Oncology nursing: looking into the future

There is no need to highlight the high morbidity and mortality of oncological diseases, and the advances on knowledge about treatment of a number of cancers, and the need of trained and skilled nurses to deliver care and act in such contexts. For this reason, we need to emphasize the insufficient access for oncology care “among societies” and “within the same society”, the imbalance in terms of those who need and wish to provide care for ill individuals, their families and general population, and also the number of professionals and assistances that public health system structure provides.

Education about diseases, treatments and side effects and care to emotional needs are always pointed out as inadequate by patients and their families members. However, professionals often do not notice or adjust their routine to support such demands. Oncology nurses are part of these supporting processes and they also experience such limitations, therefore, they need to think about the future.

A working group including professionals from all over the world that analyzed reasons for inadequate and insufficient access to health care and have pointed out possible solutions for them in 21st century had published a report(1) giving as reasons for current problems, among other causes, the following: outdated, static and fragmented curricula that produce unprepared professionals to work in teams with narrow technical focus, and the limited ability to understand the local social reality and contextual care. This report also indicates as a limitation the hospital orientation that can cause problem to primary care, and episodic encounters rather than continuous care, sex stratification of professional class that may lead to tendency of professionals to act in isolation from or in competition with each other due to differences in professional valorization. The strategies appointed are the need of reforms in education.

The aim of this transformative learning and interdependence in education is to educate professionals to mobilize knowledge, engage them in critical reasoning, ethical and inspiring conduct to promote health equity by providing individuals the access to adequate high quality health services.(1) Nurses are invited to join and respond to these challenges.

Interdependent and trans-dependent models in health education are based on the presupposes of education and shared interprofessional competence, systematic working team and, in the future, shared transprofessional competence, i.e., reaching beyond the professional silos and including the
community. In these models, competence of each professional is what defines their actions, not their academic degree, amount of time in the work role or ability of professional groups to mobilize State power for providing them credentials and monopolies. Interdependent and transdependent models in health education are perfectly aligned with Advanced Nursing Practice Model (ANPM), which was developed after 70s in countries from the North hemisphere.

“Advanced Practice Nurses (APNs) have pursued a bachelor degree in nursing and have acquired expert knowledge base, complex decision-making skills and clinical competencies for expanded nursing practice, within their context or country in which s/he is credentialed to practice. A master’s degree is recommended for the entry level.”

Characteristics of educational training for APN are: advanced education level (at least master’s degree level), formal certification (accreditation) of programs that prepare nurses for advanced practice; formal system of licensure, registration and certification.

APN practice characteristics are: integration of clinical, research, education and management, high degree of professional autonomy and independent practice, case management/own case load, advanced assessment skills, decision-making skills, diagnostic reasoning skills, recognized advanced clinical competencies, provision of consultant services to health providers, planning, implementation and evaluation of programs, recognition as first point of contact.

APN country specific regulatory mechanics are: right to diagnose, authority to prescribe medication, authority to prescribe treatment, authority to refer clients to other professionals, authority to admit patients to hospitals, legislation to provide and protect the title Advance Practice Nurse, legislation or some other specific form of regulatory mechanism to advanced practice nurses and officially recognized titles for other nurses working in advanced practice roles.

Brazilian oncology nurses have different educational level and distinct clinical, research and management roles; however, they have to follow a single professional regulation. Most of nurses act within traditional roles of the professional, but few develop activities that are needed to become an APN.

The acquisition of competencies in oncology nursing occurred, in most cases, by in-house training, self-learning, and short-term courses. Many of these professionals have attended specialization courses that, according to the Brazil Ministry of Education, need to include at least 360 hours, and in the last years some of them have received specific training by attending oncology nursing residency (5,760 hours). There are also nurses who have acquired master or doctoral degree, however, these graduate studies are mainly focused on research competence and not to advance clinical practices. nevertheless, the ability to conduct research is one of the skills expected for APN.
Roles and attributions needed for oncology advanced practice nurses are not formally agreed among Brazilian nurses. Some nurses conduct activities that are commonly related with APN, simply because they had acquired the knowledge to do so, but there is no specific legislation in Brazil, neither specific regulation to support, career planning or even social recognition that is aligned with the role of these professionals.

Considering the inadequate access to health services by a large portion of the world population, the success of APN experience in providing health care to population in developed countries, and the potential of nurses from Central and South Americas, among other regions around the world, which include specialization programs, residency, master and doctoral degrees, the WHO/OPAS have prepared a request for governments and nurses of these countries to implement APN in primary care and obstetric nursing in order to include more professionals working in health system, take advantages from nurses’ intellectual ability and retain good professionals in the profession. After this document (3) and by the creation of the Brazil’s Federal Council of Nursing to study implementation of APN, this topic has become popular among nurses. Although oncology nurses and other nursing specialties are not the main goal of this document, there are a number of experiences and published materials about APN in the oncology area. In addition, in Brazil, there is a long way to go and a high potential perspective for APN in oncology.

There are cultural-scientific nursing societies, associations, and the title of specialist after approval in a certification examination that is available for nurses with different educational background and competencies. This is the time for a collective effort of clinical professionals, academics, scientific association of oncology nursing, legislators, and managers to prepare a project aiming the implementation of APN in oncology nursing. The process has already started and what have been learned and constructed so far must be taken as an advantage. However, the plan should allow the incorporation of this “news” in a harmonious, safe, ethical, legal and rapid way as well as in a format that protect professionals, clients, institutions and the society. The goal should be the seeking of homogenization in education, competencies, degrees, licensures, and professional certification and ethical organizations in order to provide support for the new role of oncology nurses.

Advanced practice nursing is a strategy to improve and globalize health care worldwide along with agreement with the understanding of what should be education and practice of health professionals for the 21st century.

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Pacotes molhados: o aumento do tempo de secagem aumenta o consumo de água (recurso natural escasso)?

Nominata

Nominata
Impact of intensive glycemic control on acute renal injury: a randomized clinical trial

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Abstract
Objective: To evaluate the impact of intensive glycemic control on the reduction of the incidence of acute renal injury in adult patients undergoing cardiac surgery.

Methods: Randomized clinical trial, evaluating 95 patients undergoing two glycemic control strategies. Patients were randomized to the intervention (IG) or control (CG) group. The goal was to maintain glycaemia between 140 and 180 mg/dl. The insulin dose adjustment was based on undiluted arterial blood glucose measurements at one hour intervals, by means of a blood glucose and beta-ketone monitoring system.

Results: The incidence of acute kidney injury was 53.7% (KDIGO stages 1, 2 or 3). There was no significant difference between the groups regarding the primary outcome (p = 0.294). However, a greater frequency of complete renal function recovery (p = 0.010), ICU discharge (p = 0.028), and hospital discharge (p = 0.048) was found among patients undergoing conventional glycemic control. The use of intensive glycemic control was associated with longer ICU stay (p = 0.031). The number of episodes of hypoglycemia was similar in both groups (1.6 ± 0.9 vs. 1.3 ± 0.6, p = 0.731), demonstrating the safety of the strategies used.

Conclusion: The impact of intensive glycemic control on reducing the incidence of acute kidney injury was not observed. In contrast, patients treated in the CG had a higher frequency of complete renal function recovery.

Keywords
Hyperglycemia; Cardiac surgical procedures; Acute kidney injury; Insulin

Descritores
Hiperglicemia; Procedimentos cirúrgicos cardíacos; Lesão renal aguda; Insulina

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Introduction

Hyperglycemia, regardless of whether or not diabetes mellitus is present, is one of the main risk factors associated with poor prognosis in patients undergoing cardiac surgery.\(^{(1-3)}\) Because it is considered a modifiable risk factor, some studies have highlighted the importance of rigorous glycemic control and its influence on mortality and morbidity, including renal dysfunction.\(^{(4,5)}\)

In the current literature, recommendations for glycemic control are mostly derived from studies of critical patients; when assessing renal dysfunction, there is no consensus on standardizing the definition for renal dysfunction.\(^{(3,6)}\) A limited number of studies\(^{(1,7)}\) focused on the use of an intensive glycemic control protocol to reduce the incidence of acute kidney injury (AKI); no study specifically investigated the outcome of intensive treatment in renal function using the most current international classification of AKI, Kidney Disease: Improving Global Outcomes (KDIGO).\(^{(8)}\) Consequently, the comparison of findings from different studies is compromised due to the heterogeneity of these results.

Acute kidney injury, defined based on elevated serum creatinine levels, occurs in almost 25% of patients in the first days after cardiac surgery, speculatively as a result of postoperative hypotension, use of nephrotoxic substances, and inflammation.\(^{(9,10)}\) Acute kidney injury is a frequent complication after cardiac surgery, with an incidence ranging from 20% to 57%.\(^{(11,12)}\) When it occurs in the cardiac surgery postoperative period, it is associated with an increase in hospitalization costs, longer hospital stays, increased time on mechanical ventilation, increased rates of wound infection and mortality, especially when there is a need for dialysis.\(^{(13-16)}\) Although the exact mechanisms responsible for postoperative AKI remain uncertain, its prognostic impact is well documented, not only in terms of morbidity but also in long-term events, such as incomplete recovery of renal function, and progression to chronic kidney disease, cardiovascular events, and death.\(^{(15,17)}\)

Hyperglycemia has been suggested as a risk factor for the development of postoperative AKI.\(^{(1,3,7)}\) However, the method for obtaining the best hyperglycemic control in the cardiac surgery setting remains uncertain. Thus, the objective of this study was to evaluate the impact of intensive glycemic control in reducing the incidence of acute renal injury in adult patients undergoing cardiac surgery, when compared to conventional glycemic control.

Methods

This was a randomized controlled trial, performed in a teaching hospital that is a reference site in Cardiology, Cardiac and Thoracic Surgery, located in the state of São Paulo, Brazil. The methodology of the study was based upon the recommendations of the Consort Statement. The study was enrolled in ClinicalTrials.gov, under the identifier NCT02574156, and acronym CHYCS - Control of Hyperglycemia After Cardiac Surgery: CHyCS Trial.

Patients undergoing cardiac surgery from May of 2016 to December of 2016, who presented glycemia greater than or equal to 200 mg/dl in the first six hours of admission to the surgical ICU (SICU) were included. Patients younger than 18 years of age, hospitalized for surgical correction of congenital heart disease, cardiac transplant, and/or participating in another study were excluded, as well as patients with a diagnosis of chronic renal failure undergoing on dialysis. The researchers selected patients who were candidates for inclusion in the study on the day before the surgical procedure, by analyzing the surgical schedule established for the subsequent date. The candidates were carefully informed by the researchers regarding the objectives of the study, and if they agreed to participate, they were included in the study protocol.

All patients received standard surgical care as previously described.\(^{(12)}\) In summary, patients received general anesthesia that was induced using fentanyl, midazolam, etomidate and pancuronium, adjusted for weight, and maintained with fentanyl and inhaled isoflurane. The decision to use extracorporeal circulation (EC) was the decision of the surgeon, and all surgical procedures were performed...
by median sternotomy. After surgery, all patients were transferred to the SICU.

Patients who had glycemia above 200 mg/dl in the first six hours of admission to the SICU were randomized, using a random list generated through a computer program (www.random.org), and were allocated to one of the groups: the conventional group (CG) with the objective of maintaining glycemia between 140 mg/dl and 180 mg/dl, or the intensive group (IG), with the aim to maintain glycemia between 90 mg/dl and 110 mg/dl. The conventional glycemic control target is used routinely in the SICU where the study was conducted.

The patients included were monitored for capillary glycemia at one hour intervals during the first 24 hours postoperatively, and received glucose solution during their time on the protocol (400 ml of 10% glucose solution, and 100 ml of 50% glucose) and an infusion of insulin in the dilution of 100 IU of regular insulin and 100 ml of saline solution (0.9% NaCl) in a continuous infusion pump. The insulin dose adjustment was based on undiluted arterial blood glucose measurements, taken at one-hour intervals, using a blood glucose and beta-keitone monitoring system (Freestyle Precision Pro, Abbott®). The insulin dose was adjusted based on an algorithm(4) adapted for this study by a team of intensive care nurses trained for this purpose, and assisted daily by a research nurse not involved in the clinical care of the patients.

For the sample calculation, we defined 5% alpha (α), with 80% power, to reduce the absolute incidence of acute renal injury from 57% to 28.5%, totaling 94 patients. After ascertaining the eligibility of the participants, the randomization was by aleatory method, in blocks of ten, from a list of random numbers generated by the website: www.randomization.org.

For data collection, a specific instrument was developed with information on patient identification, demographics, clinical characteristics, procedural data, clinical evaluation, and outcomes.

Surgical risk assessment was assessed using the European system for cardiac operative risk evaluation (EuroSCORE), assessment of the degree of organ dysfunction in the ICU using the Sequential Organ Failure Assessment Score (SOFA Score), the prognosis evaluation via the Simplified Acute Physiology Score III (SAPS 3), prediction of AKI in the cardiac surgery postoperative period using the Cleveland Clinic Scoring Tool, and the evaluation of comorbidities and prediction of mortality in ten years using the Charlson Comorbidity Index.

The primary outcome was the reduction in the incidence of AKI in the postoperative cardiac surgery period. For the definition of AKI, the KDIGO criterion(8) was used, which defines AKI as an absolute increase in creatinine levels of at least 0.3 mg/dl in the last 48 hours, or a relative increase in creatinine of at least 1.5 times from baseline in the last seven days, or a urine output <0.5 ml/kg/hour in the last six hours. Only one of these criteria (increase in creatinine or reduction of urine output) is necessary for establishment of AKI. This classification stratifies the AKI in three stages, as noted in chart 1. The secondary outcomes evaluated were the need for dialysis, recovery of renal function, discharge from SICU and from the hospital, death, hypoglycemia (capillary glycemia <70mg/DL), number of episodes of hypoglycemia, and the length of stay in SICU and in the hospital.

Chart 1. Classification of acute kidney injury according to the KDIGO criterion

<table>
<thead>
<tr>
<th>Stage</th>
<th>Serum creatinine</th>
<th>Urinary output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Increase in Cr &gt; 0.3 mg/dl (≥ 26.4 μmol/l) or increase of 1.5 - 1.9 times baseline Cr</td>
<td>&lt; 0.5 ml/kg/hr for 6-12h</td>
</tr>
<tr>
<td>2</td>
<td>Increase in Cr 2 - 2.9 times baseline Cr</td>
<td>&lt; 0.5 ml/kg/hr for &gt; 12h</td>
</tr>
<tr>
<td>3</td>
<td>Increased Cr &gt; 3 times baseline Cr, or Cr &gt; to 4.0 mg/dl [≥ 354 μmol/l], OR beginning of renal replacement therapy, OR GFR decreased to &lt;35 ml/min in patients &lt; 18 years of age.</td>
<td>&lt; 0.3 ml/kg/hr for &gt; 24h, or anuria for &gt; 12h</td>
</tr>
</tbody>
</table>


The data were described by means of absolute frequencies and relative percentages when categorical, and using means and standard deviations when continuous. The associations between categorical variables and treatment types were tested by Pearson’s Chi-Square test, estimated via the Monte Carlo procedure (100,000 replications). Differences in measures of central tendency among types of treatments were tested using the Mann-Whitney test. To evaluate the associations between three or
more categorical variables, a perceptual map estimated by Multiple Correspondence Analysis was used. The significance level adopted was 5%, and the software used was the R Core Team, 2018.

The study was submitted and registered in the Brazil Platform under the Certificate of Presentation for Ethical Appreciation (CAEE) 50949115.5.0000.0068, and approved by the Research Ethics Committee of the Faculty of Medicine of the University of São Paulo, under the number 1,378,648. All participants signed the Terms of Free and Informed Consent. The study complied with national and international standards of research ethics involving human subjects, in accordance with resolution 466/12.

Results

During the data collection period, 95 patients were selected for the study, among 440 eligible patients (Figure 1). The comparative analysis between the clinical and demographic characteristics of the individuals studied shows that the IG and CG groups were homogeneous, except for the use of vasoactive substances, which was higher in the IG group. The participants were mostly males (54.7%), mean age 59.8 ± 12.8 years, at low risk for death and development of AKI, as demonstrated by the Euroscore (3.4 ± 2.6) and the Cleveland Clinic Scoring Tool (2.2 ± 1.5), respectively. The severity profiles, measured by SAPS 3 scores on admission to the SICU (p = 0.681), and the SOFA after 24 hours (p = 0.544), were also similar between groups. The most frequent type of surgery was myocardial revascularization surgery using the saphenous vein (37.9%) and mammary artery (36.8%). It was necessary to use EC in 96.8% of patients, with a mean time of 91.7 ± 33.2 minutes. The treatment with vasoactive substances was different between groups (97.2% vs. 83.1%, p = 0.047) in IG and CG, respectively, even though severity assessed by SAPS 3 was similar between the groups (p = 0.681). However, there was no difference in the doses of dobutamine (p = 0.518) or noradrenaline (p = 0.218) between groups. The clinical and demographic characteristics of patients undergoing glycemic control in both groups are presented in table 1.

![Figure 1. Flowchart for inclusion, allocation, and analysis of the research sample based on recommendations of the CONSORT Statement](image-url)
Table 1. Clinical and demographic characteristics of patients undergoing glycemic control in the Intensive Group (IG) and the Conventional Group (CG)

<table>
<thead>
<tr>
<th>Variables</th>
<th>IC (n=36)</th>
<th>CG (n=59)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex, n (%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>19(52.8)</td>
<td>33(55.9)</td>
<td>0.833*</td>
</tr>
<tr>
<td>Female</td>
<td>17(47.2)</td>
<td>26(44.1)</td>
<td></td>
</tr>
<tr>
<td><strong>Age, years (mean + SD)</strong></td>
<td>59.8(7.2)</td>
<td>59.7(13.2)</td>
<td>0.997*</td>
</tr>
<tr>
<td><strong>EuroSCORE, (mean + SD)</strong></td>
<td>3.4(2.6)</td>
<td>3.3(2.2)</td>
<td>0.888*</td>
</tr>
<tr>
<td><strong>Cleveland Clinic Scoring Tool, (mean + SD)</strong></td>
<td>2.2(1.5)</td>
<td>2.2(1.3)</td>
<td>0.413*</td>
</tr>
<tr>
<td><strong>Charlson Comorbidity Index, (mean + SD)</strong></td>
<td>7.1(1.4)</td>
<td>7.1(1.4)</td>
<td>0.128*</td>
</tr>
<tr>
<td><strong>Simplified acute physiology score, (mean + SD)</strong></td>
<td>11.8(2.7)</td>
<td>11.8(3.3)</td>
<td>0.544*</td>
</tr>
<tr>
<td><strong>Simplified acute physiology score, (mean + SD)</strong></td>
<td>11.8(2.7)</td>
<td>11.8(3.3)</td>
<td>0.544*</td>
</tr>
</tbody>
</table>

Table 2 presents the outcomes of patients undergoing glycemic control in the intensive and conventional groups. The incidence of AKI was 53.7% (KDIGO stages 1, 2 or 3). The AKI analyzed in the three stages, separately, demonstrated that among the 51 patients with AKI, 41 were classified as stage 1, seven as stage 2, and only three as stage 3. These results reflect the low severity of AKI associated with the surgical procedure in this sample. There was a higher frequency of renal function recovery (69.5% vs. 41.7%, p=0.010), and more rapid discharge from the SICU (98.3% vs. 86.1%, p=0.028) and the hospital (96.6% vs. 82.4%, p=0.048) among the CG patients when compared to the IC patients. Those patients undergoing intensive glycemic control had a longer stay in the SICU when compared to those treated with conventional control (p = 0.031).

**Discussion**

The main findings of this study demonstrate that the use of intensive glycemic control did not reduce the incidence of AKI when compared to conventional glycemic control in adult patients undergoing cardiac surgery, and that its use was associated with worse outcomes. Hyperglycemia is a common problem in the postoperative cardiac surgery peri-

**Table 2. Outcomes presented by patients undergoing glycemic control in the Intensive Group (IG) and the Conventional Group (CG)**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>IC (n=36)</th>
<th>CG (n=59)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AKI, n (%)</td>
<td>22(61.1)</td>
<td>29(49.2)</td>
<td>0.294*</td>
</tr>
<tr>
<td>KDIGO Stage 1, n (%)</td>
<td>17(47.2)</td>
<td>24(40.7)</td>
<td>0.670*</td>
</tr>
<tr>
<td>KDIGO Stage 2, n (%)</td>
<td>7(19.4)</td>
<td>4(6.8)</td>
<td>1.000*</td>
</tr>
<tr>
<td>KDIGO Stage 3, n (%)</td>
<td>3(8.3)</td>
<td>1(1.7)</td>
<td>0.555*</td>
</tr>
<tr>
<td><strong>Secondary</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Death, n (%)</td>
<td>5(13.9)</td>
<td>6(10.2)</td>
<td>0.667*</td>
</tr>
<tr>
<td>Dialysis, n (%)</td>
<td>5(13.9)</td>
<td>6(10.2)</td>
<td>0.667*</td>
</tr>
<tr>
<td>Recovery of renal function, n (%)</td>
<td>15(41.1)</td>
<td>16(26.3)</td>
<td>0.731*</td>
</tr>
<tr>
<td>Hypoglycemia, n (%)</td>
<td>8(22.2)</td>
<td>12(19.4)</td>
<td>0.670*</td>
</tr>
<tr>
<td>ICU discharge, n (%)</td>
<td>8(22.2)</td>
<td>12(19.4)</td>
<td>0.670*</td>
</tr>
<tr>
<td>Hypoglycemia episodes, (mean + SD)</td>
<td>15(41.1)</td>
<td>16(26.3)</td>
<td>0.731*</td>
</tr>
<tr>
<td>LOS-SICU, days (mean + SD)</td>
<td>7(19.4)</td>
<td>10(16.9)</td>
<td>0.587*</td>
</tr>
<tr>
<td>LOS-Hospital, days (mean + SD)</td>
<td>11(29.7)</td>
<td>13(21.3)</td>
<td>0.032*</td>
</tr>
</tbody>
</table>

n - absolute frequency; % - relative frequency; SD - standard deviation; AKI - acute kidney injury; ICU - intensive care unit; LOS-SICU - length of stay-surgical intensive care unit; LOS-Hospital - length of stay-Hospital; * Pearson's Chi-Square test; # Mann-Whitney test.
od, and an important risk factor for the development of complications, including the risk of surgical wound infection, stroke, sepsis, need for prolonged mechanical ventilation, longer length of stay, and death.\(^6,18,20\) It is known that a complex interaction between endogenous catecholamines, cytokines and the activation of the hypothalamic-pituitary-adrenal axis is involved in the pathogenesis of "stress hyperglycemia", which results in excessive induction and secretion of cortisol and gluconeogenesis. Supposed pathophysiological mechanisms by which hyperglycemia can aggravate the outcomes include the promotion of oxidative stress pathways and the induction of inflammation.\(^21,22\)

Because hyperglycemia is a potentially modifiable risk factor, it is fundamental to establish a protocol that implies greater postoperative control. Van den Berghe et al.\(^23\) were the first researchers to investigate the effects of intensive GC in patients from SICU, and their findings showed a reduction in mortality and renal dysfunction in this group of patients in which the glycemic goal was 80 - 110 mg/dL. Later, the same group of investigators evaluated the effect of the same intensive treatment protocol on patients in a clinical ICU, and likewise found a reduction in the incidence of renal dysfunction in that population.\(^5\) In a more detailed evaluation of renal function in these two studies, the incidence of renal dysfunction was lower in patients who maintained a blood glucose < 110 mg/dL, and higher in those with a blood glucose level > 150 mg/dL. In contrast, the intensive GC did not show a positive impact on the reduction of acute renal injury in our study. While Van den Berghe considered renal dysfunction to be an increase in baseline creatinine of > 2.5 mg / dL, or as the need for dialysis, we used the most current definition for AKI, the KDIGO classification, that is a more sensitive tool for assessment of renal injury which enables earlier diagnosis, and supports a better comparison of the results from different studies.

Subsequent studies to reaffirm the effect of intensive GC showed contradictory results. Two randomized controlled trials, which examined the effect of intensive treatment (with a glycemic target between 80 - 110 mg/dL) compared to a conventional protocol where the target was between 140 - 180 mg/dL in intensive care units, were interrupted early due to safety issues related to the increased incidence of severe hypoglycemia in patients allocated to the intensive treatment group.\(^24,25\) Contrary to what was observed in these studies, our study showed a similar number of episodes of hypoglycemia in the two groups: 1.6 + 0.9 vs. 1.3 + 0.6, p=0.731, respectively, in IG and CG patients. This demonstrates that, even with no impact on the primary outcome, the protocol used and hourly monitoring of the blood glucose by the team of nurses involved in the research, corroborated to this aspect of safety.

Another interesting finding of this study was that patients in the IG had lower SICU discharge frequency (p=0.028) and longer SICU stay (p=0.031), when compared with the CG. However, no difference was observed between groups in relation to mortality. These findings are in contrast to those published in the meta-analysis by Haga and colleagues\(^26\), which identified that intensive GC was associated with a reduction in mortality up to 30 days after surgery, incidence of atrial fibrillation, need for mechanical ventilation, and ICU stay after cardiac surgery. However, this review has important limitations, among them: the reduced number of randomized clinical trials included; small number of patients included in each of the studies evaluated; and important methodological differences between the studies regarding the definitions used for intensive GC.

In a recent study, Giakoumidakis and his colleagues\(^27\) randomized 212 patients into two GC protocols (one intensive and one control). The results showed that patients treated with the intensive protocol had lower mortality rates (p=0.033). However, the glycemic target defined by these researchers as intensive was similar to that established in our study for the conventional group (120 - 160 mg/dL). In addition, the data published by Giakoumidakis et al. contrast with those of the classic NICE-SUGAR study\(^28\), which showed an association of intensive control with mortality in a multicenter clinical trial involving 6104 patients.

Several studies\(^29,32\) have already demonstrated the association between hyperglycemia and acute
renal injury, although most of them use different definitions for AKI, ranging from small increases in serum creatinine to the need for dialysis. In our study, despite the high incidence of AKI in both groups, there was no significant difference between the groups, and the recovery of complete renal function was higher among those in the conventional group (p=0.010). A possible explanation for this fact is that the use of higher doses of insulin to maintain a target of lower glycemia, as happened in the IG, implies a greater variation of glycemia and consequently an increase of oxidative stress. Other studies have already demonstrated the relationship between oxidative stress and a higher incidence of AKI (12,33), as well as delayed recovery of complete renal function and longer hospital stay (30).

This study has implications for nursing practice, as the implementation of the protocol and the conduct of the research was done exclusively by specialist nurses, masters’ and doctorally prepared, with extensive experience in the area of cardiology. This high degree of qualification of the professionals, and their involvement in the application of evidence-based practices, implies a higher quality of care provided to the patients, configured as advanced nursing practice.

This study has limitations. First, it is a single-center study and the number of patients was relatively small. More importantly, although hardly predictable, the number of serious renal events was less than expected. Second, it was not possible to conduct the study with a strict blindness of the researchers; because the dose of insulin required adjustment to achieve the target of each group, monitoring of blood glucose was necessary. Finally, this study involved only patients undergoing cardiac surgery, and for this reason it is not possible to extrapolate the results obtained for patients undergoing other types of surgical procedures, or even patients admitted to the general ICU.

**Conclusion**

Notwithstanding the safety of both protocols for GC used in this study, the impact of intensive GC on reducing the incidence of acute renal injury was not noted. The results indicate a relationship between conventional GC with higher frequencies of renal function recovery, episodes of hypoglycemia, and discharge from the ICU.

**Collaborations**

Kanke PH, Veira RCO, Ferretti-Rebustini REL, Oliveira LB e Menezes AF contributed to the data interpretation, article writing, critical analysis of the relevant content, and final approval of the version to be published. Barreto IDC contributed to the study analysis and data interpretation. Santana-Santos E e Hajjar LA contributed to the study design, analysis, data interpretation, article writing, critical analysis of the relevant content, and final approval of the version to be published.

**References**


Nursing intervention based on Neuman’s theory and mediated by an educational game
Intervenção de enfermagem baseada na teoria de Neuman mediada por jogo educativo
Intervención de enfermería basada en la teoría de Neuman mediante juegos educativos

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Maria Edla de Oliveira Bringuente¹

Abstract
Objective: To evaluate nursing intervention based on Betty Neuman’s theory and mediated by an educational game, regarding the reduction of anxiety and stress levels experienced by patients undergoing myocardial revascularization.
Methods: An interventional study was carried out with preoperative patients undergoing myocardial revascularization in reference hospitals from the southeast region of Brazil. The sample was made up of 32 participants, two of whom as a pre-test. Data collection occurred from May to November 2016 with the use of the following instruments: questionnaire for identification of sociodemographic data and evaluation of patients’ experiences in face of hospitalization; State-Trait Anxiety Inventory (STAI); and Stress Symptoms List (SSL/VAS) for evaluation of anxiety and stress levels before and after application of an educational game. The data were analyzed by means of the Statistical Package for the Social Sciences 21 (SPSS) software.
Results: Participants, before the nursing intervention mediated by the educational game, presented anxiety trait with a median of 37, anxiety state with a median of 31, and stress level with a median of 30. After application of the educational game, a significant reduction (p<0.001) was found in anxiety and stress levels (median of 25 and 11, respectively).
Conclusion: The nursing intervention mediated by the educational game significantly reduced the anxiety and stress levels of the participants in the study.

Keywords
Nursing care; Nursing theory; Stress, physiological; Anxiety; Myocardial revascularization

Descritores
Cuidados de enfermagem; Teoria de enfermagem; Estresse fisiológico; Ansiedade; Revascularização miocárdica

Descripciones
Atención de enfermería; Teoría de enfermería; Estrés fisiológico; Ansiedad; Revascularización miocárdica

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Conflicts of interest: none to declare.
**Introduction**

The hospitalization process means depersonalization for ill patients, because they recognize the difficulty in keeping their identities, intimacy, and privacy. These issues, according to Betty Neuman, result in stressors, which increase anxiety and stress levels of hospitalized patients.

Neuman classifies stressors into three types: extrapersonal, intrapersonal, and interpersonal. Therefore, individuals’ environmental, emotional, and daily living factors may cause anxiety and stress. In addition, the author uses a system analysis based on human needs for stress protection and reduction, because she believes that stress causes, as well as risk factors, may be preventively identified and dealt with by means of nursing interventions. She emphasizes human beings’ need for dynamic balance, which may be provided by nurses when using prevention as an intervention, providing patients with full care, that is, providing individual care to families and groups, with the aim of keeping a maximum well-being level.

