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Tiss-28 Therapeutic Intervention Scoring System

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Abstract
This paper intends to translate the results obtained with the application of the Therapeutic Intervention Scoring System (TISS-28) in the Surgical Patient Monitoring Unit (UMDC). By applying the TISS-28 in the UMDC of the Surgical Service 1 of the CHTV, I intend to make clear the workload of Nursing practiced by the Nurses of the service. The TISS-28 value allows not only to estimate the interventions and therefore the indirect severity of the patients, but also to dimension the nursing workload in the Intensive Care Units, since each TISS-28 point consumes 10.6 minutes of the work time of a nursing professional in the care of the critically ill patient.
The study carried out with the application of TISS 28, is an exploratory-descriptive study, with a quantitative approach, using measures of central tendency, performed in the Surgical Patient Monitoring Unit (UMDC), surgical service 1 of the Tondela-Viseu Hospital Center.
The UMDC has 7 beds, it is a unit intended to receive patients in critical condition in pre- and postoperative, were part of the study population all patients admitted to the UMDC, from May 1 to 31, as inclusion criteria were considered all patients over 18 years and with a minimum stay of 24 hours in the unit. Analysis of the results showed that in a total of 27 patients, 44.5% were female and 55.5% were male, there was an occupation rate of 52.7% in the period in question. In a more detailed analysis and taking into account the measures of central tendency we can say that the average hours of care required per day in the UMDC is 45.37 hours which corresponds to an average of 85.62 TISS points per day. Taking into account the statistical data, when we present an average TISS point of 85.62 points and considering that each nurse should perform a maximum of 46 points, with this rate of occupation the use of 1.86 nurses per shift should be recommended. Although the results of this study can be reduced by the fact that it is performed only in one month, they are indicative data, which go against the bibliographical references.
Keywords*: TISS-28; Workload*

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I. Introduction

The Intensive Care Unit (ICU) is intended for the care of high-risk patients and must have uninterrupted assistance from doctors and nurses, with specific equipment and specialized human resources. Two factors that stand out in relation to ICU care are the increasing costs of health care and the need for accurate data on severity and prognosis, enabling accurate decisions to be made by family members and the health team. Severity of clinical status is the main characteristic of an ICU patient, and measurement of this severity is a constant challenge (Schuster & Kollef,1994).

Initially, graduation systems were created due to the need to measure the efficacy of therapeutic interventions performed in critically ill patients, nursing needs and patient and family satisfaction with the services offered by the ICU. However, nowadays, more emphasis has been given to the use of these systems as an index of disease severity (Miranda, Rijk &Schaufeh, 1996). Severity indices are defined as numerical classifications related to certain characteristics presented by patients and that provide means to evaluate the probabilities of death and morbidity resulting from a pathological condition. They have, as a basic objective, the quantitative description of the degree of organ dysfunction of patients in a critical state, expressed through prognostic indices. They are calculated from the sum of numerical values that correspond to the clinical and laboratory alterations of the patient or the type and/or quantity of procedures to which he was submitted (Miranda, Ryan, Schaufeli &Fibler, 1998). From the 70's on, several systems were developed for the graduation of the severity of ICU patients' diseases. They vary considerably and have contributed in different ways to the evaluation of prognosis. Among the several existing prediction indexes, the Therapeutic Intervention Scoring System (TISS) has stood out as a system that classifies the patient's severity, quantifying the therapeutic interventions of medical and nursing procedures used (Cullen et al., 1984).

It is based on the premise that, independent of the diagnosis, the more procedures the patient receives, the greater the severity of the disease and, consequently, more time spent by nursing for such care. Depending on the total number of points obtained, the patients are classified into four groups according to the need for

surveillance and intensive care, as shown in the Table of Cullen cited by Elias, Matsuo, Cardoso and Grion (2006):

Table 1 - *Classification of patients according to intensive care*

Class	Points	Need for vigilance and care
Class I	From 0 to 19 points	Patients physiologically stable and requiring prophylactic observation
Class II	From 20 to 34 points	Patients physiologically stable but requiring intensive nursing care and continuous monitoring
Class III	From 35 to 60 points	Hemodynamically severe and unstable patients
Class IV	Greater than 60 points	Patients with compulsive indication for admission to the ICU with continuous and specialized medical and nursing assistance

Note. *Table adapted from Elias et al (2006, p. 325).*

The 28 variables of TISS-28 are analyzed daily, allowing the achievement of a patient's evolution profile by scoring and classifying the severity. It is not used to make prognostics, but can help in the evolutionary evaluation of the patient's clinical worsening. It has been observed, in daily clinical practice, the association between death and high TISS value score, in severe patients of the ICUs studied.

