

Measuring nursing care workload in non-intensive cardiac surgery: an observational study

Misurazione del carico di lavoro infermieristico nelle unità di degenza cardiocirurgica non intensive:
uno studio osservazionale.

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ABSTRACT

Background: An understanding of the time nurses spend assessing and meeting patients' needs is key to improve nursing outcomes and support organizational well-being.

Aims and objectives: The study was designed to determine whether the use of an assessment scale with some clinical parameters indicative of hemodynamic, neurological, respiratory and mobility functions could be able to estimate nursing care workload in non-intensive cardiac surgery patients.

Methods: A correlational descriptive study was designed. Two types of inpatients were included in the study: those waiting for cardiac surgery and those who had already undergone cardiac surgery. Using specific indicators, patient's clinical status was classified in 10 levels of complexity and nursing care interventions were divided into three categories: clinical activities, educational activities and organizational activities. For each of this categories the correlation coefficient between the nursing time and the level of patient's complexity was measured.

Results: Per hour of hospitalization, nurses spent an average of 11 minutes and 49 seconds providing care to each patient. A good correlation coefficient between the amount of the nursing time spent for clinical activities and the level of patient's complexity was found. Educational activities were minimal compared with the clinical and organizational activities, but they were mostly conducted during the preoperative phase.

Conclusions: The assessment scale tested in this study, including some information about the patient's clinical status, allowed to estimate clinical nursing workload in non-intensive cardiac surgery patients.

Keywords: Nursing in cardiology setting; health status indicators; severity of illness index; nursing care complexity; non-intensive cardiac surgery unit.

RIASSUNTO

Background: la quantificazione del tempo impiegato dagli infermieri per valutare e trattare i bisogni dei pazienti rappresenta un fattore chiave per migliorare gli esiti assistenziali e favorire il benessere organizzativo delle strutture sanitarie.

Obiettivi: lo studio è stato eseguito per verificare se l'uso di una scala di indicatori della funzione emodinamica, neurologica, respiratoria e motoria, possa consentire di stimare il carico di lavoro infermieristico richiesto dai pazienti cardiocirurgici ricoverati nelle unità di degenza non intensive.

Metodi: per lo scopo del lavoro è stato disegnato uno studio descrittivo-correlazionale. Sono stati osservati pazienti in fase preoperatoria e postoperatoria. Utilizzando una scala di indicatori specifici, lo stato clinico del paziente è stato suddiviso in 10 livelli di complessità assistenziale; mentre le attività infermieristiche sono state classificate in 3 categorie: cliniche, educative e gestionali. Per ognuna di queste categorie è stato misurato il coefficiente di correlazione tra il tempo assistenziale erogato ed il livello di complessità rilevato.

Risultati: per ogni ora di ricovero gli infermieri hanno erogato mediamente a ciascun paziente 11 minuti e 49 secondi di assistenza. Il tempo impiegato in attività assistenziali cliniche è risultato correlato al livello di complessità rilevato. Le attività educative sono risultate prevalenti nella fase preoperatoria, ma il tempo ad esse dedicato è risultato minimo rispetto a quello impiegato in attività cliniche e gestionali.

Conclusioni: la scala di indicatori clinici testata ha consentito di stimare il carico di lavoro infermieristico di tipo clinico richiesto dai pazienti cardiocirurgici ricoverati nelle unità di degenza non intensive.

Parole chiave: infermieristica in cardiologia, indicatori clinici, indice di gravità della malattia, complessità infermieristica, unità di cardiocirurgia non intensive

INTRODUCTION

The literature has clearly demonstrated that many patient's outcomes are nursing sensitive and that the quality of nursing care depends on the nurses ability to meet the patient's needs (Manley et al., 2011).

Furthermore, nursing management quality can affect both the work environment and the economic performance. In fact, Magnet Hospitals showed that a good quality of nursing care reduces nurses turnover and nurses shortage (McClure et al., 1983).