Stressors are present in patients undergoing heart surgery, in different ways and intensities during their hospital stay, because still in the preoperative period, they have to deal with anxiety with surgery, fear of anesthesia, fear of intubation, fear of death, fear of the intensive care unit (ICU), fear of pain, and absence of their families. The stressors experienced by these patients may negatively affect surgery and their recovery, because they may develop problems and complications that compromise their surgical recovery.

Betty Neuman’s holistic view enables nurses to see individuals as owners of a culture, as individuals who belong to societies or groups, have principles, families, and different education and knowledge levels, especially enabling them to see that these human beings have full interaction with the environment, becoming potential targets of stressors. Therefore, Neuman’s theory inspired and grounded the development of a game-shaped educational technology.

In the public healthcare area, the term technology is used according to the following classifications: “hard”; “soft-hard”, and “soft”. The technology categorized as “hard” is associated with objects and machinery; “soft-hard” with structured knowledge; and “soft” with processes that affect relationships among individuals. Therefore, the conception of technology, opens a wide range of possibilities and challenges.

Nurses may make use of these technological tools in different ways, especially educational technologies, to communicate with patients, either by means of primers, booklets, manuals, protocols, educational games, or resources such as software and websites, with the presence or not of nurses during their use. By integrating patients with the teaching-learning process, they may become potential mediators and protagonists in care.

The need for searching pedagogical strategies for self-care promotion with preoperative patients undergoing myocardial revascularization enabled the development of a game-shaped educational technology, which, in a problem-solving and interactive playful way, would promote knowledge on patients’ experiences in the surgical process.

The use of educational games as a teaching resource must promote interesting and challenging situations, allowing the self-questioning of learners regarding their performance, in addition to promoting the active participation of all players. Educational games enable the development of the ability to think, reflect, analyze, understand, formulate hypotheses, and test and evaluate them with autonomy and cooperation.

Nurses, as care providers and educators, may also make use of playful tools, such as diagrams, primers, constructs, software, and other educational technologies, working with the reality that individuals will experience in their preoperative period. Therefore, information and education may reduce anxiety and depression, improve individuals’ performance in the prevention of complications, thus significantly contributing to their recovery process in the postoperative period.
It is in this context that games gain space as positive and attractive tools in the teaching-learning process and health education carried out by nurses.

The objective of the present study was to evaluate a nursing intervention based on Betty Neuman’s theory, mediated by a game-shaped educational technology regarding the reduction of anxiety and stress levels experienced by patients undergoing myocardial revascularization.

Therefore, the following question was considered: Does nursing intervention mediated by a game-shaped educational technology reduce anxiety and stress levels experienced by patients in pre-operative myocardial revascularization?

**Methods**

This was an interventional study carried out with perioperative patients undergoing myocardial revascularization in reference hospitals for heart surgery in the metropolitan region of Vitória, a city in the state of Espírito Santo, from May to November 2016.

The total number of participants who underwent myocardial revascularization in the hospitals that served as study settings in 2015 was 352. The following parameters were used to make up the total sample: confidence level of 90%, maximum expected error of 8%, population ratio of 10%, and correction factor for finite population. Therefore, the sample was made up of 32 patients, with two of them as pre-test of nursing intervention mediated by the educational game. Data collection occurred from May to November 2016.

The following inclusion criteria were adopted: patients from both genders; patients aged 18 years or older; patients with more than 24 hours of hospitalization; patients undergoing myocardial revascularization surgery. The following aspects were considered as exclusion criteria: patients in isolation; patients with hearing or language impairment with intellectual disability that could compromise the interview or intervention.

The following instruments were used for data collection: a structured questionnaire for identification of sociodemographic data (Part I) and evaluation of the participants’ experiences when facing hospitalization (Part II), which consisted of the following questions: A) What bothers you in hospitalization?; B) What do you feel when bothered?; the State-Trait Anxiety Inventory (STAI) developed by Spielberger, Gorsuch, and Lushene\(^{(12)}\), and translated and adapted for Brazil by Biaggio and Natalício\(^{(13)}\) and the Stress Symptoms List (SSL/VAS), developed by Vasconcelos\(^{(14)}\).

Data collection occurred in three stages during the perioperative period, in three consecutive days, and each stage had an average time of 45 minutes (first stage), 60 minutes (second stage), and 30 minutes (third stage), respectively.

In the first stage, sociodemographic data were collected and evaluation of patients’ experiences regarding perioperative hospitalization was carried out, as well as anxiety and stress evaluation before the nursing intervention mediated by the educational game. The second stage was directed to the implementation of the nursing intervention mediated by the educational game. The patients were led in groups to a previously prepared room in the hospitalization area. In the third and last stage, after the nursing intervention mediated by the educational game, patients’ anxiety and stress levels were evaluated for the second time.

The educational game used as a nursing intervention mediator instrument entitled “Surgical experience game with self-care promotion”, whose authors are Diniz, Bringuente, Amorim, and Luz\(^{(15)}\) was submitted to patent application in the Brazilian National Institute of Industrial Property (INPI, as per its acronym in Portuguese), under protocol no. BR1020170091880. The game is considered a hard technology (instrument-tool), which, used in an interactive-diagnostic-care process between nurses and patients, becomes a hard-soft technology, according to Merhy\(^{(7)}\), enabling learning regarding the preoperative process and promoting patient self-care.
The educational game was validated by the participants in the study (patients).

The following stages were considered for the development of the educational game: a) definition of the objective; b) determination of the target-population’s characteristics; c) choice of the pedagogical framework: Paulo Freire; d) choice of the theoretical framework: Betty Neuman; e) selection of the content; f) development of the educational game’s physical structure.\(^{(16)}\)

The game consists of a rectangular board (65 cm length and 39 cm width) containing thirty numbered counters, six colored pawns, one dice, twelve figures with drawn images regarding the game’s theme, and a quiz handled by the person in charge of the teaching-learning process, using a problem-solving approach, dialog, and issues regarding pre-, intra-, and postoperative myocardial revascularization. Each numbered counter of the board corresponds to the number of the quiz’s questions. The game approaches the following topics: myocardial revascularization surgery; fasting; trichotomy; anesthesia; body hygiene for surgery; surgery clothing; intensive care unit (ICU); positioning in bed; mobility and active movement in bed; surgical wounds; dressing; pain; breathing and coughing exercises; hand hygiene; release of postoperative diet in ICU; stress; and lifestyle after hospital discharge (Figure 1).

The data were analyzed by means of the Statistical Package for the Social Sciences 21 (SPSS) software, with the following items considered for descriptive statistics: observed frequency, percentage, median, mean, and standard deviation. Chi-square test was used to compare ratios of the anxiety trait questionnaire’s categories. The Wilcoxon and Mann-Whitney tests evaluated the difference among the scores’ medians to observe the effectiveness of the nursing intervention mediated by the educational game in the reduction of anxiety and stress levels, before and after application of the game. The significance level adopted was 5% and confidence interval was 95%. The study project was submitted to the human research ethics committee of the teaching hospital and philanthropic hospital of the metropolitan region of Vitória, a city in the state of the Espírito Santo, where the present study was carried out and approved under CAAE no. 52280315.0.0000.5071 and protocol no. 1.698.988. The abovementioned study is part of the master’s dissertation of the present study’s main researcher.

![Figure 1. Presentation of the educational game’s board](image-url)
Results

According to the identification of sociodemographic data, the sample was mainly made up of men (76.6%), married (73.3%), retired (36%), with incomplete elementary education (73.3%), family social support (86.6%), and they were all (100%) from the southeastern region of Brazil.

To better understand stressors and anxiety/stress levels presented by the participants in the study, the results were presented into three items (I, II, and III), according to the aspect researched and instruments adopted in data collection.

I. Description of stressors based on the evaluation of patients' experiences when facing hospitalization during the preoperative period, before nursing intervention mediated by the educational game. The results regarding this item were presented in category A.

Category A - Distribution of stressors developed by Betty Neuman, identified in answers of the participants in the study to the following questions: “What bothers you in hospitalization?” and “What do you feel when bothered?” The stressors developed by Betty Neuman were distributed as follows: intrapersonal, interpersonal, and extrapersonal stressors, as follows:

- **Intrapersonal**: nervous (P1); contempt (U3); sadness (U4), nervous and worried (U5); sadness and feeling like crying (U6); sadness and worry with child (U7); regret for having smoked, not having eaten well and being sick (U8); sadness for not working (U9); worry (U12), eagerness, nervous, and homesick (U13); anguish and anxiety (U15); fear (U18); thinking about surgery (U21);
- **Interpersonal**: falsehood (U3); loss of mother (U7); being far from family, being sick, and depending on people (U13); being sick and depending on people (U15);
- **Extrapersonal**: Noise (U1); being regularly sick (U4); being inactive (U6); being in hospital (U8; U26; U28); being on work leave (U9); not working (U10); being unemployed (U11; U17); waiting for surgery (U24); being far from farm (U27).

II. Anxiety level presented by patients regarding answers to questions of the instrument Anxiety Trait/State, before and after nursing intervention mediated by the educational game.

When observing the scores achieved by patients in the evaluation of anxiety trait, the participants presented anxiety median of 37.0. Regarding the evaluation of anxiety state, before and after nursing intervention mediated by educational game, it was found a significant reduction in anxiety level (p < 0.001), from a median of 31.0 to 25.0, after application of the game (Figure 2).

III. Stress level presented by patients when answering questions of the Stress Symptoms Instrument (SSI/VAS), before and after nursing intervention mediated by the educational game.

When observing the scores achieved by patients in the evaluation of stress before and after nursing intervention mediated by the educational game, a significant reduction in stress levels (p < 0.001) was found, from a median of 30.0 to 11.0 (Figure 3).
Discussion

The hospitalization process triggers stress and anxiety. This process becomes enhanced when the purpose of hospitalization is to undergo heart surgery, which is an organ socially associated with emotions and life. Therefore, these individuals must be understood as single beings, an open system, which consists of physiological, psychological, sociocultural, developmental, and spiritual variables that constantly interact among themselves and with the environment, and as owners of a basic structure of energy resources that may be depleted without interventions in primary, secondary, and tertiary levels, with prevention in all these levels.\(^{(2)}\)

One study that used Neuman’s framework showed that patients hospitalized in ICUs presented stressors caused by the environment, unmet basic human needs, and ineffective relationship processes between nurses and patients.\(^{(3)}\) The results of the present study showed the nurses’ need for drawing on their systematized observations, with a theoretical basis to identify patients’ needs, suggesting and negotiating goals, as well as planning and implementing nursing interventions with the aim to reduce stressors, seeking to make patients aware of their current situation.\(^{(2)}\)

When using the educational game as a nursing intervention mediator, a significant reduction was found in anxiety (\(p < 0.001\)) and stress (\(p < 0.001\)) levels of preoperative patients undergoing myocardial revascularization.

Authors\(^{(17)}\) highlight the importance in using playful ways to improve assimilation of the content approached in the teaching-learning process, as learners verbally express that the use of educational games encourages participation and contributes to knowledge construction. Therefore, educational games are effective instruments in this teaching-learning process, in addition to providing participants with instant emotional gratification.

The development of educational games as a resource in the teaching-learning process for self-care makes nurses aware that care must be dealt with in a playful, creative, and participatory way, effectively integrating learners, which in this context, are patients undergoing preoperative myocardial revascularization.\(^{(18)}\)

Nursing guidelines based on scientific knowledge and technical expertise, which complement care, when carried out in a didactic and simple way with a holistic and human approach, positively contribute to the teaching-learning process and significantly act in anxiety reduction of patients undergoing surgery, in addition to reducing postoperative pain.\(^{(11,19)}\)

One study carried out with pregnant women using a game in the prenatal teaching-learning process conducted by a nurse, with themes associated with labor, childbirth, puerperium, and breast care making use of colorful pictures associated with each theme, showed that the development of educational technology was relevant, promoting interactivity, dynamism, relaxation, and exchange of knowledge and experiences, which effectively contributed to learning.\(^{(20)}\)

Quality nursing care is of utmost importance in the hospital environment, because nurses have knowledge and strategical resources to fully meet patients’ basic human needs, physically and emotionally prepare them for surgery, guiding and encouraging them for self-care, and understanding that these human beings are weakened and vulner-
able to complications that may deplete their basic energy by means of stressors, which may compromise their recovery process.\textsuperscript{3,11}

Betty Neuman, when characterizing the nursing profession as unique, committed to issues that involve and affect responses of individuals to stressors, shows the importance of nurses, since their role is to provide care with a holistic view, valuing the need for maintaining, recovering, or achieving the stability of the system/patients. The coordination of theory with practice enables the identification of stressors by means of the nurse-patient interaction and contributes to the development of confrontation strategies and important prevention levels.\textsuperscript{(21)}

The use of technology in the form of educational games as a mediator of intervention to promote self-care becomes important, because it provides interaction between nurses and individuals, as well as individuals and groups, contributes to comprehensive and dynamic development of cognitive, emotional, and motor areas, in addition to contributing to the development of autonomy, criticism, and creativity of the elements involved.\textsuperscript{(18)}

Therefore, nursing intervention mediated by educational games as prevention form according to Neuman’s theory, enabled nurses to use this theoretical and methodological framework, creating space for patients to express their human needs affected and situations that were bothering them during preoperative hospitalization. In addition, it enabled nurses to deal with patients’ care and stressors, promoting their well-being and preventively acting in all prevention levels, with the aim at preserving energy and the surgical recovery process of these patients. The limitations of the present study were centered on the need for increasing the number of participants in the study and using biological and social markers as one more evaluation method of intervention impacts. The present study brings as a contribution to education, the use of games as educational technology, using education and nursing principles, approaching playful ways in a process of high stressors, aiming at self-care promotion for preoperative myocardial revascularization patients.

**Conclusion**

In conclusion, nursing intervention mediated by educational game, having Betty Neuman’s theory as a theoretical basis, significantly reduced the anxiety and stress levels of preoperative myocardial revascularization patients. This pedagogical strategy in the hospital context is considered relevant, which is presented as a cold, painful, and suffering environment with strict protocols and routines. The use of the educational game resource in this context makes both care and the environment humanized. The contribution of the present study for research lies in the scientific rigor observed and mediated by participatory educational technologies. In addition, it contributes to nursing care, which may be dealt with in a scientific and humanized way, thus generating a successful impact on life care.

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**Collaborations**

Diniz JSP, Batista KM, Luciano LS, Fiorese M, Amorim MHC, and Bringuente MEO declare that they contributed to the conception of the study, analysis, and interpretation of data, relevant critical review of the intellectual content, and approval the final version to be published.

**References**


Clinical and metabolic alterations and insulin resistance among adolescents

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Abstract
Objective: Analyzing the clinical and metabolic alterations and their relation to insulin resistance among adolescents.
Methods: Analytic study, carried out with 357 adolescents of state public schools in a municipality in Northeastern Brazil. The applied form contained the variables Body Mass Index, Waist Circumference, Neck Circumference, Taper Index, Average Blood Pressure, Triglycerides, Blood Sugar Level, High-Density Lipoprotein Cholesterol, Insulin, and Homeostasis Model Assessment Index, analyzed through descriptive measures for quantitative variables, and through frequency for qualitative variables. Association tests were made through Chi-Square test and through Odds Ratio.
Results: Prevalence of insulin resistance was 33.9%. The average values of waist circumference, neck circumference, taper index, average systolic blood pressure and average diastolic blood pressure were high in, respectively, 2.2%, 30%, 10.9%, 4.2% and 14% of adolescents. High-Density Lipoprotein Cholesterol levels were decreased in 30.5% of the sample, whereas triglycerides were high in 18.8%. No blood sugar alteration was identified. Those who presented altered values for body mass index, waist circumference, neck circumference, taper index, and triglycerides had higher chances to present insulin resistance (OR: 3.62; 11.54; 3.50; 4.49; 3.05, respectively). On the other hand, adolescents with altered average systolic blood pressure, average diastolic blood pressure and High-Density Lipoprotein Cholesterol did not present statistical significance (p<0.05).
Conclusion: Insulin resistance is present among adolescents, with positive and significant association to clinical and metabolic alterations.

Keywords
Insulin resistance; Adolescent; Obesity; Risk factors; Chronic diseases

Descriptors
Resistência à insulina; Adolescente; Obesidade; Fatores de risco; Doenças crônicas

Descritores
Resistência a la Insulina; Adolescente; Obesidad; Factores de riesgo; Enfermedad crónica

Keywords
Insulin resistance; Adolescent; Obesity; Risk factors; Chronic diseases

Descriptors
Resistência à insulina; Adolescente; Obesidade; Fatores de risco; Doenças crônicas

Resumo
Objetivo: Analisar as alterações clínicas, metabólicas e sua relação com a resistência à insulina entre adolescentes.
Métodos: Estudo analítico, realizado com 357 adolescentes de escolas públicas estaduais de um município do Nordeste brasileiro. O formulário aplicado continha as variáveis Índice de Massa Corporal, Circunferência da Cintura, Circunferência do Pescoço, Índice de Conicidade, Pressão Arterial Média; Triglicéridos, Glicemia, High – Density Lipoprotein Colesterol, Insulina e Índice Homeostasis Model Assessment, analisadas por medidas descritivas para variáveis quantitativas; e frequências para variáveis qualitativas. Foram realizados testes de associações através do Qui-quadrado e do teste Odds Ratio.
Resultados: A prevalência de resistência à insulina foi de 33.9%. As médias da circunferência da cintura, circunferência do pescoço, índice de conicidade, pressão arterial sistólica média e pressão arterial diastólica média estiveram elevadas, respectivamente, em 4.2%; 30%; 10.9%; 4.2% e 14% dos adolescentes. Os níveis de High – Density Lipoprotein colesterol estiveram diminuídos em 30.5% da amostra, ao passo que os triglicéridos estavam elevados em 18.8%. Não foi identificada alteração na glicemia. Aquelas que apresentaram índice de massa corporal, circunferência da cintura, circunferência do pescoço, índice de conicidade e triglicéridos com valores alterados possuíam maiores chances de apresentar resistência à insulina (OD: 3.62; 11.54; 3.50; 4.49; 3.05, respectivamente). De maneira oposta, os adolescentes com pressão arterial sistólica média, pressão arterial diastólica média e High – Density Lipoprotein colesterol alterados não apresentaram significância estatística (p<0.05).
Conclusão: A resistência à insulina está presente entre os adolescentes, com associações positivas e significativas com alterações clínicas e metabólicas.

Resumen
Objetivo: Analizar las alteraciones clínicas, metabólicas y su relación con la resistencia a la insulina entre adolescentes.
Métodos: Estudio analítico, realizado con 357 adolescentes de escuelas públicas provinciales/departamentales de un municipio del Nordeste brasileño. El formulario aplicado contenía las variables: índice de masa corporal, circunferencia de la cintura, circunferencia del cuello, índice de conicidad, presión arterial promedio, triglicéridos, glucemia, colesterol High-Density Lipoprotein, insulina e Índice Homeostasis Model Assessment, analizadas por medidas descritivas para variables cuantitativas, y frecuencias para variables cualitativas. Se realizaron pruebas de relaciones a través de la prueba χ² de Pearson y Odds Ratio.
Resultados: La prevalencia de resistencia a la insulina fue de 33.9%. Los promedios de circunferencia de la cintura, circunferencia del cuello, índice de conicidad, presión arterial sistólica promedio y presión arterial diastólica promedio fueron altos respectivamente en el 4.2%; 30%; 10.9%; 4.2% y 14% de los adolescentes. Los niveles de colesterol High-Density Lipoprotein fueron bajos en el 30.5% de la muestra, mientras que los triglicéridos fueron altos en el 18.8%. No se identificó alteración en la glucemia. Los que presentaron índice de masa corporal, circunferencia de la cintura, circunferencia del cuello, índice de conicidad y triglicéridos con valores alterados tenían mayores chances de presentar resistencia a la insulina (OD: 3.62; 11.54; 3.50; 4.49; 3.05, respectivamente). De forma contraria, los adolescentes con presión arterial sistólica promedio, presión arterial diastólica promedio y colesterol High-Density Lipoprotein alterados no presentaron significación estadística.
Conclusión: La resistencia a la insulina está presente en los adolescentes, con una relación positiva y significativa respecto a alteraciones clínicas y metabólicas.

Keywords
Insulin resistance; Adolescent; Obesity; Risk factors; Chronic diseases

Descriptors
Resistência à insulina; Adolescente; Obesidade; Fatores de risco; Doenças crônicas

Descritores
Resistência a la Insulina; Adolescente; Obesidad; Factores de riesgo; Enfermedad crónica
Introduction

The changes in life habits of the world population, with low levels of daily physical activity added to an inadequate diet that includes high calorie-density foods, influence the development of several chronic diseases, such as Systemic Arterial Hypertension (SAH), Dyslipidemias, Diabetes Mellitus, Obesity, and Insulin Resistance (IR). These changes happen independently from age group, as they are increasingly common among adolescents.

Due to those changes, adolescence is considered a critical time for the development of obesity and other metabolic disorders, since it is the context where the phenomena of nutrition transition happens, and excess weight is significantly increasing in that population group, thus it is considered a serious public health problem.¹

Accumulation of body fat during this age range may lead to the development of IR, an event that consists of unbalanced glucose metabolism, causing increased insulin production, decreased receptor concentration, cell-transit mechanism failure or impairment of some post-receptor mechanisms after its use. Furthermore, this excessive concentration of body fat, especially abdominal fat, is directly related to high values of Free Fatty Acids (FFA) in the bloodstream. Those disorders may hamper insulin signaling and, as a result, cause an IR case.²

A recent study with 121 obese children and adolescents, aged 6 to 17 years old, in Coimbra, Portugal, observed IR present in 38.1% of the sample, upon use of HOMA-IR.³ Another study carried out with 162 school-attending adolescents, aged 12 to 19 years old, revealed a prevalence of altered IR in 23.5% of the studied population.⁴ Other studies that were carried out with the same research public reinforced the assertion that dyslipidemic adolescents present higher IR levels when compared to eutrophic ones.⁵−⁷

Given the aforementioned facts, identification of IR in adolescents using HOMA-IR index, with additional assessment of anthropometric and metabolic variables of this population group, makes it possible to identify the risk factors that are more closely associated to IR development and of its secondary diseases, thus assisting on the implementation of intervention measures scoped on public health prevention of cardiovascular events and non-transmittable chronic diseases in adolescence and adulthood.⁵,⁶

Therefore, a necessity for further clarification is observed when it comes to detection of IR in adolescents. Use of HOMA-IR index for that task enables a quick and early event diagnosis, making it possible to identify the cardiometabolic factors related to disorder development in epidemiologic studies.

Due to the scarcity of investigations concerning the theme at hand, carried out in the state of Piauí/Brazil, specifically with adolescents in public schools, assessing the connection of HOMA-IR index with anthropometric and metabolic variables becomes essential for identifying factors that may be changed in relation to the development/control of IR cases in adolescents, and for promoting cardiovascular health among this population group.

This research also holds noticeable impact for nursing, since professionals of the area are the coordinators of Health Ministry programs, such as Programa Saúde na Escola (PSE – Health in School Program), thus knowledge of reality may guide intervention and health education actions, stimulating the population to take on healthy life habits and, therefore, share and build knowledge about the life quality theme, tied to the early onset of chronic-degenerative diseases.

In that perspective, it is undeniable that the most important metabolic disorders comprise hyperinsulinemia and insulin resistance, and those events are related, later on, to high blood sugar levels. Therefore, this study aimed at assessing clinical and metabolic indicators and their relation with insulin resistance among adolescents.

Methods

This is an analytic, quantitative study, which was carried out in 18 state public schools located in the city of Picos, state of Piauí, Northeastern Brazil. Study population comprised 3,800 students from
both sexes, in state public schools, aged 10 to 19 years old, all duly enrolled and attending class in the schools where the study was performed. The sample size was estimated by the finite population formula, considering a 95% confidence level, 8% relative error, absolute error=4%, \( t_{.025}^2 = 1.96 \). The sample resulted in 357 participants stratified in 18 schools and selected by simple random sampling.

Inclusion criteria were: being enrolled to school and attend class regularly; being aged from 10 to 19 years old; and participating of all research steps. Those unable to participate on the gathering of anthropometric measurements (pregnant individuals and wheelchair users) were excluded, as well as people who were diagnosed with a disease or who used medication that could interfere with carbohydrate and lipid metabolism. Thus, twelve participants were excluded. After the exclusions were recorded, new randomized selection was carried out until the estimated number of adolescents from each school could be reached.

Data collection happened from August to December/2014 and March/2015. A structured instrument was used, presenting personal data, socioeconomic data, clinical variables and metabolic variables.

The following clinical variables were observed: Body weight (kg), Height (cm), Body Mass Index (BMI), Neck Circumference (NC), Waist Circumference (WC), Taper Index (TI), and Blood Pressure (BP).

Weight was measured with portable digital body scales, with maximum capacity of 150 kg and sensitivity at 100g, where the subject was assessed in the center of the equipment, wearing light clothes, no shoes, in erect posture, standing with feet next to each other and arms hanging alongside the body. Height was measured using an unextendible measuring tape of 0.5 cm precision, which was attached perpendicularly to a flat wall. With those data, BMI (kg/m\(^2\)) adjusted for age and sex of participants was analyzed and sorted, so among nutritional diagnostic there are: < Percentile 0.1 = Acute Thinness, \( \geq \) Percentile 0.1 and < Percentile 3 = Thinness, \( \geq \) Percentile 3 and < Percentile 85 = Eutrophia, \( \geq \) 85 and < Percentile 97 = Overweight, \( \geq \) Percentile 97 and \( \leq \) Percentile 99.9 = Obesity, and > Percentile 99.9 = Acute Obesity. (7-10)

BMI was sorted according to parameters defined for adolescents by OMS (2007) and employed by Sociedade Brasileira de Pediatria (SBP – Brazilian Pediatrics Association) (2009) and by Projeto Erica (Erica Project) (2011). Neck circumference was measured with a 2-meter measuring tape which was flexible and inelastic. Participants were oriented to stand up straight, with their heads positioned in the horizontal plane. Thee top edge of the measuring tape was placed below the laryngeal prominence and it was applied perpendicularly around the neck axis. (11) For analysis, the cutoff points developed by Hingorjo, Qureshi, Mehdi(12) were used, adapted to adolescents, which define overweight individuals as those with NC>35.5cm and NC>32cm on males and females, respectively.

Waist circumference measurements were obtained using an inelastic measuring tape placed on the skin, with the subject standing up straight, on the average point between the last rib and the top edge of the iliac crest at the end of expiratory movement, and sorted according to the age, sex and race, thus being.

The Taper Index proposed by Valdez(14) has an equation where TI considers the measurements of WC, body weight, height and a 0.109 constant, which presents the conversion of volume and weight into length measures. TI calculation was made according to the following formula:

\[
\text{Taper Index} = \frac{\text{Waist circumference (m)}}{\sqrt{\frac{\text{Body weight (kg)}}{\text{Height (m)}}}}
\]

TI was deemed adequate or inadequate, according to the cutoff point established for men and women, respectively: 1.25 and 1.18. (15)

Blood pressure was measured by the classic ausculatory method with a research validated device. Blood pressure checking followed the procedures recommended by the VII Brazilian Hypertension Directives. (16) Cuffs of appropriate size for the circumference of adolescents’ arms were used, and a
A protocol was developed for blood pressure verification, which considered the two measurements of systolic and diastolic blood pressure taken from the adolescent, after five minutes of rest. In case the difference between the first and second measurements of systolic blood pressure or diastolic blood pressure was higher than 5mmHg, a third measurement was taken and the average between the second and third results of systolic blood pressure and diastolic blood pressure as considered. In order to sort blood pressure results, this study used the curves for definition of percentile of child/adolescent height according to age and sex, as presented on the United States’ National High Blood Pressure Education Program, and the percentile table of blood pressure.

Blood samples were used for biochemical measurements. A day before blood collection, parents and other responsible parties were contacted by telephone to remind them of the importance of fasting for 12 hours, in order to obtain lab data. Lab exams were all conducted in a laboratory that was contracted for that end, and they included HDL-C serum dosage, triglycerides, insulin and fasting blood sugar. Blood samples were drawn by venipuncture after 12 hours of fasting. Blood was drawn into vacuum tubes containing separating gel without anticoagulant. After collection, blood was centrifuged for 10 minutes at 3,000 rpm to separate serum from the other components, so it was used to conduct analysis.

Levels of triglycerides, HDL-cholesterol and blood sugar were determined by using a calorimetric enzyme kit processed in the Autohumalyzer A5 device, (Human GMBH, Kaiselautern, Germany). Insulin was determined in the ACS-180 Automated Chemiluminescence System device (Ciba Corning, Diagnostics Corp; Medifield, USA). Results of triglycerides and HDL-cholesterol were compared to the reference values for childhood and adolescence of the V Brazilian Directive of Dyslipidemias and Atherosclerosis Prevention(17). Fasting blood sugar followed the values of Sociedade Brasileira de Diabetes (Brazilian Diabetes Society).(18)

HOMA-IR index was used to assess resistance to insulin, and it was obtained by calculating the multiplication of fasting plasma insulin (um/mL) and fasting blood sugar (mmol/L) divided by 22.5. The cutoff point in use was equal or higher than 3.16 for both sexes.(19)

Initially, calculations were of averages, standard deviation, minimum and maximum values, for quantitative variables; and of simple frequency and percentual for qualitative variables. Multiple logistic regression method was used for data analysis, where the dependent variable is binary, given by “Insulin Resistance” in order to assess the co-variables that are associated to this result and avoid possible confusion factors. Odds Ratio measurement was used to quantify the association strength between the co-variables and the result. At first, co-variables were brought to the model according to their significance in bivariant association with the study result, considering a significance level of 0.2 at this stage; sex and age variables were also added to the model. In the final model, co-variables remained whose estimated parameters were significative to a 0.05 level of significance.

Data were processed and analyzed in International Business Machines Statistics Package Social Science version 20.0 (IBM SPSS20.0) and in software R version 3.5.1 for data modeling. As soon as they were analyzed, data were presented in tables so disclosure and organization of information regarding the research objective could become clearer.