Based on the understanding that the Intensive Care Unit (ICU) is the place of the hospital where the care of critically ill and high-risk patients is centralized, adding human resources, materials and equipment, it is essential that there is a balance between the needs of patients and the infrastructure for care. The high cost to maintain a complex structure such as the ICU has increasingly justified the strict cost control in this area, especially with personnel. One of the great responsible for hospital costs in ICU has been the sophisticated technology employed for diagnosis and treatment. Parallel to this there is the need for a large number of hours to care for these patients, since the time of hospitalization and its complexity is increasing. There is an increasing number of publications in the specialized literature on intensive care using severity indexes to measure workload and nursing care needs due to the easy application and interpretation in the characterization of patients. In addition, the dynamics of the unit, the effectiveness of the treatment performed and its cost can be monitored and analyzed, leading to an adequate allocation of available human and material resources. Studies involving 36 ICUs from twelve European community countries found that ICUs are responsible for the admission of 5% of patients and the consumption of 20% of the hospital budget (Miranda et al, 1998). It is also noteworthy that 90% of the staff working in ICUs is composed by the nursing team.

The most commonly used methodology to determine costs in health organizations is a process in which all costs related to the production of a service are grouped to the units that produce final services, called global costs, by absorption (Ching, 2001). However, a criticism of this methodology is that, although it provides knowledge of fixed labor costs, it disregards variations due to the complexity of the patient.

In general, statistical data regarding bed occupancy refer to the percentage of the ICU occupancy rate. In this type of analysis, however, the daily variability of the complexity of care and costs for the care of these patients is imperceptible, as different levels of care complexity may represent the same occupation rate. The hypothesis that nursing care hours were directly proportional to cost was confirmed in studies, through the Therapeutic Intervention Scoring System, TISS-28 (Telles& Castilho, 2007). Demonstrating that the use of this index to measure direct hours of nursing care is a logical and relatively simple method of cost allocation per patient in the ICU. Regarding the identification of the different levels of severity of patients and, therefore, of nursing care needs, the Therapeutic Intervention Scoring System (TISS) was developed as a system that classifies the indirect severity of the patient, having as principle that the amount of therapeutic interventions to which patients are submitted are related to the severity of the clinical condition, i.e., the more severe the patient's condition, the greater the number of therapeutic interventions needed for treatment and, consequently, the greater the time spent by nurses for such care. Evaluating patients, with indices that objectively measure the severity of clinical conditions, the interventions employed, as well as the nursing care needs, has become imperative in the current clinical care context, in view of the costs it entails for the national health system.

Nursing workload quantification indices are, nowadays, one of the fundamental tools in ICU planning and evaluation.

They have been and are used for purposes as diverse as assessing the severity of illness, evaluating the use of Intensive Care Units (ICUs), correcting the number of Intensive Care beds available, and defining the levels of care provided.

The concept of levels of care was initially proposed in the early 1960s by Lockward and collaborators (Lockward cited by Moreno, 2000). This concept was subsequently operationalised by members of a consensus

conference in Bethesda in 1983 (NIH, 1983). According to this classification, ICUs were to be classified into four groups: intensive care; high care; medium care; low care;

Two fundamental criteria in this classification:
- Technological resources (type and frequency of use of monitoring and therapeutic interventions);
- Human resources (training and medical coverage and patient-nursing relationship).

In the 1980s, a working group, the European Society for Critical Care, considered this classification to be very insufficient, proposing a new classification based exclusively on the number of patients treated by each nurse:
- Level I, with a 4:1 patient to nurse ratio;
- Level II, with a patient-nurses ratio of 2.5:1;
- Level III, with a 1:1 sick to nurse ratio;

Tested in the Netherlands in the early 1990s, this methodology was later validated in a large multicenter study in 12 areas of Europe, EURICUS I (Moreno & Miranda, 1998).
Two measurements can thus be calculated:
a) The planned level of care according to the number of nurses and the number of beds according to Bethesda definitions (NIH, 1983). The calculation of the number of beds assisted by a nurse can easily be calculated according to the formula:

$$\text{Number of beds assisted by a nurse} = \frac{A \times B \times C \times D \times E}{F \times G}$$

