support pillows and then depart from the area.

0502 **ADJUSTING POSITION OF BED**: Raise, lower or adjust position of bed and then depart from the area.

PHYSIOLOGICAL PARAMETERS

VITAL SIGNS:

0801 **BLOOD PRESSURE MANUAL**: Place equipment at bedside, place cuff around extremity, position stethoscope, measure blood pressure, remove cuff, record results and then remove equipment from area.

0808 **ORAL TEMPERATURE, PULSE AND RESPIRATIONS**: Place equipment at bedside, position temperature probe or thermometer. Place fingers over radial artery pulse and count rate. Count respiratory rate while fingers are placed over radial artery pulse. Remove fingers from radial artery pulse rate, record results of measurements, and then remove equipment from area.

0809 **PULSE - PEDAL/FEMORAL/POPITEAL**: Place fingers on the artery pulse and count rate. Remove fingers from pulse area and then record results.

0810 **PULSE - DOPPLER**: Place equipment at bedside, place sensor over pulse area, assess and record pulse rate and then remove equipment from area (Types of equipment may vary).

CARDIAC ACTIVITY:

1003 **12 LEAD ECG**: Place equipment at bedside, connect leads to patient and obtain ECG, record name, date and time on ECG. Remove leads and clean skin and then remove equipment from area.

45

1005 HEART SOUNDS ASSESSMENT: Place stethoscope at bedside, arrange pajamas for visual access of chest, assess and record findings and then remove stethoscope from area.

1009 RHYTHM STRIP MEASUREMENTS: Upon obtaining the rhythm strip, measure P-R interval, S-T segment, and assess for arrhythmic pattern and then record results.

1010 RHYTHM STRIP - ECG MACHINE: Place equipment at bedside, prepare equipment for use, apply limb leads, obtain 20 second strip, record name, date and time, remove limb leads and then remove equipment from area.

1012 ADJUSTING CARDIAC MONITOR/CONNECTING LEADS/RESET ALARM: Upon arrival at the bedside, adjust cardiac monitor, connect leads or reset the alarm and then depart from the area.

NEUROLOGICAL:

1101 PUPIL REFLEXES: Place equipment at bedside, adjust room lighting, assess pupillary reflexes with flashlight and then remove equipment from area.

1104 ORIENTATION: Upon arrival at bedside, make inquiries within the framework of interviewing that will give information about patient's orientation for time, place and person, and then record results.

1105 MOTOR/SENSORY TESTING: Upon arrival at the bedside, assess extremities for sensation awareness and muscle strength and then record results.

RESPIRATORY ASSESSMENT:

1202 PULMONARY ASSESSMENT: Upon arrival initiate assessment by auscultation of the lungs, and/or percussion of the chest wall over the involved areas. Assess symmetry of chest and determine if respiratory movement is abdominal or thoracic and record results.

THERAPEUTIC ACTIVITIES/MODALITIES

GASTROINTESTINAL:

1301 NASOGASTRIC TUBE - INSERTION: Place equipment at bedside, secure towel around patient's neck, give patient glass of water, instruct patient on how to swallow tube, lubricate tube, insert tube, assess for placement, tape in position, then remove equipment from area/or when non-responsive omit glass of water and instructions and then remove equipment from the area.

1302 <u>NASOGASTRIC TUBE - IRRIGATION</u>: Place irrigation solution at bedside, unclamp or disconnect tube, irrigate tubing with asepto syringe, reclamp or reconnect tubing and then remove equipment from area.

1303 <u>NASOGASTRIC TUBE - REMOVAL</u>: Place towel around patient's neck, position patient, remove tape, clamp tube and remove tubing and then remove equipment from area.

RESPIRATORY:

1402 <u>OXYGEN ADMINISTRATION - MASK</u>: Place equipment at bedside, turn on oxygen, fit the mask over the mouth and nose, adjust headband, evaluate fit and patient's adjustment to the equipment, and regulate oxygen flow rate and then depart from area.

1403 <u>OXYGEN ADMINISTRATION - PRONGS</u>: Place equipment at bedside, fit nasal prongs and adjust headband, regulate oxygen rate; evaluate patient's adjustment to oxygen and equipment and then depart from the area.

1411 <u>SUCTIONING - ORAL</u>: Place equipment or set up equipment at bedside, suction oral cavity with suction catheter/oral suction tip, flush catheter before and after each aspiration, replace used equipment or remove used equipment from area.

1413 <u>SUCTIONING - NASO-TRACHEAL</u>: Set up equipment at bedside, put on sterile gloves, pass nasal catheter and suction, flush catheter before and after each aspiration, replace used equipment, and then remove used equipment from area.

1414 <u>SUCTIONING - ENDOTRACHEAL</u>: Set up sterile equipment at bedside, put on sterile gloves, suction through endotracheal tube, flush catheter before and after each use, bag breathe between each aspiration, remove gloves, replace used equipment, and then remove used equipment from area.

1420 <u>INCENTIVE SPIROMETER</u>: Place spirometer at bedside, assist patient during the procedure to determine proper usage of spirometer, and then remove or replace to storage area at bedside.

1421 <u>INTUBATION</u>: Place equipment at bedside, assist physician during the intubation process, tape endotracheal tube in place and then remove equipment from the area.

1422 <u>POSITIONING FOR X-RAY</u>: Upon arrival at bedside, assist with positioning of X-Ray film; then assist with removal of exposed film and then depart from the area.

1430 <u>EXTUBATION</u>: Place equipment at bedside, assist physician with removal of endotracheal tube and then remove equipment from the area.

CARDIOVASCULAR:

1501 <u>VENIPUNCTURE - BLOOD SAMPLE</u>: Place equipment at bedside. Apply tourniquet to extremity, cleanse site, perform venipuncture and withdraw blood sample, and then apply pressure to puncture site. Apply labels on blood tubes and then remove equipment from the area.

1502 <u>VENIPUNCTURE - BLOOD CULTURE</u>: Place equipment at bedside, apply tourniquet to extremity, clean site, perform venipuncture and withdraw blood sample, and then apply pressure to puncture site. Apply labels on blood culture bottle and then remove equipment from the area.

1503 <u>ARTERIAL PUNCTURE - BLOOD GASES</u>: Place equipment at bedside, locate arterial puncture site, perform puncture and draw blood, and then place sample on ice. Apply pressure to puncture site; then label sample and then remove equipment from the area.

1504 <u>INTRAVENOUS INFUSION - FLOW RATE</u>: Upon arrival at bedside, calculate and adjust flow rate as specified and then depart from the area.

1505 <u>INTRAVENOUS INFUSION - INITIATING</u>: Place equipment at bedside, apply tourniquet to extremity, cleanse site, perform venipuncture and connect IV tubing, apply ointment and dressing, and tape securely. Calculate and regulate flow rate, record on intake and output record and then remove equipment from the area.

1506 <u>INTRAVENOUS INFUSION - CHANGE IV BOTTLE</u>: Place equipment at bedside, remove used IV container and replace with new IV container and then remove equipment from the area.

1507 <u>INTRAVENOUS INFUSION - IV PUSH MEDICATION:</u> Place equipment at bedside, select site for injection of solution utilizing existing system, administer IV solution and then remove equipment from the area.

1509 <u>INTRAVENOUS INFUSION - PIGGY-BACK MEDICATION</u>: Place equipment at bedside, select site for administration of solution utilizing existing systems, record on intake and output record, and then remove equipment from the area.

1510 <u>INTRAVENOUS OR ARTERIAL LINE - TERMINATION</u>: Place equipment at bedside, remove dressing and terminate IV or arterial catheter/needle, apply pressure to site, and record on intake and output record if appropriate and then remove equipment from the area.

1511 <u>INTRAVENOUS INFUSION - INFUSION PUMP SET-UP</u>: Place equipment at bedside, set up IV tubing and adjust flow rate dial. Record on intake and output record and then remove used equipment from the area.

1512 <u>ELASTIC STOCKINGS</u>: Place stockings at bedside. Expose lower extremities, put elastic stockings on lower extremities and then depart from the area.

1514 <u>INTRAVENOUS INFUSION - BLOOD</u>: Place equipment at bedside, assure correct transfusion, etc., connect to present intravenous system, record on intake and output record, and then remove equipment from the area.

1515 <u>INTRAVENOUS/ARTERIAL LINE - BLOOD SAMPLE</u>: Place equipment at bedside, clear system, obtain blood sample through stopcock, flush system, label samples, and then remove equipment from the area.

1520 <u>INTRAVENOUS INFUSION - PLATELETS/PLASMA</u>: Place equipment at bedside, connect to present intravenous system. Record on intake and output record and then remove used equipment from area.

1522 <u>CARDIOPULMONARY RESUSCITATION</u>: Upon arrival at bedside, perform any or all aspects of cardiopulmonary resuscitation.

SKIN:

1604 <u>SMALL DRESSING CHANGE, < 4" - 8"</u>: Place equipment at bedside, remove soiled dressing, cleanse skin, apply dressing to site, and then remove equipment from the area.

1605 <u>LARGE DRESSING CHANGE, > = 4" - 8"</u>: Place equipment at bedside, remove soiled dressing, cleanse skin, apply dressing to site and then remove equipment from the area.

1606 <u>REINFORCING DRESSING</u>: Place equipment at bedside, apply dressing to present dressing for reinforcement and then remove equipment from the area.

1620 <u>ISOLATION, GOWNING AND GLOVING</u>: Upon arrival at isolation area, wash hands, put on isolation gown, mask, and gloves, or when departing the isolation area, remove isolation gown, mask, and gloves, wash hands and then depart from the area.

NEUROLOGICAL - SKELETAL:

1805 <u>ICE PACK</u>: Place ice bag at bedside, remove old ice bag and replace with new ice bag, secure ice bag in place and then remove equipment from the area.

1807 <u>EXTREMITY ELEVATION</u>: Place equipment at bedside, elevate extremity through use of pillows, bed adjustments and/or sling attachments and then depart from the area.

1811 <u>CIRCULATION CHECK</u>: Upon arrival at bedside check extremity for swelling, numbness, and tingling, evaluate temperature and color of the skin, assess the patient's ability to move the part and then depart from the area.

UROLOGICAL - GYNECOLOGICAL:

1901 <u>CATHETERIZATION - FOLEY</u>: Place equipment at bedside, prepare patient and insert Foley catheter, inflate balloon, tape catheter in position, connect to urinary drainage bag and then remove used equipment from the area.

1902 CATHETERIZATION - STRAIGHT: Place equipment at bedside, prepare patient and insert catheter, empty bladder, remove straight catheter and then remove used equipment from the area.

1904 URINE SPECIMEN - ROUTINE: Place equipment at bedside, instruct patient on how to collect specimen, label specimen and then remove specimen from the area.

1905 URINE SPECIMEN - CLEAN CATCH/FOLEY: Place equipment at bedside, instruct patient on how to collect specimen or collect sample from Foley catheter, label specimen and then remove specimen from the area.

1907 FOLEY CATHETER REMOVAL: Place equipment at bedside, expose catheter and drainage system, deflate Foley balloon and remove Foley catheter. Measure urine, record on intake and output record and then remove used equipment from the area.

1916 BLADDER IRRIGATION: Place equipment at bedside, set up equipment, irrigate bladder and then remove equipment from the area.

MEDICATION:

2101 ORAL: Upon arrival at bedside, obtain a glass of water, administer the oral medication and then depart from the area.

