

# THE SEVERITY OF PATIENTS' CONDITIONS AND THE NURSING WORKLOAD IN AN INTENSIVE CARE UNIT\*

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**ABSTRACT:** This quantitative and prospective study, undertaken in July – November 2012 with a total of 183 hospitalizations, aimed to measure the severity of the condition of patients admitted to an Intensive Care Unit, and to quantify the nursing workload through the Therapeutic Intervention Scoring System. For statistical analysis, the absolute and relative frequencies were calculated and organized in tables and graphs. The severity of the patients' illnesses by class: 47.54% were class II: 20 to 34 points on the TISS-28. The categories of therapeutic interventions with 100% were: Basic activities and ventilatory support. The mean of the TISS-28 measurements resulted in 24.1 points, requiring a workload of 12.8 hours. The mean of the daily TISS-28 score was 232 points, requiring 123 hours of nursing care, while the nursing team in the period produced 120 hours of work per day. The study identified the most frequent categories and interventions, thus supporting care planning.

**DESCRIPTORS:** Intensive care; Severity of the patient's condition; Workload.

## GRAVIDADE DE PACIENTES E CARGA DE TRABALHO DE ENFERMAGEM EM UNIDADE DE TERAPIA INTENSIVA

**RESUMO:** Estudo quantitativo, prospectivo, realizado no período de julho a novembro de 2012, totalizando 183 internações, objetivou mensurar a gravidade dos pacientes admitidos em uma Unidade de Terapia Intensiva e quantificar a carga de trabalho de enfermagem através da aplicação do *Therapeutic Intervention Scoring System*. Para análise estatística foi calculado frequência absoluta e relativa, organizada em tabelas e figuras. A gravidade dos pacientes por classe, 47,54% da classe II: 20 a 34 pontos do TISS-28. A categoria das intervenções terapêuticas com 100% foi: Atividades básicas e suporte ventilatório. A média das mensurações do TISS-28 resultou em 24,1 pontos, demandando uma carga horária de 12,8 horas. A média do TISS-28 diário foi de 232 pontos, demandou 123 horas de cuidados de enfermagem, enquanto a equipe de enfermagem no período gerou 120 horas de trabalho ao dia. O estudo identificou as categorias e as intervenções mais frequentes podendo ser um subsídio ao planejamento assistencial.

**DESCRITORES:** Terapia intensiva; Gravidade do paciente; Carga de trabalho.

## GRAVEDAD DE PACIENTES Y CARGA DE TRABAJO DE ENFERMERÍA EN UNIDAD DE TERAPIA INTENSIVA

**RESUMEN:** El objetivo de esta investigación fue mensurar la gravedad de los casos de los pacientes de una Unidad de Terapia Intensiva y cuantificar la carga de trabajo de enfermería a través de la aplicación del Therapeutic Intervention Scoring System. Estudio cuantitativo, prospectivo, realizado en el periodo de julio a noviembre de 2012, totalizando 183 internaciones. Para análisis estadístico, fue calculada frecuencia absoluta y relativa, organizada en tablas y figuras. Acerca de la gravedad de los pacientes por clase, 47,54% de la clase II: 20 a 34 puntos del TISS-28. La categoría de las intervenciones terapéuticas con 100% fue: Actividades básicas y soporte de ventilación. La media de las mensuraciones del TISS-28 resultó en 24,1 puntos, demandando una carga horaria de 12,8 horas. La media del TISS-28 diario fue de 232 puntos, con demanda de 123 horas de cuidados de enfermería, mientras el equipo de enfermería en el periodo generó 120 horas de trabajo al día. Se identificaron las categorías y las intervenciones más frecuentes, siendo posible crear un subsidio en el planeamiento asistencial.

**DESCRIPTORES:** Terapia intensiva; Gravedad del paciente; Carga de trabajo.

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## INTRODUCTION

The Intensive Care Unit (ICU) attends patients in an acute or critical state, who require continuous and specialized care. It has advanced equipment and technology, and trained and qualified human resources receiving continuous training and education. It is an environment which provides sophisticated, complex and expensive care, differentiated from the other units in the institution<sup>(1)</sup>. The ICU undoubtedly receives patients in a serious condition, and in order to identify the patients' degree of severity, it is necessary to use instruments which demonstrate these patients' instability and their probability of recovery.

There are Patient Classification Systems (PCS), which, through measuring different variables, contribute to the care provided in, and also to the management of, the ICU, using instruments which allow reliable results for the evaluation of the patients<sup>(2)</sup>. Among the parameters for classifying patients in ICU, the severity of the illness stands out most.