The research project was approved by the Research Ethics Committee of Universidade Federal do Piauí (UFPI), under Opinion n. 853.499.

**Results**

357 adolescents of both sexes were included in the study. Out of the sample, 63.0% of adolescents were female. Age varied from 10 to 19 years old, averaging 14.99±2.4, considering that the predominant age group ranged from 15 to 19 years old (60.2%).

Pertaining self-identified color/race, 53.5% were mixed. Regarding economic class, it was observed that most (66.9%) belonged to “C-class” (i.e., lower-middle class), whereas no student belonged to “A-class” (i.e., wealthy). Considering labor, 88.2% of adolescents stated that they exclusively studied.
Clinical and metabolic alterations and insulin resistance among adolescents

The clinical variables in the sample were investigated, where 18.5% of students were overweight, according to BMI, averaging 20.5±3.83. Concerning WC, students presented an average of 70.8±8.23, and only 4.2% presented excessive central adiposity. Regarding NC, 30.0% presented inadequate NC. TI was found inadequate in 10.9% of adolescents. High SBP and DBP levels were found in 4.2% and 13.8% of the sample, with average and standard deviation of 103.1±11.46 and 67.6±9.55 for SBP and DBP.

Concerning the characteristics of metabolic variables among adolescents, it was possible to observe that the component that presented no kind of alteration was blood sugar, which was normal in 100% of adolescents with an average of 75.9±10.37. Nonetheless, triglycerides were limit-high in 11.2% and high in 7.6% of the study sample, averaging 78.2±36.0. HDL-C had values under the recommended in 30.5% of adolescents, varying with minimum and maximum values of 29.30-85.90, respectively. From the total sample, 100 adolescents (28%) were diagnosed with IR, with minimum 2.0 and maximum 11.

Furthermore, the co-variables that initially were part of the model (p<0.20) were identified, which were: BMI, WC, NC, TI and TG (triglycerides). Variables Age and Sex were added to the model to assess their influence upon insulin resistance. In order to carry out the technique, 357 cases were validated out of the 357 sampled. 28% cases of insulin resistance were observed, and 72% without insulin resistance.

Table 1 presents the complete model, generated with the selected co-variables. It is noticeable that co-variables Sex, BMI and WC did not influence insulin resistance significantly (p>0.05), therefore they shall leave the model.

The updated model, without not-significative variables, can be observed in Table 2. In order to analyze the adjustment quality of the final model, the Omnibus test was carried out (χ²=119.24 gl=5; p<0.001), where the hypothesis of the updated model being equal to the model without co-variables was rejected. Applying the Hosmer and Lemeshow Test it is seen that χ²=12.56, gl=8, com p-value=0.128, i.e., the values predicted in the model are not significatively different from those observed.

With model adjustment quality approved, as well as adequation of proposed distribution, it was necessary to interpret the estimated parameters (Table 2). It was discovered that age is a protection factor for insulin resistance, where the addition of a year decreases chances of insulin resistance by 10.4%. for variable NC, it was identified that adolescents who have inadequate NC present approximately 3 times more chance to be insulin resistant when compared to adolescents with adequate NC. A similar situation is noticeable regarding inadequate TI levels and high TG levels, which show an OR of about 3.2 and 2.8, respectively.

Aiming at ensuring that the distribution proposed for the model is adequate, residue analysis was made using the simulated envelopes graph (Figure 1), where it was verified that Pearson residues are above line and within confidence interval of 95%, making it evident to assume adequate distribution for the study model.

Table 1. Multiple (complete) binary logistic regression model for insulin resistance

<table>
<thead>
<tr>
<th>Model variables</th>
<th>Estimated coefficient</th>
<th>Standard error</th>
<th>Wald statistic</th>
<th>P value</th>
<th>OR</th>
<th>(95%) CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (Female)</td>
<td>-0.286</td>
<td>0.269</td>
<td>1.124</td>
<td>0.289</td>
<td>0.752</td>
<td>0.44-1.27</td>
</tr>
<tr>
<td>Age (years)</td>
<td>-0.097</td>
<td>0.016</td>
<td>36.418</td>
<td>&lt;0.001*</td>
<td>0.908</td>
<td>0.88-0.94</td>
</tr>
<tr>
<td>BMI (Altered)</td>
<td>0.28</td>
<td>0.354</td>
<td>0.623</td>
<td>0.43</td>
<td>1.323</td>
<td>0.66-2.65</td>
</tr>
<tr>
<td>NC (Inadequate)</td>
<td>0.875</td>
<td>0.299</td>
<td>8.552</td>
<td>0.003*</td>
<td>2.399</td>
<td>1.33-4.31</td>
</tr>
<tr>
<td>TI (Inadequate)</td>
<td>1.014</td>
<td>0.401</td>
<td>6.399</td>
<td>0.011*</td>
<td>2.758</td>
<td>1.26-6.05</td>
</tr>
<tr>
<td>TG (High)</td>
<td>0.94</td>
<td>0.357</td>
<td>6.948</td>
<td>0.008*</td>
<td>2.561</td>
<td>1.27-5.15</td>
</tr>
<tr>
<td>WC (Enlarged)</td>
<td>1.044</td>
<td>0.734</td>
<td>2.023</td>
<td>0.155</td>
<td>2.84</td>
<td>0.67-11.96</td>
</tr>
</tbody>
</table>

OR - Odds Ratio; (95%) CI – 95% Confidence Interval

Table 2. Multiple (updated) binary logistic regression model for insulin resistance

<table>
<thead>
<tr>
<th>Model variables</th>
<th>Estimated Coefficient</th>
<th>Standard error</th>
<th>Wald statistic</th>
<th>L.D.</th>
<th>P value</th>
<th>OR</th>
<th>(95%) CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>-0.109</td>
<td>0.012</td>
<td>86.712</td>
<td>1.00</td>
<td>&lt;0.001*</td>
<td>0.896</td>
<td>0.876-0.917</td>
</tr>
<tr>
<td>NC (Inadequate)</td>
<td>1.005</td>
<td>0.272</td>
<td>16.184</td>
<td>1.00</td>
<td>&lt;0.001*</td>
<td>2.988</td>
<td>1.753-5.094</td>
</tr>
<tr>
<td>TI (Inadequate)</td>
<td>1.167</td>
<td>0.371</td>
<td>9.000</td>
<td>1.00</td>
<td>0.002</td>
<td>3.213</td>
<td>1.553-6.647</td>
</tr>
<tr>
<td>TG (High)</td>
<td>1.030</td>
<td>0.346</td>
<td>8.893</td>
<td>1.00</td>
<td>0.003</td>
<td>2.802</td>
<td>1.424-5.516</td>
</tr>
</tbody>
</table>

OR - Odds Ratio; (95%) CI – 95% Confidence Interval; L.D. – liberty degree
Discussion

Study result limitations are related to cross-sectional design, which does not allow one to define cause-and-effect relations between studied variables.

Results herein presented brought important contributions to the Northeastern area of Brazil, especially to the countryside of Piauí, revealing relevant data to literature, mostly due to the absence of papers that tried to analyze insulin resistance among adolescents in public schools. Those data support intervention planning, in nursing practice, aiming at controlling the factors that lead to insulin resistance development in adolescents.

After result presentation it was possible to characterize research participants, who were, mostly, female, aged between 10 and 19 years old, with self-identified brown skin, belonging mainly to economic “C class”. Likewise, studies carried out with this public to investigate risk factors and/or excessive weight, as well as other studies that investigated community health/illness situation, portrayed that the female sex was the most frequent one. (20)

Regarding the distribution of clinical variable among adolescents, it was noticed that 18.5% of adolescents presented excessive weight (overweight/obesity) when assessed for BMI, split between 12.9% overweight and 5.6% obese. This is a higher result than the one in a study carried out with 305 adolescents in Petrolina, state of Pernambuco, which showed excessive weight in 16% of students. (21)

Despite its causes being preventable, excessive weight has been growing worse in this age gap, thus becoming the health issue in largest evolution worldwide. (5)

Prevalence observed in literature suffers slight differences when compared to the data presented in this study. They vary between minimum values at 11.2% to maximum at 38% of overweight children and adolescents. Thus, it may be said that this study leads to average prevalence equivalent to those identified in the researches under discussion. In some studies, no significative difference was found between sexes either, however, the association with age points that the older the individuals, the higher are overweight indexes. (22)

Such findings are deemed worrisome, because obesity is currently seen as a global epidemic, and its predominance is growing both in developed and underdeveloped countries. (4) Moreover, overweightness and obesity may cause psychosocial problems among adolescents due to media and societal pressure to achieve at any cost a body shape considered ideal. (23)

Since obesity is acknowledged as a disease of multifactor etiology, it is expected that studies involving adolescents show different comorbidity standards. Consequently, it is necessary that educational measures be incentivized to raise adolescents’ awareness to take on a more active life style to favor negative energetic balance, such as food and nutritional education, because it is less burdensome to public resources and more efficient against obesity and its harmful consequences.

Regarding abdominal adiposity, in this study 4.2% of the study sample presented enlarged values, whereas 95.8% presented eutrophic values. The opposite prevalence was found in a research carried out with 1030 adolescents in the countryside of the state of Rio Grande do Sul (Southern Brazil), which identified abdominal obesity in 24% of adolescents; (20) and a study carried out in Fortaleza, state of Ceará (Northeastern Brazil), with 702 students, which showed a prevalence of enlarged WC in 13.6% of participants. (24)

Considering NC levels, it was observed that 30% of the sample present inadequate parameters. A similar frequency was found in a study carried out with the same public of the research...
with 2,866 participants, which made the predominance of altered NC evident in 30.1% of the study sample. Those results agree with conclusions presented by research with female adolescents, which showed that NC is an important indicator of core fat assessment, so the inclusion of this clinical parameter is necessary in the assessment of adolescents’ nutritional state.

With the aforementioned in mind, several body makeup assessment techniques have been in development, however many of them present high financial costs to be performed. It is necessary, therefore, to develop simple techniques, more inexpensive and with good accuracy levels to be applied both to adolescents and to the population at large.

Regarding TI, it was found that 10.9% of participants presented altered values, with minimum ar 0.98 and maximum at 1.35. In a study carried out in public schools in the city of Viçosa, state of Minas Gerais (Southeastern Brazil), with 113 adolescents, it was brought to light that TI was not a good indicator of body mass and total body fat.

In what pertains altered BP levels, this investigation presented it in 17.2% of the sample. Likewise, a cross-section research developed with 653 adolescents observed the prevalence of factors associated to high BP levels in adolescents in the city of Ponta Grossa, state of Paraná (Southern Brazil), and, in a similar way, it found that 12.4% of the sample had high BP, with positive and significative correlation to overweightness (p<0.001).

Other investigations revealed similar values to this study, as observed in a study carried out in the Northeastern area of Brazil, with 211 adolescents, which had 13.7% of its assessment sample presenting SAH. Higher results were observed in the research involving adolescents from municipal schools in the countryside of Rio Grande do Sul state, with SAH prevalence in 30.4% of the sample, given that 17.9% were deemed at stage I and 12.5% at stage II.

Identifying SAH in early ages is a relevant action for controlling and preventing SAH during adulthood. Despite that, most adolescents do not get frequent BP checks, thus monitoring becomes so difficult.

Regarding metabolic variable distribution among adolescents, it was found that TGs were altered in 18.8% of analyzed subjects. Those results meet what was observed in a study that analyzed cardiovascular risk factors, anthropometric and lipidic profile of adolescents. It showed high TG alteration levels (45.5%). Those metabolic disorders enhance IR, which is considered a central event in generation of metabolic disease risks.

Literature highlights, furthermore, that TG alteration appears mainly in students of lower socioeconomic class, as people with low income are associated with incidence of and mortality due to cardiovascular disease, probably because of accumulation of risk factors.

Concerning HDL-cholesterol, 30.5% of adolescents presented it below recommended levels. These results are lower than the ones found in a research that aimed to assess 113 obese individuals aged between 7 and 18 years old, where HDL-c was below recommendation in 69% of the study sample. It is probable that the difference is due to different methodologies or cutoff points of lab exams, but, also, to different life style standards, including meals and physical activities.

In this study, IR was the most prevalent of metabolic alterations. It was presented with altered levels in 28% of the research subjects, and it is considered one of the complications of obesity. This result is similar to the data collected in a study carried out with 186 adolescents aged 10 to 19 years old, which observed IR predominance in 42.5% of research participants; and to the research carried out with 121 obese children and adolescents, aged 6 to 17 years old, in Coimbra, Portugal, which observed the presence of IR in 38.1% of them, using HOMA-IR with 3 as a cutoff point; in that same study, 12.5% of individuals had some form of dyslipidemia.

Moreover, higher frequencies were found in a research with 321 obese adolescents aged 10 to 17 years old, with 65% of assessed subjects presenting IR. In another study, the authors concluded that IR levels must be monitored in overweight adolescents, since they observed the higher is IR, the wider is presence off cardiovascular risk factors.
As observed in the aforementioned studies, in spite of different authors noticing high prevalence of alterations in glycemic and lipidic profiles, results are variable. It is probable that it happened due to different methodologic approaches or cutoff marks in lab exams, but, also, due to different life style standards, including meal quality and practice of physical activities.

Still regarding this research, it was verified that IT presented significative association to all the indicators of bodily makeup (BMI, WC and NC), as well as TI and TG, and it is in line with other works.\(^{(35)}\)

In this study there was no significative correlation between variables Sex, BMI, and WC, and insulin resistance. It was possible to find divergent studies in another paper, which observed that male adolescents who were overweight or obese presented more than double prevalence of insulin resistance.\(^{(4)}\) It was found, still in our study, that adolescents with inadequate NC had approximately 3 times more chances of developing insulin resistance (OR: 2.988).

It must be highlighted that the relation observed between IR and analyzed variables, in this study, point to increasing development risk, as adults, of cardiovascular disease, diabetes type II and metabolic syndrome.

Thus, health promotion actions must be taken in schools with adolescents, especially in the school environment itself. Considering the population under study is young, and the earlier regular physical activity, healthy food consumption and specific actions of collective nature are offered to this age group, the better future results will be. In that sense, it is of utmost importance to emphasize that adolescence is a transition phase to adulthood, and adolescents must be encouraged to lead a healthy life style.

**Conclusion**

Findings in this study showed adolescents’ high frequency of insulin resistance and alterations in clinical and metabolic variables, especially excessive body adiposity, neck circumference, high tri-glycerides, and low HDL-cholesterol with positive and significative associations to the clinical and metabolic variables.

**Acknowledgements**

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**Collaborations**

Guimarães MR, Santos AA, Moura TFR, Rocha MR, Moura IH and Silva ARV contributed to project conception, data analysis and interpretation, article writing, relevant critical review of intellectual content and final version approval for publication.

**References**

Clinical and metabolic alterations and insulin resistance among adolescents


Objective: To identify the risk factors associated to falls of hospitalized patients in medical-surgical clinics.

Methods: Analytic and descriptive study with a quantitative approach, carried out from June to September 2017 in a large-scale public hospital in the northern area of Ceará state, Brazil. The sample had 155 patients and data collection was made through a structured tool split in five parts: a) Clinical-Epidemiologic Data; b) Mini-mental state examination; c) Morse Fall Scale application; d) Katz Index application; and e) “Fall Risk” Nursing Diagnosis (ND). For statistical analysis, a 5% sample error was taken into consideration.

Results: Out of 155 patients, 41.2% (64) had a clinical diagnosis and 58.8% (91) were traumatological patients. Statistic correlation was identified for fall occurrences between hospitalization days (p=0.017) and Katz (p=0.017) for clinical patients, while traumatological patients presented fall occurrence positive association on variables age (p=0.028) and Katz (p=0.037).

Conclusion: Main identified risk factors were: use of auxiliary devices, fall background, post-surgical status, walking difficulties, decreased strength on body extremities, impaired balance, impaired physical mobility, little-known setting, and insufficient non-slip flooring in bathrooms.

Keywords
Patient safety; Accidental falls; Risk factors

Descritores
Segurança do paciente; Acidente por quedas; Fatores e risco

Descritores
Seguridad del paciente; Accidentes por caídas; Factores de riesgo
Introduction

Patient safety has been a growing priority, motivating new international health policies and leading to joint efforts from institutions, health professionals and patients. The objective is, thus, to decrease and control risks arising in health services in an effective and qualified way. (1,2)

One of the main adverse events in hospitals is patient falls, which is a global public health problem that impacts patient safety culture in hospital environments, since it is associated to emerging complications in patients’ clinical state, extended hospitalizations and increasing hospital costs. (3,4) Furthermore, it may restrict daily activities, thus contributing to the onset of post-fall syndromes with dependency, loss of autonomy, immobilization and depression. Fall incidence in hospital environments varies from 1.1% to 22%, depending on care department and patient profile. (5,6)

Faced with this setting, the World Health Organization alerts that the number of injuries cause by falling will double until 2030 if fall prevention strategies are not implemented. (6) Several factors may contribute to fall occurrence, such as impairments to balance, walking pace, visual acuity and cognition, as well as chronic diseases, postural hypotension, use of psychotropic medication, slippery surfaces, path obstacles and poor lighting. (3,4,7,8)

Such factors may vary according to the location and the profile of care public. Therefore, identification of risk factors is important for efficient planning and implementation of fall prevention interventions, (3,4) guided by the identification of individuals with higher fall susceptibility. (4,6)

Considering that the medical clinic is a department which is present in most hospital institutions, the following question arises: what are the main risk factors for fall occurrence in the medical clinic department?

Thus, the objective of this study is to identify the risk factors associated to falls of hospitalized patients in medical clinics.

Methods

This is an analytic and descriptive study of quantitative approach which was carried out in a hospital located in the north area of the state of Ceará, Brazil, a regional reference in high-complexity health care. That philanthropic entity provides health services for approximately 40 thousand patients a month, and it contributes to the academic training of professionals of several areas, thus it is also consolidated as a teaching hospital. With 450 hospital beds, the institution provides care for over 60 municipalities in the area and for a population of approximately two million people. (9)

The medical clinic of that hospital has 56 beds, out of which 29 ones are destined to clinical patients and 27 ones are reserved for traumatological patients. The sample population counted on patients who were hospitalized in the medical clinic during the timeframe from June to September 2017.

Sample calculation was made based on data about the number of hospitalizations performed from January to December 2016. On that year, the department provided care for 513 patients, averaging 42.75 patients a month. Sample calculation used the percentual estimation formula with sample error of 5%, confidence interval of 95%, n=513 and outcome occurrence proportion of 15%,(3) resulting in 142 patients. Considering also the possibility of losses, 9% were added to quantitative factor, resulting in 155 patients.

Inclusion criteria were: a) being hospitalized in the medical clinic department under study during the data collection timeframe; and b) being literate. Otherwise, exclusion criteria were: a) presenting some cognitive or communication limitation that could compromise the individual’s participation in the interview or the answer to the data collection tool; b) referral of transference to another hospital department; and c) being in hemodynamic instability that could prevent bedside approach for participation in the study.

During hospitalization, patients were invited to take part in the research – that happened through interviews to fill in a structured tool that contained five parts: a) Clinical-Epidemiologic
Data; b) Mini-mental state examination; c) Morse Fall Scale application; d) Katz Index application; and e) Fall Risk ND.

In clinical-epidemiologic data assessment, information such as sex, age, marital status, educational attainment, origin, income level, medical diagnosis and medication. Mini-Mental State Examination (MMSE) assesses capabilities such as temporal and space orientation, immediate and recall memory, calculation, language-naming, repetition, understanding, writing, and copying a picture. As a clinical tool, it may be used to detect cognitive losses on evolutive disease monitoring and on treatment response monitoring.\(^{(10)}\) It presents a maximum score of 30 points in its analysis, where a score under 24 points is considered an indication of cognitive deficit.\(^{(11)}\)

Morse Fall Scale comprises six items with two or three possible answers for each question. Assessed items are: previous fall background, secondary diagnosis, assistance to walk, intravenous therapy, walking posture, transference posture, and mental state, resulting in an indication of fall risk varying from 0 to 125 points – the higher the score, the higher the risk, as it is considered a high fall risk when the result is 45 points or higher, moderate fall risk from 25 to 45 points, and low fall risk from 0 to 24 points.\(^{(12)}\)

Katz Index, also known as Index of Independence in Activities of Daily Living, assesses daily living activities in hierarchic relation, thus it is organized to measure functional capability upon performance of six tasks: bathing/showering, getting dressed, using the toilet, moving, having continence, and having food. Score varies from 0 to 6 points, rated as total care dependence at 0 to 1 point; partial dependence from 2 to 4 points; and independence over 5 points.\(^{(13)}\)

Risk factor presence was also assessed regarding “Fall Risk” ND, according to NANDA-I Taxonomy II\(^{(14)}\), which is defined as vulnerability to increasing fall susceptibility that may cause physical harm and compromise health.

Statistical analysis was carried out on SPSS software in order to obtain absolute and percentual frequencies, averages and standard deviation. Significance level was set at 5% and confidence interval at 95%. Normality distribution of continuous variables was verified through Kolmogorov-Smirnov Test and, for comparison purposes between independent groups, Mann-Whitney Test was used. For categorical variables, Pearson’s Chi-Square Test was chosen.

Study development observed all Brazilian and international regulations for ethics in research involving human beings (Opinion n. 2102871). Patients were included in the study only after signing an Free and Informed Consent Term.

## Results

Out of 155 participants, 41.2% (64) had a clinical diagnosis and 58.8% (91) were traumatological patients. The clinical-epidemiologic profile found in this research is presented on table 1.

### Table 1. Description of patients’ sociodemographic characteristics and comorbidities

| Variables/Categories | Group | p-value
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Clinical</td>
<td>Trauma</td>
</tr>
<tr>
<td>n(%)</td>
<td>n(%)</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>30(46.9)</td>
<td>9(9.9)</td>
</tr>
<tr>
<td>Male</td>
<td>34(53.1)</td>
<td>82(90.1)</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>19(29.7)</td>
<td>66(72.5)</td>
</tr>
<tr>
<td>Inactive</td>
<td>45(70.3)</td>
<td>25(27.5)</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>37(57.8)</td>
<td>60(65.9)</td>
</tr>
<tr>
<td>Divorced</td>
<td>6(9.4)</td>
<td>2(2.2)</td>
</tr>
<tr>
<td>Single</td>
<td>14(21.9)</td>
<td>28(30.8)</td>
</tr>
<tr>
<td>Widow/Widower</td>
<td>7(10.9)</td>
<td>1(1.1)</td>
</tr>
<tr>
<td>Religion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atheist</td>
<td>2(3.1)</td>
<td>2(2.2)</td>
</tr>
<tr>
<td>Catholic</td>
<td>54(84.4)</td>
<td>80(87.9)</td>
</tr>
<tr>
<td>Evangelical</td>
<td>8(12.5)</td>
<td>9(9.9)</td>
</tr>
<tr>
<td>Educational attainment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to 8 years</td>
<td>44(68.8)</td>
<td>62(68.1)</td>
</tr>
<tr>
<td>9 to 11 years</td>
<td>16(25.0)</td>
<td>27(29.7)</td>
</tr>
<tr>
<td>Over 12 years</td>
<td>4(6.3)</td>
<td>2(2.2)</td>
</tr>
</tbody>
</table>
| Average Age (SD)     | 47.69±20.29 | 42.42±18.62 | 0.388
| Hospitalization days | 8.52±6.11 | 8.64±7.42 | 0.589
| MMSE                 | 17.75±8.65 | 21.30±7.54 | 0.005

† Pearson’s Chi-Squared; * Mann-Whitney Test

Table 2 describes the assessment of independence in activities of daily living.
Upon comparison of the clinical group with the traumatological one, there was a statistically significant difference in activities: bathing/showering (p=0.000), getting dressed (p=0.000), performing personal hygiene tasks (p=0.000), and moving (p=0.000). Regarding the rating of care dependence level according to Katz Scale, traumatological patients were deemed totally dependent to a significantly higher percentual (p=0.000) (Table 2).

On table 3, it is possible to analyze fall risk factors verified with the Morse Scale among hospitalized patients in the medical clinic department.

On table 3, it is observed that there are statistically significant differences when comparing fall risk assessment among clinical and traumatological patients, i.e.: presence of comorbidities (p=0.000) and walking pace (p=0.000). In both groups, patients present previous fall backgrounds (84.4% for clinical patients vs. 93.4% for traumatological ones), they have comorbidities (Clin.: 50% vs. Traum: 82.4%), they don’t use intravenous therapy (Clin.: 65.6% vs. Traum: 73.6%), they don’t need assistance to move/walk (Clin.: 85.9% vs. Traum: 74.7%), and they are oriented in space and time (Clin.: 96.9% vs. Traum: 96.7%).

Only concerning the walking pace there was a divergence on patient profiles, such that, for the clinical group, 75% (48) patients either presented a normal pace; they don’t walk or are totally bedridden, while 60.4% (55) of traumatological patients present a compromised or reeling pace (table 3). Regarding the fall risk rating according to Morse Scale, 40% (62) of patients presented low fall risk, 33% (51) presented moderate fall risk, and 27% (42) presented high fall risk.

Table 4 presents the correlation between Morse Fall Scale scores and the following variables: age, hospitalization days, MMSE score, and Katz Scale score.

On table 5, the relation of risk factors for Fall Risk diagnosis, identified among clinical and traumatological patients, may be observed.
Similar frequencies were observed between sexes regarding clinical patients, whereas there was a predominance of men in the traumatological patient group. According to scientific literature, there is no formed consensus whether sex is a risk factor increasing fall occurrence. There are studies showing fall incidence as higher among men, and others present women as the most frequent victims of this kind of accident.\(^{(15)}\)

In this study, age average did not diverge between groups: 47.6 years among clinical patients and 42.4 among traumatological ones. Upon analysis of other studies, old age is considered a risk factor for falls and for their consequent injuries, due to alterations cause by the physiological process of aging.\(^{(15,16)}\)

Regarding the length of hospitalization, average time spent in the medical clinic department ranged from 8.52 days (± 8.11) – among clinical patients – to 8.64 days (± 7.42) among traumatological patients. These data are in agreement with a study that was conducted in a hospital in the countryside of Rio Grande do Sul state, Brazil, with hospitalized patients in Surgical Clinic and Medical Clinic I and II departments, which identified a hospitalization length of 7.7 days (± 9.2), with a longer amount of days upon comparison with the patients in this study. It is known that the longer hospitalization time is, the higher fall risk is,\(^{(17)}\) what poses as a warning about the importance of implementing preventive measures aiming at decreasing risks and providing safe environments to patients.