2102 INTRAMUSCULAR: Place equipment at bedside, locate site for injection, administer medication and then remove equipment from the area.

2103 SUBCUTANEOUS: Place equipment at bedside, locate site for injection, administer medication and then remove equipment from the area.

2104 SUPPOSITORY, RECTAL/VAGINAL: Place equipment at bedside, prepare, administer suppository and then remove equipment from the area.

2105 TOPICAL: Place equipment at bedside, locate and expose site for topical application of medication, apply medication and then remove equipment from the area.

2106 SUBLINGUAL: Place equipment at bedside, place medication under patient's tongue and then remove equipment from the area.

OTHER:

2416 FUNDAL MASSAGE: Upon arrival at bedside, expose patient's lower abdominal area, massage fundus, assess height of uterus and then record

2417 CHANGING PERINEAL PAD: Place supplies at bedside, assess amount of bleeding, change perineal pad and then remove used supplies from the area.

* **New Activities not previously measured by Sherrod et al. (1981)**

* 2703 <u>ADMISSION TO THE PACU</u>: Upon arrival at the patient's bedside, the admission procedure should include the following (not necessarily in this order): (a) insure airway patency and initiate O2; (b) place IV fluids/blood products on IV pole and check flow rate and amount of fluid in the bag(s); (c) assess integrity of IV/central/arterial site(s); (d) connect the patient to the pulse oximeter; (e) place cardiac monitor electrodes and note initial cardiac monitoring for rate and rhythm; (f) inspect dressings and drains; (g) check and record the blood pressure, pulse, temperature, and respiratory rate; (h) receive the report from the anesthetist/anesthesiologist; (i) report baseline (PARS) measurements to anesthetist and/or anesthesiologist; (j) make assessment of patient's total condition; (k) assess patient's body position and reposition if necessary; (l) initiate the stir up routine, encourage the patient to cough and deep breathe, orient him or her to the unit; (m) record initial nursing assessment on the flow sheet or appropriate form; (n) initial assessment ends when continuous nursing activity stops.

* 2704 <u>HYPOTHERMIA SET-UP</u>: Place heat lamps at bedside, adjust position, set timer and then depart from the area.

Appendix C

New PACU Task Operational Definitions

2703 **ADMISSION TO PACU:** This procedure should include the following (not necessarily in this order): (a) insure airway patency and initiate oxygen (b) place IV fluids/blood products on IV pole and check flow rate and amount of fluid in the bag(s); (c) assess integrity of IV/central/arterial site(s); (d) connect the patient to the pulse oximeter (e) place cardiac monitor electrodes and note initial cardiac monitoring for rate and rhythm; (f) inspect dressings and drains; (g) check and record the blood pressure, pulse, respiratory rate, and temperature; (h) receive the report from the anesthetist/anesthesiologist; (i) report baseline (PARS) measurements to anesthetist or anesthesiologist; (j) make assessment of the patient's total condition; (k) assess patient's body position and reposition if necessary; (l) initiate the stir-up routine, encourage the patient to cough and deep breathe, orient him to the unit; (m) record initial assessment on the flow sheet or appropriate form; (n) initial assessment ends when continuous nursing activity stops.

2704 **HYPOTHERMIA SET-UP:** Place heat lamps at bedside, adjust position, set timer and then depart from the area.

2705 **STIR-UP ROUTINE:** Upon arrival at bedside complete the following: (a) instruct patient to cough and deep breathe; (b) answer questions about surgery; (c) reorient to place and time; (d) assess level of comfort; (e) determine if patient can be medicated for pain, give fluids if permitted; (f) record vital signs and then depart from the area.

2707 **SETTING UP PROGRAMMABLE MONITORS:** Gather required equipment at bedside and complete the following: (a) calibrate monitor(s); (b) position transducers; (c) connect transducers to cables, cables to monitor(s); (d) assess display data; (e) record information and then remove equipment from area.

2708 **DISCHARGE FROM THE PACU:** Upon arrival at bedside, this discharge procedure should include basically the following tasks (not necessarily in this order): (a) complete assessment of the patient and document; (b) disconnect from monitor(s); (c) empty Foley bag; (d) mark output from JP's, hemovacs, etc.; (e) hang new IV bag if needed; (f) record amounts on intake and output record; (g) change ice bags; (h) obtain and record vital signs; (i) review orders with patient; (j) answer patient's questions; (k) provide needed information to patient regarding transportation to ward; (l) and call report to receiving ward.

2709 **VITAL SIGNS AND STIR-UP ROUTINE/MONITORED PATIENTS:** Place equipment at bedside, position temperature probe or thermometer. Observe monitor for cardiac rate, note respiratory rate, and blood pressure. Initiate stir-up routine: (a) instruct patient to cough and deep breathe; (b) answer questions about surgery; (c) reorient to place and time; (d) assess level of comfort; (e) determine if patient can be medicated for pain, give fluids if permitted; (f) record vital signs and then depart from the area.

2711 <u>BLOOD PRESSURE, AUTOMATIC, NON-INVASIVE:</u> Place equipment at bedside, place cuff around extremity, program monitor parameters, initiate sequence, record results; remove cuff and then remove equipment from the area.

Appendix D1

Mean times for Integrated (Bundled) PACU tasks[a]

TASK NAME	MEAN TIME	NEW BUNDLED TASK	NEW MEAN TIME
Circulation Check	.67	Circulation/pulse	1.70
Pulse Check	1.03	Check	
Extremity Elevation	.91	Extremity Elevation	1.71
Ice Pack Application	.80	and Ice Pack Application	
BP Manual	1.29	Vital Signs	2.32
Temp, Pulse, Resp	1.03		
Vital Signs	2.32	Vital Signs plus	4.02
Stir-up	1.70	Stir-up	
Vital Signs	2.32	Vital Signs with	5.76
Stir-up	1.70	Stir-up plus Fundal	
Fundal Massage	1.74	Massage	
Vital Signs	2.32	Vital Signs with	7.80
Fundal Massage	1.74	Fundal Massage plus	
Neuro Assessment	3.74	Neuro Assessment	
Vital Signs	2.32	Vital Signs plus	3.50
Motor/Sensory	1.18	Motor/Sensory	
Vital Signs	2.32	Vital Signs plus	6.06
Neuro Assessment	3.74	Neuro Assessment	
Chg IV Bag	1.65	Change IV Bag and	2.40
Adj Flow Rate	.75	Adjust Flow Rate	

[a] The new mean time is the sum of task times for tasks consistently done together.

Appendix D2

Mean times for (Combined) PACU tasks[b]

TASK NAME	MEAN TIME	NEW COMBINED TASK	NEW MEAN TIME
Output Urine	1.09	Output other than	.97
Output Vomitus	.85	Drainage Bottles	
Bedpan	2.60	Bedpan/Urinal	2.29
Urinal	1.97		
Medication			
Oral	.81	Medication other	1.13
IM	1.23	than IV	
Subq	.90		
Suppository	1.48		
Topical	1.22		
Medication IV			
Piggy-back	1.77	Medication IV	1.88
Push	1.99		
Oxygen Admin			
Mask	.99	Oxygen Admin	.90
Prongs	.81		
Urinary Cath			
Foley	7.97	Urinary Cath	7.23
Straight	6.49		
EKG-12 Lead	10.33	EKG-Rhythm Strip	9.06
Rhythm Strip	7.78	12 Lead	
Blood, Whole	3.71	Blood Products	3.65
Blood, Plasma	3.58		
Platelets			
Nasotracheal	3.73	Suction Tracheal	3.68
Endotracheal	3.63	Tube	
Suctioning			

[b] The new mean time is the average of task times for mutually exclusive tasks.

Appendix E

Operational Definitions for all PACU Nursing Task Selected by both Panels of Experts

ACTIVITIES OF DAILY LIVING

HYGIENE:

0103 ORAL HYGIENE: Place equipment at bedside, turn patient to his/her side, cleanse gums, teeth and mouth with applicators and then remove equipment from the area.

0109 OCCUPIED BED: Place linen at bedside; turn patient on side, roll linen to one side of bed, replace with clean linen, turn patient to freshly made side of bed, remove soiled linen, complete bed making and then remove soiled linen from area.

0111 CHANGING BOTTOM SHEET: Place linen at bedside, remove bottom sheet, replace with clean sheet, straighten top sheet and then remove soiled linen from the area.

0118 CHANGING BED LINEN PROTECTOR/CHUX: Upon arrival at bedside, position patient, remove soiled chux, place clean chux under patient, straighten bed and then remove used chux from the area.

NUTRITION:

0208 MEASURING AND RECORDING INTAKE: Place calibrated cylinder/container at bedside, measure or calculate fluids, record amount on intake and output record and then remove used equipment from area.

ELIMINATION:

0301 MEASURING AND RECORDING OUTPUT - URINE: Place calibrated cylinder at bedside; measure or calculate volume, record amount on intake and output record and then remove equipment from the area.

0303 MEASURING AND RECORDING OUTPUT - VOMITUS: Remove emesis from patient's bedside, measure vomitus in calibrated cylinder, record amount on Intake and Output Record.

0304 MEASURING AND RECORDING OUTPUT - DRAINAGE BOTTLES, ALL TYPES: Place calibrated cylinder at bedside, pour contents from drainage bottle into calibrated cylinder, measure or calculate volume, replace drainage bottle,

record amount on intake and output record and then remove equipment from the area.

0305 GIVING - BEDPAN: Place bedpan at bedside, place patient on bedpan, provide toilet tissue, remove patient from bedpan, cover bedpan and remove from area.

0306 GIVING A URINAL: Place urinal at patient's bedside, remove cover, adjust patient's pajamas for placement of urinal, remove urinal from patient, replace cover and then remove urinal from area.

0307 INCONTINENT CARE: Place equipment at patient's bedside, bathe buttocks, perineum and thighs, change bedding and then remove equipment and soiled linen from area.

CHANGING POSITION:

0501 CHANGING PATIENT'S POSITION IN BED: Remove support pillows, reposition patient, apply support pillows and then depart from the area.

0502 ADJUSTING POSITION OF BED: Raise, lower or adjust position of bed and then depart from the area.

PHYSIOLOGICAL PARAMETERS

VITAL SIGNS:

0801 BLOOD PRESSURE, MANUAL: Place equipment at bedside, place cuff around extremity, position stethoscope, measure blood pressure, remove cuff, record results and then remove equipment from area.

0808 ORAL TEMPERATURE, PULSE AND RESPIRATIONS: Place equipment at bedside, position temperature probe or thermometer. Place fingers over radial artery pulse and count rate. Count respiratory rate while fingers are placed over radial artery pulse. Remove fingers from radial artery pulse rate, record results of measurements, and then remove equipment from area.

0809 PULSE - PEDAL/FEMORAL/POPITEAL: Place fingers on the artery pulse and count rate. Remove fingers from pulse area and record results.

0810 PULSE -DOPPLER: Place equipment at bedside, place sensor over pulse area, assess and record pulse rate and then remove equipment from area (Types of equipment may vary).

CARDIAC ACTIVITY:

1003 12 LEAD ECG: Place equipment at bedside, connect leads to patient and obtain ECG, Record name, date and time on ECG. Remove leads and clean skin and then remove equipment from area.

1005 HEART SOUNDS ASSESSMENT: Place stethoscope at bedside, arrange pajamas for visual access of chest, assess and record findings and remove stethoscope from area.