Scales of severity are used for this evaluation. These are numerical variations related to specific characteristics presented by the patients, providing means of evaluating the probabilities of mortality and morbidity resulting from the pathological situation<sup>(3)</sup>. Examples are the Acute Physiology and Chronic Health Evaluation (APACHE) and the Simplified Acute Physiological Score (SAPS), which are the internationally-recognized and -used scales most used in ICU.

However: to work with scales of severity alone is not sufficient to provide quality care for these patients. It is necessary to take into consideration the number of human resources available in the unit for the care. In recent years, various ICUs have used instruments for assisting in the dimensioning of the nursing staff. In addition to meeting the requirement for the care necessary for the patients, it improves the working conditions and, consequently, the health of the nursing workers, who – because of the nature of the work – already deal constantly with stressful situations and situations involving death<sup>(4)</sup>. However, to improve the quality of the care and the cost-effectiveness ratio in ICU, and to ensure the safety of the patients, nursing workload indicators are becoming increasingly more necessary<sup>(5)</sup>.

To this end, the Federal Council of Nursing, through Resolution N.293/2004, established parameters for the minimum quantity of different levels of training for nursing professionals, in accordance with the complexity of the care required by the hospital units. It considers 17.9 hours of nursing care to be the highest value per bed in 24 hours in intensive care<sup>(6)</sup>. However, in practice, this Resolution is weak in ICU, as it fails to take into account the variety of the patients cared for in intensive care units, the resources available, and the change in the demands presented by, and in the nursing care for, the same patient during her inpatient treatment<sup>(7)</sup>.

The Therapeutic Intervention Scoring System (TISS-28) stands out as a technical, administrative instrument for evaluating the care process, as it is an existing scale which allows the dimensioning of the nursing personnel through the classification of the patients, according to the complexity of their care<sup>(8)</sup>.

The TISS was created in 1974, with 57 therapeutic interventions, by Kullen et al, with the aim of evaluating the severity of the states of critically-ill patients, and allowing an analysis of costs with greater reliability. It introduced the measuring of nursing workload into clinical practice, and was first used in a hospital in Massachusetts in the United States of America. In 1983, Keene and Kullen, following the first revision of the instrument, modified it to include 76 therapeutic interventions. Following a further revision of the instrument, with an initial sample of 10,000 data from the TISS 76, extracted at random from the database of the Foundation for Research on Intensive Care in Europe, the TISS 76 was simplified, coming to contain 28 therapeutic interventions, and came to be known as the TISS 28. For the validation of the instrument, 22 ICUs in Holland participated in the study, which was first published in 1996<sup>(9)</sup>.

The TISS 28 is made up of seven categories of therapeutic intervention: basic activities, ventilatory support, cardiovascular support, renal support, neurologic support, metabolic support and specific interventions. Each category is made up of specific items, with scores varying from 1 to 8 points, using information referent to the last 24 hours of inpatient treatment in the ICU.

In the Miranda version, it was inferred that one point on the TISS-28 was equivalent to the

consumption of 10.6 minutes of the time of a nursing professional in direct care to the patient<sup>(8)</sup>. It is concluded, therefore, that a professional, during an eight-hour shift, can attend a patient of at the most, 46 points.

The TISS-28 classifies the patients as: Class I, from 0 to 19 points (physiologically stable patients, requiring prophylactic observation); Class II, from 20 to 34 points (physiologically stable patients, but requiring intensive nursing care and continuous monitoring); Class III, from 35 to 59 points (seriously-ill patients, hemodynamically unstable); Class IV, over 60 points (patient to be compulsorily hospitalized in ICU with continuous and specialized medical and nursing care). The total score of the TISS-28 varies from a minimum of 0 to 76 points; the highest score means a higher number of therapeutic interventions, greater severity of the patient's condition, and a higher number of hours of nursing care<sup>(3)</sup>.

The decision was made to undertake this study because the researchers believe in the importance of the TISS-28 and in its relevancy for planning nursing care and in the adjusting of material and human resources.

The researchers' rationale for this study is their belief that the TISS-28 is a good instrument for determining patients' degree of severity; for this reason, it is relevant for the planning of nursing care and for the adjusting of material and human resources.

It aimed to measure the severity of the condition of the patients admitted to a General Intensive Care Unit, and to quantify the nursing workload through administering the TISS-28.

## METHOD

This quantitative, descriptive, prospective study was undertaken in the period July – November 2012, in the ICU of a general hospital in the South region of Brazil.