Where:
- A - number of nursing shifts in a day (usually 3);
- B - number of beds in the ICU;
- C - number of days of the week that the ICU works (usually 7);
- D - occupation rate (usually 85%);
- E - extra work needed for vacations, casualties, etc. (generally used 25%, i.e. 1.25);
- F - number of nurses in ICU;
- G - number of working days in each week (usually 5);

b) The level of care used: Calculated by dividing the number of TISS points equivalent to the activities of one nurse per shift (46 TISS points) by the average value of the daily ICU TISS.
Calculated these measures, the level of care planned for each ICU can easily be compared with the level of care in which each ICU operates.

This report intends to translate the results obtained with the application of the Therapeutic Intervention Scoring System (TISS-28) in the Surgical Patient Monitoring Unit (UMDC). By applying the TISS-28 in the UMDC of the Surgery Service 1A of Hospital de São Teotónio E.P.E., I intend to make clear the workload of Nursing practiced by the Nurses of the service.

This report is divided into five parts, this introduction, where a brief description of the scale and its applicability is made, in the second part I will present the operational definitions of the TISS-28, the third part where I describe the methodology used in the analysis of results, in the fourth part the presentation and discussion of the results of the application of the scale in the Month of May and finally try to present solutions for better care in the UMDC, taking into account the existing human resources and the evaluation carried out after the application of TISS-28.

II. TISS 28 - Operational Settings

The Therapeutic Intervention Scoring System (TISS) is a nursing workload and severity measurement system in Intensive Care Units (ICU), created in 1974 and updated in 1983, based on the quantification of therapeutic interventions according to complexity, degree of invasiveness and time spent by nursing to perform certain procedures in the critically ill patient (Keene & Cullen, 1983). In order to make the index more adjusted to measure the nursing workload and to facilitate practical application, a large modification was made in 1996, which resulted in the TISS-28 version (Table II) (Miranda et al, 1996). In this new structure, the index, besides suffering from a reduction in the number of items, had significant changes in its configuration, with the grouping of related items. The system was then composed of seven categories of therapeutic interventions, as follows: basic activities, ventilatory support, cardiovascular, renal, neurological, metabolic and specific interventions.

With this restructuring, the TISS-28 value allows not only to estimate the interventions and therefore the indirect severity of the patients, but also to dimension the nursing workload in the ICU, since each TISS-28

point consumes 10.6 minutes of the work time of a professional of the nursing team in the care of the critically ill patient (Miranda et al, 1996). The system was translated and validated into Portuguese (Nunes, 2001), enabling its use in our environment. In the practical application, however, some nurses have referred doubts related to the definition of some items of the instrument, for this reason the standard operational definitions are presented (Nurses of the EEUSP research group, 2005):

Basic activities:

1. Standard monitoring. Regular hourly vital signs, records and calculation of water balance.
It applies to the patient who, in any 24-hour period, has received control of some vital parameter continuously or at least every hour and water balance calculation at least every 24 hours.
2. Laboratory. Investigations, biochemical and microbiological.
It applies to patients undergoing any biochemical or microbiological examination, regardless of quantity, performed in the laboratory or at the bedside.
3. Single mediation. Endovenous, intramuscular, subcutaneous, and/or oral.
Includes patients who received one or more drugs via IM, CS, VO or a single intravenous drug. Consider the amount of drugs and not the frequency of administration. Maintenance serum is not applied as an IV drug.
4. Multiple intravenous drugs. More than one drug. Single or continuous injections.
Includes patients who received two or more intravenous drugs. Consider the amount of drugs and not the frequency of administration. Maintenance serum is not applied as an IV drug.
5. Exchange of routine dressings. Care and prevention of decubitus ulcers and daily dressing change.
It applies to the patient who received one or two dressing change sessions, regardless of the number of sites and the type of dressing or who received any pressure ulcer prevention intervention.
6. Frequent dressing changes. Frequent dressing change (at least once per nursing shift) and/or extensive wound care.
This applies to a patient who has received a minimum of three dressing change sessions, regardless of the number of sites and the type of dressing or at least one extensive wound dressing change.
7. Drain care. All (except nasogastric tube)
It applies to patients who have any drainage system installed. It includes a long duration bladder probe (S.V.L.D) and excludes nasogastric tube (SNG).