1009 RHYTHM STRIP MEASUREMENTS: Upon obtaining the rhythm strip, measure P-R interval, S-T segment, assess for arrhythmic pattern and then record results.

1010 RHYTHM STRIP - ECG MACHINE: Place equipment at bedside, prepare equipment for use, apply limb leads, obtain 20 second strip, record name, date and time, remove limb leads and then remove equipment from area.

1012 ADJUSTING CARDIAC MONITOR/CONNECTING LEADS/RESET ALARM: Upon arrival at the bedside, adjust cardiac monitor, connect leads or reset the alarm and then depart from the area.

NEUROLOGICAL:

1101 PUPIL REFLEXES: Place equipment at bedside, adjust room lighting, assess pupillary reflexes with flashlight and then remove equipment from area.

1104 ORIENTATION: Upon arrival at bedside, make inquiries within the framework of interviewing that will give information about patient's orientation for time, place and person and then record results.

1105 MOTOR/SENSORY TESTING: Upon arrival at the bedside, assess extremities for sensation awareness and muscle strength and then depart from the area.

RESPIRATORY ASSESSMENT:

1202 PULMONARY ASSESSMENT: Upon arrival initiate assessment by auscultation of the lungs, and/or percussion of the chest wall over the involved areas. Assess symmetry of chest, determine if respiratory movement is abdominal or thoracic and then depart from the area.

THERAPEUTIC ACTIVITIES/MODALITIES

GASTROINTESTINAL:

1301 NASOGASTRIC TUBE - INSERTION: Place equipment at bedside, secure towel around patient's neck, give patient glass of water, instruct patient on how to swallow tube, lubricate tube, insert tube, assess for placement, tape in

position, then remove equipment from area/or when non-responsive omit glass of water and instructions.

1302 NASOGASTRIC TUBE - IRRIGATION: Place irrigation solution at bedside, unclamp or disconnect tube, irrigate tubing with asepto syringe, reclamp or reconnect tubing and then remove equipment from area.

1303 NASOGASTRIC TUBE - REMOVAL: Place towel around patient's neck, position patient, remove tape, clamp tube, remove tubing and then remove equipment from area.

RESPIRATORY:

1402 OXYGEN ADMINISTRATION - MASK: Place equipment at bedside, turn on oxygen, fit the mask over the mouth and nose, adjust headband, evaluate fit and patient's adjustment to the equipment, regulate cxygen flow rate and then depart from the area.

1403 OXYGEN ADMINISTRATION - PRONGS: Place equipment at bedside, fit nasal prongs and adjust headband, regulate oxygen rate, evaluate patient's adjustment to oxygen and equipment and then depart from the area.

1411 SUCTIONING - ORAL: Place equipment or set up equipment at bedside, suction oral cavity with suction catheter/oral suction tip, flush catheter before and after each aspiration, replace used equipment or remove used equipment from area.

1413 SUCTIONING - NASO-TRACHEAL: Set up equipment at bedside, put on sterile gloves, pass nasal catheter and suction, flush catheter before and after each aspiration, replace used equipment, and then remove used equipment from area.

1414 SUCTIONING - ENDOTRACHEAL: Set up sterile equipment at bedside, put on sterile gloves, suction through endotracheal tube, flush catheter before and after each use, bag breathe between each aspiration, remove gloves, replace used equipment, and then remove used equipment from area.

1420 INCENTIVE SPIROMETER: Place spirometer at bedside, assist patient during the procedure to determine proper usage of spirometer, and then remove or replace to storage area at bedside.

1421 INTUBATION: Place equipment at bedside, assist physician during the intubation process, tape endotracheal tube in place and then remove equipment from area.

1422 POSITIONING FOR X-RAY: Upon arrival at bedside, assist with positioning of X-Ray film, assist with removal of exposed film and then depart from the area.

1430 EXTUBATION: Place equipment at bedside, assist physician with removal of endotracheal tube and then remove equipment from the area.

CARDIOVASCULAR:

1501 <u>VENIPUNCTURE - BLOOD SAMPLE</u>: Place equipment at bedside. Apply tourniquet to extremity, cleanse site, perform venipuncture and withdraw blood sample, and then apply pressure to puncture site. Apply labels on blood tubes and then remove equipment from area.

1502 <u>VENIPUNCTURE - BLOOD CULTURE</u>: Place equipment at bedside, apply tourniquet to extremity, clean site, perform venipuncture and withdraw blood sample, and then apply pressure to puncture site. Apply labels on blood culture bottle and then remove equipment from area.

1503 <u>ARTERIAL PUNCTURE - BLOOD GASES</u>: Place equipment at bedside, locate arterial puncture site, perform puncture and draw blood, and then place sample on ice. Apply pressure to puncture site, label sample and then remove equipment from area.

1504 <u>INTRAVENOUS INFUSION - FLOW RATE</u>: Upon arrival at bedside, calculate and adjust flow rate as specified and then depart from the area.

1505 <u>INTRAVENOUS INFUSION - INITIATING</u>: Place equipment at bedside, apply tourniquet to extremity, cleanse site, perform venipuncture and connect IV tubing, apply ointment, dressing, and tape securely. Calculate and regulate flow rate, record on intake and output record, and then remove equipment from area.

1506 <u>INTRAVENOUS INFUSION - CHANGE IV BOTTLE</u>: Place equipment at bedside, remove used IV container and replace with new IV container and then remove equipment from area.

1507 <u>INTRAVENOUS INFUSION - IV PUSH MEDICATION</u>: Place equipment at bedside, select site for injection of solution utilizing existing system, administer IV solution and then remove equipment from area.

1509 <u>INTRAVENOUS INFUSION - PIGGY-BACK MEDICATION</u>: Place equipment at bedside, select site for administration of solution utilizing existing systems, record on intake and output record and then remove equipment from area.

1510 <u>INTRAVENOUS OR ARTERIAL LINE - TERMINATION</u>: Place equipment at bedside, remove dressing and terminate IV or arterial catheter/needle, apply pressure to site, and record on intake and output record if appropriate and then remove equipment from area.

1511 <u>INTRAVENOUS INFUSION - INFUSION PUMP SET-UP</u>: Place equipment at bedside, set up IV tubing and adjust flow rate dial. Record on intake and output record and then remove used equipment from area.

1512 <u>ELASTIC STOCKINGS</u>: Place stockings at bedside. Expose lower extremities, put elastic stockings on lower extremities and then depart from the area.

1514 <u>INTRAVENOUS INFUSION - BLOOD</u>: Place equipment at bedside, assure correct transfusion, etc., connect to present intravenous system, record on intake and output record, and then remove equipment from area.

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1515 INTRAVENOUS/ARTERIAL LINE - BLOOD SAMPLE: Place equipment at bedside, clear system, obtain blood sample through stopcock, flush system, label samples, and then remove equipment from bedside.

1520 INTRAVENOUS INFUSION - PLATELETS/PLASMA: Place equipment at bedside, connect to present intravenous system. Record on intake and output record and remove used equipment from area.

1522 CARDIOPULMONARY RESUSCITATION: Upon arrival at bedside, perform any or all aspects of cardiopulmonary resuscitation.

SKIN:

1604 SMALL DRESSING CHANGE, <4" - 8": Place equipment at bedside, remove soiled dressing, cleanse skin, apply dressing to site and then remove equipment from area.

1605 LARGE DRESSING CHANGE, >= 4" - 8": Place equipment at bedside, remove soiled dressing, cleanse skin, apply dressing to site and then remove equipment from area.

1606 REINFORCING DRESSING: Place equipment at bedside, apply dressing to present dressing for reinforcement and then remove equipment from area.

1620 ISOLATION, GOWNING AND GLOVING: Upon arrival at isolation area, wash hands, put on isolation gown, mask, and gloves, or when departing the isolation area, remove isolation gown, mask, and gloves, wash hands and then depart from the area.

NEUROLOGICAL - SKELETAL:

1805 ICE PACK: Place ice bag at bedside, remove old ice bag and replace with new ice bag, secure ice bag in place and then remove equipment from area.

1807 EXTREMITY ELEVATION: Place equipment at bedside, elevate extremity through use of pillows, bed adjustments and/or sling attachments and then depart from the area.

1811 CIRCULATION CHECK: Upon arrival at bedside check extremity for swelling, numbness, and tingling, evaluate temperature and color of the skin, and then assess the patient's ability to move the part and then depart from the area.

UROLOGICAL - GYNECOLOGICAL:

1901 CATHETERIZATION - FOLEY: Place equipment at bedside, prepare patient and insert Foley catheter, inflate balloon, tape catheter in position, connect to urinary drainage bag and then remove used equipment from area.

1902 CATHETERIZATION - STRAIGHT: Place equipment at bedside, prepare patient and insert catheter, empty bladder and remove straight catheter and then remove used equipment from area.

1904 URINE SPECIMEN - ROUTINE: Place equipment at bedside, instruct patient on how to collect specimen, label specimen and then remove specimen from area.

1905 URINE SPECIMEN - CLEAN CATCH/FOLEY: Place equipment at bedside, instruct patient on how to collect specimen or collect sample from Foley catheter, label specimen and then remove specimen from area.

1907 FOLEY CATHETER REMOVAL: Place equipment at bedside, expose catheter and drainage system, deflate Foley balloon and remove Foley catheter. Measure urine and record on intake and output record and then remove used equipment from area.

1916 BLADDER IRRIGATION: Place equipment at bedside, set up equipment and irrigate bladder and then remove equipment from area.

MEDICATION:

2101 ORAL: Upon arrival at bedside, obtain a glass of water and administer the oral medication and then depart from the area.

2102 INTRAMUSCULAR: Place equipment at bedside, locate site for injection, administer medication and then remove equipment from area.

2103 SUBCUTANEOUS: Place equipment at bedside, locate site for injection, administer medication and then remove equipment from area.

2104 SUPPOSITORY, RECTAL/VAGINAL: Place equipment at bedside, prepare and administer suppository and then remove equipment from area.

2105 TOPICAL: Place equipment at bedside, locate and expose site for topical application of medication, apply medication and then remove equipment from area.

2106 SUBLINGUAL: Place equipment at bedside, place medication under patient's tongue and then remove equipment from area.

2416 FUNDUS MASSAGE: Upon arrival at bedside, expose patient's lower abdominal area, massage fundus, assess height of uterus and then record.

2417 CHANGING PERINEAL PAD: Place supplies at bedside, assess amount of bleeding, change perineal pad and then remove used supplies from area.

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*New Activities not previously measured by Sherrod et al. (1981)

*2703 ADMISSION TO THE PACU: Upon arrival at the patient's bedside, this admission procedure should include the following (not necessarily in this

order): (a) insure airway patency and initiate oxygen; (b) place IV fluids/blood products on IV pole and check flow rate and amount of fluid in the bag(s); (c) assess integrity of IV/central/arterial site(s); (d) connect the patient to the pulse oximeter; (e) place cardiac monitor electrodes and note initial cardiac monitoring for rate and rhythm; (f) inspect dressings and drains; (g) check and record the blood pressure, pulse, and respiratory rate; (h) receive the report from the anesthetist/anesthesiologist; (i) report baseline (PARS) measurements to anesthetist/anesthesiologist; (j) make assessment of patient's total condition; (k) assess patient's body position and reposition if necessary; (l) initiate the stir up routine, encourage the patient to cough and deep breathe, orient him or her to the unit; (m) record initial nursing assessment on the flow sheet or appropriate form; (n) initial assessment ends when continuous nursing activity stops.