Concerning educational attainment, there was a predominance of 0 to 8 years of education in both groups. Educational level directly influences fall occurrence, because patients may present low health literacy, thus impairing their understanding of provided guidance about fall prevention. Thus, it is important to identify cognitive deficit based on standardized scales, aiming at tracking down those patients under risk of cognitive compromise. Moreover, individuals of low educational level need a longer time to adapt to the new environment (hospital), what may lead to an impaired sense of space location, impacting their performance of tasks such as self-care practices.\(^{(18)}\)

Regarding MMSE application, it was observed that clinical patients present lower cognitive performance (17.75 average scores) when compared to traumatological patients (21.30 average scores), thus reinforcing the importance of closer attention to individuals with a clinical diagnosis concerning the nurse-patient communication process, as language has to be adapted to patients’ educational level. According to literature, there is a positive as-

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Group</th>
<th>Clinical n(%)</th>
<th>Trauma n(%)</th>
<th>p-value†</th>
</tr>
</thead>
<tbody>
<tr>
<td>In adults</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 65 years old</td>
<td>13(20.3)</td>
<td>12(13.2)</td>
<td>0.235</td>
<td></td>
</tr>
<tr>
<td>Lower limb prosthesis</td>
<td>-</td>
<td>2(2.2)</td>
<td>0.233</td>
<td></td>
</tr>
<tr>
<td>Wheelchair use</td>
<td>3(4.7)</td>
<td>8(8.8)</td>
<td>0.327</td>
<td></td>
</tr>
<tr>
<td>Auxiliary device use</td>
<td>8(12.5)</td>
<td>35(38.5)</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Fall background</td>
<td>15(23.4)</td>
<td>28(30.8)</td>
<td>0.315</td>
<td></td>
</tr>
<tr>
<td>Cognitive</td>
<td>3(4.7)</td>
<td>3(3.3)</td>
<td>0.659</td>
<td></td>
</tr>
<tr>
<td>Alterations to cognitive function</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physiological</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arthritis</td>
<td>3(4.7)</td>
<td>2(2.2)</td>
<td>0.388</td>
<td></td>
</tr>
<tr>
<td>Anemia</td>
<td>23(35.9)</td>
<td>7(7.7)</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Lack of sleep</td>
<td>18(28.1)</td>
<td>10(11.0)</td>
<td>0.006</td>
<td></td>
</tr>
<tr>
<td>Post-surgery</td>
<td>9(14.1)</td>
<td>35(38.5)</td>
<td>0.011</td>
<td></td>
</tr>
<tr>
<td>Proprioceptive deficits</td>
<td>3(4.7)</td>
<td>3(3.3)</td>
<td>0.659</td>
<td></td>
</tr>
<tr>
<td>Diarrhea</td>
<td>5(7.8)</td>
<td>3(3.3)</td>
<td>0.211</td>
<td></td>
</tr>
<tr>
<td>Walking pace difficulties</td>
<td>20(31.3)</td>
<td>68(74.7)</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Hearing difficulties</td>
<td>4(6.3)</td>
<td>4(4.4)</td>
<td>0.607</td>
<td></td>
</tr>
<tr>
<td>Visual difficulties</td>
<td>10(15.6)</td>
<td>10(11.0)</td>
<td>0.397</td>
<td></td>
</tr>
<tr>
<td>Vascular disease</td>
<td>4(6.3)</td>
<td>-</td>
<td>0.016</td>
<td></td>
</tr>
<tr>
<td>Decreased strength on extremities</td>
<td>19(29.7)</td>
<td>33(36.3)</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Impaired balance</td>
<td>17(26.6)</td>
<td>57(62.6)</td>
<td>0.393</td>
<td></td>
</tr>
<tr>
<td>Urinary urgency</td>
<td>4(6.3)</td>
<td>2(2.2)</td>
<td>0.900</td>
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</tr>
<tr>
<td>Orthostatic hypotension</td>
<td>8(12.5)</td>
<td>12(13.2)</td>
<td>0.198</td>
<td></td>
</tr>
<tr>
<td>Impaired physical mobility</td>
<td>19(29.7)</td>
<td>60(65.9)</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Neoplasm</td>
<td>7(10.9)</td>
<td>1(1.1)</td>
<td>0.006</td>
<td></td>
</tr>
<tr>
<td>Neuropathy</td>
<td>5(7.8)</td>
<td>1(1.1)</td>
<td>0.033</td>
<td></td>
</tr>
<tr>
<td>Incontinence</td>
<td>3(4.7)</td>
<td>3(3.3)</td>
<td>0.659</td>
<td></td>
</tr>
<tr>
<td>Altered blood sugar levels</td>
<td>2(3.1)</td>
<td>3(3.3)</td>
<td>0.952</td>
<td></td>
</tr>
<tr>
<td>Feet-affecting conditions</td>
<td>10(15.6)</td>
<td>12(13.2)</td>
<td>0.668</td>
<td></td>
</tr>
<tr>
<td>Environmental</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disorganized environment</td>
<td>4(6.3)</td>
<td>1(1.1)</td>
<td>0.074</td>
<td></td>
</tr>
<tr>
<td>Little-known setting</td>
<td>19(29.7)</td>
<td>20(22.0)</td>
<td>0.276</td>
<td></td>
</tr>
<tr>
<td>Exposure to unsafe conditions</td>
<td>2(3.1)</td>
<td>3(3.3)</td>
<td>0.952</td>
<td></td>
</tr>
<tr>
<td>Insufficient lighting</td>
<td>2(3.1)</td>
<td>-</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Insufficient non-slip flooring in bathrooms</td>
<td>23(35.9)</td>
<td>23(25.3)</td>
<td>0.153</td>
<td></td>
</tr>
<tr>
<td>Use of immobilization</td>
<td>-</td>
<td>2(2.2)</td>
<td>0.233</td>
<td></td>
</tr>
<tr>
<td>Use of loose carpets</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Pharmacological agents</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pharmacological agent</td>
<td>24(37.5)</td>
<td>15(16.5)</td>
<td>0.003</td>
<td></td>
</tr>
<tr>
<td>Use of alcohol</td>
<td>3(4.7)</td>
<td>15(16.5)</td>
<td>0.024</td>
<td></td>
</tr>
</tbody>
</table>

† Pearson’s Chi-Square
Association between hospitalized patients’ increased fragility and low cognitive performance, thus contributing to fall occurrence.\(^{(19)}\)

Concerning the presence of comorbidities, most patients presented associated diseases, so that was a statistically significant factor among both groups. Patients with more than one medical diagnosis have a higher chance of presenting limitations to several systems (musculoskeletal, cardiovascular, neurological, psychological, among others). According to some studies, there is a direct association between the number of comorbidities and patients’ higher number of falls.\(^{(3)}\)

The prevalence of patients with low dependence to nursing care among clinical patients and the higher frequency of patients with complete need of assistance in order to carry out activities of daily life in the traumatological group are associated to the fact that, in many cases, patients that suffer trauma, mainly those who suffer fractures, need to be immobilized for a certain timeframe, what impairs their self-care and increases fall risks. A study conducted in a private hospital, in the northwestern area of Rio Grande do Sul state, with 112 patients, confirms the necessary care towards traumatological patients, since 42.3% of patients who underwent traumatological surgery were in high fall risk.\(^{(20)}\)

Regarding the average score of predominant Morse assessments in this study, low fall risk was found. Compared to other literature, there is a research that scored 31.7 (±16.9) in the Morse Scale, what grants it a rating of moderate fall risk.\(^{(19)}\) According to the literature, that divergence happens due to the hospital department and to offered services.\(^{(3)}\)

Main risk factors related to “Fall Risk” ND make evident in this study were the use of auxiliary devices, impaired physical mobility, little-know setting, insufficient non-slip floorings in bathrooms, and pharmacological agents.

According to a study that was conducted in a large hospital in Southern Brazil with 174 hospitalized patients in clinical and surgical departments, main fall risk factors were identified as impaired balance, walking pace difficulties, impaired physical mobility, being over 60 years old, proprioceptive deficit, and medication. Faced with the results for Fall Risk diagnosis, fall prevention interventions were developed, according NIC reference, reinforcing literature findings that recommend multifactor interventions for fall prevention.\(^{(15)}\)

All across the world, fall prevention challenges keep prevailing, despite validated risk assessment tools and several risk prevention programs.\(^{(21)}\) Identifying people in high risk of fall occurrence and improving awareness about existing risk factors, as well as access to information through educational interventions, may decrease the devastating effects of falls.\(^{(1)}\) Nurses have a fundamental role in fall prevention in hospital environments, starting from the identification of individuals’ risk factors for fall occurrence and health education about this theme.\(^{(22)}\)

Limitations of this study are the fact it was conducted in a public hospital, what may not correspond to the reality in private hospitals, and that it was carried out during four months of the year, thus factors related to fall risk may be different in other months. It is important to develop new studies that aim at identifying the fall incidence rate existing in this area. It is also worth emphasizing that no studies were found in literature which associated the variables age, Katz and MMSE among patients of medical clinic departments, what impaired the discussion of these findings. It is suggested that new studies focus on the construction of educational technologies in tune with health service reality, what may increase the effectiveness of guidance provided about this adverse event that causes grievous impacts to the health status of individuals.

## Conclusion

In this study, the main risk factors that were identified were: use of auxiliary devices, fall background, post-surgical status, walking pace difficulties, decreased strength on body extremities, impaired balance, impaired physical mobility, little-known setting, and insufficient non-slip flooring in bathrooms. Higher association for fall risk was observed in traumatological patients, who presented higher dependence to carry out activities of daily life. It must be highlighted that...
it is necessary to raise professionals’ awareness to take hold of tools made available in literature to guarantee patient safety, such as specific scales to assess fall risks and the systematization of Nursing care, which may contribute to fall occurrence prevention and care qualification. It is of utmost importance that nurses know fall susceptibilities, so they can identify risk factors and develop a care plan with effective interventions to prevent falls and provide quality care, based on NANDA, NOC and NIC terminologies.

**Acknowledgements**

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**Collaborations**

Aguiar JR, Barbosa AO and Barros LM contributed to project conception, data collection and interpretation, article writing, critical review of article content and approval of final version for publication. Galindo Neto NM, Ribeiro MA and Caetano JÁ contributed to article writing, critical review of article content and approval of final version for publication.

**References**

Factors associated with failure to discharge in the context of home care

Fatores associados a não efetivação da alta na assistência domiciliar

Factores asociados a la falta de concreción del alta en la atención domiciliaria

Vânia de Souza¹
Érika Guimarães Lage¹
Fernanda Penido Matozinhos¹
Mery Natali Silva Abreu¹

Abstract

Objective: Our aim was to analyze the factors associated with failure to discharge users of the home care service to primary healthcare.

Methods: This was a cross-sectional study conducted at the home care service of the metropolitan region in the state of Minas Gerais, Brazil. Data from the records of 157 users assisted by the home care teams in 2016, including those that remained throughout 2017, were collected. The socio-demographic, economic, health, and behavioral data were analyzed, in addition to data regarding access to the home care service and the socio-demographic variables of the caregivers. Poisson regression was used to determine the factors associated with failure to discharge from the home care service to primary healthcare, considering p < 0.05 as significant.

Results: The percentage of failure to discharge to primary healthcare was 22.29%. The increase in age and frequency of home visits were associated with failure to discharge. Income of >$780.00 increased by 2.55 times the percentage of failure to discharge from the home care service to primary healthcare compared with users whose income was <$260.00. Being referred from the emergency care unit decreased the percentage of failure to discharge when controlling for the remaining variables of the model.

Conclusion: The results demonstrated the existence of users for whom the home care service has difficulties in discharging to primary healthcare; discharge was also associated with the type of access to the service. This study presented contributions to the subject.

Méthodes: Estudio de delineamiento transversal realizado en el Servicio de Atención Domiciliar para la Atención Primaria de Salud en relación a los usuarios que permanecieron atendidos en 2017. Analizada las características sociodemográficas, económicas, de salud, comportamentales y de acceso al Servicio de Atención Domiciliar para la Atención Primaria de Salud, considerando p<0.05.

Resultados: La frecuencia de alta no efectivada para la APS fue 22.29%. El aumento en la edad y la frecuencia de visitas realizadas por los usuarios asociaronse a la falta de alta. El ingreso superior a $780,00 aumentó en 2,55 veces la prevalencia de no efetivación de alta. A ser proveniente de la Unidad de Pronto Atendimento disminuyó el porcentaje de no efetivación de alta cuando controlada las demás variables presentes en el modelo.

Conclusión: Los resultados apuntaron a la existencia de usuarios que lo que el Servicio de Atención Domiciliar tiene dificultades de efetivación de alta para la Atención Primaria, estando a alta también vinculada al tipo de acceso al servicio; tendo o estudo revelado contribuições para a área.

Keywords
Home nursing; Comprehensive health care; Home care services; Health services; Epidemiology

Descritores
Assistência domiciliar; Assistência integral à saúde; Serviços de assistência domiciliar; Serviços de saúde; Epidemiologia

Descritores
Atención domiciliar a salud; Atención integral de salud; Servicios de atención a salud a domicilio; Servicios de salud; Epidemiología

Keywords
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Atención domiciliar a salud; Atención integral de salud; Servicios de atención a salud a domicilio; Servicios de salud; Epidemiología

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Introduction

In Brazil, home care (HC) service in an organized manner began in the 1960s; since 1990, it has gained importance. The service is regulated by Administrative Rule 825/2016, which defines HC in the Brazilian Unified Health System [Sistema Único de Saúde(SUS)] and describes the teams qualified for HC. HC is an healthcare modality integrated to the Health Care Network [Rede de Atenção à Saúde (RAS)]. It is characterized by prevention, treatment, rehabilitation, palliative care, and health promotion actions provided at home, ensuring assistance to individuals who require clinical care, without the need for hospitalization.

HC is a strategy of dehospitalization, which releases hospital beds, leading to cost reduction and providing a more humanized, integral, and user-centered care by breaking away from the hospital-centered model. For service users and their caregivers, this form of care allows them to overcome barriers to access other RAS services, especially diagnostic exams and specialized consultations, allowing different care than that provided to other users of the SUS.

It is organized into three methods: home care 1, 2, and 3 (HC1, HC2, and HC3), which are differentiated by the specific care needs, periodicity of home visits, intensity of multiprofessional care, and use of equipment. In HC1, care is provided by the primary healthcare (PHC) teams, with less frequent visits and multiprofessional interventions, based on the assumption that caregivers are stable and provide satisfactory care. The home care service (HCS) is responsible for HC2 and HC3 modalities, meeting the demand of hospitals, emergency care units (ECUs), and the PHC. These patients require intense, continuous, and multiprofessional care, with at least one weekly visit, and the use of equipment or more complex procedures, such as mechanical ventilation.

The multiprofessional home care team (MHCT) is formed by a nurse, a physician, a nursing technician, and a physical therapist or social worker. MHCTs are classified as type 1 and 2, according to the workload of medical and nursing professionals. In MHCT 1, there is a 40 hour-weekly workload for both professionals. In MHCT 2, the minimal workload is of 20 hours for the physician and 30 hours for the nurse.

HCS should be organized on a territorial basis and interact with the RAS, especially with the PHC. In stable cases and in those in which an improvement in clinical status is observed, the patients should be discharged to the PHC. Cases of acute exacerbation are referred to hospitals or ECUs.

The process of integrating the HCS with the RAS, and particularly with the PHC, is challenging, presenting issues related to the mechanism of entry and continuity of PHC care after discharge from the HCS. This transposition of users to the PHC is a concern among HCS professionals, and may generate delays in discharge owing to the uncertainty regarding the continuity of care at the PHC level. The coordination between HCS and PHC teams is important to facilitate the process of transfer to the HC1 modality in a timely manner, allowing more effective care.

Few studies have assessed the difficulties faced by the HCS to discharge its users to the PHC (namely those who remained in the HCS despite meeting the criteria for HC1). Discharge is defined here as that performed from the HCS to the PHC, for users who met the eligibility criteria for the HC1 modality. The literature features studies that focus on the care barriers to home visits in PHC, on strategies to improve the coordination between HCS and hospital care, on the organization of the HCS, and on the preparation of the population for long-term care.

The authors believe that deepening the research on the transition process from the HCS to the PHC can contribute to the coordination between these two services. This would allow planning of integrated care actions for users who no longer require care in HC2 or HC3 modalities.

This study aimed to analyze the factors associated with failure to discharge users assisted in the HCS to primary healthcare.
Materials and Methods

This was a cross-sectional study that collected data from the medical records of four teams from an HCS of the metropolitan region of the state of Minas Gerais, Brazil. The service has six MHCTs, all classified as type 1, which provide care in the HC2 and HC3 modalities. Four are Clinic MHCTs, one is a Pediatric MHCT, and the other is an Orthopedic MHCT; the latter two are differentiated by their specialties. All of them are linked to a care center, whether an ECU or a municipal hospital.

The sample included 157 records of users assisted in the HCS in 2016 and their respective caregivers. The inclusion criteria for users were as follows: care provided by one of the Clinic MHCTs and discharge from HC2/HC3 modalities to HC1 in 2016 or until data collection in 2017. Only the first admission of the user was considered, even if they were later readmitted, to avoid data duplication.

The exclusion criteria were: care provided by a specialized MHCT; transfer to ECUs, hospitals, and specialized consultation centers; administrative discharge, such as that caused by the user moving to another city; admission owing to surgical risk, given the short period of hospitalization (usually one day); and death.

The inclusion criterion for caregivers was having their name listed in the medical record as the user’s primary caregiver.

The data collection instrument was constructed from the forms that compose the medical records of the service, having been previously applied to the manager of another HC service, a nurse researcher in HC, and five professionals from the assessed HCS; the instrument was amended as needed until a final version was settled upon.

The outcome was defined as failure to discharge from the HCS when the user was classified as HC1; the variable was measured as 0 or 1, where 0 corresponds to users who were discharged when they met the HC1 classification and 1 corresponds to those who were not discharged to the PHC when meeting the HC1 classification and remained in the HCS.

STATA® 14.0 was used for statistical analysis, which included prevalence estimates (%). For the numerical variables was used the Shapiro–Wilk normality test. The results were presented as means and standard deviations or medians and interquartile ranges (IQRs), respectively.

Univariate and multivariate analysis was performed using Poisson regression models with robust variances. The dependent variable was failure to discharge to the PHC; the socio-demographic, economic, health, and behavioral data of the individuals as well as data on access to HCS were considered as explanatory variables. The model also factored in the socio-demographic variables of caregivers.

Variables with p < 0.20 were included in the multivariate model. Theoretical criteria were also used to include variables in the model. To exclude variables, the backward method was used, with significance level of 5% for the permanence of the variables in the final model.

The goodness of fit deviance test was used. The prevalence ratio (PR), with a 95% confidence interval (95% CI), was used as an effect measure. In all statistical tests, a 5% significance level was adopted.

The research was approved by the Ethics Committee on Research Involving Human Beings under opinion No. 2,096,262.

Results

The median age of the 157 users was 66.86 years; the majority were male (51.59%), living with a partner (59.09%), with income ranging from USD 260.00 to USD 780.00 (88.53%), and without health insurance (95.23%). The main reason for HCS follow-up was antibiotic therapy (34.41%). Regarding health and behavioral characteristics, hypertension was predominant (70.86%), and users had access to the HCS through ECU (48.38%; Table 1).

With regard to the characteristics of the caregivers, there was a predominance of women (76.77%), with a mean age of 48.65 years, and most caregivers (41.93%) were children of users (Table 1).
Of the 157 discharges from the HCS to the PHC, 35 (22.29%) were not effective. Among these users, the median age was 64.19 years (IQR = 54.76–71.38), with a median of 19 home visits (IQR = 8–40), and with higher frequency of women (25.00% of the total sample) and of individuals living with a partner (30.77%) and with income higher than USD 780 (75.00%). Furthermore, 25% did not have health insurance (data not shown).

Dressings were the main reason for failure to discharge (36.73%). A higher percentage of failure to discharge patients was observed among those with diabetes mellitus (32.73%) and those who did not report hospitalization in the last 12 months (42.86%). Most cases of failure to discharge involved users referred by the PHC (39.47%). With regard to the caregivers of users who were not discharged, the mean age was 48.26 years; most were male (25.00%) and nieces/nephews of the users (33.33%).

In the univariate analysis, being attended to by the HCS owing to antibiotic therapy was associated with a lower probability (PR = 0.154, 95% CI = 0.05–0.49) of failure to discharge than those who were attended to owing to dressing. A higher frequency of visits was associated with a higher probability of not being discharged (PR = 1.02 and 1.01, respectively). Moreover, income higher than USD 780.00 increased by 2.55 times the prevalence of failure to discharge from the HCS to the PHC when compared with users whose income was less than USD 260.00. Being referred from the ECU decreased the prevalence of failure to discharge when compared to users who were referred from the BHU or FHS (PR = 0.36).

### Table 1. Profile of users attended to at the home care service–metropolitan region of Minas Gerais

<table>
<thead>
<tr>
<th>Characteristics of users</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Socio-demographic and economic factors</strong></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>n = 157</td>
</tr>
<tr>
<td>Sex</td>
<td>n = 157</td>
</tr>
<tr>
<td>Male</td>
<td>81 (51.59)</td>
</tr>
<tr>
<td>Female</td>
<td>76 (48.4)</td>
</tr>
<tr>
<td>Marital status</td>
<td>n = 110</td>
</tr>
<tr>
<td>With a partner</td>
<td>65 (59.09)</td>
</tr>
<tr>
<td>Without a partner</td>
<td>45 (40.9)</td>
</tr>
<tr>
<td>Income</td>
<td>n = 157</td>
</tr>
<tr>
<td>Less than USD 260.00</td>
<td>14 (8.91)</td>
</tr>
<tr>
<td>USD 260.00–USD 780.00</td>
<td>139 (88.53)</td>
</tr>
<tr>
<td>Greater than USD 780.00</td>
<td>4 (2.54)</td>
</tr>
<tr>
<td>Health Insurance</td>
<td>n = 84</td>
</tr>
<tr>
<td>Yes</td>
<td>4 (4.76)</td>
</tr>
<tr>
<td>No</td>
<td>80 (95.23)</td>
</tr>
<tr>
<td>Reason for admission to the HCS</td>
<td>n = 154</td>
</tr>
<tr>
<td>Dressing</td>
<td>49 (31.81)</td>
</tr>
<tr>
<td>Antibiotic therapy</td>
<td>53 (34.41)</td>
</tr>
<tr>
<td>Clinical support</td>
<td>47 (30.51)</td>
</tr>
<tr>
<td>Home rehabilitation</td>
<td>5 (3.24)</td>
</tr>
<tr>
<td>Number of visits received</td>
<td>n = 157</td>
</tr>
<tr>
<td>Health and behavioral factors</td>
<td>n = 127</td>
</tr>
<tr>
<td>Systemic hypertension</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>37 (29.13)</td>
</tr>
<tr>
<td>Yes</td>
<td>90 (70.86)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>n = 125</td>
</tr>
<tr>
<td>No</td>
<td>70 (56)</td>
</tr>
<tr>
<td>Yes</td>
<td>55 (44)</td>
</tr>
<tr>
<td>Hospitalization in the last 12 months</td>
<td>n = 132</td>
</tr>
<tr>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Yes</td>
<td>125 (93.3)</td>
</tr>
<tr>
<td>Access to HCS</td>
<td>n = 155</td>
</tr>
<tr>
<td>Referred from</td>
<td></td>
</tr>
<tr>
<td>BHU + FHS</td>
<td>38 (24.51)</td>
</tr>
<tr>
<td>Hospital</td>
<td>42 (27.09)</td>
</tr>
<tr>
<td>ECU</td>
<td>75 (48.38)</td>
</tr>
<tr>
<td>Characteristics of caregivers</td>
<td>n (%)</td>
</tr>
<tr>
<td><strong>Socio-demographic factors</strong></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>n = 148</td>
</tr>
<tr>
<td>Sex</td>
<td>n = 155</td>
</tr>
<tr>
<td>Male</td>
<td>36 (23.22)</td>
</tr>
<tr>
<td>Female</td>
<td>119 (76.77)</td>
</tr>
<tr>
<td>Relationship with user</td>
<td>n = 155</td>
</tr>
<tr>
<td>Spouse/partner</td>
<td>38 (24.51)</td>
</tr>
<tr>
<td>Children/stepchildren</td>
<td>65 (41.93)</td>
</tr>
<tr>
<td>Father/mother</td>
<td>13 (8.38)</td>
</tr>
<tr>
<td>Brother/sister</td>
<td>15 (9.67)</td>
</tr>
<tr>
<td>Nephew/niece</td>
<td>9 (5.8)</td>
</tr>
<tr>
<td>Others</td>
<td>15 (9.67)</td>
</tr>
</tbody>
</table>

BHU – Basic Health Unit; FHS – Family Health Strategy; HCS – home care service; ECU – emergency care unit; * married + stable union; a single + widow + separated + divorced; c median; d mean.
Factors associated with failure to discharge in the context of home care

Discussion

Failure to discharge to PHC was associated with elderly users, the requirement of more home visits, and income above USD 780.44.

The association of age above 60 years with the higher demand for HC, also present in the literature, is related to an increase in functional disabilities.\(^{(13-15)}\) The probability of demand for HC is higher in those older than 80 years when compared with the age range of 60–65 years.\(^{(13)}\)

This probability was shown to be 10.4 times higher in the elderly who presented functional incapacity to perform activities of daily life than in those who were capable.\(^{(15)}\)

These data are relevant, considering that the age of users may influence the decision of the HCS manager to postpone discharge to the PHC when they realize that the PHC may not provide continuous care for the elderly user, especially in cases in which the caregiver is also elderly.\(^{(6)}\) Furthermore, worldwide population studies indicate an increase in life expectancy for the age group of 60 years or more, from 18.7 years in 2000 to 20.4 years in 2015.\(^{(16)}\) This indicates the need to increase HC and its support network. In the context of aging, a study on long-term care in a sample of patients aged 65 years or more showed they preferred the support network provided by family and friends.\(^{(17)}\)

The association between income and the prevalence of HC has also been shown in other studies.\(^{(15,18)}\) In a Brazilian study that included 1,593 elderly individuals, the probability of receiving HC was 5.2-fold higher among those with a higher income, when compared to those whose income was less than USD 260.00.\(^{(15)}\)

The justification that individuals with higher incomes have more means to hire the specialized services of a formal caregiver was indicated in a national study with 671 elderly individuals.\(^{(18)}\) While this association cannot be generalized to the Brazilian population, 71% of the formal caregivers in the aforementioned study cared for elderly patients in the higher income quartiles.\(^{(18)}\) The association between higher incomes and the odds of receiving at least one hour of HC services was also observed in

### Table 2. Univariate analysis of the potential user factors associated with failure to discharge from home care

<table>
<thead>
<tr>
<th>Socio-demographic factors</th>
<th>PR</th>
<th>95% CI</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (continuous)</td>
<td>1.00</td>
<td>0.99–1.01</td>
<td>0.854</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>1.26</td>
<td>0.70–2.28</td>
<td>0.476</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With a partner</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without a partner</td>
<td>0.79</td>
<td>0.42–1.49</td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than USD 260.00</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>USD 260.00–USD 780.00</td>
<td>0.54</td>
<td>0.25–1.19</td>
<td>0.127**</td>
</tr>
<tr>
<td>Greater than USD 780.00</td>
<td>2.1</td>
<td>0.85–5.19</td>
<td>0.108**</td>
</tr>
<tr>
<td>Health insurance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>0.5</td>
<td>0.17–1.44</td>
<td></td>
</tr>
<tr>
<td>Reason for admission to the HCS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dressing</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antibiotic therapy</td>
<td>0.15</td>
<td>0.05–0.49</td>
<td>0.002**</td>
</tr>
<tr>
<td>Clinical support</td>
<td>0.69</td>
<td>0.38–1.28</td>
<td>0.245</td>
</tr>
<tr>
<td>Home rehabilitation</td>
<td>0.54</td>
<td>0.09–3.28</td>
<td>0.507</td>
</tr>
<tr>
<td>Frequency of visits</td>
<td>1.01</td>
<td>1.01–1.03</td>
<td>0.000**</td>
</tr>
<tr>
<td>Health and behavioral factors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systemic hypertension</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1.78</td>
<td>0.80–3.98</td>
<td>0.222</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1.43</td>
<td>0.80–2.55</td>
<td>0.601</td>
</tr>
<tr>
<td>Stroke</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1.24</td>
<td>0.56–2.74</td>
<td>0.125**</td>
</tr>
<tr>
<td>Hospitalization (last 12 months)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>0.48</td>
<td>0.19–1.22</td>
<td></td>
</tr>
<tr>
<td>Access to HCS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Referred from BHU + FHS</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital</td>
<td>0.72</td>
<td>0.39–1.35</td>
<td>0.308</td>
</tr>
<tr>
<td>ECU</td>
<td>0.27</td>
<td>0.12–0.58</td>
<td>0.001**</td>
</tr>
</tbody>
</table>

**PR – prevalence ratio; HCS – home care service; BHU – Basic Health Unit; FHS – Family Health Strategy; ECU – emergency care unit; 95% CI – 95% confidence interval; * Poisson univariate regression model with robust variances; ** p-value less than 20% (p < 0.20)**

### Table 3. Adjusted analysis of the factors associated with failure to discharge from home care service to primary healthcare

<table>
<thead>
<tr>
<th>Factors</th>
<th>PR</th>
<th>p-value**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.02</td>
<td>0.024*</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than USD 260.00</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>USD 260.00–USD 780.00</td>
<td>0.85</td>
<td>0.685</td>
</tr>
<tr>
<td>Greater than USD 780.00</td>
<td>2.55</td>
<td>0.027*</td>
</tr>
<tr>
<td>Referred from BHU + FHS</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Hospital</td>
<td>0.84</td>
<td>0.582</td>
</tr>
<tr>
<td>ECU</td>
<td>0.36</td>
<td>0.025*</td>
</tr>
<tr>
<td>Frequency of visits</td>
<td>1.01</td>
<td>0.002*</td>
</tr>
</tbody>
</table>

**PR – prevalence ratio; * significant p-value (p-value < 0.05); ** Model adjusted for marital status and reason for admission in the HCS; *** Deviance test - final model fit assessment.**
In a survey of 8,815 elderly Americans, being twice as high as that observed in lower-income families.\(^{(19)}\)

In contrast to these results, a higher probability of HC was reported in poorer classes than in upper class elderly individuals (A and B) in a study with 6,624 elderly individuals from 23 Brazilian states.\(^{(13)}\)

In another study on the subject, the reason for the association of HC with lower income was related to the reduction of social inequities through the FHS.\(^{(15)}\)

In a systematic review of socioeconomic conditions and access to health services among the elderly, the results varied according to the country and type of service used. In Brazil and Canada, HC was more frequent among the poorest, whereas in the United States it was more common among the richest and most educated. In countries where public policies are more equitable, studies indicate a greater frequency of HC among the poorest and least educated.\(^{(20)}\)

With regard to access to HCS, the present study showed that there was a lower frequency of failure to discharge among users referred from the ECU. In this case, it can be inferred that HC services linked to the ECU treat users with acute conditions, often related to infections such as urinary and respiratory tract infections for which hospital admission is indicated but can be avoided with HC-enhanced services.\(^{(1)}\) Furthermore, consultations carried out in the PHC may reproduce the clinical practice of emergency services, due to the continuous tension in the balance between the scheduled supply of health services and the spontaneous demand, which hinders user adherence, particularly regarding the control of chronic diseases.\(^{(21)}\) Thus, it is possible that a chronic PHC user, when referred to the HCS, will require more time to be discharged.

The literature highlights the importance of patient engagement in their own care, preserving their autonomy and independence through guidance that contributes to their decision-making regarding their recovery process and not necessarily dependent on the care of a health professional. This autonomy can be enhanced by reducing the gap between scientific knowledge and the user’s knowledge, thereby allowing the development of a care plan in which the user can participate more actively in their care process.\(^{(22)}\)

In a review of the literature on congestive heart failure, the authors emphasized the importance of investing in health education provision by the multidisciplinary team to avoid (re)hospitalization. The use of tools such as videos, booklets, and telephone follow-up helps users understand the guidelines for maintaining care at the time of hospital discharge.\(^{(23)}\)

In the context of the HCS and the PHC, this strategy can bring benefits to the user and the services, allowing post-discharge care to be more effective.

While HCS fulfills its role by avoiding hospitalizations and meeting the demands from the BHU and PHC, it is important to highlight the need for shared care and the development of collective strategies involving these services, especially the PHC. In a survey carried out with HCS coordinators and managers of municipalities, meetings among the RAS teams were proposed as a way to establish continuous care for the user and the improvement of the interaction between the services.\(^{(11)}\) This interaction would allow to define the flow of care management in line with the demands of the service and the users. It would also be a way of including the efforts of the SUS to reduce the fragmentation of healthcare actions by strengthening health policies focusing on integrality and equity.\(^{(24)}\)

The identification of factors associated with failure to discharge from the HCS to the PHC also aids in the planning of the discharge process, with the aim of promoting continuous care and the effectively support of families in the promotion of health actions.

The limitations of this study were the size of the sample and the loss of some data, which is expected when data is collected from medical records. Furthermore, its cross-sectional design did not allow the identification of the causality of the associations shown in the results. Finally, some aspects that may be associated with failure to discharge HCS users to the PHC such as the political, organizational, and structural characteristics of the services, were not assessed.

**Conclusion**

The results of the present study indicated that the frequency of failure to discharge was associated with
the variables age, frequency of visits, higher income, and access to the HCS; discharge was also associated with the type of access to the service. These findings indicate the need for further scientific research in this area to gain insight into the obstacles that affect the discharge from the HCS to the PHC; research and comparison with other national HC services and with other experiences that may have been successful with RAS is recommended. Educational interventions and collective actions to improve the link with RAS are also a necessary contribution to more effective and higher-quality HC.

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Collaborations

Souza V, Lage EG, Matozinhos FR, Abreu MNS contributed to the project design, data analysis and interpretation, article writing, critical review of intellectual content, and final approval of the version to be published.