Ventilatory support

8. Mechanical ventilation. Any form of mechanical ventilation/assisted ventilation with or without positive end expiratory pressure, with or without muscle relaxants; spontaneous breathing with positive end expiratory pressure.
Applied to the patient in use of the mechanical ventilation apparatus in a continuous or intermittent manner, in any mode, with or without endotracheal tube (CPAP, BPAP "Weaning").
9. Supplementary ventilatory support. Spontaneous breathing through the endotracheal tube without positive end-expiratory pressure; supplemental oxygen by any method, except mechanical ventilation parameters.
Applied to spontaneous breathing, with or without tracheotomy or endotracheal tube, that has received oxygen supplementation by any method, performing those methods that depend on ventilation apparatus. In these cases the patient scores in the previous item.
10. Care with artificial airways. Endotracheal tube or tracheotomy.
It is applied to the patient using an orotracheal tube, nasotracheal or tracheotomy.
11. Treatment to improve lung function. Physiotherapy, thoracic, stimulated spirometry, inhalation therapy, endotracheal aspiration.
It applies to the patient who has received any treatment to improve lung function, performed at any frequency. It includes breathing exercises with apparatus.

Cardiovascular support

12. Unique vasoactive medication. Any vasoactive drug.
Applies to the patient who has received only one vasoactive drug, regardless of the type of dose (noradrenaline, dopamine, dobutamine, sodium nitroprusside, etc.).
13. Multiple vasoactive medication. One more vasoactive drug, regardless of type and dose.
It applies to the patient who has received two or more vasoactive drugs, regardless of type and dose (noradrenaline, dopamine, dobutamine,
sodium nitroprusside, etc.)
14. Intravenous replacement of large volume losses. Volume administration> 4.5 liters/day, regardless of the type of fluid administered.
Applied to a patient who received more than 4.5 liters of solution per day, regardless of the type of fluid administered.

15. Peripheral arterial catheter.
It is applied to the patient who has used one or more peripheral artery catheters.
16. Left atrium monitoring. Pulmonary artery catheter with or without cardiac output measurement.
It is applied to the patient who used a pulmonary artery catheter.
17. Central venous route.
It is applied to the patient with one or more central venous vein catheters, excluding Swan-Ganz catheter.
18. Cardiopulmonary resuscitation after cardiac arrest in the last twenty-four (24) hours (excluding precordial puncture).
It is applied to the patient who has had CA and received resuscitation measures, excluding precordial punch.

Renal support
19. Hemophiltration techniques. Dialysis techniques.
Applies to the patient who has received any type of dialysis procedure, intermittent or continuous.
20. Quantitative measurement of urinary output
It applies to the patient with diuresis control, with or without some kind of urinary catheter.
21. Active diuresis.
It is applied to the patient who has received any drug to stimulate urine production (Furosemide, Mannitol, Aldactone, Diamox, Higroton, etc.).

Neurological support
22. Intracranial pressure measurement.
Applies to the patient who maintains artifacts for ICP monitoring.

Metabolic support
23. Medicated treatment of acidosis/complicated metabolic alkalosis.
It is applied to the patient who received a specific drug for the correction of acidosis or metabolic alkalosis, excluding volume replacement to correct alkalosis (Sodium Bicarbonate, Ammonia Chloride, Diamox, etc.).
24. Total Parenteral Nutrition.
It is applied to the patient who received central or peripheral venous infusion of substances in order to meet nutritional needs.
25. Enteral nutrition through nasogastric tube or other gastrointestinal route.
It is applied to the patient who received substances with the purpose of supplying the nutritional needs, through a tube, through any route of the gastrointestinal tract.

Specific interventions
26. Unique specific intervention in the ICU.
Naso / orotracheal intubation or tracheostomy, pacemaker placement, ICD, CVC, cardioversion, endoscopy, emergency surgery in the last 24 hours, gastric lavage, complicated dressings; routine interventions without direct consequences for the patient's clinical conditions, such as X-rays, ultrasound, electrocardiogram, venous catheter introduction are not included.
It is applied to the patient undergoing a single diagnostic or therapeutic intervention, among those listed, performed within the ICU.
27. Multiple specific interventions in the ICU. More than one as described above.
It is applied to the patient submitted to two or more diagnostic or therapeutic interventions, among those listed, performed in the ICU.
28. Specific interventions outside the ICU. Diagnostic or surgical procedures.
It is applied to the patient submitted to one or more diagnostic or therapeutic interventions performed outside the ICU.