*2704 HYPOTHERMIA SET-UP: Place heat lamps at bedside, adjust position, set timer and then depart from the area.

*2705 STIR-UP ROUTINE: Upon arrival at bedside complete the following: (a) instruct patient to cough and deep breathe; (b) answer questions about surgery; (c) reorient to place and time; (d) assess level of comfort; (e) determine if patient can be medicated for pain, give fluids if permitted; (f) record vital signs and then depart from the area.

*2707 SETTING UP PROGRAMMING MONITORS: Gather required equipment at bedside and complete the following; (a) calibrate monitors(s); (b) position transducers; (c) connect transducers to cables, cables to monitors(s); (d) assess display data; (e) record information and then remove equipment from area.

*2708 DISCHARGE FROM PACU: Upon arrival at bedside this procedure should include the following (not necessarily in this order): (a) complete assessment of the patient and document; (b) disconnect from the monitor(s); (c) empty Foley bag; (d) mark output from JP's, hemovacs, etc.; (e) hang new IV bag if needed; (f) record amounts on Intake and Output Record; (g) change ice bag(s); (h) obtain and record vital signs; (i) review orders with patient; (j) answer patient's questions; (k) provide information to patient on transportation to ward; (l) call report to receiving ward.

*2709 VITAL SIGNS AND STIR-UP ROUTINE MONITORED PATIENTS: Place equipment at bedside, position temperature probe or thermometer. Observe monitor for cardiac rate, note respiratory rate, and blood pressure. Initiate stir-up routine: (a) instruct patient to cough and deep breathe; (b) answer questions about surgery; (c) reorient to place and time; (d) assess level of comfort; (e) determine if patient can be medicated for pain, give fluids if permitted; (f) record vital signs and then depart from the area.

*2711 BLOOD PRESSURE, AUTOMATIC, NON-INVASIVE: Place equipment at bedside, place cuff around extremity, program monitor parameters, initiate sequence, record results and remove cuff and equipment from area.

Appendix F

Statistical Parameters for Tasks Selected as Relevant to PACU Practice

NUMBER TASK	MEAN	SD	SE	RANGE MIN	MAX	n^a	$n^{,b}$	C.I.^{c} (80%) (95%)
0103 ORAL HYGIENE	3.24	1.74	.16	.47	8.70	122	112	(3.45,3.04) (3.55,2.93)
0109 OCCUPIED BED	9.70	3.52	.21	4.07	27.15	284	51	(9.97,9.42) (10.11,9.29)
0111 CHG BOTTOM SHEET	3.42	1.75	.53	1.35	6.08	11	127	(4.14,2.70) (4.59,2.26)
0118 CHG CHUX	1.06	.87	.77	.17	5.53	164	296	(1.09,.92) (1.14,.87)
0208 INTAKE	.86	1.04	.06	.25	2.60	289	572	(.94,.78) (.98,.74)
0301 OUTPUT URINE	1.09	.90	.04	.22	10.60	489	251	(1.13,1.03) (1.17,1.01)
0303 OUTPUT VOMITUS	.85	.45	.15	.32	1.82	9	142	(1.05,.64) (1.18,.51)
0304 OUTPUT DRAINAGE BAG	1.70	1.14	.09	.42	8.58	154	176	(1.81,1.58) (1.88,1.51)
0305 BEDPAN	2.60	1.26	.08	.20	7.32	232	92	(2.71,2.49) (2.76,2.44)
0306 URINAL	1.97	.85	.07	.30	4.65	133	73	(2.06,1.87) (2.12,1.82)
0307 INCONTIN CARE	7.13	4.14	.39	1.10	28.50	110	132	(7.64,6.62) (7.91,6.35)
0501 CHG PT POSITION	2.13	1.55	.09	.12	13.32	267	205	(2.25,2.00) (2.31,1.94)
0502 CHG BED POSITION	.49	.74	.04	.00	11.08	360	868	(.54,.44) (.57,.42)

NUMBER TASK	MEAN	SD	SE	RANGE MIN	MAX	n^a	n'^b	C.I.^{c} (80%) (95%)
0801 B/P MANUAL	1.04	.38	.01	.25	2.93	823	51	(1.06,1.02) (1.06,1.01)
0808 T/P/R	1.29	.60	.02	.52	5.07	596	127	(1.32,1.26) (1.34,1.24)
0809 PULSE CHECK	1.03	.36	.04	.43	1.75	77	48	(1.08,.98) (1.28,1.17)
0810 PULSE BY DOPPLER	3.25	1.59	.41	1.07	6.30	15	39	(3.80,2.70) (4.12,2.38)
1003 12 LEAD ECG	10.33	3.17	.38	.73	17.95	71	37	(10.82,9.84) (11.08,9.58)
1005 HEART SOUND ASSESSMENT	1.28	.56	.06	.43	5.00	91	75	(1.36,1.21) (1.40,1.17)
1009 RHYTHM STRIP MEASUREMENT	1.37	1.01	.12	.57	6.63	65	213	(1.54,1.21) (1.62,1.13)
1010 RHYTHM STRIP ECG MACHINE	7.78	2.17	.38	5.12	12.45	33	32	(8.27,7.28) (8.55,7.01)
1012 MONITOR ADJ	.95	.43	.08	**	**	31	87	(1.02,.87) (1.10,.79)
1101 PUPIL REFLEX	.66	.36	.03	.18	2.48	158	118	(.70,.62) (.72,.60)
1102 MENTAL ALERTNESS	.91	.38	.05	.27	1.88	52	71	(.97,.84) (1.01,.80)
1104 ORIENTATION	.99	.57	.06	.05	4.17	90	128	(1.07,.92) (1.11,.88)
1105 MOTOR/ SENSORY	.18	.55	.05	.23	2.92	137	84	(1.24,1.12) (1.27,1.08)
1202 PULMONARY ASSESSMENT	1.67	.71	.07	.52	4.17	117	71	(1.76,1.59) (1.80,1.54)
1301 N/G TUBE INSERT	8.00	7.17	1.05	2.48	45.00	47	324	(9.36,6.64) (10.10,5.90)

NUMBER TASK	MEAN	SD	SE	RANGE MIN	MAX	n[a]	n'[b]	C.I.[c] (80%) (95%)
1302 N/G TUBE IRRIGATION	1.59	1.56	.24	.45	3.88	42	392	(1.90,1.27) (2.07,1.10)
1303 N/G TUBE REMOVAL	1.46	1.00	.20	.33	4.18	25	196	(1.73,1.20) (1.88,1.05)
1402 OXYGEN ADM MASK	.99	.60	.06	.20	3.45	91	14	(1.07,.91) (1.11,.86)
1403 OXYGEN ADM PRONGS	.81	1.05	.10	.20	10.52	116	656	(.94,.69) (1.00,.62)
1411 SUCTION ORAL	1.66	1.29	.12	.22	8.50	119	234	(1.81,1.51) (1.89,1.43)
1413 SUCTION NASO - TRACHEAL	3.73	1.17	.32	1.57	5.65	13	45	(4.17,3.29) (4.43,3.03)
1414 SUCTION ENDO- TRACHEAL	3.63	1.53	.16	1.10	12.73	88	69	(3.84,3.41) (3.95,3.30)
1420 INCENTIVE SPIROMETER	2.97	1.39	.16	.92	9.68	78	86	(3.17,2.76) (3.28,2.65)
1421 INTUBATE	17.33	15.22	4.59	5.00	58.17	11	373	(23.58,11.07) (27.43,7.23)
1422 POSITION FOR X-RAY	3.75	1.80	.15	1.22	8.43	146	90	(3.95,3.56) (4.05,3.46)
1430 EXTUBATE	2.56	1.08	.62	* *	**	3	180	(3.58,1.54) (4.54,.57)
1501 BLOOD SAMPLE VENIPUNCTURE	4.97	2.41	.23	.50	19.27	107	92	(5.27,4.67) (5.44,4.51)
1502 BLOOD CULTURE VENIPUNCTURE	3.52	2.11	.10	.42	15.00	446	138	(3.65,3.39) (3.71,3.32)
1503 BLOOD GAS ARTERIAL	5.47	3.81	.42	1.33	17.58	81	191	(6.17,4.92) (6.31,4.56)

NUMBER	TASK	MEAN	SD	SE	RANGE MIN	RANGE MAX	n^a	n'^b	C.I.^{c} (80%) (95%)
1504	ADJ IV/ IRRIG FLOW	.75	.81	.04	.07	8.58	412	449	(.80,.70) (.83,.67)
1505	START IV	9.24	6.60	.39	2.00	60.00	287	197	(9.74,8.74) (10.01,8.48)
1506	CHG IV BAG ADJ FLOW	1.65	.92	.05	.33	8.25	364	119	(1.71,1.59) (1.75,1.56)
1507	IV PUSH MED	1.99	1.61	.10	.33	10.87	280	252	(2.12,1.87) (2.18,1.80)
1509	IV PIGGY BACK MED	1.77	1.26	.06	.37	11.98	397	196	(1.85,1.68) (1.89,1.64)
1510	D/C IV ARTERIAL LINE	3.23	2.48	.16	.78	14.50	239	230	(3.44,3.03) (3.55,2.92)
1511	INFUSION PUMP SETUP	3.65	2.18	.21	.58	9.13	111	140	(3.92,3.39) (4.06,3.24)
1512	ELASTIC STOCKINGS	3.41	1.20	.12	.88	8.08	99	48	(3.57,3.26) (3.65,3.17)
1514	WHOLE BLOOD ADM	3.71	1.75	.11	.68	9.97	73	24	(3.98,3.45) (4.12,3.30)
1515	BLOOD SAMPLE IV/ARTERIAL	2.89	1.65	.17	.52	14.45	92	128	(3.12,2.67) (3.24,2.55)
1520	PLATELETS/ PLASMA	3.58	1.59	.33	1.08	8.03	23	84	(4.01,3.14) (4.26,2.89)
1522	CPR	62.27	62.63	18.08	2.13	210.00	12	490	(86.92,37.63) (102.07,22.48)
1604	DRESS CHG SMALL	6.17	4.12	.35	1.10	21.17	138	175	(6.62,5.71) (6.86,5.47)
1605	DRESS CHG LARGE	11.36	7.53	.60	3.77	55.57	158	172	(12.14,11.36) (12.55,10.18)
1606	REINFORCE DRESSING	3.54	1.98	.40	1.03	10.48	24	133	(4.08,3.54) (4.38,2.71)