References


Workplace violence in Family Health Units: a study of mixed methods

Violencia en el trabajo en salud de familia: estudio de métodos mixtos

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Abstract
Objective: To verify the prevalence of workplace violence in Family Health Units, characterize the victims and know the implications of conditions and organization of work in workers exposure.

Methods: A mixed study of the concomitant type. The quantitative stage included a sample of 106 health professionals from 17 Family Health Units who answered questions about sociodemographic data and the Survey Questionnaire Workplace Violence in the Health Sector. At the qualitative stage, 18 violence victims workers were intentionally selected to respond to the semi-structured interview. Quantitative findings were subjected to descriptive and analytical statistics, and qualitative data to thematic analysis.

Results: About 69.8% of the workers were exposed to violence, with the main victims being younger workers and the nursing staff (p=0.047). Violence was also associated with a worse assessment of relationships with colleagues (p=0.003) and managers (p=0.008). The interviewees attributed to the reception of the unit the space of greatest risk of aggression. The lack of resources, absence of a doctor in the unit and its location in areas of traffic were aspects related to the exposure of professionals to violence.

Conclusion: Violence has proved prevalent in work in family health units and improvements in structure, human and material resources as well as public safety are needed to control and prevent worker aggression.

Keywords
Workplace violence; Occupational health; Working conditions; Primary health care; Family health

Descritores
Violencia no trabalho; Saúde do trabalhador; Condições de trabalho; Atenção Primaria em saúde; Saúde da família;

Descritores
Violencia laboral; Salud laboral; Condiciones de trabajo; Atenção primária em saúde; Saúde da família;

Keywords
Violence at work; Occupational health; Working conditions; Primary health care; Family health

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Introduction

Workplace violence in health services has been the subject of national and international studies, especially in hospital services. However, Primary Health Care Services, such as the Family Health Units (FHU), require that work activities be developed in the users' own territory, with a greater approximation of the households and social spaces of the community, which can lead to increased exposure to violence.

This situation worsens in the large urban areas of less developed countries, as rapid urbanization, associated with increased crime, significantly exposes professionals to violence. International studies that have previously investigated the presence of violence in primary health care services have confirmed the phenomenon, pointing out that more than half of participants experience at least one type of workplace violence per year, with prevalence of 52.6% in Serbia and 90.2% in Spain.

Workplace violence has been related to aspects that permeate working conditions, such as poor lighting, excessive noise, lack of materials and damaged physical structure and work organization, such as working alone, high circulation of unidentified persons, insufficient numbers lack of specific training to deal with violence. According to the World Health Organization, healthy work environments depend on the organization and working conditions, the first one referring to everyday attitudes, values, beliefs and practices; and the second to the physical structure, materials, products, chemicals and production processes in the workplace.

Work organization results from the social and intersubjective relationships of workers with organizations. In this perspective, working requires taking action for relationships with others, demanding joint, conscious and unconscious actions, in order to create an environment of coordination and cooperation. Thus, the present research starts from the understanding that the act of working is not only to produce, but also to transform oneself, being the central work on the worker's affective life.

In relation to the mentioned aspects, it is worth considering that the fragmentation of work and the fragilities that result from the adoption of interactions marked by rigid hierarchy, as well as the inadequacy in the physical space of the BHU, the scrapping of equipment and materials, have already been described in the literature and can influence the behavior of users and the health team, fomenting violent attitudes in industrial relations. These attitudes, in turn, confront fundamental assumptions of work in FHU, which requires teamwork, mediated by dialogue and bonding with users and community. Previous studies highlight the importance of establishing the link in the implementation of health promotion and disease prevention actions. Speech, listening, bonding and weak negotiation have repercussions on the search for primary care services, as well as on the co-responsibility of users and on the trust relationship necessary for care longitudinality.

Considering the above, there was the question: do professionals who work in FHU are exposed to workplace violence? Do the conditions and organization of work influence this phenomenon? The study aimed to verify the prevalence of workplace violence in FHU's, to characterize the victims and to know the implications of the conditions and organization of work in workers' exposure.

Methods

It was a research of mixed methods of the concomitant type. The quantitative step used a cross-sectional, descriptive and analytical design; the qualitative step was of the exploratory-descriptive type and occurred in the same encounter with the worker, immediately after the application of the questionnaire.

The study was conducted in FHU's of a district that makes up the basic care network managed by the city hall of a capital of Southern Brazil. FHU's base their assistance on the Family Health Strategy's principles. Therefore, they must guarantee access based on the recognition of the needs of the people and of the assigned territory, organizing activities between spontaneous demand and programmatic actions of health education and care at home and at the unit. The proposed activities should always
prioritize the multidisciplinary work and focused on actions of surveillance, prevention and health promotion.

The municipality studied had an estimated population of 1,481,019 inhabitants, with the service network at this level distributed in 17 health districts, with 45 Basic Health Units and 73 FHUs. The present research focused on 27 teams of 17 FHUs from a district management in which curricular activities are carried out at the Universidade Federal do Rio Grande do Sul, where students and professors have witnessed reports and/or situations of violence in the work of the teams. In addition, the choice of the study scenario is related to the vulnerability of professionals working at the FHUs, which needs to be considered considering the potential implications of violence on workers’ health and continuity of the Family Health Strategy’s actions in the municipality.

The study population consisted of nine physicians, 16 nurses, 25 nursing technicians/assistants and 56 Community Health Agents (CHA) (n=106). In the quantitative stage, all the professionals (n=190) who comprised the minimum family health team were invited to participate in the study. Those with less than 12 months of work at the FHUs (n=36), who were away (n=22) or on vacation (n=7) at the time of collection were excluded and those who were inaccessible due to suspension of activities due to conflicts (n=8) as well as refusals (n=11) were considered losses. The final sample of 106 workers from the quantitative stage was statistically significant, considering 95% confidence and 5% error, 50% prevalence, calculated with the aid of WINPEPI version 11.32.

At the qualitative stage, 18 professionals were intentionally invited, who stated in the previous stage that they had suffered violence in the last 12 months. This sub-sample was composed of six CHA, six nursing technicians, five nurses and one doctor. The intentional selection adopted sought to select, among the violence victims at work, professionals who proved to be better informers, that is, implicated in the problem and motivated to talk about it. 18 respondents were defined by the criterion of data saturation, which applies when no new element emerges and the increase of new information does not modify the understanding of the studied phenomena.¹⁵

The sample was collected between September and December 2017. The sample of professionals was invited to answer a questionnaire about socio-demographic and labor data (gender, age, skin color, years of study, marital status, children, tobacco use, medication use, chronic illness, professional category, years of health experience, years of FHU experience, if you work in another institution, as well as professionals’ perception about work organization, satisfaction, recognition and interpersonal relationships) and the Survey Questionnaire Workplace Violence in the Health Sector, proposed by the World Health Organization, International Labour Organization and Public Services and International Council of Nursing.¹⁶ The tool was translated and adapted into Portuguese and used in Brazilian research to assess violence in health work in the last 12 months, and the aggression may be physical or psychological (the latter modality includes verbal, moral, sexual or racial forms), which are assessed independently of their frequency and can form a global categorical measure (whether or not they have suffered some form of violence).³,¹⁷,¹⁸ The tool also includes questions that make it possible to characterize situations of violence, victims, offenders and measures that require investments in the face of workplace violence.¹⁶,¹⁷ The professionals who composed the qualitative stage also answered a semi-structured interview recorded in audio, following a pre-established script, which dealt with the conditions and the organization of the work in the FHUs and their relations with the occurrence of labor violence.

The analysis of the quantitative data was carried out by the software Statistical Package for the Social Sciences (SPSS), version 18.0. Values of p≤0.05 were considered statistically significant. The categorical variables were described by means of relative and absolute frequencies and the continuous and scalar variables were described by measures of central tendency and dispersion. The Chi-Square Test for association and Mann-Whitney Test were used
to verify differences between medians in the groups, after Shapiro-Wilk Normality Test.

The data from the transcripts of the interviews were submitted to the thematic type analysis technique, according to Minayo, giving rise to the following categories (and their thematic subcategories): Characterization of workplace violence in FHUs (violence victims); Conditions and organization of work (Structure and resources, Interpersonal relationships) and; (Im)possibilities to prevent/control violence (Measures to prevent workplace violence and, Urban violence).

After the statistical analysis of the numerical data and categorization of the interviews, the findings were confronted and articulated, searching for identification of convergences, differences and combinations, in order to respond to the objectives through the complementarity of information, which allowed greater comprehensiveness to the look cast on workplace violence.

The study was approved by the Ethics and Research Committee of the proposing institution (no. 2,081,737) and co-participant (number 2,128,825) and all participants signed the Free and Informed Consent Term. The research respected the ethical precepts contained in Resolution 466/12 of the Brazilian Health Board (Conselho Nacional de Saúde). As a guarantee of anonymity of the participants in the use of speech fragments, the acronym ‘INT’ was used for ‘interviewee’, followed by the interview order number.

### Results

The sample composed of 106 FHU workers was predominantly female (80.2%), with a median age of 42.5 years (34.7-51), median of 11 years (6 - 16) of experience in the health area and four years (3 - 12.2) in the FHUs, 52.8% CHA, 23.6% nursing technicians, 15.1% nurses and 8.5% doctors. The prevalence of workplace violence in FHUs was 69.8% of workers exposed in the last 12 months. Table 1 shows the distribution of workers victims and not violence victims at work according to sociodemographic and labor characteristics.

In addition to the aspects highlighted in the table, the thematic sub-category “violence victims” dealt with reception as a place/activity of greater exposure to violence, since it is an environment that requires the professional to listen and receive the users who seek attendance, as well as determining flows to the demands. In addition to being the first contact between service and user, the schedules of professionals, organization of home visits and the order of care is under the supervision of the worker in activity at the reception. Thus, often those who are ahead of this first service is responsible for giving the unwanted information to users or even “deny” the intended assistance:

### Table 1. Distribution of workers victims and non-violence victims at work according to sociodemographic and labor characteristics

<table>
<thead>
<tr>
<th>Variables</th>
<th>Workplace violence</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes (n=74)</td>
<td>No (n=32)</td>
</tr>
<tr>
<td>Gender*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>61(71.8)</td>
<td>24(28.2)</td>
</tr>
<tr>
<td>Male</td>
<td>13(16.9)</td>
<td>8(38.1)</td>
</tr>
<tr>
<td>Age* (Years)</td>
<td>40.5(33 - 50)</td>
<td>44.5(40 – 53.7)</td>
</tr>
<tr>
<td>Skin color*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>31(77.5)</td>
<td>9(22.5)</td>
</tr>
<tr>
<td>White</td>
<td>42(64.6)</td>
<td>25(35.4)</td>
</tr>
<tr>
<td>Studying years*</td>
<td>13(11 – 18)</td>
<td>13(11 – 17)</td>
</tr>
<tr>
<td>Marital status*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single, widow(er) or without a partner</td>
<td>33(67.3)</td>
<td>16(32.7)</td>
</tr>
<tr>
<td>Married or with a partner</td>
<td>41(71.9)</td>
<td>16(28.1)</td>
</tr>
<tr>
<td>Children* (number)</td>
<td>1(0 – 2)</td>
<td>1(0 – 2)</td>
</tr>
<tr>
<td>Tobacco use*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>96(71.4)</td>
<td>6(40)</td>
</tr>
<tr>
<td>No</td>
<td>25(67.6)</td>
<td>12(28.6)</td>
</tr>
<tr>
<td>Medication use*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>51(70.8)</td>
<td>21(29.2)</td>
</tr>
<tr>
<td>No</td>
<td>23(67.6)</td>
<td>11(32.4)</td>
</tr>
<tr>
<td>Chronic disease*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>43(74.1)</td>
<td>15(25.9)</td>
</tr>
<tr>
<td>No</td>
<td>31(64.6)</td>
<td>17(35.4)</td>
</tr>
<tr>
<td>Professional category*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHA</td>
<td>33(58.9)</td>
<td>20(41.1)</td>
</tr>
<tr>
<td>Nursing tech/assist Nurse</td>
<td>21(84)</td>
<td>4(16)</td>
</tr>
<tr>
<td>Doctor</td>
<td>14(50.9)</td>
<td>13(49.1)</td>
</tr>
<tr>
<td>Experience years*</td>
<td>11(6.7 – 15.2)</td>
<td>13(55.6 – 16)</td>
</tr>
<tr>
<td>Experience years at FHUs*</td>
<td>4(3 – 7.7)</td>
<td>5(3 – 16)</td>
</tr>
<tr>
<td>Boss*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>12(85.7)</td>
<td>2(14.3)</td>
</tr>
<tr>
<td>No</td>
<td>6(85.7)</td>
<td>1(14.3)</td>
</tr>
<tr>
<td>Absence days*</td>
<td>7(2 – 20)</td>
<td>6(1.2 – 16.5)</td>
</tr>
<tr>
<td>Works in other institution*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>10(76.9)</td>
<td>3(23.1)</td>
</tr>
<tr>
<td>No</td>
<td>6(85.7)</td>
<td>1(14.3)</td>
</tr>
</tbody>
</table>

* - n (%); - median (interquartile ranges); § - Chi-Square Test; + - Mann-Whitney Test; ** - Student t
The staff at the front desk suffers much more (...). INT 18

(...) I know it’s not my job, only I have to do as all the other colleagues have to do ... reception is something that makes you very stressed (...). INT 10

(...) so I think that these issues of a lot of crowds, of a lot of people, make people tense and this tension from my point of view can be one of the factors that predispose to violence, to attack ... not wanting to wait (...). INT 14

And this way they find to be served [at the reception] is screaming, offending (...). INT 7

Considering assessment aspects of the work, table 2 shows that workers violence victims have lower means in assessments on labor aspects.

Table 2. Averages and Standard Deviation of workers’ assessments on labor aspects between victims and non-victims of workplace violence in FHUs

<table>
<thead>
<tr>
<th>Variables</th>
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<th>p-value*</th>
</tr>
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<tr>
<td></td>
<td>Yes (n=74)</td>
<td>No (n=32)</td>
<td></td>
</tr>
<tr>
<td>Working conditions</td>
<td>2.97 (±0.68)</td>
<td>3.19 (±0.98)</td>
<td>0.153</td>
</tr>
<tr>
<td>Work organization</td>
<td>3.58 (±0.84)</td>
<td>3.91 (±0.69)</td>
<td>0.068</td>
</tr>
<tr>
<td>Satisfaction with work</td>
<td>3.29 (±1.16)</td>
<td>3.47 (±1.27)</td>
<td>0.314</td>
</tr>
<tr>
<td>Acknowledgment for the work</td>
<td>3.14 (±1.23)</td>
<td>3.41 (±1.16)</td>
<td>0.367</td>
</tr>
<tr>
<td>Relationship with colleagues</td>
<td>3.95 (±0.68)</td>
<td>4.34 (±0.65)</td>
<td>0.003</td>
</tr>
<tr>
<td>Relationship with the boss</td>
<td>4.18 (±0.78)</td>
<td>4.59 (±0.56)</td>
<td>0.008</td>
</tr>
</tbody>
</table>

* Mann-Whitney test

Note: The assessments were scored using a likert scale of five points, from the worst (1) to the best assessment (5). However, the test presented in the table compares the difference of medians to facilitate the interpretation of the findings, being chosen to present the means and Standard Deviation.

The interviews made it possible to understand the implications of the working conditions on exposure to violence in FHUs, it is pointed out that aspects related to the lack or scrap of materials, equipment and physical structure. The corresponding lines were attributed to the thematic category “structure and resources”, and this can be seen in the following excerpts:

(...) It gets difficult when you do not have medication, sometimes we do not even have material to work with. There was a time without gauze, without tape because they did not send it to us and it was due to the lack of it (...). INT 5

(...) “not to have” is a reason to attack us (...). INT 1

(...) there are about six thousand five hundred users for a health post, we should have more teams, we should have three teams, we only work with two, with a reduced staff (...). INT 7

(...) people do not have any structure, the health center is poorly located (...) they are things related to the functioning of the unit, it bothers me a lot, because it is not me, it is not the relationship, it is not my job that is being, the person is talking, it is about the unit operation. INT 10

Also, in the same thematic category, the absence of physicians in the units was mentioned with emphasis on the occurrence of aggressions of the users, bringing to the surface implications of the organization of the work in which it corresponds to the assistance model, that advocates the integrality of the assistance and should be the entrance door of SUS users and represents the primary level of health care.

(...) if he had a doctor and he would not be too late to serve (...) It’s the doctor’s fault! Even because depending on the material they manage to pull it off somewhere else. It is more an issue of the lack of doctor (...). INT 3

(...) everyone wants appointments, they want to consult with the doctor, it’s no use going through me, it’s no use going through the nurse, they want the doctor. INT 8

Like, there is no medical service, the person comes and does not want to know, she has to find a guilty party and the culprit is the nurse or someone who is attending... I think people think that the post revolves around the doctor who has no other services (...) a day without a doctor is a little, it is very stressful ... having the full professional staff, would be the most important. INT 10
According to the reports, users are the main perpetrators of workplace violence in FHUs, which is also supported by the quantitative findings, since 71.6% of the aggressions suffered by workers in the last 12 months were practiced by users and 6.4% by family/companions. Violence victims perpetrated by users reported in the interviews that this practice occurs mainly through swearing, insults and threats.

Colleagues accounted for 11% of the situations quantified and leaders 9.2%. In this direction, some discourses highlighted in the category “interpersonal relationships” show that the socio-professional relations also imply in the experiences of violence in FHUs:

You do not have this openness with your colleague sometimes to collaborate, sometimes it takes a little teamwork, (...) it ends up generating a stress and you take it, there comes a time when you blow up. INT 15

(…) generates a tension in the team, because many people think of them and, rightly so, because they want to protect themselves. But someone will have to open the post, someone will have to make this post work and whoever gets here, whoever makes this post work, he will be attacked (…). INT 17

In figure 1, it is possible to observe some factors that deserve greater investments in FHUs and that if improved, they may, in the opinion of professionals, influence the occurrence of violence.

Moreover, the fact that services are in territories with criminal factions and frequent situations in which drug traffickers do not respect community service spaces, arouses feelings of fear in professionals, as well as favors exposure to workplace violence in FHUs. These aspects were considered in the thematic category “urban violence” and can be evidenced in the following statements.

(…) a few days ago we did not go out to work [in the streets and in the homes] because there were some conflicts in the territory (…). INT 6

We work in an area that has a traffic war, so you live, you stay on the hill and you end up experiencing all the conflict, the whole situation of violence (…). INT 10

We had to close the unit and leave, as there were firefights nearby. INT 13

For the professionals interviewed, their work process is hampered by the lack of public safe-...
Discussion

The prevalence of workplace violence in FHUs reinforces findings from other studies. As for sociodemographic characteristics, associated with violent episodes in primary care services, nursing was revealed in a study in Serbia as the most exposed category, with no differences for gender, age, marital status, education level and years of experience. In a Spanish study, doctors and nurses were less exposed to workplace violence in Primary Health Care than other professionals who occupy the front line in services. This finding differs from the present research regarding the most exposed professional category, but it resembles in relation to the greater risk attributed to the performance in the service’s reception.

In a Brazilian study carried out with 269 professionals from the multidisciplinary team, it was observed that the victims were characterized by female gender, lower age and schooling, nursing technicians and more days absent at work, with a statistically significant difference. In the present study, the time of experience in FHUs, working in another institution, tobacco use, skin color and number of children were not variables associated with workplace violence, a result similar to the study already cited.

Chronic diseases and the use of medication were also not associated with exposure to violence, however, the high prevalence of workers living with chronic diseases and making use of medications. A study carried out with professionals of the health team who work in Primary Health Care pointed out that these workers experience physical pains and complaints, which relate to stress caused by lack of resources, conflicts at work, lack of professional recognition, work overload, among others.

Regarding the workers’ exposure at the reception of the unit, a Brazilian study developed in the state of Alagoas showed that there is a divergence between the problem identified by the professional and the need seen by the patient served. In addition, due to the link established between the professional and the users, the latter feels free to collect attention and care at the time that is convenient. Still, the request for fitting in care is frequent and not always possible, which also generates aggressive contestations.

Absence or inefficiency of doctors in the FHUs was a factor attributed by participants to user dissatisfaction, which can mean the reproduction of the physician-centered model in the manifestation of users by the search for care, a finding also found in another study in the context of primary care. A research carried out in the city of São Paulo, Brazil, showed that there is insecurity on the part of users about having their demands served by professionals and services, with a lack of information, which generates tensions, mainly with receptionists. Thus, the lack of resolution in the FHUs can be a factor that triggers threats and offenses in their work environment.

The shortage of human and material resources in primary care services abroad was also related to the intention to quit. Thus, the search for health care is incompatible with the organization and working conditions offered in primary care, generating exhaustion for professionals and user dissatisfaction. At this juncture, violence adds damages that influence productivity and quality of work, resulting in dissatisfied professionals, who do not feel recognized, and who have fragile or conflicted relationships with colleagues, bosses and users.

In view of the findings, it can be inferred that the workers violence victims suffer doubly, since in addition to the daily aggressions from users and service colleagues, they still suffer from the lack of structure and human resources. This aspect was pointed out by the influence of structural violence on the moral integrity of workers, generating suffering since experiencing these structural problems can be reason for aggressions among their partners. Moreover, it is possible to add urban violence as a form of workplace aggression in FHUs, which makes it possible to...
say that professionals are threefold exposed to violence considering the threats and fear experienced in working with the often more dangerous communities.

Structural violence can also be seen through the invisibility with which workers’ exposure to violence is treated at the SUS network. There are no flows established in cases of aggression between people, which shows that the institution/structure is indifferent to the victims, and that there is no solitary way of trying to deal with the situation from their own resources.

Among the measures to minimize cases of workplace violence, the research pointed out that authority figures, such as security guards, represent a protective aspect regarding the exposure of health professionals to violence, as well as access control to the service, education to the users of the services and adequate attitudes by the professionals in situations of violence. (28)

In addition, investing in strategies that strengthen teamwork, incorporating technologies that contribute to the resolvability of care, and reducing work overload can empower professionals to act on a daily basis. Thus, it is hoped that they will participate politically in the management of health services and in the instances of social control, seeking the implementation of measures that strengthen professionals and enhance universal access. (29)

When it comes to Primary Health Care, the aspects referring to regions with high crime rates and poorly lit environments may be the factors that deserve more attention, corroborating the indication of the literature. (7) Thus, it is understood that working in communities where crime is constant increases the fear and the chance of exposure of professionals to violence, which in the present study has been shown to affect the activities carried out in the community, affecting the quality of the service provided.

In addition, violence is a complex phenomenon that affects different spheres of society and encompasses cultural values, educational level, economic instability, social injustices and impunity. These aspects refer to a macropolitical conjuncture that is reproduced in the labor contexts, including the service sector. Among the strategies for confronting violence in Brazil and abroad, the United Nations Organization launches sustainable millennium goals, among which is the search for the promotion of peaceful and inclusive societies for sustainable development, providing access to justice and building institutions effective, accountable and inclusive at all levels. Furthermore, it is the responsibility of the health sector to collaborate jointly with intersectoral actions to foster a culture of peace and respect for all persons, workers and health system users. (30)

**Conclusion**

There was a prevalence of 69.8% of FHU workers exposed to workplace violence, being the victims characterized as younger workers, with occupation in the nursing and worse assessments on the relationships in the work. Carrying out work activities at the reception of the unit represented greater susceptibility to aggressions from users, either because they seek the service with revolt or because they become aggressive with the unwanted outcome. The absence of doctors in the health teams was mentioned as the main cause of verbal aggression, reinforcing the user’s expectation for the biomedical care model and little compensation of Primary Health Care attributes. Failures in the unit structure, deficiency of material and human resources, instigate users’ dissatisfaction, aimed at professionals, who are also exposed to urban violence related to areas of drug trafficking in the territory. Thus, the conditions and organization of work imply the occurrence of violence in FHUs. Violence in this daily work also has negative repercussions on the labor context, and can be considered a complex phenomenon composed of negative and interrelated cadences. The results of this research have as implications for health and nursing the need for investments in service infrastructure, worker safety and care strategies that foster the model of care sought...
for the FHUs. As a limitation of the study, it is possible to consider that the methodological design does not allow a follow-up on the effects that these episodes bring to the professionals and to the resolution of the FHUs. In addition, the study was developed in a health district of the capital. It is recommended to carry out more comprehensive studies on Primary Health Care in order to broaden the picture of the assessed disease.

Collaborations

Sturbelle IC, Dal Pai D, Tavares JP, Trindade LL, Riquinho DL and Ampos L declare that they contributed to the study design, data analysis and interpretation, article writing, relevant critical analysis of intellectual content and approval of the final version to be published.

References


Psychometric validation of a tool that assesses safety culture in Primary Care
Validação psicométrica de instrumento que avalia a cultura de segurança na Atenção Primária
Validación psicométrica del instrumento que evalúa la cultura de seguridad en la Atención Primaria

Sandra Dal Pai1,2
Tassiane Ferreira Langendorf3
Maria Cristina Soares Rodrigues4
Manuel Portela Romero5
Marli Maria Loro1
Adriane Cristina Bernat Kolankiewicz1

Abstract
Objective: To analyze the reliability and validity of psychometric properties of the Brazilian version of the Survey on Patient Safety Culture in Primary Care.

Methods: A quantitative cross-sectional study conducted with multidisciplinary team professionals working in Primary Health Care in a city in the Northwest region of the Rio Grande do Sul State, Brazil. The tool used was “Pesquisa sobre Cultura de Segurança do Paciente para Atenção Primária à Saúde” (Survey on Patient Safety Culture in Primary Care).

Results: Cronbach’s alpha was considered satisfactory. Factorial analysis reached satisfactory loads in all its factors. The tool showed feasibility of application and potential structure assessment for which it is proposed.

Conclusion: The Brazilian version of the questionnaire proved to be valid and reliable and could contribute to research on Patient Safety Culture in Primary Care in the country.

Keywords
Patient safety; Primary health care; Validation studies

Descritores
Segurança do paciente; Atenção primária à saúde; Estudos de validação

Descritores
Seguridad del paciente; Atención primaria de salud; Estudios de validación

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Conflicts of interest: nothing to declare.
Introduction

Currently, patient safety is recognized as free from harm or harm to both caregivers and assisted patients,(1) regarded as primary attribute for ensuring quality healthcare.(2)

This theme has been the focus of discussion among leaders and managers from different countries, given the numerous Adverse Events (AEs) that occur during health care.(3-9) Discussions reflect organizations’ efforts to adopt measures that enable coping and reduction of AEs, which are defined as incidents that result in damage when error reaches patients.(10)

In health services there are conditions that involve increased risks of AEs. In Primary Health Care (PHC), this fact is related to the high demand of users affected by multiple chronic health conditions, with advanced age, polymedicated and living in socially vulnerable situation, thus representing a public health problem.(11)

A pioneer study in Brazil, which measured incidents in 11,233 consultations at 13 Family Health Units (FHUs) in a microregion of Rio de Janeiro State identified 0.91% AEs, with prevalence of administrative errors, miscommunication, errors in treatment, performance of clinical and diagnostic tasks.(12)

A positive safety culture must be expressed in the services that make up the Health Care Network (RAS – Rede de Atenção à Saúde), with a view to reducing the occurrence of AEs and improving the safety climate, especially in PHC.(13) PHC is understood as care coordinator of RAS, as well as a communicating center among health services.(14) Therefore, assessing patient safety culture in PHC is fundamental, as it allows identifying aspects that directly interfere with care provided to users.

In Brazil, so far, there are two validated tools that measure patient safety culture in PHC. There is the Safety Attitudes Questionnaire Ambulatory Version (SAQ-AV), created in 2007 in the United States of America (USA), translated and adapted for use in Brazil,(15); and the Survey on Patient Safety Culture in Primary Care, adapted and validated semantically for Brazil(13) from the original MOSPSC, developed in the USA in 2007.(16)

MOSPSC stands for Medical Office Survey on Patient Safety Culture, and has been translated, validated linguistically and psychometrically in Spain,(17), Yemen,(18) and Portugal.(11) In Brazil, the tool was translated, adapted and validated, with semantic analysis and assessment of item clarity and comprehension,(13) making it necessary to perform psychometric validation.

A valid, reliable and consistent measurement tool for the measurement of safety culture in PHC provides relevant evidence to ensure the reliability of study results, assisting in the overall analysis, with support for establishing strategic planning for improvement. quality of services, as well as providing comparisons of national and international surveys.

Therefore, the objective of the study was to analyze reliability and validity of psychometric properties of the Brazilian version of the Survey on Patient Safety Culture in Primary Care.

Methods

A quantitative cross-sectional study conducted in 17 Family Health Units (FHUs), located in a municipality in Rio Grande do Sul State, Brazil. Data collection took place from December 2017 to April 2018. In the month prior to collection, FHUs had 228 professionals from the multidisciplinary team. Participants were selected by convenience sampling.

Inclusion criteria were being a professional of the multidisciplinary team that provided direct and indirect assistance to patient, working in the unit for at least 30 days and working at least 20 hours per week. This established time and workload allows employees to gain insight into individual and group values, attitudes, perceptions, and competencies that determine patient safety commitment and proficiency in the institution in which they operate.(19) The exclusion criteria were: being on sick leave or other type of leave during the data collection period.

After applying these criteria, 24 professionals were excluded because they were on maternity or...
health leave and 10 because they had not worked in the unit for at least 30 days, resulting in 194 professionals. Of these, six refused to participate. 188 professionals participated, including physicians, dentists, nurses, nursing assistants/technicians, community health agents, nutritionists, pharmacists, psychologists, physiotherapists, occupational therapists, dental assistants, social workers, physical educators and administrative assistants.

To perform data collection, initially, the researched institution was requested a list with the names of employees and their respective work shifts. Unit managers were contacted to define the best time and date to apply the questionnaire. Data collection was performed in the professionals’ work environment by a researcher during the team meeting. All participants received information regarding the research, such as objective, justification, risks and benefits, as well as legal and ethical issues. After agreeing to participate, they received an envelope containing the questionnaire accompanied by the Free and Informed Consent Term (FICT), in two copies. Respondents privacy was assured.