Obs: Exclusion criteria are applied in four conditions:
"multiple intravenous medication" excludes "single medication",
"mechanical ventilation" excludes "supplementary ventilatory support",
"multiple vasoactive medication" excludes "single vasoactive medication",
"multiple specific interventions in the ICU" excludes "single specific interventions in the ICU".

Table II - TISS-28

Basic Activities	
Standard monitoring (hourly vital signs, fluid balance).	5
Biochemical and microbiological investigations.	1
Singe medication (any route).	2
Multiple intravenous medications.	3
Care and prevention of decubitus and daily dressing changes.	1
Frequent dressing changes (at least one time per each nursing shift).	1
Care of drains.	3
Cardiovascular Support	
Single vasoactive medication.	3
Multiple vasoactive medications.	4
Intravenous replacement of large fluid losses (> 3 L/m^2/day).	4
Peripheral arterial catheter.	5
Pulmonary artery flotation catheter.	8
Central venous line.	2
Cardiopulmonary resuscitation after arrest in the past 24 hours.	3
Specific interventions	
Single specific interventions in the ICU (naso or orotracheal intubation, cardioversion, introduction of peacemaker, endoscopies, emergency surgery in the past 24 hours).	3
Multiple specific interventions in the ICU (more than one described above).	5
Specific interventions outside ICU (surgery or diagnostic procedures).	5
Ventilatory Support	
Mechanical ventilation.	5
Supplementary ventilation support (supplementary oxygen by any method except if mechanical ventilation parameters apply).	2
Care of artificial airways (endotracheal tube or tracheostoma).	1
Treatment for improving lung function (e.g. thorax physiotherapy, incentive spirometry, inhalation therapy, intratracheal suctioning).	1
Renal Support	
Hemofiltration/dialytic techniques.	3
Quantitative urine output measurement.	2
Active diuresis (e.g. furosemide > 0.5 mg/Kg/day).	3
Neurologic Support	
Measurement of intracranial pressure.	4
Metabolic Support	
Treatment of complicated metabolic acidosis/alkalosis.	4
Intravenous alimentation.	3
Enteral feeding through gastric tube or other route (e.g. jejunostomy).	2

Note: Adapted table of Nurses from the EEUSP research group (2005, p.233)

The operational definition of the items of any measurement instrument is an essential element for the success of the intended results, which also applies to the TISS-28. However, despite the importance of these operational definitions, their existence alone is not sufficient to ensure a data collection that results in correct and reliable information. In the case of the TISS-28, for this to occur, prior to the application itself, it is essential that nurses involved in data collection know the purposes of the index, its indication, contributions and limitations, which requires prior training and systematic, including pilot testing aimed at "calibration" of professionals who will apply the instrument. This test was carried out in early May at the UMDC as well as training for professionals who have worked on the scale. It is also essential to pay attention to the items that are self-excluded, so that there is no misattribution of scores. Finally, although the success of the TISS-28 application depends on its availability in the unit, the existence of written instructions for use and the training of

the applicators, the motivation and involvement of the UMDC nurses is that they will ensure the success of the implementation of the instrument, since they will certainly be asked to supplement information, not always available in existing records.

The instrument presented above is the one that was initially translated into Portuguese, at this time this instrument has already been revised and updated resulting in the scale we use in the UMDC exposed in Annex I.

III. Methodology

The study carried out with the application of TISS 28, is an exploratory-descriptive study, with a quantitative approach, performed in the Surgical Patient Monitoring Unit (UMDC) of the surgical service 1-A of the Hospital de S. Teotónio de Viseu E.P.E..

The UMDC has 7 beds, it is a unit designed to receive patients in critical condition in pre- and post-operative. As a level II unit, its main objective is the surveillance and continuous monitoring of the surgical patient in critical condition.

All patients admitted to the UMDC from 1 to 31 May 2009 were included in the study population, as inclusion criteria all patients over 18 years of age and with a minimum stay of 24 hours in the unit. Thus, data collection was performed for 31 days, with collection anomalies on 2 days, 7 and 18. For statistical reasons these two days will not be taken into account for the presentation of results and therefore 29 days will be under analysis.