The ICU has 10 beds, and receives adult clinical and surgical patients. It attends Unified Health System patients, health insurance schemes and private patients. In this department, the nursing team is made up of four nursing technicians and one nurse directly involved in patient care per shift, one nurse manager for the unit, and one nurse auditor, totalling 22 nursing professionals.

These are distributed in four teams, with a workload of 42 hours per week.

The study population was made up of 190 episodes of inpatient care which occurred in the ICU in the period July – November 2012. Episodes of inpatient treatment of less than 24 hours were excluded from the study, this being one of the criteria of the TISS 28. The sample was made up of 183 episodes of inpatient treatment.

The list of inpatients treated in the period delimited for data collection was obtained based on the unit's record book. The data were collected by one of the researchers, directly from the patients' hospital records. The data collection instrument had two parts. The first refers to demographic data (number of the admission registration, age, sex, marital status, place of origin) and epidemiological data (the shift when inpatient treatment began, and the shift during which the patient was discharged, and diagnosis on admission and causes of death, according to the International Statistical Classification of Diseases and Related Health Problems – Tenth Revision (ICD-10), and the type of discharge of all inpatients. The second part was made up of the items of the TISS 28, measured among patients who had received inpatient treatment for more than 24 hours.

The calculation of the nursing workload according to the TISS-28 undertaken through direct observation of the client, by the medical and nursing records made of procedures, and the therapeutic and monitoring procedures, during the minimum period of 24 hours of inpatient treatment through to the discharge of the patient in the ICU. The activity of collecting the data was undertaken by one of the researchers, these being collected once a day, always at the same time, in the period from 1st July through to 30th November 2012. After being filled out, the instrument was analyzed and the daily score for the TISS-28 was calculated. In order to convert the TISS-28 scale into hours, it was multiplied by 10.6 minutes, which represents the time taken by the work necessary for each point of the TISS-28 per eight-hour shift. Following that, the result was multiplied by three (shifts of eight hours each). Finally, it was divided by 60 minutes in order to arrive at the number of hours of nursing care.

The data analysis was undertaken using descriptive statistics, using the distribution of absolute and

relative frequencies. A database was constructed, using Microsoft Office Excel 2010 spreadsheets, which was analyzed using simple tabulations of the variables, presented using tables and graphs.

The study was approved by the UFSC's Committee for Ethics in Research with Human Beings, under Opinion: 155,004, respecting the stipulations of Resolution N. 196/96 of the Ministry of Health's National Health Council.

## RESULTS

The demographic and epidemiological data for the episodes of inpatient treatment studied (n=183) showed that the majority of patients were male (60.6%), with a predominance in the age range of 50 to 60 years old (22.6%), and originating from the micro-region of Itajaí (92.9%). The most frequent reason for the inpatient treatment, according to the ICD-10, was diseases of the circulatory apparatus (26.2%), followed by cancers (16.8%). In the third place were injuries, poisonings, and some other consequences of external causes (13.6%). It was ascertained that 39.89% of the patients studied come to ICU from the surgical center, followed by those from other units in the institution (28.53%), and those received from the Emergency Room (27.87%). Although it was observed that 46.44% of the patients were admitted in the night period (19h00min – 07h00min), if one takes into account the hourly workload by shift, it is in the afternoon period (13h00min-19h00min), with 39.89% of the admissions, that the highest turnover of patients occurs.

It was observed that (73.77%) of the patients, on being discharged from ICU, were moved to other units in the institution. These discharges occurred with the greatest frequency (39.89%)

during the afternoon shift. Regarding the number of deaths, there was not a high discrepancy in frequency between the three shifts, given that the morning and afternoon shifts last six hours each, and that the night shift lasts 12 hours. Among the 183 episodes of inpatient treatment studied, a rate of 22.40% of deaths was obtained. The most frequent length of inpatient treatment was from one to three days (43.17%). It also stands out that 20.22% received inpatient treatment for between four to seven days, and that 11.47% were in ICU for between eight and 10 days.

Analyzing the classification of the severity of the patients' conditions in accordance with the TISS-28 and its relationship with sex, Table 1 showed a predominance in class II – Physiologically stable patients, although needing continuous intensive care nursing and monitoring, 25.68% male and 21.8% female. It is worth noting that in all the classes, there was a higher frequency of men and that none of the patients could be placed in class IV (Patient to be compulsorily hospitalized in ICU with continuous and specialized medical and nursing care). Seriously-ill patients who are hemodynamically-stable (Class III), were observed at a lower frequency. No patient was recorded with compulsory indication for continuous and specialized medical and nursing care (Class IV).