The researcher remained in the room in order to answer questions, if any, and receive the questionnaire answered. The time taken by professionals to complete the questionnaire ranged from 20 to 45 minutes. The Brazilian version of the Survey on Patient Safety Culture in Primary Care, which assesses patient safety culture in PHC, was used as a tool. (13)

The original tool consists of 51 questions that measure 12 dimensions of patient safety construct, which include Communication Openness, Communication About Error, Information Exchange with Other Institutions, Office Process and Standardization, Organizational Learning, Overall Perceptions of Patient Safety and Quality, Owner/Managing partner/Leadership Support for Patient Safety, Patient Care Tracking/Follow-up, Patient Safety Issues and Quality, Staff Training, Teamwork and Work Pressure and Pace. (16) MOSPSC questionnaire was translated, adapted and semantic validated for Brazil, and the tool consisted of 12 constructs that measure patient safety culture. (13)

To assess Patient Safety Culture in population in which the questionnaire was applied, a positive perception was considered as the dimension where Patient Safety Indicators (PSI) was > 3 and a clearly positive perception when PSI was ≥ 4. (9)

Data were organized in the Epi-Info® 6.04 program, with independent double entry. After correcting errors and inconsistencies, statistical analysis was performed using the Statistical Package for Social Sciences (SPSS®), version 18.0 for Windows. Categorical variables are expressed as absolute frequencies and proportions, and quantitative variables are described by measures of central tendency (mean or median) and dispersion (standard deviation or interquartile range) according to the normality distribution assessed by the Kolmogorov-Smirnov test.

To perform a comparative analysis of all dimensions that make up the questionnaire, the original response scale for sections A (Patient Safety and Quality Issues) and B (Information Exchange with Other Institutions), which have six response categories, was transformed into a rating scale 1 through 5, like the rest of the sections, by applying the Original Scale Assigned Score (PES - Pontuação Atribuída na Escala Original) formula x (4/5) + 0.2. In this process, it was taken into account that the questionnaire used contains questions posed positively and others negatively. The reverse questions of the tool refer to items C3, C6, C8, C10, C12, C14, D4, D7, D10, E1, E2, E4, F3, F4 and F6. After these transformations, a specific synthesis score of each dimension was calculated by averaging the scores assigned to the questions that make up the corresponding dimension.

PSI was defined as the mean score of all questions that make up the 12 dimensions analyzed. In all cases, the range was 1 to 5. Relative frequencies of each question were calculated and the composite indicators of each dimension were measured by the following formula: (9)

$$\Sigma \text{ (positive, neutral and negative) answers in items of one dimension}$$

$$\frac{\text{Number of total responses on items in one dimension}}{}$$
Internal consistency of the MOSPSC scale was investigated by Cronbach’s alpha internal coefficient, calculated separately for each domain. In addition, the reverse items were adjusted for Cronbach’s alpha calculation. To validate the tool, it was tested for its factorial structure, using the exploratory factor analysis technique by the main component method and a factorial analysis by the principal axis extraction method, Varimax rotation.

Research project was approved by the Research Ethics Committee, under the Opinion 2,413,567 of 4th December 2017, respecting all ethical standards recommended by Resolution 466/2012.

Results

The population surveyed for psychometric validation of the tool was mostly female (87.8%), with a predominant age of 31 to 50 years (58%). The most frequent educational levels were high school (42.8%) and graduate (31.6%). Work time periods prevailed in the unit of more than 11 years (27.8%) and from 6 to 10.9 years (25.1%). Regarding the hours worked per week, most professionals worked over 32 hours (91.0%).

The assessed health team generally had a positive perception regarding patient safety culture (PSI=3.64) in most domains, including: Patient Safety and Quality (4.12); Information Exchange with Other Institutions (4.11); Staff Training (3.40); Office Process and Standardization (3.64); Communication About Error (3.89); Owner/Managing partner/Leadership Support for Patient Safety (3.19); Organizational Learning (3.87); Overall Perceptions of Patient Safety and Quality (3.72); Overall Patient Safety Assessment (3.48); and Overall Quality Assessment (3.45) (Table 1).

Considering the MOSPSC scale’s original structure, consistency was investigated by Cronbach’s alpha (αC). Estimates pointed to satisfactory reliability (αC≥0.700) in Patient Safety and Quality list (αC=0.848), Information Exchange with Other Institutions (αC=0.853), Owner/Managing partner/Leadership Support for Patient Safety (αC=0.703) and Overall Quality Assessment (αC=0.829) (Table 1).

Regarding acceptable reliability (0.600≤ αC <0.700), there were Teamwork (αC=0.603), Pressure and Work Pace (αC=0.683), Staff Training (αC=0.603), Communication Openness (αC=0.676), Patient Care Tracking/Follow-up (αC=0.660) and Overall Perceptions of Patient Safety and Quality (αC=0.620). Additionally, Office Process and Standardization (αC = 0.477) and Communication About Error (α=0.416) showed reliability below the acceptable minimum (Table 1).

For reliability analysis, the MOSPSC tool was tested for the factorial structure to identify item distribution in each domain, and it was similar to the preestablished structure. The MOSPSC scale

| Table 1. Mental tendency measures and variability for the Medical Office Survey on Patient Safety Culture (MOSPSC) domains |
|---|---|---|---|---|
| Domains | Mean | Standard Deviation | Amplitude Minimum | Maximum |
| Patient Safety and Quality | 4.12 | 0.77 | 1.00 | 5.00 |
| Information Exchange with Other Institutions | 4.11 | 0.75 | 1.40 | 5.00 |
| Teamwork | 4.31 | 0.48 | 2.00 | 5.00 |
| Work Pressure and Pace | 2.38 | 0.78 | 1.00 | 5.00 |
| Staff Training | 3.40 | 0.75 | 1.00 | 5.00 |
| Office Process and Standardization | 3.64 | 0.63 | 1.00 | 5.00 |
| Communication Openness | 4.07 | 0.66 | 1.00 | 5.00 |
| Patient Care Tracking/Follow-up | 4.32 | 0.58 | 3.00 | 5.00 |
| Communication About Error | 3.89 | 0.65 | 2.00 | 5.00 |
| Owner/Managing partner/Leadership Support for Patient Safety | 3.19 | 0.77 | 1.00 | 5.00 |
| Organizational Learning | 3.87 | 0.70 | 1.00 | 5.00 |
| Overall Perceptions of Patient Safety and Quality | 3.72 | 0.61 | 2.00 | 5.00 |
| Overall Patient Safety Assessment | 3.46 | 0.73 | 2.00 | 5.00 |
| Overall Quality Assessment | 3.45 | 0.66 | 2.00 | 5.00 |
| Patient Safety Indicators (PSI) | 3.64 | 0.84 | 1.00 | 5.00 |

<table>
<thead>
<tr>
<th>Quartiles</th>
<th>1st</th>
<th>2nd Median</th>
<th>3rd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Safety and Quality</td>
<td>3.89</td>
<td>4.28</td>
<td>4.60</td>
</tr>
<tr>
<td>Information Exchange with Other Institutions</td>
<td>3.80</td>
<td>4.20</td>
<td>4.80</td>
</tr>
<tr>
<td>Teamwork</td>
<td>4.00</td>
<td>4.25</td>
<td>4.75</td>
</tr>
<tr>
<td>Work Pressure and Pace</td>
<td>1.75</td>
<td>2.25</td>
<td>2.75</td>
</tr>
<tr>
<td>Staff Training</td>
<td>3.00</td>
<td>3.33</td>
<td>4.00</td>
</tr>
<tr>
<td>Office Process and Standardization</td>
<td>3.77</td>
<td>4.33</td>
<td>4.75</td>
</tr>
<tr>
<td>Communication Openness</td>
<td>4.00</td>
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<td>4.75</td>
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<td>Patient Care Tracking/Follow-up</td>
<td>3.77</td>
<td>4.33</td>
<td>4.75</td>
</tr>
<tr>
<td>Communication About Error</td>
<td>3.50</td>
<td>4.00</td>
<td>4.25</td>
</tr>
<tr>
<td>Owner/Managing partner/Leadership Support for Patient Safety</td>
<td>3.77</td>
<td>4.33</td>
<td>4.75</td>
</tr>
<tr>
<td>Organizational Learning</td>
<td>3.67</td>
<td>4.00</td>
<td>4.33</td>
</tr>
<tr>
<td>Overall Perceptions of Patient Safety and Quality</td>
<td>3.50</td>
<td>3.75</td>
<td>4.13</td>
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<tr>
<td>Overall Patient Safety Assessment</td>
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<td>3.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Overall Quality Assessment</td>
<td>3.40</td>
<td>4.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Patient Safety Indicators (PSI)</td>
<td>3.77</td>
<td>4.25</td>
<td>4.75</td>
</tr>
</tbody>
</table>
showed significant adjustment represented by the Kais test (Kaiser-Meyer-Olkin) of 0.835 and the significant Bartlett sphericity test \[ \chi^2(1596) = 1914.773; p<0.001 \], which attested to the possibility of performing the factor analysis. The anti-image matrix corroborates tool items' sample adequacy for the use of factor analysis, presenting all the high values in its diagonal, between 0.885 (in the variable “D11”) and 0.977 (in the variable “A2”), suggesting the inclusion of all variables for factor analysis.

The latent underlying criterion or eigenvalue was met, where only eigenvalues ≥ 1 were considered significant. The Guttman-Keiser criterion estimated that 14 latent variables should be extracted, where the first had an eigenvalue of 5.232, carrying about 9.386% variance, while in the last factor (F14) the eigenvalue was 1.235, which managed explain 2.551% of variance. The factorial model reached a 63.444% explained variance ratio (Table 2).

### Table 2. Extraction of rotational matrix factors, eigenvalues and explained variance ratio for MOSPSC scale

<table>
<thead>
<tr>
<th>Factorial component (latent variable)</th>
<th>Eigenvalues</th>
<th>% Explained variance</th>
<th>Per factor</th>
<th>Accumulated</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5.232</td>
<td>9.386</td>
<td>9.386</td>
<td>9.386</td>
</tr>
<tr>
<td>2</td>
<td>4.289</td>
<td>7.695</td>
<td>17.081</td>
<td>26.465</td>
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<tr>
<td>3</td>
<td>2.963</td>
<td>5.316</td>
<td>22.397</td>
<td>48.862</td>
</tr>
<tr>
<td>4</td>
<td>2.880</td>
<td>5.167</td>
<td>27.563</td>
<td>76.425</td>
</tr>
<tr>
<td>5</td>
<td>2.577</td>
<td>4.624</td>
<td>32.188</td>
<td>108.613</td>
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<tr>
<td>6</td>
<td>2.509</td>
<td>4.502</td>
<td>36.690</td>
<td>145.303</td>
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<tr>
<td>7</td>
<td>2.386</td>
<td>4.281</td>
<td>40.971</td>
<td>186.274</td>
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<tr>
<td>8</td>
<td>2.159</td>
<td>3.874</td>
<td>44.845</td>
<td>231.119</td>
</tr>
<tr>
<td>9</td>
<td>2.001</td>
<td>3.589</td>
<td>48.434</td>
<td>280.553</td>
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<tr>
<td>10</td>
<td>1.800</td>
<td>3.230</td>
<td>51.664</td>
<td>332.217</td>
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<tr>
<td>11</td>
<td>1.782</td>
<td>3.197</td>
<td>54.861</td>
<td>387.078</td>
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<tr>
<td>12</td>
<td>1.687</td>
<td>3.120</td>
<td>57.981</td>
<td>444.059</td>
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<tr>
<td>13</td>
<td>1.427</td>
<td>2.912</td>
<td>60.893</td>
<td>504.952</td>
</tr>
<tr>
<td>14</td>
<td>1.235</td>
<td>2.551</td>
<td>63.444</td>
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Extraction method: main component analysis; Varimax rotation

In the information regarding the items that made up each of the latent variables, it was initially found that the commonalities had the lowest contribution to explain the factorial structure in item A10 (0.528), while the item that contributed the most was C11 (0.783).

According to the results in Table 2, Factor 1, responsible for the greatest explanatory power on the scale (9.386%), grouped “Patient Safety and Quality Issues”. These items made up the most important factor to explain the scale. Following, there is:

- **Factor 2 (7.695%)**: Overall Quality and Safety Assessment (G1A, G1B, G1C, G1D, G1E);
- **Factor 3 (5.316%)**: Communication Openness (D1, D2, D4, D10);
- **Factor 4 (5.167%)**: Office Process and Standardization (C8, C9, C12, C15);
- **Factor 5 (4.624%)**: Teamwork (C1, C2, C5, C13);
- **Factor 6 (4.502%)**: Work Pressure and Pace (C3, C6, C11, C14);
- **Factor 7 (4.281%)**: Information Exchange with Other Institutions (B1, B2, B3, B4);
- **Factor 8 (3.874%)**: Staff Training (C4, C7, C10);
- **Factor 9 (3.589%)**: Owner/Managing partner/Leadership Support for Patient Safety (E1, E2, E3, E4);
- **Factor 10 (3.230%)**: Patient Care Tracking/Follow-up (D3, D5, D6, D9);
- **Factor 11 (3.197%)**: Overall Patient Safety Assessment
- **Factor 12 (3.120%)**: Communication About Error (D7, D8, D11, D12);
- **Factor 13 (2.912%)**: Organizational Learning (F1, F5, F7);
- **Factor 14 (2.551%)**: Overall Perceptions of Patient Safety and Quality (F2, F3, F4, F6).

It is noteworthy that scale factors where there was compromised reliability estimated by Cronbach’s alpha presented satisfactory factor loads in the set of their factors. Hence, the maintenance of these items will not compromise the scale results (Table 3).

Moreover, respecting the results obtained in the reliability and factorial validation of MOSPSC scale in this sample, there is evidence that the pre-established structure for this tool was reached. The tool showed feasibility of application and potential structure assessment for which it is proposed. Results were considered reliable due to the exploratory factor analysis model fit obtained through adequate free asymmetric distribution methods in order to estimate ordinal categorical items with nonparametric distribution.
Table 3. Varimax rotation factor analysis matrix and 14-factor Keiser normalization for the MOSPSC scale

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
<th>F4</th>
<th>F5</th>
<th>F6</th>
<th>F7</th>
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<th>F12</th>
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<td>A1</td>
<td>0.602</td>
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Eigenvalues <0.300 were omitted and variables were grouped by loads on each factor.
Discussion

The tool was reliable and satisfactory for use in the Brazilian population, given its similarity to validation studies conducted in other countries. It should be noted that, in the mentioned dimensions, the possibility of discarding items with low correlations would not significantly change the domains’ alpha and the scale composition, which would go from 0.974 to 0.943 in the total scale composition, from 0.477 to 0.498 in the domain “Office Process and Standardization”, 0.416 to 0.663 in “Communication About Error”. Such changes are not justified because there is no way to guarantee that deleting the items would not impair content validity.

When compared with validation studies conducted in different countries, tool use with all components of the scale yielded no harm to the safety culture assessment. Cronbach’s $\alpha$ values obtained are similar to those reported by the Agency for Health Research and Quality (AHRQ), in most dimensions, which are considered adequate.

The adaptation of MOSPSC in Spain obtained an overall $\alpha$ of 0.96. In this adaptation, questions were added and, when assessing $\alpha$ for each dimension, unsatisfactory value was obtained for Staff Training and Patient Care Tracking/Follow-up. When validating for the Arabic version, $\alpha$ ranged from 0.20 to 0.70, and Information Exchange with Other Institutions and List of questions on patient safety and quality due to high non-response and non-applicability were excluded. Similar results were found in the validation to Portuguese, where $\alpha$ ranged from 0.52 to 0.88, and for the same reasons cited in the previous study both dimensions were excluded.

According to the results of the on-screen investigation, the factor responsible for the greatest explanatory power on the scale (9.386%) grouped Patient Safety and Quality Issues. In studies conducted in Yemen and Portugal, this dimension was excluded by the high rate of non-response and non-applicability, contrary to the present study, which obtained 97% response rate. This high response rate is due to researcher availability to remain in the referred units. A study that assesses safety culture recommends that the maximum possible participation of professionals in safety culture assessments is obtained, because the higher the response rate, the more appropriate is its representation.

The second largest factor (7.695%) was the Overall Quality Assessment (G1A, G1B, G1C, G1D, G1E). In the Arabic validation study, this domain also kept five questions, same as the original tool. In the Spanish version, this dimension presents six questions, which included the question related to Overall Patient Safety Assessment (G2).

In the Spanish and Arabic studies, factor 3 (5.316%), Communication Openness (D1, D2, D4, D10) remained present and with the same questions as the original tool. Factor 4 (5.167%), which refers to the Office Process and Standardization (C8, C9, C12, C15), also remained with the same questions in the Arabic study. However, in the Spanish validation an issue has been incorporated into this dimension (C19).

The results for Factor 5 (4.624%) for Teamwork and Factor 6 (4.502%), Working Pressure and Rate (C3, C6, C11, C14) had no modified questions in the Spanish and Arabic validation studies.

Information Exchange with Other Institutions (B1, B2, B3, B4) relates to factor 7 (4.281%). In Yemen and Portugal validation studies, this dimension was excluded by the high rate of non-response and non-applicability. In the Spanish study, this dimension had an excluded question (B5), which was contained in the original MOSPSC tool, which refers to a question that could be described by the respondent, specifying the contact sector.

Staff Training (C4, C7, C10) is identified as factor 8 (3.874%) of the scale. In the Spanish version, this dimension had duplicate questions for assistant and non-assistant professionals and had added questions (C16, C17, C17, C19). In an Arabic study, this domain remained with the same issues as the original tool. In these countries, factor 9 (3.589%), Owner/Managing partner/Leadership Support for Patient Safety (E1, E2, E3, E4), and factor 10 (3.230%), Patient Care Tracking/Follow-
up (D3, D5, D6, D9) did not have modified questions. Factor 11 (3.197%), related to G2 Overall Patient Safety Assessment, it was not separately measured in the other validation studies.\(^{(11,17,18)}\)

Communication About Error (D7, D8, D11, D12) relates to factor 12 (3.120%), and the Spanish study version\(^{(17)}\) had questions incorporated in the factorial solution (D13, D14). In the Arabic version,\(^{(18)}\) the tool was kept with the same questions as the original tool. Finally, factor 13 (2.912%), referring to Organizational Learning (F1, F5, F7), and factor 14 (2.551%), referring Overall Perceptions of Patient Safety and Quality (F2, F3, F4, F6) had no modified questions in Spanish\(^{(17)}\) and Arabic validation studies.\(^{(18)}\)

This study shows that professionals interviewed had a positive safety culture. In organizations provided with a culture of positive security, this is through communication based on mutual trust, shared understandings of the importance of security, and confidence in preventive effectiveness measures.\(^{(16)}\) A positive safety culture means service leaders and managers work to ensure care is delivered safely and quality, using different tools to identify gaps and create safer health processes.\(^{(22)}\)

This study was conducted in a city in Rio Grande do Sul State, which may be a limitation for results generalization. Nevertheless, the results obtained in this research contribute to the dissemination of knowledge on the subject, as there is still little data in the literature.

It is noteworthy that this study of psychometric validation is unprecedented in Brazil, setting as a starting point for future investigations that can be performed in other Brazilian regions.

**Conclusion**

The Survey on Patient Safety Culture in Primary Care presented valid and reliable psychometric properties when applied to a municipality in the southern Brazilian region. Patient safety culture was positive in most of the tool domains, except for Work Pressure and Pace. The obtained results are fundamental for the tool application in studies that intend to assess patient safety culture in PHC in different regions of the country. Future studies can be developed with a psychometrically validated tool for Brazil, in order to know the present safety culture, thus recommending tool validation with professionals from other places, expressing the work process culture for patient safety and quality in their microregional spaces.

**Collaborations**

Dal Pai S, Langendorf TF, Rodrigues MCS, Romero MP, Loro MM and Kolankiewicz ACB contributed to the study design, data analysis and interpretation, article writing, relevant critical review of the intellectual content and approval of the final version to be published.

**References**


Psychometric validation of a tool that assesses safety culture in Primary Care


Patients undergoing peritoneal dialysis: association between nursing diagnoses and their components

Objective: To analyze the association between nursing diagnoses and their defining characteristics, related or risk factors for patients on peritoneal dialysis.

Methods: Content validation study with six nephrologist nurses, who participated in the study as experts. The focus group technique was used. Logistic regression was used for data analysis.

Results: For the four nursing diagnoses studied, was identified an association with its components as follows. Fatigue: anemia, insufficient energy and verbalization of a sustained exhaustion; Impaired walking: impaired ability to navigate curbs, impaired ability to climb stairs and insufficient muscle strength; Constipation: insufficient fluid intake, insufficient physical activity, pain with defecation, hard and formed stools; Excess fluid volume: compromised regulatory mechanisms, azotemia, intake exceeds output, weight gain over short period of time, and electrolyte imbalance.

Conclusion: The analyzed diagnoses integrate the following domains: activity/rest, elimination and exchange and nutrition, and are associated with its components for patients undergoing peritoneal dialysis.
Introduction

Chronic Kidney Disease (CKD) is the slow, progressive and irreversible loss of renal function due to decreased glomerular filtration rate (GFR) and loss of excretory, regulatory and endocrine functions.\(^1\) In Brazil, it affects more than 90 thousand people, and the incidence occurs in the age group between 19 and 64 years.\(^2,3\) These data tend to grow because of the increase of chronic diseases such as diabetes mellitus (DM) and systemic arterial hypertension (SAH).\(^4\)

Various types of Renal Replacement Therapy (RRT) are indicated for patients with advanced CKD, namely: hemodialysis (HD), peritoneal dialysis (PD) and renal transplantation.\(^5,6\) Among these, PD has the best cost-benefit ratio and the potential advantage of being performed at home.\(^5,7\) However, it demands that patients adopt a differentiated lifestyle in relation to food, hygiene, medicines and health care.

In this context, nurses are an important facilitator of the care of patients in PD treatment, either by performing nursing procedures or by evaluating and providing guidance on their health status, exams, medications, diet, among others. Moreover, in the process of caring for this clientele, the accurate interpretation of human responses is essential for the selection of appropriate interventions and evaluation of the outcome achieved.

Therefore, nurses must develop the Nursing Process (NP) based on critical thinking and clinical judgment, as this is essential for safe and effective care. The NP is composed of five phases: history, nursing diagnoses (ND), interventions, implementation and evaluation of nursing actions. The identification of ND is a vital step, because it allows the judgment of human responses that require nursing interventions.

The identification of ND is a relevant instrument in the operationalization of care in patients undergoing PD treatment and may contribute to improve their quality of life and nurses’ knowledge in the field of care, teaching and research.

An integrative review seeking for scientific productions on the subject in question was performed to support and justify the development of the study. The following databases of the Virtual Health Library (VHL) were used: Latin American and Caribbean Literature (LILACS) and International Literature in Health and Biomedical Sciences (Medline); SCOPUS and Cumulative Index to Nursing and Allied Health Literature (CINAHL) with the following crossings: Peritoneal dialysis; Nursing diagnosis; Nursing process.

A shortage of studies related to ND in patients undergoing PD treatment, especially current research on the association between diagnoses and their components, justified the performance of the present study.

The objective of this study was to analyze the association between nursing diagnoses and their defining characteristics, and the related or risk factors for patients undergoing peritoneal dialysis.

Methods

This article is the content validation part of a macro study. In that study, was performed the validation of the nursing diagnoses identified after nursing consultations with 82 registered patients undergoing peritoneal dialysis and under regular follow-up at a referral center for the treatment of renal diseases located in the Northeast of Brazil. These participants were included in the previous stage of the larger project in the period between March and September 2017.

The population that was the focus of the present study included 16 nurses working in the referred center. The following inclusion criteria were adopted for the sample: being a specialist in Nephrology, having experience in ND and acting in the institution as an internship preceptor. Professionals on medical leave or vacation were excluded. After applying the criteria, was reached a final sample of six expert nurses.
For the identification of Nursing Diagnoses, were used an interview script and a physical examination containing sociodemographic and clinical data, defining characteristics (signs and symptoms), and risk/related factors subdivided into the 12 domains present in NANDA International Taxonomy II. In addition, were used specific questions for people with kidney disease, such as: time of diagnosis and treatment, presence of comorbidities, knowledge about the disease, medications used and information about laboratory tests performed. The instrument that originated this part of the article refers to content validation and was constructed before the nursing consultation with the 82 patients.

This step was performed by two authors of the present study, both with a PhD degree, seeking to identify the defining characteristics and related/risk factors according to NANDA-I, version 2015-2017. For the identification of the Nursing Diagnoses, was adopted the clinical judgment model of Gordon. Then, were built 82 Microsoft Office Excel spreadsheets (each referring to a user) that formed the list of diagnoses with an average of 30 ND in each spreadsheet.

Subsequently, the six expert nurses received 82 spreadsheets, which contained sociodemographic and clinical data, the list of defining characteristics and risk/related factors marked according to their presence or absence for each ND investigated for each user, so they could direct the diagnostic inference.

Then, each expert analyzed and judged if the ND, according to NANDA-I, version 2015-2017, was present or absent in each of the worksheets. The NDs underwent a process of consensus validation among the six experts through a focus group that resulted in 22 validated diagnoses. In the focus group, through the analysis of worksheets, the experts discussed the relationship between the data collected and their clinical support for reaching the diagnoses. They also assessed the agreement between the defining characteristics, related or risk factors and ND, thereby reaching priority diagnostics.

For the treatment of data, instruments were numbered, and their variables were coded and inserted into a Microsoft Office Excel 2009 database. Subsequently, data were compiled and processed by the IBM Statistical Package for the Social Science (SPSS), version 20.0 for Windows.

Inferential statistics was performed using the Pearson’s chi-square test, the Fisher’s exact test and logistic regression through the stepwise method. The aim was to identify the components of ND that influenced the process of establishing human responses in renal patients undergoing PD treatment. A significance level of 10% was considered.

The study met the national and international standards of ethics in research and was approved by the Research Ethics Committee under number 330.508.

**Results**

Most expert nurses were females (88.5%), aged between 35 and 45 years (34.1%), residents of the Northeast region of Brazil (100%), and had more than 15 years of professional training (83.9%). Regarding occupation, the majority (80.5%) worked as teachers in educational institutions, had a PhD degree (56%), taught ND (84.8%) and assisted people with Chronic Kidney Disease (80.7%).

Table 1 describes the 22 priority diagnoses validated by the six expert nurses.

Table 2 shows the NDs that had a statistically significant association with their respective defining characteristics and related/risk factors through the Pearson’s chi-square test and Fisher’s exact test. The statistical tests could not be performed with the nursing diagnosis Risk for infection, because it was present in 100% of study participants.

The last stage of the study was the logistic regression for NDs that had a statistically significant association in the chi-square test with their respective defining characteristics and related/risk factors, such as: Fatigue, Impaired walking, Constipation, Excess fluid volume. Table 3 shows the association between the Defining characteristics/Related factors and the nursing diagnoses identified in patients undergoing PD.
Table 1. Distribution of the Nursing Diagnoses identified in chronic renal patients on peritoneal dialysis (n=82)

<table>
<thead>
<tr>
<th>Nursing Diagnoses (%)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Risk for infection (100)</td>
<td></td>
</tr>
<tr>
<td>2. Excess fluid volume (91.1)</td>
<td></td>
</tr>
<tr>
<td>3. Fatigue (73.5)</td>
<td></td>
</tr>
<tr>
<td>4. Constipation (60.2)</td>
<td></td>
</tr>
<tr>
<td>5. Impaired walking (57.3)</td>
<td></td>
</tr>
<tr>
<td>6. Acute pain (55.8)</td>
<td></td>
</tr>
<tr>
<td>7. Ineffective health management (32.3)</td>
<td></td>
</tr>
<tr>
<td>8. Sexual dysfunction (29.4)</td>
<td></td>
</tr>
<tr>
<td>9. Situational low self-esteem (29.4)</td>
<td></td>
</tr>
<tr>
<td>10. Anxiety (26.4)</td>
<td></td>
</tr>
<tr>
<td>11. Ineffective protection (22.0)</td>
<td></td>
</tr>
<tr>
<td>12. Intolerance to physical activity (19.1)</td>
<td></td>
</tr>
<tr>
<td>13. Risk for fall (16.1)</td>
<td></td>
</tr>
<tr>
<td>14. Disturbed sleep pattern (16.1)</td>
<td></td>
</tr>
<tr>
<td>15. Disturbed sensory perception: visual (11.7)</td>
<td></td>
</tr>
<tr>
<td>16. Disturbed sensory perception: auditory (8.8)</td>
<td></td>
</tr>
<tr>
<td>17. Chronic sadness (7.3)</td>
<td></td>
</tr>
<tr>
<td>18. Deficient knowledge (7.3)</td>
<td></td>
</tr>
<tr>
<td>19. Fear (5.8)</td>
<td></td>
</tr>
<tr>
<td>20. Risk for powerlessness (4.4)</td>
<td></td>
</tr>
<tr>
<td>21. Impaired dentition (4.4)</td>
<td></td>
</tr>
<tr>
<td>22. Impaired skin integrity (2.9)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Distribution of Nursing Diagnoses according to the respective related/risk factors and defining characteristics that were statistically significant (p<0.05)

<table>
<thead>
<tr>
<th>Nursing Diagnosis</th>
<th>Related/risk factors</th>
<th>p-value</th>
<th>Defining characteristics</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk for infection</td>
<td>Invasive procedure, chronic disease</td>
<td>0.024</td>
<td>Insufficient energy</td>
<td>0.001</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Anemia</td>
<td>0.036</td>
<td>Verbalization of a sustained exhaustion</td>
<td>0.016</td>
</tr>
<tr>
<td>Impaired walking</td>
<td>Impaired ability to navigate curbs</td>
<td>0.001</td>
<td>Insufficient muscle strength</td>
<td>0.021</td>
</tr>
<tr>
<td>Constipation</td>
<td>Insufficient fluid intake</td>
<td>0.029</td>
<td>Pain with defecation</td>
<td>0.018</td>
</tr>
<tr>
<td>Excess fluid volume</td>
<td>Insufficient physical activity</td>
<td>0.038</td>
<td>Hard, formed stool</td>
<td>0.042</td>
</tr>
<tr>
<td></td>
<td>Compromised regulatory mechanism</td>
<td>0.012</td>
<td>Azotemia</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Table 3. Association between defining characteristics/related factors and nursing diagnoses identified in patients undergoing peritoneal dialysis

<table>
<thead>
<tr>
<th>Defining characteristics/Related factors</th>
<th>Nursing Diagnosis</th>
<th>p-value</th>
<th>Cox &amp; Snell R²</th>
<th>Nagelkerke R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anemia Fatigue</td>
<td>Present</td>
<td>0.013</td>
<td>0.627</td>
<td>1.000</td>
</tr>
<tr>
<td>Absent</td>
<td>0.0</td>
<td>16.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbalization of a sustained exhaustion</td>
<td>Present</td>
<td>0.032</td>
<td>0.705</td>
<td>1.000</td>
</tr>
<tr>
<td>Absent</td>
<td>0.0</td>
<td>14.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insufficient energy</td>
<td>Present</td>
<td>0.002</td>
<td>0.649</td>
<td>1.000</td>
</tr>
<tr>
<td>Absent</td>
<td>0.0</td>
<td>14.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insufficient muscle strength</td>
<td>Impaired walking</td>
<td>Present</td>
<td>0.001</td>
<td>0.727</td>
</tr>
<tr>
<td>Absent</td>
<td>0.0</td>
<td>14.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insufficient fluid intake</td>
<td>Constipation</td>
<td>Present</td>
<td>0.015</td>
<td>0.727</td>
</tr>
<tr>
<td>Absent</td>
<td>0.0</td>
<td>14.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake exceeds output</td>
<td>Present</td>
<td>0.018</td>
<td>0.727</td>
<td>1.000</td>
</tr>
<tr>
<td>Absent</td>
<td>0.0</td>
<td>14.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight gain over short period of time</td>
<td>Present</td>
<td>0.036</td>
<td>0.727</td>
<td>1.000</td>
</tr>
<tr>
<td>Absent</td>
<td>0.0</td>
<td>14.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

An association was identified between the ND Fatigue and the Related factor Anemia, and with the Defining characteristics Insufficient energy and Verbalization of a sustained exhaustion. For the ND Impaired Walking, there was...
an association with the Related factor Impaired ability to navigate curbs, Impaired ability to climb stairs and the Defining Characteristic Insufficient muscle strength. For the ND Constipation, there was an association between the Related factors Insufficient fluid intake, Insufficient physical activity and the Defining characteristics Pain on evacuation, Hard and formed stools. For the ND Excess fluid volume, was identified an association between the Related factor Compromised regulatory mechanisms, and with the Defining characteristics Azotemia, Intake exceeds output, Weight gain in short period and Electrolyte imbalance.