NUMBER	TASK	MEAN	SD	SE	RANGE MIN	MAX	n^a	$n^{,b}$	C.I.^{c} (80%) (95%)
1620	ISOLATION GOWNING/ GLOVING	1.47	.65	.06	.15	3.67	111	77	(1.55,1.39) (1.59,1.34)
1805	ICE PACK	.80	.52	.04	.13	5.75	220	168	(.85,.75) (.87,.73)
1807	EXTREMITY ELEVATION	.91	.42	.03	.37	2.60	148	84	(.96,.87) (.98,.85)
1811	CIRCULATION CHECK	.67	.27	.02	.30	2.00	160	64	(.69,.64) (.71,.62)
1901	FOLEY CATHETER INSERTED	7.97	4.84	.66	2.62	29.12	53	148	(8.83,7.10) (9.30,6.63)
1902	STRAIGHT CATHETER INSERTED	6.49	3.10	.58	2.53	16.68	29	95	(7.25,5.74) (7.67,5.31)
1905	URINE SPECIMEN	2.07	1.24	.16	.12	4.55	63	144	(2.27,1.86) (2.38,1.75)
1907	URIN CATH REMOVAL	3.33	2.36	.26	.98	13.58	80	198	(3.67,299) (3.86,2.81)
1916	URIN BLAD IRRIGATION	4.02	3.01	.59	1.23	12.55	26	237	(4.80,3.24) (5.23,2.80)
2101	ORAL MED	.81	.72	.03	.07	6.22	712	302	(.84,.77) (.86,.76)
2102	I M MED	1.23	.68	.06	.15	5.73	439	119	(1.30,1.15) (1.34,1.11)
2103	SUBQ MED	.90	.34	.02	.27	2.23	229	56	(.93,.87) (.95,.86)
2104	SUPPOSITORY RECTAL VAGINAL	1.48	.72	.08	.40	4.52	74	93	(1.59,1.37) (1.65,1.31)
2105	TOPICAL MED	1.22	1.39	.12	.15	13.85	125	502	(1.38,1.06) (1.49,.98)

NUMBER TASK	MEAN	SD	SE	RANGE MIN	MAX	n^a	n'^b	C.I.^{c} (80%) (95%)
2106 SUBLINGUAL MED	.48	.23	.02	.17	1.38	108	89	(.51,.45) (.52,.43)
2416 FUNDAL MASSAGE	.95	.80	.06	.18	6.30	176	277	(1.03,.87) (1.07,.83)
2417 PERIPAD	.79	.43	.04	.28	4.38	136	119	(.83,.74) (.86,.72)

NEWLY IDENTIFIED PACU TASKS (2700 Series)

NUMBER TASK	MEAN	SD	SE	RANGE MIN	MAX	n^a	n'^b	C.I.^{c} (80%) (95%)
2703A ADM PACU GEN ANESTH	18.36	8.36	.57	2.40	58.88	215	80	(19.07,17.60) (19.48,17.23)
2703B ADM PACU SPIN/REG ANESTH	15.94	6.67	.86	5.22	38.62	60	70	(17.05,14.82) (17.66,14.22)
2703C ADM PACU LOCAL/SED ANESTH	12.60	5.25	.97	1.73	28.28	29	72	(13.88,11.33) (14.60,10.61)
2704 HYPOTHERMIA	.63	1.20	.18	.17	8.13	43	1467	(.87,.39) (1.00,.27)
2705 STIR-UP ROUTINE	1.71	1.98	.17	.22	17.13	134	530	(1.93,1.48) (2.04,1.37)
2707 MONITOR SET UP	.87	.54	.18	.30	1.93	9	2	(1.12,.62) (1.20,.46)

NUMBER	TASK	MEAN	SD	SE	RANGE		n[a]	n'[b]	C.I.[c] (80%) (95%)
					MIN	MAX			
2708	DISCHARGE PACU	4.82	2.11	.13	.75	15.28	26	374	(4.99,4.65) (5.08,4.56)
2709	VS/STIR-UP	3.03	2.86	.28	.55	21.73	107	349	(3.39,2.67) (3.58,2.48)
2711	B/P AUTOMATIC	1.19	1.74	.21	.22	14.73	67	847	(1.47,.92) (1.62,.77)

NOTE:

n[a] = HCSCIA data collected sample size
n'[b] = sample size derived from manpower regulations
C.I.[c] = 80% and 95% confidences intervals (means will fall within 80% or 95% C.I.)
** = From Sherrod et al. (1981), inadequate sample size to compute other descriptive statistics.

Appendix G

Mean Times for Individual and Integrated Tasks with Operational Definitions for Integrated Tasks for Pilot Test

TASK	INDIVIDUAL MEAN TIME (minutes)	INTEGRATED MEAN TIME (minutes)

1.0 VITAL SIGNS (Combination of Sherrod et al. [1981] and New Measurement)

1.1 V/S: T,P,R,   B/P 1.2903   (MANUAL)   **2.32**
                        P,R 1.0388

   1.2 **Vital Signs Plus Stir-Up Routine:** Includes time to place equipment at bedside, position temperature probe or thermometer. Observe monitor for cardiac rate, note respiratory rate, and blood pressure. Initiate stir-up routine: (a) instruct patient to cough and deep breathe; (b) answer questions about surgery; (c) reorient to place and time; (d) assess level of comfort; (e) determine if patient can be medicated for pain, give fluids if permitted; (f) record vital signs; (g) depart from the patient's bedside.

        Vital Signs   2.32
        Stir-up   +1.70   **4.02**

   1.3 **Vital Signs with Stir-Up Routine PLUS Fundal Massage:** Includes 1.2 plus time to palpate level of fundus, assess firmness, massage fundus if boggy until firm, assess amount of bleeding, and change perineal pad. Depart from patient's bedside.

        Vital Signs   2.32
        Stir-up   1.70
        Fundal massage   .95
        Peri-pad chg   + .79
                           5.76   **5.76**

   1.4 **Vital Signs with Fundal Massage PLUS Neuro assessment:**
Includes 1.3 plus time to adjust room lighting then check pupillary reflexes with flashlight; make inquiries within the framework of interviewing that will give information about patient's orientation, memory, intellectual performance, and judgment; and assess extremities for sensation awareness, muscle strength and record results and leave patient's bedside.

        Vital Signs   2.32
        Fundal Massage (peripad) 1.74
        Neuro Assessment   +3.74
                                  8.80   **8.80**

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1.5 **Vital Signs PLUS Motor/Sensory Test:** Includes 1.1 plus time to assess extremities for sensation awareness and muscle strength, record results, and depart from patient's bedside.

```
Vital Signs        2.32
Motor/sensory     +1.18
                   3.50                          3.50
```

1.6 **Vital Signs PLUS Brief Neuro Assessment:** Includes 1.1 plus, adjust room lighting then check pupillary reflexes with flashlight; make inquiries within the framework of interviewing that will give information about patient's orientation, memory, intellectual performance, and judgment; and assess extremities for sensation awareness and muscle strength.

```
Vital Signs        2.32
Neuro check
o  Pupil reflex     .66
o  Mental alertness .91
o  Orientation      .99
o  Motor sensory  +1.18
                   6.06                          6.06
```

2.0 **MONITORING** (Based on a combination of Sherrod et al. [1981] and New measurements)

2.1 **Doppler Pulse:**   **3.25**

2.2 **Circulation/Pulse Check:** Includes time to check extremity for pulse, swelling, numbness, and tingling, evaluate temperature and color of the skin, and then assess the patient's ability to move the part. Record the results and depart the patient's bedside.

```
Circulation/pulse check
o  Circulation       .6672
o  Pulse           +1.0317
                   1.6989                        1.70
```

2.3 **Heart Sounds Assessment**   **1.28**

2.4 **Intake Encounter**   **.86**

2.5 **Monitor Adjustment**   **.95**

2.6 **Output Drainage Bottles**   **1.70**

2.7 **Output Other Than Drainage Bottles:** Includes time to measure urine/emesis, record amount on Intake and output record, and remove equipment from the area.

```
Output other than drainage bottles
o Output urine     1.09
o Output vomitus + .85
                   1.94/2= .97                   .97
```

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2.8 **Pulmonary Assessment**   **1.67**

2.9 Initial Assessment (New Measurement)

    2.9a **General anesthesia**   **18.36**
    2.9b **Spinal & Regional Anesthesia**   **15.94**
    2.9c **Local & Local Plus Sedation**   **12.60**

2.10 **Discharge PACU (New Measurement)**   **4.83**

3.0 ACTIVITIES OF DAILY LIVING/FEEDING: (Sherrod et al. [1981])

3.1 **Changing Chux**   **1.01**

3.2 **Changing Bottom Sheet**   **3.42**

3.3 **Changing Pt's Position in Bed**   **2.13**

3.4 **Changing Position of Bed**   **.49**

3.5 **Giving Bedpan or Urinal**: Includes time to place bedpan or urinal at bedside, place bedpan or urinal for patient, provide toilet tissue, remove equipment from the patient cover and remove from the area.

    Giving bedpan/urinal

      o Bedpan   2.5998
      o Urinal   +1.9695
                  4.5694/2   **2.28**

3.6 **Incontinent Care**   **7.13**

3.7 **Occupied Bed**   **9.70**

3.8 **Oral Hygiene**   **3.24**

4.0 IV THERAPY (Sherrod et al. [1981])

4.1 **Adjust IV or Irrigation Flow Rate**   **.75**

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4.2 **Blood Products:** Includes time to place equipment at bedside, insure correct transfusion, connect to present intravenous system, record on Intake and Output Record, and remove equipment from area.

Blood products

- o Blood whole   3.7119
- o Plasma/platelet +3.5765
                     7.2884/2   **3.64**

4.3 **Changing IV Bottles and Adjusting Flow Rate:** Includes time to place equipment at bedside, remove used IV container and replace with new container, calculate and adjust flow rate, and remove equipment from area.

Changing IV and adjust flow rate
- o Changing IV   1.6528
- o Adj flow rate   + .7528
                     2.4056   **2.41**

4.4 **DC IV or Arterial Line**   **3.23**

4.5 **Infusion Pump Set Up**   **3.65**

4.6 **Start IV**   **9.24**

5.0 <u>TREATMENT/PROCEDURES/MEDICATION:</u> (Sherrod et al. [1981])

5.1 **Arterial Blood Gas**   **5.47**

5.2 **CPR**   **62.27**

5.3 **Dressing Change Small**   **6.17**

5.4 **Dressing Change Large**   **11.36**

5.5 **Dressing Reinforced**   **3.54**

5.6 **Elastic Stockings**   **3.41**

5.7 **ECG Rhythm Strip or 12-Lead:** Includes time to place equipment at bedside, prepare equipment for use, apply leads, obtain rhythm strip/ECG, remove leads, and record name, date, and time. Remove equipment form area.

EKG rhythm strip or 12-lead

- o ECG rhythm strip 7.7785
- o 12-Lead   +10.3289
                     18.1074/2   **9.05**

5.8 **Extremity Elevation and Ice Pack Application:** Includes time to place equipment at bedside, elevate extremity through use of pillows, bed adjustments and/or sling attachments, apply ice bag, secure ice bag in place; then remove equipment from area.

Extremity elevation and ice pack application

o Extremity elevation	.9140	
o Ice pack	+ .8001	
	1.7141	**1.71**

5.9 **Hypothermia Set-up (New Measurement)**   **.63**

5.10 **Isolation, Gowning and Gloving**   **1.47**

5.11 **IV/Arterial Line, Blood Sample**   **2.89**

5.12 **Medication Encounter:** Includes time to obtain medication and equipment to administer medication by stated route and remove equipment from area.

Medication encounter

o Oral	.8085	
o IM	1.2259	
o SubQ	.9010	
o Topical	1.2234	
o Suppository	+1.4799	
	5.6387/5 = 1.12774	**1.13**

5.13 **Medication Encounter IV:** Includes time to place equipment at bedside, select site for administration of solution using the existing system, record on intake and output record, and remove equipment from area.

Medication encounter IV

o IV push	1.9933	
o IV piggy-back	+1.7653	
	3.7586/2 = 1.8793	**1.88**

5.14 **Nasogastric Tube Insertion**   **8.00**

5.15 **Nasogastric Tube Irrigation**   **1.59**

5.16 **Nasogastric Tube Removal**   **1.46**

5.17 **Positioning for X-Ray**   **3.75**

5.18 **Rhythm Strip Measurement**   **1.37**

5.19 **Urinary Catherization Indwelling or Straight:** Includes time to place equipment at bedside, prepare patient and insert catheter, tape catheter in

position, connect to urinary drainage system, and remove used equipment from area.