In this study, the percentage distribution of the patients by therapeutic interventions of the TISS-28 was noted in the following categories: Basic activities and Ventilatory support obtained 100% frequency, and in second place (91.26%) there is the category of Renal support. In third place, with 72.6%, there is Cardiovascular support, followed by Metabolic support with 71.04%, Specific interventions with 9.84%, and in last place, the Neurologic system with 2.19%.

Chart 1 - Classification of severity of condition by class of TISS-28, according to the sex of patients in ICU in the period July – November 2012. Itajaí-SC-Brazil 2013.

Classes TISS 28 (CULLEN, 1974)	Genre				Total	
	Male		Female			
	n	%	n	%	n	%
Class I	40	21,86	21	11,48	61	33,33
Class II	47	25,68	40	21,86	87	47,54
Class III	24	13,11	11	6,01	35	19,13
Class IV	-	-	-	-	-	-
Total	111	60,65	72	39,35	183	100

Regarding the severity of the condition of the patients in ICU, after 1,471 measurements through the TISS-28, in the period July – November 2012, the TISS-28 mean was ascertained at 24.1 points. In Figure 1, we observed that there was no relevant difference in the mean of the TISS-28 in the months when the data was collected. It is worth noting that in August, even with a higher number of patients, the mean was below (23.60) that of the month of September (24.13), which had a higher turnover of patients.

The mean TISS-28 value obtained in this study (24.1) was multiplied by 10.6, arriving at the value of 255.99. This was afterwards multiplied by three, as 10.6 corresponds to an eight-hour shift, and was finally divided by 60 minutes, resulting at a mean of 12.8 hours of nursing care per day per patient. In relation to the nursing workload,

the sum of the TISS-28 was calculated for all the days and for all the patients, divided by 153 days, which is equivalent to the period of July – November 2012, obtaining a mean daily score for the TISS-28 of 232 points, which require 123 hours of nursing care per day. Evaluating the daily schedule of the nursing team's work in the unit under study, it may be noted that the team produces 120 hours of work per day, including the nurses and nursing technicians from all the shifts. The nursing team of the ICU under study, in the data collection period, was made up of four nursing technicians and one nurse directly involved in patient care in each shift.

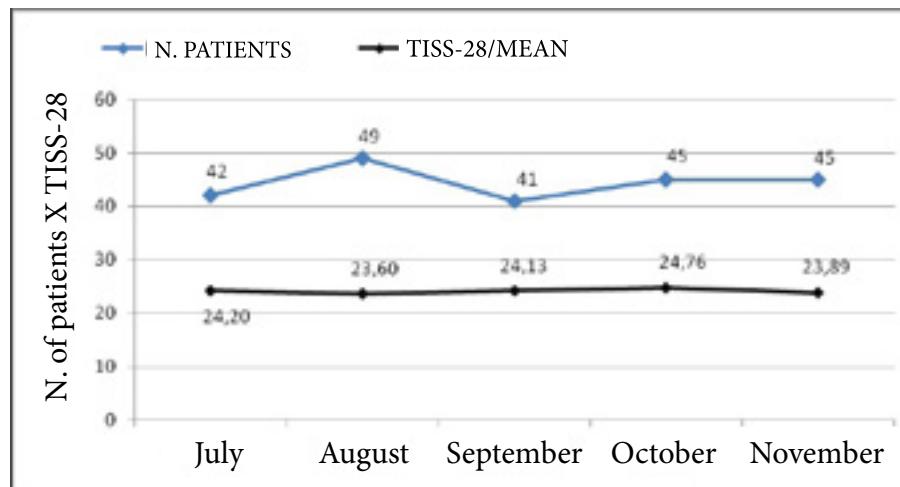


Figure 1 – Distribution of the TISS-28 mean, in relation to the number of patients/month receiving inpatient treatment in the period July – November 2012. Itajaí-SC, 2013

## DISCUSSION

Other studies present results similar to those which were presented, in relation to the origin of the patients, such as, for example, the study undertaken in the ICUs of the University of São Paulo Faculty of Medicine Clinics Hospital, in which 57.8% of the patients come from the surgical center<sup>(10)</sup> and the study undertaken in the ICUs of two hospitals in the city of São Paulo, with 46.3%<sup>(11)</sup>.

The surgical center of the hospital institution under study undertakes major operations, which require immediate post-operative care in ICU. In this phase, the patient presents hemodynamic instability, needing rigorous control of the vital

signs, of bleeding, of the volume of drainage and ventilatory support, continuous care, which requires professionals who are trained and qualified for the assistance. Consequently, the nursing workload increases, according to the severity of the patients' conditions.