Discussion

One of the nursing diagnoses found in all patients on peritoneal dialysis was Risk for infection. After cardiovascular causes, infectious diseases are among those that most kill patients undergoing dialysis. International research has identified sepsis as the second leading cause of death in patients on peritoneal dialysis, thereby demonstrating an increased risk in patients with more than one episode during treatment. (9)

In a study developed in Brazil with a sample of 90 patients, almost half (42.2%) had peritonitis, of which 15.5% had two or more episodes. (10) This is the main complication of peritoneal dialysis, whether in manual (MPD) or automated (APD). (11)

Therefore, professionals should advise patients about measures that minimize this risk and lead to a tunnel infection or an infection in the peritoneal catheter exit site, which are possible risk factors associated with the development of peritonitis. In addition, the constant evaluation of laboratory tests, dressing changes and observation of patients’ body manifestations, signs and symptoms of infection (edema, hyperemia, heat, flushing, hyperthermia), hand hygiene with alcohol gel before and after each procedure, and using an aseptic technique for invasive procedures promote patient safety and protection. (12-14)

Although the ND Risk for Infection has been determined for 100% of patients and validated by experts, the identification of this diagnosis must be done with cautious by avoiding its indiscriminate use. According to studies discussed previously, there is evidence that less than 50% of people undergoing peritoneal dialysis have peritonitis.

Hence the importance of studies on the accuracy of nursing diagnoses for an adequate diagnostic inference. Knowledge about the clinical indicators with better predictive capacity for a given diagnosis offers nurses a greater precision in the choice and direction of interventions in clinical practice and favors the achievement of results.

Sociodemographic and nutritional factors, climatic conditions, diabetes mellitus, and the PD modality are the possible risk factors associated with the development of peritonitis. (13,14)

It is important that patients and/or caregivers are trained and supervised by nurses regarding the conditions of housing, supplies and procedures for PD for the prevention of infectious complications, such as catheter exit orifice infection and peritonitis. Approximately 18% of mortality related to peritoneal dialysis infection is due to peritonitis. However, only 4% of episodes of peritonitis result in death. The severe and prolonged damage caused to the peritoneal membrane leads to peritoneal failure, which makes peritonitis the main cause for transferring peritoneal dialysis patients to hemodialysis. Therefore, its prevention is critical for a successful program. (13)

Fatigue was also a nursing diagnosis present among patients. Chronic Renal Insufficiency can lead to progressive loss of muscular structure because of the unsatisfactory protein quantity in the extracellular fluid. (15) In addition, renal patients have anemia because of erythropoietin deficiency.
As a result, oxygen diffusion becomes impaired and leads cells to produce a large amount of lactic acid that causes muscle fiber saturation and consequent fatigue.\(^{(16)}\)

Designing a care plan is a greatly important task in nursing so that patients maintain their autonomy and self-care in the performance of activities of daily living. The following stand out within this plan: explain the causes of fatigue to patients and their caregivers, determine each patient’s physical limitations, identify activities in which help is needed and define the forms of resolution together with the patient, and encourage the verbalization of feelings about the limitations.\(^{(2,3)}\)

In addition, it is important to provide guidelines on the importance of sleep and nutritional supplementation rich in folic acid and vitamin B12, as these contribute to the maturation of red blood cells and consequent reduction of these patients’ anemia typical of their clinical condition itself. A study showed that resistance exercises improved strength, fatigue and physical performance of patients. These findings suggest beneficial effects of aerobic and resistance training on muscle mass in pre-dialysis and dialysis patients.\(^{(4)}\)

Impaired walking was also identified in the present study. The loss of muscle mass in CKD is an important complicator, contributes to a sedentary lifestyle and compromises cardiovascular health due to the increase in morbidity and mortality. Patients on dialysis also have a reduced level of physical activity, which can induce the loss of muscle proteins and muscular atrophy through a complex mechanism that includes physical inactivity and lack of conditioning.\(^{(3)}\)

Aiming at a coordinated movement and greater resistance of these patients, nurses can implement actions for promoting body mechanics by stimulating the practice of active and passive exercises, and the control of energy loss and consumption. The team must have double care with the physical mobility of these patients in order to minimize the risk for falls and their complications.\(^{(13)}\)

Constipation is also present within this group of patients. The origin of intestinal constipation in dialysis patients is multifactorial and mainly a consequence of the low water intake and use of drugs such as calcium carbonate, the most used phosphorus chelator in the prevention and treatment of hyperphosphatemia. Attention should also be paid to the physical activity profile of patients on dialysis, since they have low exercise capacity compared to healthy individuals, and sedentarism is an important factor for the presence of constipation.\(^{(16)}\)

Although water intake is related to a higher number of gastrocolic reflexes and contributes to intestinal lubrication, individuals with CKD should have a reduced water intake. Low fluid intake has been associated with intestinal constipation by observing its relation to slow intestinal transit and decreased fecal excretion.\(^{(17)}\)

Thus, the following nursing interventions can be performed: hydroelectrolytic control, water control and control of constipation/impaction. The guidelines on controlled water intake, consumption of soluble fibers such as pectins, gums, mucilages and some hemicelluloses are fundamental for the normalization of intestinal transit.\(^{(15)}\) Early treatment of factors that may impair physical capacity, such as anemia and malnutrition, is essential for preventing chronic constipation in these patients.\(^{(4)}\)

Finally, the diagnosis of Excess fluid volume was also identified. Chronic renal patients are unable to filter nitrogenous excreta, electrolytes and liquids, but the treatment does not completely replace renal function, and these substances accumulate. Excess fluid affects the health of these patients, which can lead to pulmonary edema, congestive heart failure and hypertension, that if untreated, can lead to death.\(^{(18)}\)

For reaching the water balance expected results, nurses must be attentive to the possible signs of water imbalance and perform the necessary interventions such as water control, hydroelectrolytic control and water monitoring through the restriction of liquids, evaluation of the presence of edema and maintenance of fluid balance.\(^{(15)}\)
As a limitation, the non-probabilistic sampling type does not guarantee the representativeness of the sample. The small number of studies addressing nursing diagnoses in people undergoing peritoneal dialysis treatment and using inferential statistics led to some difficulties in comparing the findings of the present study. Hence the suggestion of developing other studies with a view to provide stronger support for nurses’ practice with people undergoing peritoneal dialysis, especially regarding nursing diagnoses and their predictors.

Conclusion

The study allowed to identify an association between the four nursing diagnoses and their components as follows: Fatigue: anemia, insufficient energy and verbalization of a sustained exhaustion; Impaired walking: impaired ability to navigate curbs, impaired ability to climb stairs and insufficient muscle strength; Constipation: insufficient fluid intake, insufficient physical activity, pain on defecation, hard and formed stools; Excess fluid volume: compromised regulatory mechanisms, azotemia, intake greater than output, weight gain over short period of time, and electrolyte imbalance. This study contributes to the advancement of nursing care, because the analysis of associations between the diagnoses and their components provides greater clinical power for nurses and allows the knowledge of aspects related to human responses of people, as well as the multicausal dimension and interconnection of these factors. This identification establishes useful nursing interventions for these people’s needs and their health context, reduces complications of the treatment and the experience with the disease, and provides a basis for teaching nursing diagnoses.

Collaborations

Campos MXB, Dutra EJO, Silva CJA, Menezes HF, Santos RSC and Silva RAR collaborated in the project design, data collection, analysis and interpretation of data, article writing, critical review of the intellectual content and approval of the final version to be published.

References

Patients undergoing peritoneal dialysis: association between nursing diagnoses and their components


Validation of Libras technology for health education of deaf people

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Abstract

Objective: To produce and validate an educational video in Libras (Brazilian Sign Language) for the health education of deaf people about AIDS and its transmission forms.

Methods: Methodological development study, with psychometric referential, developed in an audio-communication school. Five judges and 18 deaf people participated. On data collection, the Likert scale was used and, on analysis, Cronbach’s Alpha and Content Validity Index (CVI) were used.

Result: The educational video “Libras communication: learning about Acquired Immunodeficiency Syndrome (AIDS)” is 20 minutes long. Video script was divided in three blocks with their respective items: Block A – AIDS, transmission forms, signs and symptoms, diagnosis, treatment, prevention; Block B – Kinds of protection; Block C – AIDS, a public health problem. Among judges, average CVI of 0.96 was obtained for the items and 0.90 for the psychometric criteria of general assessment. Among deaf people, average CVI of 0.87 was obtained. Total Cronbach’s Alpha for the judges was 0.989 and, for the deaf subjects, 0.634.

Conclusion: The educational video presents evidence of validity and representativeness to be used in health care and health education processes of the target population.

Keywords
Validation studies; Technology; Health education; Deafness; Acquired immunodeficiency syndrome

Descritores
Estudos de validação; Tecnologia; Educação em saúde; Surdez; Síndrome de imunodeficiência adquirida

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Conflicts of interest: nothing to declare.

Introduction

Since the Acquired Immunodeficiency Syndrome (AIDS) epidemic in the 1980’s there have been advances to its treatment, with the implementation of antiretroviral therapy in constant upgrading and scheme simplification, introduction of new medication combinations with distinct action mechanisms and decrease in adverse side-effects. (1)

Such actions make it evident that countries take combat efforts against this disease, which still remains as a public health problem. This context motivated the participating countries in the 20th International AIDS Conference, in 2014, to commit to reach, until 2020, a treatment goal: 90% diagnosed, under treatment and with viral suppression. (2)

However, the global experience has been showing that coercive strategies push people away from services. In that sense, the UN 2030 Agenda for Sustainable Development takes the concepts of inclusion, equity and social justice for tracking approach in line with UNAIDS 2016-2021 Strategy which is believed to prevent 17.6 million new HIV infections and 10.8 million deaths due to AIDS between 2016-2030. (3)

In Brazil, the high mortality rate due to AIDS in different social segments presents a challenge for health professionals’ praxis, because restrictions still persist when it comes to debating sexuality, criminalizing transmission, besides medicalization bringing an individual ontology that fails to consider political experiences, memory of struggles, and connections to human rights and solidarity. In that scenario, the Brazilian response to AIDS has society and its reactions as the protagonist, demanding public policies to face the epidemic. Therefore, if there is collective vulnerability, it is necessary to change the response ontology, from individual to collective scope. (4,5)

Concerning social vulnerability, it is constituted by life contexts that may increase the risks and the manifestation of the disease. This assumption highlights the necessity of vulnerability identification in order to define plans of action and health education, with the perspective of changing the conditioning life factors to risk and disease. (6)

Among vulnerable social segments, deaf people face difficulties related to life conditions and health care. Those people suffer the impact of social determinants related to low socioeconomic position, low educational levels, and challenges upon communication with health professionals. (7)

Added to such life conditions, there is the stigma of asexuality to victimize them. There are, in literature, reports of undue social beliefs about disabled people, as if they were unattractive and incapable of working. Disabled women are perceived by the families of potential spouses as a burden, incapable of getting pregnant, raising children or taking care of their husband. Furthermore, disabled women are vulnerable to rape, since perpetrators believe they cannot react. (8)

Besides the fact that such myths favor the exposure of that social segment to sexually transmitted infections, there are difficulties to access health care services, especially for deaf people, since most professionals do not have appropriate training and do not know Brazilian Sign Language (Libras). (9)

These negative attributes harm care provision to these users and hinder the health education process for sexually transmitted infection prevention. It must be highlighted, moreover, that Libras has different grammar and vocabulary from Portuguese. Thus, deaf people need greater care upon use of technical terms, so more attention is due for communication with this social group so they can take information in effectively.

Furthermore, technological evolution is rising and allows the use of new resources on health care practices, such as Information and Communication Technologies (ICT), making care more dynamic and seeking adequation to the peculiar needs of the deaf community. Thus, technological progress makes the construction of educational tools about several themes possible, using graphics, animation, sound, text and video. This visual pedagogy is fundamental for the effectiveness of bilingual educational practices, because it allows deaf people’s learning in three bases, formed by text, image and video. (12)

In that perspective, this study aimed at developing and validating an educational video in Libras
for the health education of deaf people about AIDS and the ways it is transmitted.

Methods

Methodological development study carried out in 2016, at School of Audio-communication Demóstenes Cunha Lima (EDAC - Escola de Audiocomunicação Demóstenes Cunha Lima), partnered with the Association of Professional Translators and Interpreters of Campina Grande (APTIILCG - Associação de Profissionais Tradutores Intérpretes de Campina Grande), and with the Social Communication Course of Universidade Estadual da Paraíba (CCS/UEPB), all located in the city of Campina Grande, Paraíba State, Brazil. It was intended to obtain an answer to the following guiding question: Is there validity evidence of a technology signaled in Libras to be used in health education processes for deaf people?

It must be highlighted that all ethical aspects of research involving human beings were preserved. It was made clear for all subjects who took part in video shooting that the video would be used for scientific ends, and all signed a consent affidavit for image use.

The Echer construction method for health care instruction manuals was adapted for the conduction of this study, following predetermined steps in order to make development easier, with quality and scientific rigor, as follows:

- 1st step – Review of specialized literature for selection of conceptual information and instructions about AIDS.
- 2nd step – Writing a script, based on the evidence of literature review and Health Ministry recommendations. Researchers selected script content, which was categorized in three blocks of statements, containing the items to be validated: Block 1 - “Knowledge”, Item A) Sexually Transmitted Infections and the kinds of STI; Item B) What is HIV and what is AIDS; Item C) The immune system and what happens when it is harmed; Item D) How is HIV transmitted and contracted; Item E) Signs and symptoms after HIV contamination; Item F) Diagnosis, treatment and prevention. Block 2 – “Prevention”, Item G) Condoms and other protection; and Block 3 – “Wrapping Up”, where AIDS was approached as a public health problem.
- 3rd step – Video script validation. Five EDAC teachers and five CCS/UEPB students were selected. Each participant received a tool consisting of an adapted Likert scale, with five points, varying from terrible to excellent, as follows: 1 – Terrible; 2 – Bad; 3 – Insignificant; 4 – Good; and 5 – Excellent. Participants were informed they should mark an “X” in each item in the assessment tool, according to their understanding about the proposed items, and a day was scheduled for filled-in tools to be returned.
- 4th step – Shooting of the educational video signaled in Libras. A Libras interpreter was chosen in APTILCG who had, at least, three of the inclusion criteria: having Prolibras certification – proficiency exam that certifies Libras teachers, translators and interpreters; having a validated Translator and Interpreter course; having experience with audiovisual material and availability to be an extra/actor during shootings. Meanwhile, a student was chosen in CCS/UEPB who fulfilled the criteria: be enrolled for graduation course and attended at least 80% of the course hours. That participant had to voice over the whole video and assist on video shooting parameters. Shooting sessions were scheduled according to the interpreter’s, the student’s, and the researchers’ availability, and they were carried out in an adequate location for shooting audiovisual material. Later on, the material was technically edited, to be assessed by specialists and by the group of deaf people.
- 5th step – Material validation by Libras specialists and by deaf individuals. This step was consolidated in three distinct moments:
  - 1st moment – Review of all the produced material, focusing on the correlation between selected information from literature and the acting images that were shot.
- 2nd moment – Validation of video content by Libras specialists. APTILCG was contacted again for the selection of five Libras specialists (14) who fulfilled at least three of the preestablished criteria: being a Libras translator/interpreter; being fluent in Libras; having Prolibras certification; and acting as an interpreter or translator of Libras in educational institutions. The specialists received the adapted Likert scale and were informed they should mark an “X” on each item of the assessment tool according to their understanding and proficiency in Libras. At this moment the video was shown, item by item with pauses, so the specialists could make a strict assessment. Therefore, assessment criteria were established: interpretation; sign adequation; dactylology adequation; and content clarity. Each criterium was assessed regarding its clarity, objectivity, execution time, comprehension and Libras adequation. Structural analysis of the video was also performed, thus participants assessed the Libras filming criteria: logical sequence; background; focus; framing; lighting; standards for video shooting targeting deaf audiences; video length; content comprehension; signaling and interpretation used by the interpreter; signaling and interpretation of content.

- 3rd moment – Video content validation by deaf subjects. Video assessment was made by a group of 18 deaf people selected in EDAC, considering the following criteria: being over 18 years old; being a high school student; and being fluent in Libras. Those were mandatory criteria because the video is meant to be used in educational action for deaf people in public schools and in Primary Heath Care, for groups of deaf people with those characteristics. The deaf participants were gathered in a room with one researcher and one interpreter. The video was shown to the deaf people with pauses, item by item, so assessment could be made. Criteria for each topic were: interpretation, comprehension, sign adequation and interpretation execution. Assessment was made by marking an “X” on the desired option of the Likert scale, according to the understanding of Libras, so each item could be rated: terrible (1), bad (2), insignificant (3), good (4), or excellent (5).

Once assessment was over, the tools were retrieved for statistical analysis, using the Statistical Package for the Social Sciences (SPSS) software. Agreement among judges and among deaf subjects, and the quantification of content validity were defined by the Content Validity Index (CVI), deriving from the Likert scale answered by judges and deaf subjects. CVI calculation was made by dividing the sum of answers 4 and 5 in agreement by the total number of answers. In order to be deemed valid, each tool item had to present CVI over 0.8. (15)

In order to verify the internal consistence between items there was the use of Cronbach’s Alpha, which is meant to measure the reliability, the magnitude of correlation of tool items, so that values over 0.60 are appropriate for preliminary investigation, and values from 0.90 to 0.95 are considered excellent. (16)

The project was approved by the Research Ethics Committee of UEPB under CAAE n. 0700.0.133.000-11 and process n. 11.

Results

The study resulted in the development and validation of the educational video “Libras Communication: learning about AIDS”, which is 20 minutes long. Regarding the internal consistence verification of the assessment tool, it obtained Cronbach’s Alpha = 0.989 from judges and 0.634 from deaf subjects. For data analysis, the values corresponding to each item and to each criterium per item were verified, defining CVI values, according to table 1.

Regarding the general assessment of the video, made by the judges, psychometric criteria were considered as presented on table 2.

Concerning the assessment made by the group of deaf people, the final results are displayed on ta-
Table 1. Distribution of specialists’ answer scores about psychometric criteria (n=5)

<table>
<thead>
<tr>
<th>Psychometric criteria</th>
<th>Judge 1</th>
<th>Judge 2</th>
<th>Judge 3</th>
<th>Judge 4</th>
<th>Judge 5</th>
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Table 2. Distribution of specialists’ answers about psychometric criteria of general assessment of the video (n=5)

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<th>Psychometric criteria</th>
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<th>CVI criteria</th>
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Table 3. Distribution of deaf subjects’ answer scores about psychometric criteria (n=18)

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<th>CVI criteria</th>
<th>CVI item</th>
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</tr>
<tr>
<td>Execution</td>
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<td>1</td>
<td>3</td>
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<td>Item B</td>
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<tr>
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<td>0</td>
<td>6</td>
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<tr>
<td>Execution</td>
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<td>4</td>
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<td>Comprehension</td>
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<td>Execution</td>
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<tr>
<td>Execution</td>
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Discussion

The development of educational technology about HIV and AIDS targeting an audience of deaf people emerged from the necessity to expand health information that is pertinent and adequate to that population, thus aiming to solve health care gaps rising from a communication deficit, which is caused by...
most professionals’ lack of Libras knowledge. The study used the content validation process, however it is necessary that the video and its items be submitted to other validation levels, such as clinical testing and construct validation.

Educational technologies scoped on health are presented as facilitating tools in the teaching-learning process and are used as a means to share knowledge, allowing individuals to exchange experiences that lead to skill improvement. Thus, educational technology is seen as a tool to be used by health care professionals in their daily practice, in order to promote prevention through health education. (17,18)

According to the results obtained through analysis, the value related to Cronbach’s Alpha in specialists’ assessment can be considered as equivalent to very high internal consistence, thus it is a positive assessment of the magnitude of tool items, corroborating other specialized analysis. (16)

Concerning the Alpha found through deaf subjects’ assessment, validation studies previously developed with similar data assert that the value can be considered adequate when it comes to a tool with few items, such as Likert scales. (16,19)

Regarding video validity and its representativeness by the judges, this study went alongside other authors that versed on tool content validation in health research. It was noticed that the specialists’ answer distribution about psychometric criteria obtained CVI, both by item and by criteria, as recommended by literature, where all are valued equal or higher than the standard cutoff mark. (15,20-22)

In relation to the validation of specialists’ answer distribution about psychometric criteria for general assessment of the video, there was an effort to assess structure and execution. In that sense, generally satisfactory CVI were obtained. Nevertheless, only for the criteria “Standard for Libras video shooting” CVI was below recommendation, indicating the need for higher adequation and rigor on adopted standards for audiovisual communication with the public.

However, attention can be drawn to the fact that assessments about the standard for shooting videos in Libras may vary among areas in the country, and they were submitted to the analysis of a restricted group of experts. Therefore, this limitation is observed in spite of global CVI being satisfactory, what granted validity and reliability to the video.

In what refers to content validation made by the target public, only item “A” was assessed below the cutoff mark. However, some authors recommend, in order to ensure representativeness in an assessment carried out with six subjects or more, values no lower than 0.78. (23,24) Thus, item A may also be considered as valid and representative, since it did not harm the tool globally.

This investigation is in step with another study that aimed at validating the content of signs, symptoms and diseases/health care grievances expressed in Libras by deaf people, wherein 33 expressions were assessed and 28 of them obtained satisfactory CVI, thus being deemed representative and valid. (25)

It must be emphasized that content validity is of utmost importance on tool development and adaptation processes. The reports of another study are corroborated as it implicates that the methodology in use may subsidize the development of technology that is attractive and comprehensive to the deaf public, what may facilitate the production of other technologies linked to education, focused on this theme or on any other that involves health care and attention. (26,27)

Throughout the development of this study, the absence of signs for many terms of the health field was observed, so only dactylogy is used. Faced with that, it is necessary to improve and develop other studies from a theoretical/epistemological perspective, in order to fill in the gaps caused by communication difficulties in the health field.

It is important to highlight the potentialities of validation developed in this study, which may be understood focusing on improvement to communication between deaf people and health care professionals, thus contributing to the quality of health care offered to this social segment. Moreover, the video may be used in extension projects aiming at education and health care promotion, extending its usefulness to school and community environments.
Therefore, the video is relevant to facilitate the teaching and learning of communication with deaf people, and to assist on actions of self-care, health promotion and disease prevention. This characteristic defines the developed material as an innovative technology that answers to the principle of comprehensiveness of health care, where it may be an effective tool in the health care provided by nurses, who are active members on health promotion and prevention processes with the population. That statement is reaffirmed by a study that was developed in primary care, with sample groups of deaf people and nurses, in a virtual environment that focused the treatment of hypertension and diabetes type 2. Even without interpreters, the environment had excellent acceptance by both sample groups, allowing the interaction between them, shortening appointment time in 15 minutes and preserving patient privacy. (28)

Conclusion

The objective of developing and validating an educational technology was reached, both in content and form. The video “Communication in Libras: learning about AIDS” obtained psychometric scores that are compatible with proposed acceptability indexes in literature, presenting validity and representativeness measured by specialists and by the deaf people who took part in the study, so it may be used in the health care and in the health education processes of the target population.

Acknowledgements

A special thanks to the Coordination for the Improvement of Higher Education Personnel (CAPES - Coordenação de Aperfeiçoamento de Pessoal de Nível Superior) for the master’s degree scholarship that made the development and conclusion of this study possible. To Universidade Estadual da Paraíba for funding the research. Article originating from the matrix project: “Comunicação com o surdo: contribuição à assistência de enfermagem media-da pela Língua de Sinais”, with financial resources from Universidade Estadual da Paraíba, Campina Grande, Paraíba State, Brazil.

Collaborations

Magalhães IMO, França ISX, Coura AS, Aragão JS, Silva AFR, Santos SR, Basílio EEF e Sousa FS contributed to project conception, data analysis and interpretation, article writing, critical review of intellectual content and final approval of the publication version.

References


Anti-infective medication administration errors by dose omission

Erro de administración de medicamentos anti-infectiosos por omissão de doses

Alaíde Francisca de Castro1
Jacqueline Pereira Oliveira1
Maria Cristina Soares Rodrigues1

Abstract

Objectives: To measure anti-infective medication administration errors by dose omission in an adult intensive care unit.

Methods: A descriptive, cross-sectional, and prospective study, carried out in October and November 2018 in an adult intensive care unit of a teaching hospital in the Federal District, Brazil. The sample was one of convenience. The numbers of prescribed medications and dose omissions were registered on two forms. The medications were classified according to the Anatomical Therapeutic Chemical Code. Data were treated statistically by applying logistic regression and tests for proportions.

Results: Information on about 7,140 prescribed medications was gathered, and 310 dose omissions were identified, which corresponded to a 4.34% error rate in the administration of medications in general. The sample used 711 anti-infective drugs (9.95%), which were associated with 48 dose omissions, yielding a 6.75% error rate. Among the anti-infective medications, the highest number of omissions was in the group of carbapenems (n=13; 27.08%), to be administered intravenously (n=38; 79.16%) and at 8 pm (n=10; 20.83%).

Conclusion: The anti-infective medication administration error rate by dose omission was significant and higher than for the other groups of drugs, showing a higher incidence in the intravenous route and at times approaching changes of shifts. Safety barriers must be implemented, such as dose triple-checking (at the pharmacy, when the medication is received at the intensive care unit, and at the time of administration). Additionally, adequate drug scheduling, continuing education, and training programs for safe use of medications can be useful for preventing these errors.

Resumo

Objetivos: Medir a taxa de erro de administração de medicamentos anti-infeciosos por omissão de doses em Unidade de Terapia Intensiva Adulto.

Métodos: Estudo descritivo, transversal e prospectivo, realizado nos meses de outubro e novembro de 2018, em Unidade de Terapia Intensiva adulto de um Hospital de Ensino do Distrito Federal. A amostra foi por conveniência e foram registrados o número de medicamentos prescritos e o número de omissões de doses das prescrições em dois formulários. Os medicamentos foram classificados conforme o Anatomical Therapeutic Chemical Code. Realizada análise estatística com regressão logística e testes para proporções.

Resultados: Coletaram-se informações de 7.140 medicamentos prescritos e foram identificadas 310 omissões de doses, correspondendo a 4.34% de taxa de erro na administração de medicamentos em geral. A amostra utilizou 711 anti-infectivos (9.95%), entre os quais ocorreram 48 omissões de doses, correspondendo a 6.75% de taxa de erro por omissão de doses. Entre os anti-infectivos, o maior número de omissões foi nos carbapenênicos (n=13; 27.08%), prescritos para serem administrados por via intravenosa (n=38; 79.16%) e no horário das 20h (n=10; 20.83%).

Conclusão: A taxa de erro de administração por omissão de dose dos anti-infectivos foi alta, maior que entre os demais medicamentos, mais frequente pela via intravenosa e nos horários próximos às trocas de turnos. Barreiras de segurança devem ser implementadas, como a triplicatura da dosagem – na farmácia, no recebimento na UTI e na administração propriamente dita, além de aprimoramento adequado, educação permanente e treinamento em uso seguro de medicamentos.