Nursing staff is a major factor influencing nursing care quality. Nursing staff concerns quantitative and qualitative aspects (number of nurses, skill-mix and nursing support personnel) of nursing workload, which measurement is a main problem for nurse managers.

In non-intensive cardiac surgery units, it would be very useful to have a simple tool to measure the nursing workload in real time.

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In fact, although in these care settings there are different types of patients and nurses, nursing care workload often is not defined by objective criteria, which take into account of these differences.

The risk of adverse events is minimized and patient outcomes improve when nurses are able to meet their patients' healthcare needs (Kane et al., 2007; Rafferty et al., 2007; Lang et al., 2004). Furthermore, the time nurses spend assessing and meeting patient needs is a key factor in both nurses' professional improvement and the organizational well-being of health institutions (Welton et al., 2006; Aiken et al., 2002; Needleman et al., 2002). Patients with high care complexity absorb a larger amount of nursing resources, especially in terms of the competent workload required, which directly impacts organizational costs (Chiang, 2009).

Nursing-workload a measurement of the nursing care activities (direct and indirect), that are always related to patients, as well as non-nursing care activities, such as participation in research activities or following students during their internship. Nursing care activities can be defined according to both a time dimension (nursing care intensity) and a professional dimension (skill mix). Nursing care intensity depends on the volume of work (number of interventions provided), while the skill-mix depends on patient care complexity and is defined by the type of the care activities that are required, whether delegated or not delegated (Lancia et al., 2011).

The patient's clinical status is the main factor to consider when measuring care complexity and, then, when assessing the required nursing-workload (Rosenberg, 2002). Nursing administration department constantly strive to achieve high quality care at the lowest possible cost. One of its main goals is to measure the nursing-workload trends and provide appropriate nurse staffing levels for each type of healthcare setting.

Several methods have been tested to measure the intensity of nursing care and many refer to Patient Classification Systems (PCS) that consider patients' healthcare needs, the severity of the illness and the nursing resources available (Sermeus et al., 2008). There have also been attempts to regulate the relationship between

nurses and patients with rigid rules set by national governments.

Many authors argue that when there is no PCS globally shared by hospitals, the definition of nursing staff based on national rules can meet the real healthcare needs only when it is possible to standardize the levels of care and treatments (Unruh et al., 2006; Rothberg et al., 2005; Unruh et al., 2005).

However, for PCS to be usable, the tool on which it is based must be valid, applicable, simple, efficient, useful, objective and accepted (Williams et al., 2006).

PCSs can only be used appropriately when their reference models are based on direct measurement of nursing care delivered or when they use subjective estimates made by expert nurses.

Regarding the time spent by nurses on indirect care activities, because it is difficult to measure them, some authors have suggested that it could be ignored or defined by a constant factor, considering indirect care activities as complementary to nursing (Phillips et al., 1992).

Regarding these concepts, this study defined a simple and reproducible method that estimated the amount of time needed for direct and indirect nursing care in non-intensive cardiac surgery patients.

It is inspired by the observation that to describe briefly the conditions of their patients, non-intensive cardiac surgery nurses often used recurring information, especially during the handover.

Hence, the research objective of this study was to demonstrate whether a quantitative model, based on these recurring information communicated during the shift change, it was able to intercept the care needs of these patients in terms of the time spent by nurses to perform their clinical, educative and organizational activities.

AIMS

The study was designed to determine whether the use of an assessment scale with some clinical parameters indicative of hemodynamic, neurological, respiratory and mobility functions, could be able to estimate

HEMODYNAMIC	Hearth Rate	Rhythmic	Arrhythmic	PMK	=
		(2)	(1)	(0)	
	Blood Pressure	Normal	Hypo-hypertension	Inotropics/Vasodilators	=
		(2)	(1)	(0)	
NEUROLOGY		Lucid	Disorientated	Unconscious	=
		(2)	(1)	(0)	
RESPIRATORY		Eupnea	Dyspnea	Tracheostomy	=
		(2)	(1)	(0)	
MOBILITY		Free	Free in the bed	Forced in the bed	=
		(2)	(1)	(0)	
Total					

Figure 1. Assessment scale in non-intensive cardiac surgical patients

nursing care workload in non-intensive cardiac surgery patients.