Urinary catherization indwelling or straight

o Indwelling cath. 7.9674
o Straight cath.   +6.4924
                    14.4598/2 = 7.2299   **7.23**

5.20 **Urine Specimen, Clean Catch/Indwelling**   **2.07**

5.21 **Urinary Catheter Removal**   **3.33**

5.22 **Urinary Bladder Irrigation**   **4.02**

5.23 **Venipuncture Blood Culture Encounter**   **4.97**

5.24 **Venipuncture Blood Sample Encounter**   **3.52**

6.0 <u>RESPIRATORY THERAPY:</u> (Sherrod et al. [1981])

6.1 **Extubation**   **2.56**

6.2 **Incentive Spirometer**   **2.97**

6.3 **Intubation**   **17.33**

6.4 **Oxygen Administration (Initial and/or Adjustment):** Includes time to place equipment at bedside, turn on oxygen, fit mask over mouth and nose or fit nasal prongs, adjust headband, regulate oxygen flow rate, evaluate fit, patient's adjustment to oxygen and equipment and then depart from the area.

Oxygen administration (initial and adjustments)

o Oxygen initial   .9887
o Oxygen adjust   +.8110
                    1.7997/2= .8998   **.90**

6.5 **Suctioning Oral**   **1.66**

6.6 **Suctioning Tracheal Tube:** Includes time to set up equipment at bedside, put on sterile gloves, pass catheter and suction, flush catheter before and after each aspiration. Replace used equipment, and then remove used equipment from area.

Suctioning tracheal tube

o Nasotracheal   3.7285
o Endotracheal   +3.6262
                    7.3547/2 = 3.67735   **3.68**

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Appendix H

WMSN PACU Worksheet Used in Pilot Study

WORKLOAD MANAGEMENT SYSTEM FOR NURSING
POST ANESTHESIA RECOVERY UNIT WORKSHEET

RN _____ | DATE _____

Time admitted to PACU _____ | Pertinent Patient Information

Time ready for discharge _____ | Diagnosis _____

Time actually discharged _____ | Gender _____

Age _____ | Soc. Sec. No. _____

Activities	Counting Area	Total Number
Vital Signs		
1.1 Vital signs: T, P, R, B/P		
1.2 Vital signs **PLUS** stir-up routine		
1.3 Vital signs with stir-up **PLUS** fundal massage		
1.4 Vital signs with fundal massage **PLUS** neuro assessment		
1.5 Vital signs **PLUS** motor/ sensory testing		
1.6 Vital signs **PLUS** brief neuro assessment		
Monitoring		
2.1 Assessment of pulses by doppler		
2.2 Circulation/pulse check		
2.3 Heart sound assessment		
2.4 Intake encounter		
2.5 Monitor adjustments		
2.6 Output encounter, drainage bottle		
2.7 Output encounter, other than drainage bottle		
2.8 Pulmonary assessment		
2.9 Surgical recovery, initial assessment--**MARK ONE ONLY**		
2.9a General anesthesia		OR
2.9b Spinal or regional anesthesia		OR
2.9c Local or local with sedation		
2.10 Surgical recovery, discharge assessment		
Activities of Daily Living/Feeding		
3.1 Changing bed linen protector/chux		
3.2 Changing bottom sheet		
3.3 Changing patient's position in bed		
3.4 Changing position of bed		

Activities	Counting Area	Total Number
3.5 Giving bedpan or urinal		
3.6 Incontinent care		
3.7 Occupied bed		
3.8 Oral hygiene		
IV Therapy		
4.1 Adjusting IV or irrigation flow rate		
4.2 Blood product administration		
4.3 Changing IV bottle and adjusting flow rate		
4.4 Discontinuing an IV infusion or arterial line		
4.5 Infusion pump set-up		
4.6 Starting an IV		
Treatments/Procedures/Medications		
5.1 Arterial blood gas encounter		
5.2 CPR		
5.3 Dressing change, small		
5.4 Dressing change, large		
5.5 Dressing, reinforcement		
5.6 Elastic stocking		
5.7 EKG-rhythm strip or 12-lead		
5.8 Extremity elevation and ice bag application		
5.9 Hypothermia set-up		
5.10 Isolation gowning and gloving		
5.11 Intravenous/arterial line blood sample encounter		
5.12 Medication encounter, other than intravenous		
5.13 Medication encounter, intravenous		
5.14 Nasogastric tube, insertion		
5.15 Nasogastric tube, irrigation		
5.16 Nasogastric tube, removal		
5.17 Positioning for X-ray		
5.18 Rhythm strip measurement		
5.19 Urinary catherization		
5.20 Urine specimen collection encounter		
5.21 Urinary catheter removal		
5.22 Urinary bladder irrigation		

POST ANESTHESIA RECOVERY UNIT WORKSHEET (CONTINUED)

Activities	Counting Area	Total Number
5.23 Venipuncture-blood culture encounter		
5.24 Venipuncture-blood sample encounter		
Respiratory Therapy		
6.1 Extubation		
6.2 Incentive spirometer		
6.3 Intubation		
6.4 Oxygen administration		
6.5 Suctioning, oral		
6.6 Suctioning, tracheal tube		

Continuous

7.1 Activity requiring **1:1** (not documented elsewhere on this form)

Activity _____

  Start clock time _____ End clock time _____

  Number of Staff: RNs _____ Paraprofessionals _____

  Reasons needing 1:1 staffing _____

7.2 Activity requiring **greater than 1:1** (not documented elsewhere on this form)

Activity _____

  Start clock time _____ End clock time _____

  Number of Staff: RNs _____ Paraprofessionals _____ _____

  Reasons needing greater than 1:1 staffing _____

Comments: Please write any suggestions or questions you have regarding using this worksheet:

Appendix I

Operational Definitions and Mean Times for
Tasks that were Unbundled/Uncombined

1.0 VITAL SIGNS AND COMMON PACU PARAMETERS

	MEAN TIMES
*[1.1] **Fundal Massage:** Includes time to palpate level of fundus, assess firmness, massage fundus if boggy until firm, assess bleeding and lochia by noting amount and character of flow, change peripad and depart from patient's bedside.	1.74
*[1.2] **Motor/Sensory Testing:** Includes time to assess extremities for sensation awareness and muscle strength, record results, and depart from area.	1.18
*[1.3] **Neuro Assessment:** Includes time to adjust room lighting then check pupillary reflexes with flashlight; make inquiries within the framework of interviewing that will give information about the patient's orientation, memory, intellectual performance, and judgment; and assess extremities for sensation awareness and muscle strength. Record results and depart the area.	3.74
*[1.4] **Stir-Up Routine:** Includes time to initiate stir-up routine: (a) instruct patient to cough and deep breathe; (b) answer question about surgery; (c) reorient to place and time; (d) assess level of comfort; (e) determine if patient can be medicated for pain, give fluids if permitted and depart from the area.	1.70
*[1.5] **Vital Signs (Automated):** Place equipment at bedside, attach equipment to patient, program monitor parameters, initiate sequence, and record results.	1.01

*Bracketed numbers are Unbundled/Uncombined tasks
on Field Test data collection worksheet.

Appendix J

WMSN PACU Worksheet Used in Field Test

WORKLOAD MANAGEMENT SYSTEM FOR NURSING - POST ANESTHESIA CARE UNIT WORKSHEET

SECTION I:
General Information

RN _____ DATE _____ SITE _____

(Signature of Nurse Finalizing Form)

SECTION II: Pertinent Patient Information

Worksheet _____ Initial OR Continuing _____   Time Admitted to PACU _____

Procedure _____   Time ready for discharge _____

Last four Soc Sec No _____   Time actually discharged _____

Gender _____ Age _____

SECTION III: Activities

Activities	Counting Area	Total No
VITAL SIGNS AND COMMON PACU PARAMETERS		
1 1 Fundal massage		
1 2 Motor/sensory testing		
1 3 Neuro assessment		
1 4 Stir-up routine		
1 5 Vital signs T, P, R, B/P		
MONITORING		
2 1 Assessment of pulses by doppler		
2 2 Circulation/pulse check		
2 3 Heart sound assessment		
2 4 Intake encounter		
2 5 Monitor adjustments		
2 6 Output encounter, drainage bottle		
2 7 Output encounter, other than drainage bottle		
2 8 Pulmonary assessment		
2 9 Surgical recovery, initial assessment-- **MARK ONE ONLY**		
2 9a General anesthesia		OR
2 9b Spinal or regional anesthesia		OR
2 9c Local or local with sedation		
2 10 Surgical recovery, discharge assessment		

	Counting Area	Total No
ACTIVITIES OF DAILY LIVING/FEEDING		
3 1 Changing bed linen protector/chux		
3 2 Changing bottom sheet		
3 3 Changing patient's position in bed		
3 4 Changing position of bed		
3 5 Giving bedpan or urinal		
3 6 Incontinent care		
3 7 Occupied bed		
3 8 Oral hygiene		
IV THERAPY		
4 1 Adjusting IV or irrigation flow rate		
4 2 Blood product administration		
4 3 Changing IV bottle and adjusting flow rate		
4 4 Discontinuing an IV infusion or arterial line		
4 5 Infusion pump set-up		
4 6 Starting an IV		

BUNDLED PACU ITEMS

2.9 Surgical recovery, initial assessment
    2.9a General Anesthesia
        Vital signs (one or more times)
        Airway patency
        Initiate oxygen
        IV fluids/blood on IV pole
        IV flow rate, amount fluids in bag
        Place pulse oximeter
        Assess IV, central, arterial sites
        Note cardiac monitor rate and rhythm
        Inspect dressing and drains
        Receive report from anesthesia
        Report baseline (PARS) measurements to anesthesia
        Assess patient's total condition
        Reposition if necessary
        Initiate stir-up (cough, deep breathe, orient to unit
        Record findings on appropriate form
        Initial assessment ends when continuous nursing activity stops
    2.9b Spinal or regional anesthesia:
        same as 2.9a except neuro and motor/sensory assessment
        replaces stir-up routine.
    2.9c Local or IV sedation:
        same as 2.9a

2.10 Surgical recovery discharge assessment:
        Vital signs
        Complete assessment of the patients (PARS)
        Disconnect from the monitors
        Empty urinary bag
        Mark output from JP's, hemovacs, etc
        Hang new IV (if needed)
        Record amounts on intake and output record
        Change ice bag(if necessary)
        Take and record vital signs
        Review orders with patient
        Answer patient's questions
        Provide to patient information about transfer

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POST ANESTHESIA CARE UNIT WORKSHEET (CONTINUED)

TREATMENTS/PROCEDURES/MEDICATIONS

	Counting Area	Total No
5.1 Arterial blood gas encounter		
5.2 CPR		
5.3 Dressing change, small		
5.4 Dressing change, large		
5.5 Dressing, reinforcement		
5.6 Elastic stocking		
5.7 EKG rhythm strip or 12-lead		
5.8 Extremity elevation with or without ice bag application		
5.9 Hypothermia set up		
5.10 Isolation, gowning and gloving		
5.11 Intravenous/arterial line blood sample encounter		
5.12 Medication encounter, other than intravenous		
5.13 Medication encounter, intravenous		
5.14 Nasogastric tube, insertion		
5.15 Nasogastric tube, irrigation		
5.16 Nasogastric tube, removal		
5.17 Positioning for X-ray		
5.18 Rhythm strip measurement		
5.19 Urinary catherization		
5.20 Urine specimen collection encounter		
5.21 Urinary catheter removal		
5.22 Urinary bladder irrigation		
5.23 Venipuncture blood culture encounter		
5.24 Venipuncture blood sample encounter		