The use of central tendency measures as well as the study of the standard deviation are the methods on which the discussion of results is based and the calculation of the Work Utilisation Ratio (WUR) is also introduced. The Work Utilisation Ratio (WUR) is calculated on the basis of the number of nurses available in the unit, the amount of work a nurse can do in each shift (46 TISS points) and the number of TISS points actually used during that period. The calculation of the WUR can be carried out using the following equation:

$$WUR = (\text{TISS points during the month})/(\text{number of nurses per day} \times 18.5 \times 46/3)$$

Being that:

18.5, the average number of days of work per month of each nurse (average among nurses performing 35 hours and 40 hours);

46, the maximum number of TISS points per shift;

3, the number of shifts in 24 hours;

5.34, the number of nurses per day during the month of May given the days when there were 2 nurses at night.

IV. Presentation And Discussion Of Results

The analysis of patients admitted to the UMDC during the period from 1 to 31 May 2009 showed that in a total of 27 patients, 44.5% were female and 55.5% were male, there was a unit occupation rate of 52.7% in the period in question. As can be seen in a simplistic way in the table of results (Table III), practically on all days of the month the need for hours of care was found, we should exclude as previously mentioned the days 7 and 18 for errors in the harvest, we can still observe that there are negative hours even on a few days with one more element.

In a more detailed analysis and taking into account the central trend measures we can say that the average hours of care needed per day in the UMDC is 45.37 hours which corresponds to an average of 85.62 TISS points per day. The median value of hours of care needed (HCN) per day is 46.64 hours, presented as a set of multimodal HCN, has as modal classes the values of 28.62; 49.29 and 62.01, corresponding to an average value of HCN of 47.7 hours. As can be seen in the values of the modal classes there is a very large interval between the minimum and maximum values, although the standard deviation translates into +/- 11.08 hours in relation to the average of 45.37 hours.

The WUR was also quantified, presenting a value of 1.64 points. In view of these results and without the need to approach other forms of calculation, we can agree that even with an occupation rate of 52.7%, and given that an average of 40.13 hours of nursing care per day were provided, there is an average deficit of 5.24 hours of daily nursing care, this value is substantially accentuated on days when there is one less element, there are in fact extreme days for example day 1 and 25 when, as can be seen in the table, the number of negative hours is worrying. On the other hand, days 5 and 14 are days on which the hours of care provided are frankly positive, due to the fact that there is one more element and it is a day on which the unit is receiving patients from the emergency room. As the emergency service is marked by unpredictability, one cannot really manage human resources with a minimum but always a medium/maximum flow in mind.

If we look closely at table III we can easily deduce that if the amount of TISS points recommended per nurse/turn is 46 points, the normal distribution even with this rate of occupation would be 2 patients per nurse, even as a way of better organization of care.

Table III - Results of the application of the scale in the month of May

	C20	C21	C22	C23	C24	C25	C26	Total	HCN	HCF	HCF-HCN	N. nurse
1	24		21	18	23	21	22	129	68.37	48	-20.37	4
2	21				23	21	17	82	43.46	36	-7.46	3
3	21			27		24		72	38.16	36	-2.16	3
4	22		19	27	18	24		110	58.3	36	-22.3	3
5			19	27	18			64	33.92	48	14.08	4
6			19	25	18			62	32.86	36	3.14	3
7				25				25	13.25	48	34.75	4
8				30	21	25	17	93	49.29	36	-13.29	3
9				27	21	28	20	96	50.88	48	-2.88	4
10				26	20	27	18	91	48.23	36	-12.23	3
11			17	29	21	31	17	115	60.95	48	-12.95	4
12			16	30	17	29		92	48.76	48	-0.76	4
13					21	33		54	28.62	36	7.38	3
14					21	33		54	28.62	48	19.38	4
15				18	18	27		63	33.39	36	2.61	3
16				18		33		51	27.03	36	8.97	3
17				17	29	27		73	38.69	36	-2.69	3
18						24		24	12.72	36	23.28	3
19				26	28	22		76	40.28	48	7.72	4
20				21	28	22		71	37.63	36	-1.63	3
21				21	28	22	18	89	47.17	48	0.83	4
22			21		32		21	74	39.22	36	-3.22	3
23			21		32	20	29	102	54.06	36	-18.06	3
24			26		32	22	23	103	54.59	36	-18.59	3
25			18	21	27	27	24	117	62.01	36	-26.01	3
26	18			21	27	27	24	117	62.01	48	-14.01	4
27	21			16	27	22		86	45.58	36	-9.58	3
28	25			20	32	22		99	52.47	48	-4.47	4
29	27			22	27	22		93	49.29	36	-13.29	3
30	22			24	21	21		88	46.64	36	-10.64	3
31	22			24	21			67	35.51	36	0.49	3
Month: May												