METHODS

A correlational descriptive pilot study was conducted from June 1 to October 31, 2008. We included four non-intensive cardiac surgery units in public hospitals of Central Italy, with the same types of patients and organizational structures.

There were two types of inpatients in these units: those waiting for cardiac surgery, and those who had already undergone cardiac surgery. Patients in the latter category came to the units after a short stay (from a few hours to one-two days) in the intensive care unit.

To better organize the data, we identified 2 different phases of a hospital stay:

1. Preoperative care: The patients assigned to this phase were those who were waiting for surgery and enrolled in this study during the nursing shift that corresponded with their admission to the hospital.

2. Postoperative admittance: The patients assigned to this phase were those who had undergone cardiac surgery and enrolled in this study during the nursing shift that corresponded with their transfer from the intensive care unit.

For all enrolled patients, a score of their clinical status was determined by an assessment scale (Figure 1), based on hemodynamic, neurological, respiratory and mobility functions, and the nursing time performed for care activities was measured and recorded.

This assessment scale allowed us to define a hypothesis of clinical complexity level, where the score ranged between 0 (high complexity) and 10 (low complexity).

To avoid evaluation bias in the detection of these indicators, we used a glossary to describe in detail the elements contained in this assessment scale. In addition, two nurses for each non-intensive care unit included in the study were trained to gather data correctly.

To determine the amount of time nurses spent on their activities, we prepared a specific form where all the possible nursing procedures and interventions were described. These procedures and interventions were inferred from a preliminary study on 20 patients with characteristics similar to those of the group observed. This preliminary analysis helped us refine the data collection and allowed us to divide nursing activities into three categories (Table I):

1. Clinical activities.
2. Educational activities.
3. Organizational activities.

NURSING ACTIVITIES (n. 192)	Mean	SD	%
organizational activities	00.03.54	00.05.23	33
clinical activities	00.06.27	00.06.41	55
educational activities	00.01.27	00.02.14	12
all activities	00.11.49	00.11.17	100

Table II. Average amount of nursing time provided to each patient per hour of hospitalization

CLINICAL ACTIVITIES		
Infusion therapy administration	Electrical cardioversion	Medical devices testing
Oxygen therapy administration	Electrocardiogram	Aid the patient eating
Pharmacotherapy one-off administration	Trichotomy	Aid the patient undress and dressing
Aerosol therapy administration	Fluid balance	Patient washing into the bed
Arterial blood gas (ABG) analysis	Arterial catheter management	EDUCATIONAL ACTIVITIES
Bladder catheter management	Central venous catheter (CVC) management	Respond to aid requests
Blood sampling	Nasogastric tube management	Patient education
Blood glucose determination with self-measurement devices	Peripheral venous catheter management	Communication
Bodily hygiene	Manual measurement of vital signs	Family needs assessment
Body-weight measurement	Body temperature measurement	ORGANIZATIONAL ACTIVITIES
Bronchial secretion aspiration	Oxygen saturation measurement	Patient admission
Blood pressure and pulse monitor calibration	Patient mobilization	Patient transfer
Calibration testing of centralized electrocardiogram telemetry monitoring system (TMS)	Pharmacotherapy administration	Patient discharge
Diuresis Control	Potassium supplementation	Handover
Vital signs continuous monitoring	Pressure ulcer treatment	Nursing and medical documentation management
Drainage management	Bed remake	Patient unit preparation
	Surgical wound dressing	