RESPIRATORY THERAPY

	Counting Area	Total No
6.1 Extubation		
6.2 Incentive spirometer		
6.3 Intubation		
6.4 Oxygen administration: Initial and adjustments		
6.5 Suctioning, oral		
6.6 Suctioning, tracheal tube		

CONTINUOUS

7.1 Activity requiring 1:1 (not documented elsewhere on this form)

Activity _____

Start clock time _____ End clock time _____

Number of Staff: RNs _____ Paraprofessionals _____

Reasons needing 1:1 staffing _____

7.2 Activity requiring greater than 1:1 (not documented elsewhere on this form)

Activity _____

Start clock time _____ End clock time _____

Number of Staff: RNs _____ Paraprofessionals _____

Reasons needing greater than 1:1 staffing _____

Comments: Please write any suggestions or questions you have regarding using this worksheet:

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Appendix K

MODEL 1 (33 Tasks)

Inclusion of the task into the regression model was based on task frequency, magnitude of the mean time, and clinical judgment. The frequency of task marked in the total sample was important because it reflected the care provided a large number of patients, or patients with complications, or patients with increased LOS. The larger the mean time the lower the frequency needed to impact the total direct care time. Clinical judgment took into account the impact of a task on the quality of care provided, effect on LOS, and the task role in possible complications.

TASK NUMBER	DESCRIPTION	FREQUENCY PER TOTAL SAMPLE	MEAN TIME	BETA WEIGHT
	INTERCEP			5.49
1.2	Motor Sensory test	781	1.18	2.07
1.4	Stir-up Routine	2,554	1.71	1.66
1.5	Vital Signs	2,954	1.01	1.29
2.2	Circulation/Pulse check	580	1.70	1.85
2.5	Monitor Adjustments	786	.95	1.45
2.6	Output Drainage Bag	172	1.70	1.34
2.7	Output Other	611	.97	2.47
2.9A	Rec Gen Anest	2,155	18.36	17.47
2.9B	Rec Spinal/Reg Anesth	488	15.94	12.75
2.9C	Rec Local &/or Sed	291	12.60	11.30
3.5	Give Bedpan/Urinal	159	2.28	4.34
3.6	Incontinent Care	29	7.13	6.79
3.7	Chg Occupied Bed	12	9.70	8.45
3.8	Oral Hygiene	201	3.24	4.11
4.1	Adj IV or Flow Rate	1,640	.75	.74
4.3	Chg IV-Adj Rate	1,026	2.41	2.74
4.4	Discont IV-Arterial Line	147	3.23	3.67
4.6	Start IV	28	9.24	7.53
5.1	Arterial Blood Gas	15	5.47	4.34
5.3	Dressing Chg Small	124	6.17	7.36
5.4	Dressing Chg Large	10	11.36	9.77
5.5	Reinforce Dressing	24	3.54	5.69
5.7	ECG-12 Lead	28	9.05	7.13
5.11	IV Arterial Sample	44	2.89	6.48
5.12	Meds, Not IV	296	1.13	2.16
5.13	Meds, IV	521	1.88	1.65
5.17	Position for X-Ray	87	3.75	4.75
5.19	Urinary Cath	39	7.23	7.54
5.24	Venipunct-Blood Sample	82	3.52	5.67
6.2	Incentive Spirometer	21	2.97	1.95
6.4	Oxygen Adm Init & Adj	478	.90	1.91
6.5	Suctioning	68	1.66	2.07
6.6	Suctioning Trach	12	3.68	2.33
INFANT	Less then 2 years			.01
CHILD	Between 2 and 11 years			-.12
SENIORS	64 years or greater			.48

TASKS NOT INCLUDED IN MODEL 1

TASK NUMBER	DESCRIPTION	FREQUENCY PER TOTAL SAMPLE	MEAN TIME
1.1	Fundal Massage	100	1.74
1.3	Neuro Assessment	104	3.74
2.1	Check Pulse by Doppler	17	3.25
2.3	Heart Sound Assessment	49	1.28
2.4	Intake	109	.86
2.8	Pulmonary Assessment	144	1.67
2.10	Discharge from PACU	2970	4.83
3.1	Chg Bed Protector-Chux	184	1.01
3.2	Chg Bottom Sheet	30	3.42
3.3	Chg Position of Patient	271	2.13
3.4	Chg Position of Bed	772	.49
4.2	Blood Product Adm	14	3.64
4.5	Infusion Pump Set-Up	554	3.65
5.2	CPR	0	62.27
5.6	Elastic Stockings	7	3.41
5.8	Extremity Elev/Ice Pack	532	1.71
5.9	Hypothermia Set-Up	20	.63
5.10	Isol, Gowning, Gloving	2	1.47
5.14	N/G Tube Insertion	3	8.00
5.15	N/G Tube Irrigation	12	1.59
5.16	N/G Tube Removal	12	1.47
5.18	Rhythm Strip Measurement	8	1.37
5.20	Urine Specimen	28	2.07
5.21	Urinary Catheter Removal	29	3.33
5.22	Urinary Bladder Irrig	10	4.02
5.23	Venipuncture-Blood Culture	5	4.97
6.1	Extubation	16	2.56
6.3	Intubation	2	17.33

MODEL 2 (31 Tasks)

Inclusion of the task into the regression model (2) was based on task frequency, magnitude of the mean time, and clinical judgment.

TASK NUMBER	DESCRIPTION	FREQUENCY PER TOTAL SAMPLE
	INTERCEP	
1.2	Motor Sensory Test	781
1.3	Neuro Assessment	104
1.4	Stir-up Routine	2,554
1.5	Vital Signs	2,954
2.2	Circulation/Pulse Check	580
2.5	Monitor Adjustments	786
2.6	Output Drainage Bag	172
2.7	Output Other	611
2.9A	Rec Gen Anesth	2,155
2.9B	Rec Spinal/Reg Anesth	488
2.9C	Rec Local &/or Sed.	291
3.3	Chg Position of Patient	271
3.5	Give Bedpan/Urinal	159
3.6	Incontinent Care	29
3.7	Chg Occupied Bed	12
3.8	Oral Hygiene	201
4.2	Blood Product Adm.	14
4.3	Chg IV-Adj Rate	1,026
4.4	Discont IV-Arterial Line	147
4.6	Start IV	28
5.3	Dressing Chg Small	124
5.4	Dressing Chg Large	10
5.7	EKG-12 Lead	28
5.11	IV Arterial Sample	44
5.12	Meds Not IV	296
5.13	Meds IV	521
5.17	Position for X-Ray	87
5.19	Urinary Cath	39
5.24	Venipunct-Blood Sample	82
6.4	Oxygen Adm Init & Adj	478
6.5	Suctioning	68

Appendix M

MODEL 3 (25 Tasks)

Inclusion of the task into the regression model (3) was based on task frequency, magnitude of the mean time, and clinical judgment. In model three, emesis (8.1) was included because it was **not** identified on the original task list but had been noted by a number of clinical staff on the data collection sheet.

TASK NUMBER	DESCRIPTION	FREQUENCY PER TOTAL SAMPLE
	INTERCEP	
1.2	Motor Sensory Test	781
1.3	Neuro Assessment	104
1.4	Stir-up Routine	2,554
1.5	Vital Signs	2,954
2.2	Circulation/Pulse Check	580
2.5	Monitor Adjustments	786
2.9A	Rec Gen Anesth	2,155
2.9B	Rec Spinal/Reg Anesth	488
2.9C	Rec Local &/or Sed	291
3.3	Chg Position of Patient	271
3.6	Incontinent Care	29
3.7	Chg Occupied Bed	12
3.8	Oral Hygiene	201
4.3	Chg IV-Adj Rate	1,026
4.6	Start IV	28
5.3	Dressing Chg Small	124
5.4	Dressing Chg Large	10
5.7	ECG-12 Lead	28
5.11	IV Arterial Sample	44
5.13	Meds IV	521
5.17	Position for X-Ray	87
5.19	Urinary Cath	39
5.24	Venipunct-Blood Sample	82
6.5	Suctioning	68
8.1	Emesis	26

Appendix N

<u>MODEL 4 (26 Tasks)</u>

Inclusion of the task into the regression model (4) was based on task frequency, magnitude of the mean time, and clinical judgment. Model four included two variables (2.6 and 2.7) that were integrated into one new variable **Combined Output** (2.67).

TASK NUMBER	DESCRIPTION	FREQUENCY PER TOTAL SAMPLE
	INTERCEP	
1.2	Motor Sensory Test	781
1.3	Neuro Assessment	104
1.4	Stir-up Routine	2,554
1.5	Vital Signs	2,954
2.2	Circulation/Pulse check	580
2.5	Monitor Adjustments	786
2.9A	Rec Gen Anesth	2,155
2.9B	Rec Spinal/Reg Anesth	488
2.9C	Rec Local &/or Sed	291
3.3	Chg Position of Patient	271
3.6	Incontinent Care	29
3.7	Chg Occupied Bed	12
3.8	Oral Hygiene	201
4.3	Chg IV-Adj Rate	1,026
4.6	Start IV	28
5.3	Dressing Chg Small	124
5.4	Dressing Chg Large	10
5.7	ECG-12 Lead	28
5.11	IV Arterial Sample	44
5.13	Meds IV	521
5.17	Position for X-Ray	87
5.19	Urinary Cath	39
5.24	Venipunct-Blood Sample	82
6.5	Suctioning	68
8.1	Emesis	26
2.67	Combined Output	783

Appendix O

MODEL 5 (26 Tasks)

Inclusion of the task into the regression model (5) was based on task frequency, magnitude of the mean time, and clinical judgment. In model five two tasks (3.3 and 5.17) were integrated into Patient Position Change (3.17).

TASK NUMBER	DESCRIPTION	FREQUENCY PER TOTAL SAMPLE
	INTERCEP	
1.2	Motor Sensory Test	781
1.3	Neuro Assessment	104
1.4	Stir-up Routine	2,554
1.5	Vital Signs	2,954
2.2	Circulation/Pulse check	580
2.5	Monitor Adjustments	786
2.9A	Rec Gen Anesth	2,155
2.9B	Rec Spinal/Reg Anesth	488
2.9C	Rec Local &/or Sed	291
3.17	Patient Position Change	358
3.6	Incontinent Care	29
3.7	Chg Occupied Bed	12
3.8	Oral Hygiene	201
4.3	Chg IV-Adj Rate	1,026
4.6	Start IV	28
5.3	Dressing Chg Small	124
5.4	Dressing Chg Large	10
5.7	ECG-12 Lead	28
5.11	IV Arterial Sample	44
5.13	Meds IV	521
5.19	Urinary Cath	39
5.24	Venipunct-Blood Sample	82
6.4	Oxygen Adm Init & Adj	478
6.5	Suctioning	68
8.1	Emesis	26
2.67	Combined Output	783

Appendix P

MODEL 6 (25 Tasks)

Inclusion of the task into the regression model (6) was based on task frequency, magnitude of the mean time, and clinical judgment. Oral Hygiene (3.8) was deleted from the task list and replaced by Emesis (8.1) with a mean time of 6.0897 minutes.