HCN - Hours of care required = total points x 0.53 (10.6 x3/60);
HCF - Hours of care provided

In view of the statistical data mentioned above, with an average TISS point of 85.62 points, and given that each nurse should achieve a maximum of 46 points, with this rate of occupancy the use of 1.86 nurses per shift should be recommended, i.e. 2 nurses per shift, the fact that there is not one more nurse on a permanent basis, particularly in the night shift, in fact leads to an exaggerated WUR result of 1.64 points, well above 100%, if we calculate the WUR with 2 nurses per shift it shows a value of 1.46 points, lower but still revealing an inadequate ratio of nursing work to the amount of TISS points existing in the period in question.

In general if we look at table III day by day we can see that the TISS values overall correspond to class II patients, i.e. with TISS points between 20 and 34 points, for this type of patients and taking into account that the UMDC is a level II intensive care unit, the nurse/patient ratios recommended internationally are 2.5 patients per nurse by the European Society for Intensive Care and 2 patients per nurse by the Centers for Disease Control USA (CDC), these recommendations meet the results described here after analyzing the results of the application of the TISS 28 instrument in the UMDC from 1 to 31 May.

V. Conclusion

As intensive care develops, the diversity of ICU patients, the organization, structure and management of these units has also increased in complexity and, consequently, the development and use of graduation systems have contributed to the analysis of the performance of intensive care units, to estimate the probability of death in the hospital environment, to predict the evolution and results of patients to the instituted therapy, to calculate ICU costs and to improve the allocation of material and human resources.

As average life expectancy increases, the probability of each individual requiring intensive care also increases, becoming essential cost accounting and a better efficiency in resource application. The large volume of costs is mainly distributed in technology and human resources, from human resources a large percentage goes to nursing teams. Although the results of this study may be lessened by the fact that it is only carried out in one

month, no doubt the application for longer could reveal more statistically accurate data, but they are indicative data, which go against the bibliographical references.

The correct allocation of human resources for a unit of this nature to function with quality should be a constant priority of management bodies, in fact we are dealing with patients in critical condition, class II, who need a high level of surveillance and continuous monitoring, reduce this level, just because it is the night shift or weekend is counterproductive with the image of quality and accuracy in nursing care.

As we have seen for some days, the level of negative hours is such that we can jeopardise the nursing care provided. Direct responsibility for this can be attributed to the operational managers as well as the management policies of the senior managers.

I believe that in units of this type, intensive care units that care for patients in critical condition, classified as Level II, who enjoy great unpredictability in relation to their occupancy rate, it should be the operational manager who defines the daily allocation of human resources.

When analyzing data obtained with the application of TISS 28, we can say that with an average daily points of 85.62, 1.86 nurses would be needed per shift, but we must not forget that we are dealing with an occupation rate of 52.7%, if by chance the rate were close to 100%, the number of nurses would have to be doubled, nothing better than the operational manager to define the human resources daily, according to the unpredictability of the occupation and the necessary nursing workload.

To this end, there are a number of tools which could be suggested for the operational manager to better establish the number of nurses needed for efficient nursing care.

Not neglecting the fact that there must be 2 nurses per shift, the operational manager may on days when there is a lower occupancy rate choose to use, holiday breaks or create an hour bank, with the appropriate limits. A prevention team can also be created to deal with the sudden increase in workload, or there can be a pre-defined call element, requiring to create call criteria and define the respective incentives.

This study was very gratifying for me because it was able to prove in a scientific way, with the appropriate limitations, what we actually feel in practice, which is a high workload statistically translated by the calculated WUR. The specificity of care for critically ill patients, as found in class II (between 20 and 34 TISS points), is not sympathetic to random limitations of human resources.

In closing, I would like to highlight the fact that I have fulfilled the objective initially defined, i.e., to make clear the burden of nursing work, carried out at the UMDC in the month of May, not being able to make intellectually reliable extrapolations, the results serve as indicators, these clear of the deficit in average terms of nursing care provided, implying all the consequences that may arise.

I have to say that as nurses, direct carers or managers become more familiar with graduation systems of disease severity, workload or prognostic methods, they can more easily develop a different perspective of better understanding of the thinking and probabilistic method for a more objective analysis of the whole nursing care management process.

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