Regarding the period of admission of patients in the ICU, a similar study in Rio Grande do Sul showed that approximately 2/3 of the episodes of inpatient treatment occurred between 13:00 and 23:00 hours<sup>(12)</sup>. The increase in admissions in the afternoon and night-time period may be related to the number of patients arriving from the surgical center, in which the majority of elective and major operations is undertaken in the morning period. Knowledge of these data is important, as it favors

the organization of the daily schedule of the work in the unit, directing the necessary number of staff to the times when the demand is highest<sup>(13)</sup>. In relation to the discharging of the patients, however, most happen in the afternoon period. In the majority of the ICUs, there is a routine that the doctors' and nurses' visits to each bed in the unit take place during the morning, with discharges being prescribed for the afternoon period<sup>(14)</sup>.

The hospital in question does not have Semi-Intensive Care Units (SICU). Studies state that 54% to 58.4% of patients discharged from ICU are moved to the SICU<sup>(15-17)</sup>. There is no doubt that if the hospital institution had a SICU, there would be a higher turnover of patients in the ICU, and consequently the waiting time for intensive care in the emergency units and surgical centers would reduce.

Regarding the rate of deaths, other studies presented similar rates, 20%, 25.9% and 30.6%<sup>(18-20)</sup>. Some studies describe that the longer the length of inpatient treatment in ICU, the higher the mortality rate, due to the patient being exposed to possible hospital infections and to exacerbation of chronic pre-existing illnesses<sup>(14)</sup>.

According to the classification of the severity of the patients' condition, according to the TISS-28, the data indicate that the majority of the patients were physiologically stable, although needing continuous nursing care and monitoring. A similar result was found in a study undertaken in the ICUs of a large general hospital in the non-metropolitan region of the State of São Paulo<sup>(1)</sup>.

Among the therapeutic interventions of the TISS-28, the categories: Basic activities, ventilatory support and renal support predominated in the study. These results were expected, due to the instability of the critically-ill patients, who require continuous monitoring of their vital parameters and to the ICU, which undertakes rigorous control of the fluid balance both in patients with and without indwelling catheters. Other studies corroborate the increase of the frequency of this category<sup>(3,15)</sup>.

The mean score of the TISS-28 obtained in this study is close to those found in Brazilian and international studies. Other studies vary from 20 points to over 30 points<sup>(21-22)</sup>. Analyzing them monthly, one can prove with these data that the quantity of patients receiving inpatient treatment

is not related directly to the mean score of the TISS-28. A similar study undertaken in the ICU of the University Hospital of the Federal University of São Paulo corroborates these data<sup>(23)</sup>.

In this study, the value of the TISS-28 required a mean number of hours of nursing care below that found in Resolution N. 293 of 2004<sup>(6)</sup>, which specifies 17.9 hours spent per client per day; however, if we relate it to the dimensioning of the nursing team we see that there is an overload of nursing work. In a similar study relating the nursing team's hours of work with the hours required by the mean of the daily TISS-28, a mean of 31 hours a day was left over, which served for covering predicted and unpredicted absences such as absenteeism, leave and holidays<sup>(1)</sup>. However, the TISS-28 - as it measures only therapeutic interventions, evaluating the indirect severity of the patient's condition - does not encompass other activities which are part of the routine of the ICU, such as baths, oral and intimate hygiene, changes of position, oral and tracheal suctioning which require nursing time<sup>(1)</sup>. In summary, the results of the systematic application of the TISS-28 provide support for the management to understand the functioning of the ICU and, consequently, to apply planning which aims for quality of care.

## CONCLUSION

With the advent of new technologies and therapeutic resources for facilitating the treatment and recovery of the patient in ICU, nursing is making increasing use of scores which evaluate the severity of the patients' conditions with the aim of planning care which is appropriate to the needs of the client.

Through the TISS-28, it was possible to identify the most frequent categories and interventions, in this way being able to contribute to the planning of the assistential care. This study ascertained that the patients were in class II (20 to 34 points), with more stays in the period of one to three days, and originating from the surgical center. According to the TISS-28, the data required a mean of 12.1 hours of nursing care per patient. However, relating dimensioning of the nursing team, one can observe an overload of work.

However, there is a shortcoming in the

measuring of the nursing workload, because of some routine activities in the daily work of the ICU which cannot be measured by the TISS-28.

Moreover, there is no score which is unanimously considered ideal measuring all the activities undertaken in ICU, as all scores have advantages and disadvantages. There is a need for studies which consider this shortcoming, becoming closer to the reality of care in ICUs.

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