Table I. Nursing activities

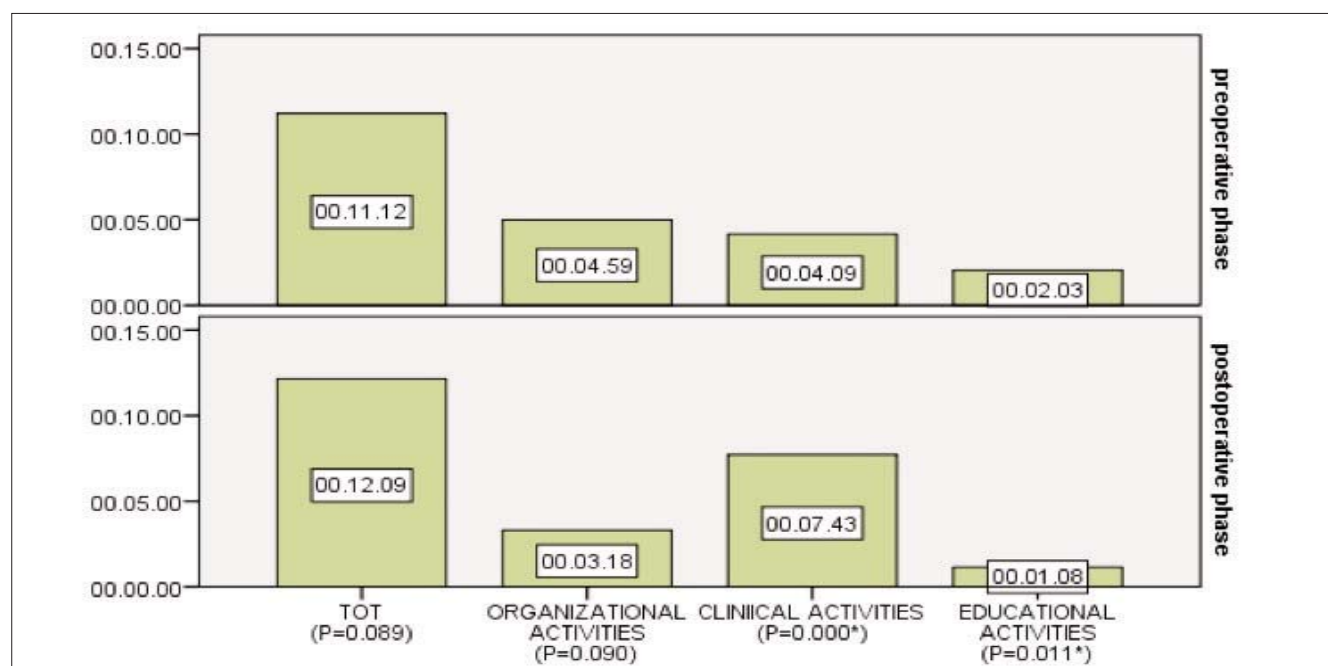


Figure 2. Average amount of nursing time provided (hh.mm.ss.) per hour of hospitalization, in the pre and postoperative phases

The time nurses dedicated to their patients was quantified in hours, minutes and seconds (hh.mm.ss.). The sample of patients was chosen randomly. At the beginning of every shift, an alpha-numerical code was assigned to each inpatient and four of these were extracted randomly. We then calculated the score of clinical status by the assessment scale, and measured the time nurses dedicated to each activity.

Due to the randomized and anonymous nature of the sampling procedures, the same patient could be assigned to both the care phases of hospital stay, preoperative and postoperative. During the night shift, clinical, educational and organizational activities were reduced to make way for vigilance; therefore nursing time was measured only during the morning and afternoon shifts (from 07 to 14 and from 14 to 21). Statistical analysis was performed using IBM SPSS statistics version 19.0. Descriptive analysis were conducted, and mean and SDs of the key variables were calculated. To compare care time spent by nurses performing clinical, educative and organizational activities in preoperative and postoperative patients groups, the Mann-Whitney test for independent samples was used.