TASK	DESCRIPTION	FREQUENCY PER TOTAL SAMPLE	MEAN TIME	BETA WEIGHT
	INTERCEP			10.48
1.2	Motor Sensory Test	781	1.1800	1.26
1.3	Neuro Assessment	104	3.7400	3.64
1.4	Stir-up Routine	2,554	1.7050	1.75
1.5	Vital Signs	2,954	1.0100	1.14
2.2	Circulation/Pulse Check	580	1.6989	1.82
2.5	Monitor Adjustments	786	.9458	1.50
2.9A	Rec Gen Anesth	2,155	18.3557	12.77
2.9B	Rec Spinal/Reg Anesth	488	15.9403	10.85
2.9C	Rec Local &/or Sed	291	12.6029	7.43
3.6	Incontinent Care	29	7.1308	6.68
3.7	Chg Occupied Bed	12	9.6977	12.05
3.17	Position Change	358	2.9407	3.59
4.3	Chg IV-Adj Rate	1,026	2.4056	3.13
4.6	Start IV	28	9.2432	9.79
5.3	Dressing Chg Small	124	6.1654	6.90
5.4	Dressing Chg Large	10	11.3649	11.61
5.7	ECG-12 Lead	28	9.0537	8.38
5.11	IV Arterial Sample	44	2.8946	8.93
5.13	Meds IV	521	1.8793	2.09
5.19	Urinary Cath	39	7.2299	7.46
5.24	Venipunct-Blood Sample	82	3.5175	4.71
6.4	Oxygen Adm Init & Adj	478	.8999	.89
6.5	Suctioning	68	1.6606	1.92
2.67	Combined Output	783	1.3314	1.70
8.1	Emesis	227	6.0897	6.60

TASKS NOT INCLUDED IN MODEL 6

TASK NUMBER	DESCRIPTION	FREQUENCY PER TOTAL SAMPLE	MEAN TIME
1.1	Fundal Massage	100	1.7400
2.1	Check Pulse by Doppler	17	3.2487
2.3	Heart Sound Assessment	49	1.2845
2.4	Intake	10	.8583
2.8	Pulmonary Assessment	144	1.6746
2.10	Discharge from PACU	2970	4.8269
3.1	Chg Bed Protector-Chux	184	1.0063
3.2	Chg Bottom Sheet	30	3.4227
3.3	Chg Position of Patient	271	2.1266
3.4	Chg Position of Bed	772	.4927
3.5	Give Bedpan/Urinal	159	2.2846
4.1	Adj IV or Flow Rate	1,640	.7528
4.2	Blood Product Adm	14	3.6442
4.4	Discont IV-Arterial Line	147	3.2334
4.5	Infusion Pump set-up	554	3.6533
5.1	Arterial Blood Gas	15	5.4705
5.2	CPR	0	62.2733
5.6	Elastic Stockings	7	3.4109
5.5	Reinforce Dressing	24	3.5442
5.8	Extremity Elev/Ice pack	532	1.7141
5.9	Hypothermia set-up	20	.6322
5.10	Isol, Gowning, Gloving	2	1.4659
5.12	Meds Not IV	296	1.1277
5.14	N/G Tube Insertion	3	8.0006
5.15	N/G Tube Irrigation	12	1.5874
5.16	N/G Tube Removal	12	1.4685
5.18	Rhythm Strip Measurement	8	1.3743
5.20	Urine Specimen	28	2.0660
5.21	Urinary Catheter Removal	29	3.3306
5.22	Urinary Bladder Irrig	10	4.0185
5.23	Venipuncture-Blood Culture	5	4.9744
6.1	Extubation	16	2.5567
6.2	Incentive Spirometer	21	2.9668
6.3	Intubation	2	17.3291
6.6	Suctioning Trach	12	3.6774

Appendix Q

WMSN PACU Final Worksheet

WORKLOAD MANAGEMENT SYSTEM FOR NURSING - POST ANESTHESIA CARE UNIT WORKSHEET

SECTION I: General Information

Date _____ Day _____ Month _____ Year

Time Admitted _____

Time Discharged/Transferred _____

SECTION II: Initial Assessment (*Mark one only*)
(Definitions on Back)

☐ General anesthesia

☐ Spinal or regional anesthesia

☐ Local or local with sedation

SECTION III: Multiple Occurring Activities
(*Please "tick" mark each time done*)

PACU PARAMETERS	Counting Area	Total No
1.1 Stir up Routine		
1.2 Vital Signs		
1.3 Motor/sensory testing		
1.4 Neuro assessment		
1.5 Circulation/pulse checks		
1.6 Monitor adjustments		
1.7 Output encounter		
1.8 Nausea/emesis		

SECTION III: (Continued)

IV THERAPY	Counting Area	Total No
2.1 IV bottle change with flow rate adjustment		
2.2 IV medication encounter		
2.3 IV insertion		
2.4 IV/arterial line blood sample encounter		

PROCEDURES		
3.1 Oxygen administration		
3.2 Suction, (all types)		
3.3 Urinary catheterization		
3.4 Venipuncture, blood sample		
3.5 Dressing change, small (≤ 4 by 8)		
3.6 Dressing change, large(>4 by 8)		
3.7 EKG, rhythm or 12-lead		

SUPPORT ACTIVITIES		
4.1 Patient position change, assistance		
4.2 Incontinent care		
4.3 Occupied bed, change		

VERIFICATION

N
D
r

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INITIAL ASSESSMENT: SELECT ONE ONLY

SURGICAL RECOVERY INITIAL ASSESSMENT: INITIAL ASSESSMENT BEGINS WHEN NURSING STAFF MEMBER(S) STARTS NURSING CARE ACTIVITIES OF A POST ANESTHESIA PATIENT AND ENDS WHEN CONTINUOUS NURSING ACTIVITIES STOP. THE FOLLOWING LIST OF NURSING ACTIVITIES MAY OR MAY NOT OCCUR AND / OR MAY OCCUR MULTIPLE TIMES (NOT NECESSARILY IN THE ORDER LISTED):

ACTIVITIES:

(1) Insure airway patency, assess respiratory status, initiate oxygen therapy, and stir-up routine as needed;

(2) Check and record B/P, pulse, respirations, temperature, neurological and/or motor-sensory response, and orient to unit;

(3) Connect the patient to the pulse oximeter, cardiac monitor, and record observations;

(4) Assess integrity of IV/central/arterial lines, place IV fluids/blood products on IV pole, check amount of fluids in bag(s) and check flow rate;

(5) Inspect dressings and drains, assess position and reposition if necessary;

(6) Receive report from Anesthesia personnel, report baseline (PARS) measurement to Anesthesia personnel, and record initial assessments on flow sheet or appropriate form, if at bedside;

ANESTHESIA TYPE:

A. **General Anesthesia:** Includes activities (1) - (6).
Mark if above nursing activities performed for patient who received only general anesthesia OR general plus spinal/regional OR general plus local/IV sedation.

B. **Spinal or Regional:** Includes activities (1) - (6) to include assessment of neurological and motor/sensory responses. Mark if above nursing activities performed for patient who received only spinal or regional anesthesia OR spinal/regional plus IV sedation.

C. **Local or IV Sedation:** Includes activities (1) - (6). Mark if above nursing activities performed for patient who received ONLY local or IV sedation.

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Reverse of IISC Form 565-R (IESI) (HCSCIA) 1 Jan 90

Appendix R

Guidelines for using the WMSN PACU Instrument

INTRODUCTION

The WMSN Post Anesthesia Care Unit (PACU) instrument is used for annotating inpatient direct nursing care activities as they occur. This information will be used to classify patients into patient acuity categories of care. Section I contains general patient information. Section II contains information concerning direct care nursing activities that occur only once. Operational definitions for Section II are on the back of the worksheet and listed as **Bundled PACU items**. Section III contains tasks that can occur multiple times. In addition, at the bottom right hand corner, there is space for the nurse to initial after each shift when the PACU is open 24 hours. When PACU is open only one shift, then just initial on the D (day shift) line. In the bottom left hand corner there is space to stamp the instrument with the patient's name plate.

GENERAL GUIDELINES

1. Initiating the Instrument: All patients who receive nursing care in the Post Anesthesia Care Unit (PACU) will have Workload Management System for Nursing - Post Anesthesia Care Unit (WMSN-PACU) instrument initiated at the start of the patient's care. The instrument should be stamped with the patient's name and kept on or near the patient's bed so that **ALL** nursing personnel can easily mark the appropriate tasks as tasks are completed. If the patient is moved within the PACU area the instrument should stay with the patient.

2. Completing the Instrument: All patients should have **Section I** (General information) completed with the appropriate type of Anesthesia in **Section II** (Initial Assessment) marked. In **Section III** (Multiple Occurring Activities), only those task that are completed should receive a tick mark each time the task is done. If a nursing staff member is a student or an orientee to the PACU, a regular PACU nursing staff member must take the time to explain and review the worksheet with the new care provider so that the new care provider can record the tasks as they occur.

3. Finalizing the Instrument: Although all nursing staff assigned to PACU are expected to record activities on the instrument as they are done, each instrument will receive a final review for clarity, completeness and accuracy by the professional nurse in charge. The nurse finalizing the instrument; checks if it was stamped with the patient's name, reviews the General Information Section (1) and marked activities in Sections II and III for clarity, accuracy and completeness. At the completion of this review, the professional nurse initials and dates the form. An instrument is finalized on two occasions:

   a. When a patient is **discharged or transferred** from PACU.

   b. At **midnight** (2400 hours) each day, for patients remaining in PACU. Once finalized, the instrument is stored at a location designated by the head

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nurse. The WMSN form is never left in the patient's record upon discharge or transfer.

4. Continuing the Instrument: A new instrument is initiated on all patients who remain in PACU past 2400 hours. This new instrument should be stamped with patients name, date changed to reflect current date, and time admitted should be left blank. The instrument should be marked in the upper left hand corner after General Information with notation of **"continuation"**. The blank admit time, changed date, and notation of **continuation** will signify a continuation instrument. The professional nurse is responsible for starting the continuation instrument.

SPECIFIC INSTRUCTIONS FOR USE

1. Section I: General Information: When any patient receives nursing care in PACU, the nursing staff completes the following:

    a.   Date (Day/Month/Year)

    b.   Time Admitted (Military Time)

    c.   Time Discharged/Transferred (Military Time)

    d.   Each worksheet is stamped with the patient's stamp plate.

    e.   Continuation past 2400, stamp with patient's name, date, leave admit time blank and mark as continuation (upper left corner).

2. Section II: Initial Assessment: This section contains the Initial Assessment and only one block should be marked. If a patient receives more than one type of anesthesia, for example a Spinal and then a General (when the spinal isn't effective), only check General Anesthesia (it is the most labor/time intensive for Initial Assessment). After the initial assessment has been completed those nursing tasks performed for the patient should be marked as individual task completions.

3. Section III: Multiple Occurring Activities: This section is completed for any patient receiving care in PACU and includes nursing care activities that occur more than once. Place a **tick mark** in the gray shaded counting area corresponding to the specific task each time the task is completed. Grouping the multiple tick marks in groups of five will facilitate counting and totaling the count. The staff providing the patient's care will upon discharge or transfer of the patient total the tick marks and write that number in the **"Total No"** column for each row.

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