To determine whether there was any relationship between the score of patient's clinical status and nursing time spent, the Spearman's correlation coefficient (Rho) was calculated.

RESULTS

A total of 192 patients were admitted with an average age of 65.09 years (standard deviation (SD)

11.95), and the median and mode ages were similar. The average amount of nursing time provided to each patient per hour of stay during the day shifts was 00h.11m.49s (SD 00h.01m.18s.), of which 55% included clinical activities, 33% organizational activities, and 12% educational activities (Table II). Although no significant differences between the two patient groups (preoperative and postoperative) were found for the total nursing time provided ($p=0.089$), disaggregated data analysis highlights that organizational activities took up the greatest amount of nursing time during the preoperative phase ($p=0.090$), whereas clinical activities were more prevalent in the postoperative phase ($p=0.000$). Educational activities were minimal compared with the clinical and organizational activities, but they were mostly conducted during the preoperative phase ($p=0.011$) (Figure 2).

With exception of the educational activities, a good degree of correlation was observed during the postoperative phase between the clinical status value, obtained by the use of the assessment scale, and the recorded nursing care workload.

Particularly, a positive correlation was detected for clinical activities in both, preoperative ($P=0.001$) and postoperative phases ($P=0.000$) (Figure 3). The regression model indicates that the variability of the time spent in the clinical care activities is explained for the 38.8% by the variability of the scale tested in this study.

No correlation with assessment scale scores was observed for organizational activities in preoperative phase.

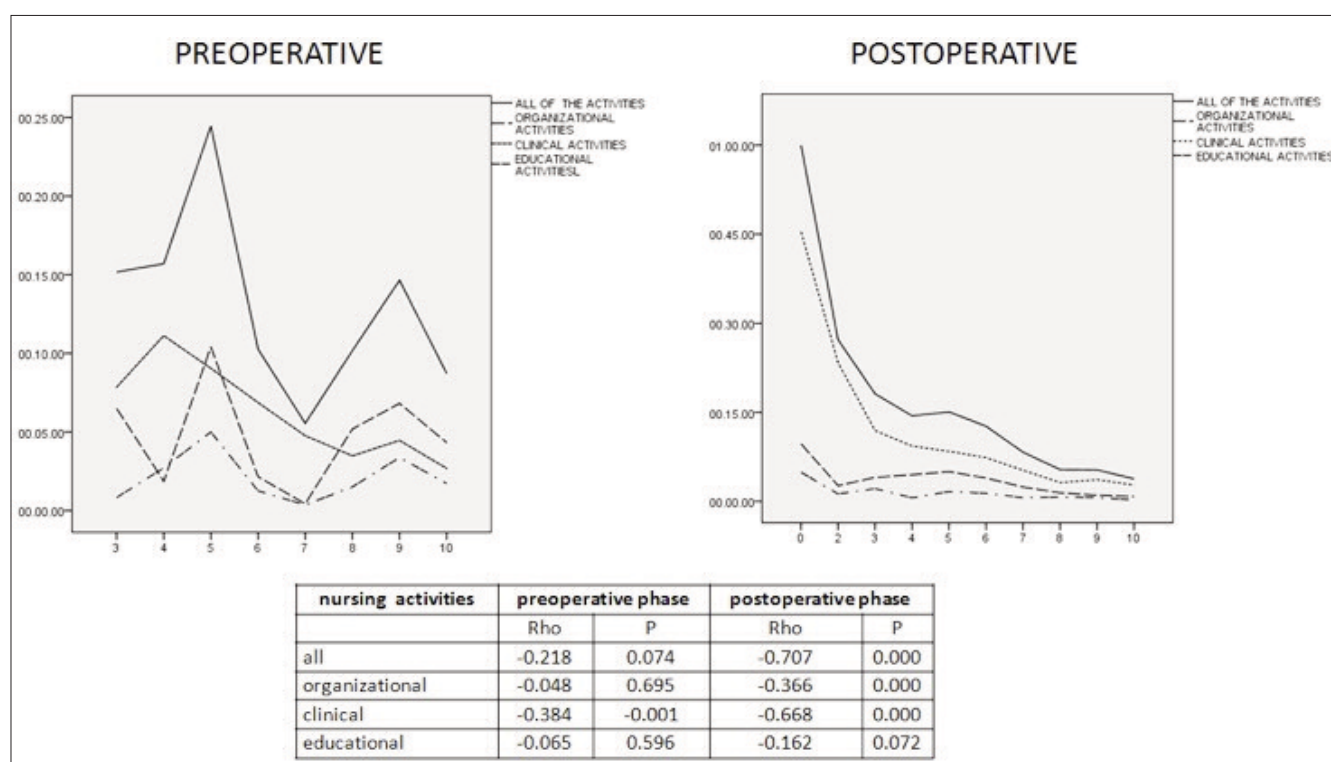


Figure 3. Correlation between clinical status value and nursing care workload in the pre and postoperative phases
X axis: assessment scale score (range 0-10) Y axis: time spent by nurses (minutes)

DISCUSSION

This study was conducted among non-intensive cardiac surgery patients and measured aspects of care that, while routine, were often difficult to define even by expert observers.

Data analyses allowed us to quantify the amount of time spent on all nursing care activities in a non-intensive cardiac surgery unit.

Results showed that in this care setting, the prediction of nursing-workload could be attributed to the values of some specific clinical indicators, included in an assessment scale, which in our study were related to the hemodynamic, neurological, and respiratory functions.

This study highlight that for each hour of stay, a patient admitted to the non-intensive cardiac surgery unit received an average 00h.11m.49s. of nursing time, and that the time spent for education activities is very limited (12%) .

Whereas the tool used was not particularly useful to estimate the organizational and educational nursing workload, we can say that this result was quite expected, because the indicators we tested were of a clinical nature.

This tool was particularly useful during the postoperative phase where clinical activities are predominant (72%), but it was less useful during the preoperative phase where organizational activities prevail (48%).

Our study confirms that nursing assessment is a fundamental way to define the complexity and intensity dimensions as main components of nursing care workload (Lancia et al., 2011).

Nursing workload measurement is necessary to determine accurately the resources to be allocated to the nursing and to prevent inefficient and ineffective management of hospitals and healthcare units (Morris et al., 2007).

A limitation of this study was our inability to determine whether the organizational activities performed during the preoperative phase were carried out at the expense of clinical activities. In fact, the study did not highlight whether the measured clinical interventions had fully met the needs of the patients.

Our results confirmed that in the cardiac surgery unit, the large amount of nursing time required for organizational activities during the preoperative phase could damage staffing dynamics, especially in the presence of a high patients turnover, and this represents a determining nursing workload factor, as also reported by other authors (Jencks et al., 1987).

Furthermore, many of the activities defined as “organizational” or “clinical” in our study, could have been delegated to support workers. In this way, precious nursing workforce resources for clinical activities could be freed and patient outcomes improved.

Another limitation of this study is the lack of definition of complexity levels of care interventions

performed, which could provide more information on the skills required by the nurses and their coworkers. It is desirable in the future an investigation in this direction.

Finally, a thorough analysis is necessary regarding the very poor time dedicated by nurses to educational activities in this care setting.

CONCLUSION

The assessment scale tested in this study, including some basic information about the patient's clinical status, easily allowed to estimate clinical nursing workload in the non-intensive cardiac surgery unit.

In this care setting, while the time spent by nurses in educational activities is still too low, the one used in the organizational activities seems too high, especially in the preoperative phase. Nursing resources are diverted to non-nursing work and this could adversely affect the outcome of the nursing care.

However, further research is needed to confirm these results.

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