How to cite:

Anti-infective medication administration errors by dose omission

Introduction

Anti-infective drugs are the second-most used class of medications in hospitals, and their widespread use significantly affects both the microbiota of patients who take them and of hospitals, which can result in microbial resistance and lead to the emergence of pathogens capable of causing infections for which there are no efficient anti-infective substances.\(^1,2\)

The Global Action Plan on Antimicrobial Resistance was approved during the World Health Assembly in 2015, with the main objective of ensuring, for the longest possible time, the continuity of successful treatments and the prevention of infectious diseases with effective, high-quality, and safe medications, used responsibly and made available to every person who needs them.\(^1\)

The goal of reducing severe and avoidable damage related to the use of medications by 50% in the subsequent five years was set as the third global challenge in 2017, in the scope of the Global Alliance for Patient Safety of the World Health Organization (WHO).\(^3\)

The Brazilian Health Regulatory Agency, aligned with the WHO Global Action Plan and the Brazilian National Program for Prevention and Control of Healthcare-Associated Infections, has encouraged the development of programs for the management of antimicrobial drug use in the country. Also, following the global trend in patient safety, the Brazilian Ministry of Health instituted the Brazilian National Patient Safety Program (PNSP, as per its initialism in Portuguese) in 2013 and created six basic protocols to channel safety actions in health services, including the safety protocol for the prescription, use, and administration of medications.\(^4,5\)

One of the current approaches to fight issues related to the vulnerabilities in the use of anti-infective drugs is the development of management programs to ensure good clinical results when these medications are used, reduce costs for health services, and minimize microbial resistance and the consequences of adverse effects.\(^5\)

In hospitals, intensive care units (ICUs) are the place where patients with severe infections are treated and the setting with the highest frequency of healthcare-associated infections (HAIs) and microbial resistance, because of multiple factors. The severity of the condition of the assisted patients, the application of invasive devices, and the longer hospital stays, among other reasons, make the use of several anti-infective medications in most patients common in ICUs. Consequently, an anti-infective medication management use program must be implemented in intensive care settings to seek improvements in the processes involved, aiming at achieving quality and safety in the provided care to reduce the impact of microbial resistance.\(^1,2,5\)

Studies on the magnitude and occurrence of incidents resulting from errors in the prescription, dispensation, and administration of medications are increasingly frequent in the literature. Analyses of the involved risk factors and their causes point to systemic and individual failures, but especially to the lack of computerization in health systems and of investments in communication technologies, combined with the increasing complexity of therapeutic procedures.\(^6-8\)

Once medication errors can be considered preventable, it is important to understand them. Consequently, the whole process must be the object of a risk management system that allows one to know the details of every step and activity in which systemic or individual failures can happen, aiming at establishing the best organization and highest safety level in the process in order to guarantee the correct use of medications.\(^6-10\)

The processes that involve the use of medications can be monitored using quality and patient safety indicators, for instance, the medication administration error rate. This indicator is understood as an analyzed piece of data that allows one to monitor and evaluate the results of work processes up to the point of the quality of the care delivered to patients. This indicator has been defined by the Brazilian Ministry of Health for mandatory monitoring of health services. The Institute for Safe Medication Practices in Brazil suggests a standardized methodology to collect data and calculate the indicator.\(^11,12\)
In this context, the following research question emerges: what is the anti-infective medication administration error rate related to dose omission in adult ICUs? The objective of the present study was to measure the medication administration error rate associated with dose omission in this type of setting.

Methods

A descriptive, cross-sectional, and prospective study, with a quantitative approach, was carried out in the adult ICU of a teaching hospital of the Federal District, Brazil. The ICU had 19 beds, with ten general beds for clinical and surgical patients and nine beds for the coronary unit.

The sample was determined by convenience, given that it depended on the number of prescribed medications and dose omissions that occurred during the data collection dates chosen for analysis. Consequently, the rate was obtained by prevalence.

Data collection was performed in October and November 2018. During this period, three days, selected by convenience, were allocated to analyze all the prescriptions issued in the week for all the inpatients. Six hundred thirteen prescriptions issued in 55 days were evaluated. The examination included prescriptions of medications and anti-infective agents from the first day of the treatment plan. Prescriptions of medications and anti-infective drugs that had been changed or canceled or were illegible were excluded because it was considered that the medication should not be administered in those cases.

Data were obtained by using two forms designed for the present study, in which the numbers of prescribed medications and dose omissions, that is, doses that were prescribed and not checked, were registered. The medication administration errors considered were dose omissions or omissions caused by failures in drug scheduling. The first form had numerical information about the prescription date, bed number, number of prescribed medications, number of dose omissions, number of anti-infective medications prescribed, and number of dose omissions of anti-infective medications. The second form was used to register information about the prescribed medications that had dose omissions, including the medication name, dose, route, and administration time.

The numerator in the fraction of the medication administration error rate indicator proposed by the PNSP is the number of medications prescribed with omission errors, that is, those which were prescribed but not administered (checked), and the denominator is the total number of administered medications (all the medications prescribed over a certain period). The ratio is multiplied by 100 so as to be expressed as a percentage. The drugs were classified according to the Anatomical Therapeutic Chemical Classification (ATCC) system.

Two electronic worksheets were designed using Excel 2013 software to create a databank. Statistical analysis was run using R: A Language and Environment for Statistical Computing software.

To investigate whether dose omissions were related to the classification of the medications, the drugs were grouped into anti-infective and non-anti-infective, and logistic regression was applied. Three binary dependent variables were analyzed using this method: dose omissions, when examining the frequency of omissions among anti-infective and non-anti-infective substances; the intravenous route, when analyzing the frequencies associated with the routes for which dose omissions happened; and the closeness of the time to changes of shifts, when examining the times the omissions occurred. Tests for proportions were used to calculate p-values, and the level of significance adopted was 1% for analysis of medication type and administration route and 5% for omission times.

The present study is part of the macroproject entitled Protocols de Segurança do Paciente e Seus Indicadores, approved by the research ethics committee of the Medical School of the University of Brasilia as per report no. 1,572,454 on July 2, 2016.

Results

Data on 7,140 prescribed medications were collected, and 310 dose omissions were identified, which
Anti-infective medication administration errors by dose omission

Corresponded to a 4.34% medication administration error rate. The sample had 711 anti-infective drugs, which accounted for 48 dose omissions, yielding a 6.75% anti-infective medication administration error rate (Table 1).

Regarding analysis of the difference in omission rates found for anti-infective and non-anti-infective medications, the result of the logistic regression was 0.53305, with a p-value equal to 0.00102. To interpret this parameter, it was necessary to calculate its exponential value, thus obtaining 1.70412076. Consequently, it was concluded that anti-infective medications have a probability of dose omission 70.04% higher than non-anti-infective drugs.

To analyze the frequency of omissions that occurred at various scheduled times for the medications, the times were grouped into those close to changes of shift (6 am, 8 am, 12 noon, 2 pm, 6 pm, and 8 pm) and other times (2 am, 4 am, 10 am, 4 pm, 10 pm, and 12 midnight). The test for proportion was applied, in which the alternative hypothesis was the omission proportion in the changes of shift is higher than 50%, and the null hypothesis was the proportion is equal to 50%. The latter was rejected, with the adopted level of significance equal to 0.1% for non-anti-infective medications and 5% for anti-infective medications. With this setting, the omission proportion was higher at times approaching changes of shifts.

An analysis of administration routes associated with dose omissions demonstrated that the probe route showed the highest omission proportion, with a statistical difference between the values found using this route and those obtained for other routes. It was concluded that, for a level of significance equal to 1%, the medications administered using the intravenous route had an 82.79% lower probability of being the object of dose omission than those administered via probes; drugs administered subcutaneously had a 53.26% lower chance of being the object of dose omission than those administered using probes; medications to be taken orally had a 40.06% lower probability of being the object of dose omission than those administered via probes; and drugs administered using other routes had a 70.92% lower chance of being the object of dose omission than those administered using probes.

Among the anti-infective drugs, the highest number of dose omissions was obtained for carbapenems (n=13), administered intravenously (n=38) and at 8 pm (n=10), as shown in detail in tables 1 and 2. It was not possible to detect a difference in the chance of dose omission in patients who received medicines intravenously or through other routes.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Prescribed medications n (%)</th>
<th>Dose omissions n (%)</th>
<th>Administration error rate (%)</th>
<th>Omission times n (%)</th>
<th>Omission routes n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-infective</td>
<td>711 (9.95)</td>
<td>48 (15.48)</td>
<td>6.75</td>
<td>2h – 2 (4.16)</td>
<td>N – 38 (79.16)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4h – 5 (10.41)</td>
<td>OR – 6 (12.5)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6h – 5 (10.41)</td>
<td>PR – 3 (6.26)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8h – 5 (10.41)</td>
<td>TR – 1 (2.08)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10h – 1 (2.08)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>12h – 3 (6.25)</td>
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<td>14h – 5 (10.41)</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td>16h – 2 (4.16)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>18h – 3 (6.25)</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td>20h – 10 (20.83)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>22h – 2 (4.16)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Absent – 5 (10.41)</td>
<td></td>
</tr>
<tr>
<td>Non-anti-infective</td>
<td>6,429 (90.04)</td>
<td>262 (84.51)</td>
<td>4.07</td>
<td>2h – 4 (1.52)</td>
<td>PR – 84 (32.06)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4h – 10 (3.81)</td>
<td>OR – 84 (32.06)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6h – 49 (18.70)</td>
<td>SC – 41 (15.64)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8h – 46 (17.55)</td>
<td>IV – 40 (15.26)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10h – 34 (12.97)</td>
<td>TR – 11 (4.19)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12h – 15 (5.72)</td>
<td>R – 1 (0.38)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14h – 42 (16.03)</td>
<td>RR – 1 (0.38)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16h – 16 (6.10)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>18h – 15 (5.72)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20h – 7 (2.67)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>22h – 15 (5.72)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24h – 6 (2.29)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Absent – 3 (1.14)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>7,140 (100)</td>
<td>310 (100)</td>
<td>4.34</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PR – probe route; OR – oral route; SC – subcutaneous route; N – intravenous route; TR – topical route; IR – inhalation route; RR – rectal route
Discussion

The main limitation of the present study is related to the method used to identify, in the nursing records, the doses of non-checked medications for which no reason for not administering them was pointed out and which showed failures in drug scheduling that resulted in non-administered doses. However, even when the medication dose was not checked during prescription, the administration may have occurred, and in this case the failure is characterized as a record failure rather than dose omission.

The investigation found a medication administration error rate caused by dose omission that can be considered high, with the rate for anti-infective agents only being very high, taking into account that all the examined doses of prescribed medications should have been administered in critical care situations, especially those of anti-infective drugs intended for patients with severe infections, because of the risk of microbial resistance and/or treatment inefficacy. The literature shows different methods to calculate error or adverse events rates, according to the studies described next.

When analyzing medication errors informed by notifiers and registered on medical forms, researchers found that 28.3% of the notifications were related to non-administered medications, with the level of harm to patients classified as none (53.1%), mild (25.7%), intermediate (14.1%), or severe (7.1%). Another investigation, in which researchers reviewed ICU patients’ medical forms and calculated the prevalence of incidents among the inpatients and the number of hospital admissions, reported an estimated 97.4% of incidents were associated with medications, and lack of checking administered medications was the most frequent type of notified circumstance (47.9%), followed by absence of notes about medication administration (21.1%).

Another study focusing on reviewing medical forms, internal data from health surveillance sectors, and notifications obtained from an incident record system regarding 138 medical forms of ICU patients revealed the occurrence of 152 adverse events, namely: dose omission—type medication errors (29.6%), pressure injuries (21.0%), unplanned extubation (17.0%), HAIs (15.13%), and detachment of probes (9.90%).

Observational studies that monitored the preparation and administration of medications identified higher dose omission rates. A study found that 69.6% of the errors occurred during medication administration, and there were dose omissions in 9.5% of the medications. This error category accounted for 85.9% of the total errors. There was more than one error in 34.5% of the doses, and no errors were detected in only 14% of the examined doses.

An observational study involving care evaluation and classification according to Carter’s positivity index in 557 doses of prepared and administered medications classified as safe care the items’ correct route (85.7%) and correct way (100%), and as tolerable care the items’ correct patient (33.3%), correct medication (66.67%), correct dose (50%), correct record (33.33%), correct guidance (0%), and correct time (50%). The authors concluded that the set of practices could be categorized as tolerable care, given that six out of eight evaluated items showed low adherence, and these weaknesses compromised the whole medication administration process.

Corroborating the higher medication administration error rate found for anti-infective drugs in the present study, a pilot investigation that analyzed the proportion of medication errors related to anti-infective agents and their consumption reported a total of 2,164 medication errors, including 301

<table>
<thead>
<tr>
<th>ATCC classification</th>
<th>Medication name</th>
<th>Number of dose omissions n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>J01DH02</td>
<td>Meropenem, 500 mg or Meropenem, 1,000 mg</td>
<td>13 (27.08)</td>
</tr>
<tr>
<td>J01BK02</td>
<td>Polymyxin B, 500,000 IU</td>
<td>6 (12.5)</td>
</tr>
<tr>
<td>J01EE01</td>
<td>Sulfamethoxazole + trimethoprim 400+80 mg or Sulfamethoxazole + trimethoprim 80+16 mg/ml</td>
<td>6 (12.5)</td>
</tr>
<tr>
<td>G01AF01</td>
<td>Metronidazole, 5 mg/ml</td>
<td>4 (8.33)</td>
</tr>
<tr>
<td>J01GB06</td>
<td>Amikacin, 250 mg/ml</td>
<td>3 (6.25)</td>
</tr>
<tr>
<td>G01AA01</td>
<td>Nystatin, 100,000 IU/ml</td>
<td>3 (6.25)</td>
</tr>
<tr>
<td>J01CG02</td>
<td>Piperacillin + tazobactam 4+0.5 mg</td>
<td>2 (4.16)</td>
</tr>
<tr>
<td>J01DB01</td>
<td>Cefepime, 500 mg</td>
<td>2 (4.16)</td>
</tr>
<tr>
<td>J01GB03</td>
<td>Gentamicin, 40 mg/ml</td>
<td>2 (4.16)</td>
</tr>
<tr>
<td>J01MA02</td>
<td>Ciprofloxacin, 400 mg</td>
<td>2 (4.16)</td>
</tr>
<tr>
<td>J01CA01</td>
<td>Ampicillin, 500 mg</td>
<td>1 (2.08)</td>
</tr>
<tr>
<td>J01MA06</td>
<td>Nortriptyline, 400 mg</td>
<td>1 (2.08)</td>
</tr>
<tr>
<td>J01X01</td>
<td>Vancomycin, 500 mg</td>
<td>1 (2.08)</td>
</tr>
<tr>
<td>J06BA02</td>
<td>Immunoglobulin, 5g/100 ml</td>
<td>1 (2.08)</td>
</tr>
<tr>
<td>D01AA01</td>
<td>Nystatin, 2,500 IU/g</td>
<td>1 (2.08)</td>
</tr>
</tbody>
</table>
(14%) related to anti-infective drugs. Most (95%) of the medication errors related to anti-infective substances did not have consequences for patients. Dose omission (26%) and administration of wrong doses were the two most frequently reported events, and 80% (n = 242/301) of the medication errors occurred during the administration step, whereas 8% (n = 24/301) happened during the prescription stage. Three anti-infective medications had the highest medication error rate: linezolid, doxycycline, and acyclovir.

The same study showed a ratio of 65.4 medication errors/10,000 defined daily doses of anti-infective medications and a proportion of 41.9 medication errors/10,000 days of therapy of the same class of medications. The authors concluded that the study puts the focus on monitoring anti-infective medications and improving the risk management system associated with this class of medications, and that anti-infective management programs must also take into account proportions of medication errors for these anti-infective drugs to increase patient safety and optimize medication use.

Just like the present study, an investigation carried out in Brazil had the objective of identifying the classes of drugs involved in medication errors in ICUs. Three hundred and five events were detected, with a mean value of 6.9 occurrences per patient. The involved medications belonged to 33 classes, with the most frequent ones being antibiotics (25.2%), reducers of gastric acidity (19.0%), and antihypertensives (9.2%). The study did not identify reasons for the higher frequency of omissions for anti-infective drugs of the carbapenem type (Meropenem) and among the different medication administration routes.

It is important to emphasize that dose omissions were more frequent at times close to changes of nursing team shifts, which may be related to the high number of activities at these moments, including both the significant number of doses scheduled at those times and other tasks involved in the change-of-shift process. The highest number of errors occurred in the processes of medication preparation and administration during the morning shift, as was also reported in another investigation.

In addition to the WHO’s recommendations and several publications in the literature about safety in the use of medications, a recent handbook with clinical practice guidelines on the safe use of medications in ICUs associates known strategies with their respective evidence categories. The document points out that hospitals and ICUs must become high-reliability institutions. An ideal patient safety culture in an ICU environment has to incorporate multiple strategies to prevent medication errors in all the steps of the process (prescription, dispensation, administration, and monitoring). Some strategies seem promising in getting around errors and improving results, such as the use of technology, including the introduction of computerized prescriptions, systems supporting clinical decision-making, medication administration systems with bar codes, and smart infusion pumps.

Still, according to the handbook, the incorporation of new strategies, such as harmonization of medications and standardized practices for preparing intravenous medications, is a potential option to reduce the occurrence of errors. An active patient safety surveillance system can identify possible medication-related events to prevent injuries in real time or similar events in future patients. Other approaches include clinical pharmaceutical participation in the care of patients admitted to ICUs, as well as guaranteeing adequate amounts of human resources for all healthcare professionals. Errors and adverse events in ICUs remain a problem, despite the increase in awareness, regulatory mandates, and technological progresses. Given the complexity of critical patients’ conditions at every care level and the limitation of hospital resources, each institution must evaluate possible strategies and implement them in their ICUs.

**Conclusion**

The medication administration error rate by dose omission for anti-infective drugs in the analyzed ICU was significant, higher than the value found for other medications, and more frequent for the intravenous route and at times close to nursing
team changes of shifts. Safety barriers and strategies to prevent failures must be implemented to decrease potential risks and the occurrence of these errors. For instance, dose triple-checking (at the pharmacy, when the medication is received in the ICU, and when the administration itself is performed), as described in standard operational procedures, could be a useful action, as could be proper drug scheduling (avoiding times close to changes of shift) and continuing education and training on the safe use of medications.

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Collaborations

Castro AF, Oliveira JP, and Rodrigues MCS declare that they contributed to the study conception, data analysis and interpretation, writing of the manuscript, critical review of its intellectual content, and final approval of the version.

References

Matrix support actions in Primary Health Care: a phenomenological study

Ações do apoio matricial na Atenção Primária à Saúde: estudo fenomenológico

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Marcio Wagner Gamatta¹
Cintia Nasi¹
Andréa Noeremberg Guimarães¹
Maria Eduarda Lima Torres¹

Abstract

Objective: To understand the meaning of mental health matrix support actions in Primary Health Care from the perspective of matrix supporters and nurses.

Methods: A qualitative study, with a phenomenological sociology approach, developed in a Primary Health Care unit of a city in Southern Brazil. Interviews were carried out with five matrix supporters and 22 nurse assistants, who worked in the territory from July to August 2017. Comprehensive interpretation followed the steps of careful reading of speeches, identification of concrete categories, phenomenological verification of social action and establishment of the typical action, according to Alfred Schütz's theoretical and methodological framework.

Results: It was revealed that matrix supporters experience the phenomenon of matrix support actions in Primary Care through instruction and participation in care represented in the following concrete categories: (1) To instruct the health professionals of the units; and (2) To participate in mental health care in the territory. Experiences of nurses are demonstrated in the concrete categories: (3) Meeting the user’s mental health demands; and (4) Matrix support structure improvement.

Conclusion: There was a mismatch between intentions and expectations, clearly exposing the conflict between what is intended and expected. Given this, it was recognized that there is no reciprocity of perspectives, evidencing the need for self-analysis of matrix supporters and nurses.

Confl icts of interest: None.

Keywords: Psychiatric nursing; Primary health care; Mental health; Mental health assistance

Descritores: Enfermagem psiquiátrica; Atenção primária à saúde; Saúde mental; Assistência à saúde mental

Descritores: Enfermagem psiquiátrica; Atendimento primário de saúde; Saúde mental; Atendimento à saúde mental

Keywords: Health; Mental health assistance

Descritores: Enfermagem psiquiátrica; Atenção primária de saúde; Saúde mental; Atenção primária à saúde mental

Abstract

Objective: Compreender o significado das ações do apoio matricial em saúde mental na Atenção Primária à Saúde, na perspectiva de apoiadores matriciais e enfermeiros.

Métodos: Estudo qualitativo, com abordagem da sociologia fenomenológica, desenvolvido na Atenção Primária à Saúde de um município na Região Sul brasileira. Foram realizadas entrevistas com cinco apoiadores matriciais e 22 enfermeiros assistenciais, que atuavam no território, no período de julho a agosto de 2017. A interpretação compreensiva seguiu as etapas de leitura atenta das falas, identificação de categorias concretas, verificação fenomenológica da ação social e estabelecimento do típico da ação, conforme referencial teórico-metodológico de Alfred Schütz.

Resultados: Foi desvelado que os apoiadores matriciais vivenciam o fenômeno das ações do apoio matricial na Atenção Primária, por meio da instrução e participação nos processos de cuidar, representadas nas seguintes categorias concretas: (1) Instruir os profissionais de saúde das unidades; e (2) Participar de cuidado em saúde mental no território. Quanto aos enfermeiros, as suas vivências estão demonstradas nas categorias concretas: (3) Atendimento às demandas em saúde mental do usuário; e (4) Melhora da estrutura do apoio matricial.

Conclusão: Constata-se um descompasso entre intenções e expectativas, evidenciando a necessidade de autoanálise dos apoiadores matriciais e enfermeiros e um (re)pensar a nível de políticas públicas e gestão da estratégia do apoio matricial quanto às práticas instituídas, para que as ações em saúde mental possam representar produção de saúde, cidadania e existência.

Resumen

Objetivo: Comprender el significado de las acciones de apoyo matricial en salud mental en la Atención Primaria de Salud, bajo la perspectiva de apoyadores matriciales e enfermeros.

Métodos: Estudio cualitativo, con enfoque de la sociología fenomenológica, realizado en la Atención Primaria de Salud de un municipio en la región Sur de Brasil. Se realizaron entrevistas con 5 apoyadores matriciales y 22 enfermeros asistenciales que trabajaban en el territorio, en el período de julio a agosto de 2017. La interpretación comprensiva incluyó las etapas de lectura atenta de los relatos, identificación de categorías concretas, verificación fenomenológica de la acción social y establecimiento de las características de acción, según el marco de referencia teórico-metodológico de Alfred Schütz.

Resultados: Se descubrió que los apoyadores matriciales experimentan el fenómeno de las acciones del apoyo matricial en la Atención Primaria a través de la instrucción y participación en los procesos de cuidar, representadas en las siguientes categorías concretas: (1) Instruir a los profesionales de la salud de las unidades; y (2) participar en el cuidado de la salud mental en el territorio. Con relación a los enfermeros, sus vivencias están demostradas en las categorías concretas: (3) atención a las demandas de salud mental del usuario; y (4) mejora de la estructura del apoyo matricial.

Conclusión: Se constató una divergencia entre intenciones y expectativas, lo que expone claramente un conflicto entre lo que se intenta y lo que se espera. Ante este hecho, se reconoce que no hay reciprocidad de perspectivas, lo que deja en evidencia la necesidad de un autoanálisis por parte de los apoyadores matriciales e enfermeros y un (re)pensar respecto a las políticas públicas y gestión de la estrategia de apoyo matricial con relación a las prácticas instituidas, para que las acciones en salud mental puedan representar producción de salud, ciudadanía y existencia.

Keywords: Enfermería psiquiátrica; Atención primaria de salud; Saúde mental; Assistência à saúde mental

Descritores: Enfermagem psiquiátrica; Atendimento primário à saúde; Saúde mental; Atenção primária à saúde mental

Keywords: Health; Mental health assistance

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Introduction

Historically, Brazil was marked by mental health actions directed at people suffering from psychic suffering and their families, based on the hospital-centered paradigm, that is, focused on care in the asylum institution. Validation of the asylum model was based on the alienism manifested in the French Revolution. Hospitalization would offer to demented or dispossessed-of-reason people a space of cure, and asylum would allow the maniac to exercise his freedom.\(^1\)

In the 1970s, change began in this model, called Psychiatric Reform. In Brazil, this Reform was founded not only in the conjuncture critique of the Brazilian subsystem of mental health, but also, and mainly, in the structural criticism to knowledge and the classic psychiatric institutions, in the midst of all the political-social movement that characterizes this same redemocratization.\(^2\)

Conceptual and practical change, regarding mental health care for people, breaks with the exclusionary proposal to be experienced by individuals and families, which reflects in the possibility of planning life projects, mobilizing peers and enjoying the daily life. In the community, Psychiatric Reform pointed to the overcoming of the hospital-centered model in psychic suffering care, aspiring to a care that does not alienate the person from his social space. For this matter, Primary Health Care is a privileged space for intervention, being an important strategy to draw actions focused on the territorial axis.\(^3,4\)

In the aggregation between Primary Care and mental health, in Brazil, matrix support was instituted as an organizational arrangement that enables the specialized technical support to the teams assigned to mental health actions in the Primary Network. Matrix support, formulated and conceived theoretically in 1999, has collaborated with the structuring of an integrative care, in which mental health actions are produced from the valorization of the social scope in the community.\(^5\)

As a possibility to look at health care and nursing in an attentive and extended way, the theoretical-methodological framework of Alfred Schütz’s phenomenological sociology has been used in research. According to this framework, social realities are constructed in meanings and identified by their immersion in social interaction, language, actions and the world being inseparable in this type of approach.\(^3\)

Phenomenological sociology deals with action, as a process anchored in motivational functions, having as one of its purposes the understanding of intersubjective processes, starting from the description of these by the individual who experiences them.\(^6\) However, description must be natural, exploring what the individual speaks, avoiding forging hypotheses and expressing only what is presented by the person.

In the perspective of understanding the subjective action of individuals explicit in their intentions and expectations, Schütz relies on the concepts of “reasons for” and “reasons why”. “Reasons for” refer to something that one wants to accomplish, goals that one seeks to achieve, having a future-oriented temporal structure and forming a subjective category of action. On the other hand, “reasons why” are evident in the completed events, which explain certain aspects of project accomplishment, having a temporal direction turned to the past.\(^7\)

Social action is how Schütz defines human relations in the social world,\(^6\) in which actions in mental health are directed to a social subject. Therefore, they must go through the care that is offered to a subject who is going through psychic suffering, entering the vital context in which the user is the protagonist of their existence. In the sphere of health and nursing, there is a possibility of reflecting and evaluating the social relations constituted among all individuals involved in mental health therapy,\(^8\) for which the Schutzian framework can contribute to the understanding of human action in a social dimension, linking action in health care to the social relations existing in the caring process.

Thus, using phenomenological sociology implies approaching the aspect that identifies in this theme a propitious space to discuss mental health care as a production of meaning and social action. In care, according to Schütz, there is the possibility of “going to things” through detachment of judge-
ment, in order to penetrate the truth of the other’s existence. The purpose is not to institute truths, but to understand what was lived by unveiling human social action. (7)

This article aimed to understand the meaning of matrix support actions in mental health in Primary Health Care, considering intentions of matrix supporters and expectations of nurses from the perspective of Schütz’ phenomenological sociology.

Methods

This research is a qualitative study of a phenomenological nature that used Schütz’ framework, using phenomenological interview for information gathering and phenomenological sociology as an analysis method. Primary Health Care was the study setting, specifically in health units located in a municipality in the state of Rio Grande do Sul, Brazil. This type of methodological approach presents a deeper space of relationships and phenomena that cannot be reduced to a changeable device, that is, it investigates aspects that acomprise the values and experiences that make up human relationships. (9)

Study participants were five matrix supporters and 22 nurses working in Primary Care. Voice was given to matrix supporters, because their actions are the foundation for mental health care in the study setting. Participation of nurses in the study is intertwined with their relevance in the first mental health care involved in the process of receiving users in Primary Care, privileging this important category, given the scarcity of studies with a focus on nurses. All participants were intentionally selected, meeting the following inclusion criteria: being part of the city’s staff; being a matrix sponsor or nurse of a health care unit of a certain region of the municipality; not being on leave and/or taking leave during data collection period; and having been working in the service for 6 months or more.

Data collection was carried out through phenomenological interviews with the aforementioned research participants, having as matrix supporters, workers of several professional categories: (2) psychiatrists, (1) occupational therapist, (1) speech therapist and (1) nutritionist. In the study setting, matrix support is carried out by the Family Health Support Center (NASF - Núcleo de Apoio à Saúde da Família), which structures the actions in mental health in the territory with the joint participation of all the supporters in interventions with the health units of the territory.

Due to the phenomenological nature of the investigation, the number on interviewed participants was not initially consolidated, thus interviews were ended when convergence of data in participants’ speech was identified. Interviews were carried out from July 18 to August 18, 2017, in varying days during the day shift at the participants’ work places.

In seeking the understanding of the phenomenon from the being that experiences it, the technique of phenomenological interviewing was used, in which there is no right or wrong to be declared, valuing the speech of the being, and the conditions understood and developed by him. (10,11) In this perspective, two guiding questions were used for the interest group of matrix supporters, and one question for nurses. For matrix supporters, the questions were: “What mental health actions have you been carrying out with Primary Care?” and “What do you intend with these actions? ”; for nurses, the question was: “What do you expect from the actions of matrix support in mental health at Primary Care?”.

Information analysis was built based on the rigor of the Schutzian phenomenological method, following the concepts of phenomenological reduction, intentionality and typification of the action. To unveil the phenomenon essence, the following steps emerged: (8) careful reading of speeches to capture the experienced situation and the subjects’ “reasons for”; identification of concrete categories that comprise subject acts; phenomenological verification of social action. Based on the typical characteristics of the speech, the meaning of subjects’ actions was established, aiming to describe the typical action of matrix supporters and nurses.

From the convergences of the units of meaning that emerged from the reports, information was analyzed in the light of Schütz’s framework and, later on, the results of the experiences of supporters and
were organized into concrete categories. In comprehensive interpretation of social action, it becomes fundamental to make a more rigorous exploration of problematic situations in relation to social typification, in which the collection of knowledge and its different dimensions are placed in the creative formulation of projects situated in acting. In all the elements and distinctions, Schütz proposes, in his descriptions of the world of life, the importance of the mundane analysis, including the role of objectivations of imaginary worlds in the construction of lived experiences.\(^\text{12}\)

Statements were identified by letters “S”, for matrix support, and “N”, for nurses, with sequential numbers from one to 22, preserving the participants’ anonymity. To produce descriptions of mundane life, participants were heard without critical judgment and were interacted with from a comprehensive approach.

In this research, the requirements established by Resolution 466/2012 of the Brazilian National Health Board (Conselho Nacional de Saúde) were met. This study was approved in Research Ethics Committees with Human Subjects under CAAE (Certificado de Apresentação para Apreciação Ética - Certificate of Presentation for Ethical Consideration) 63099916.2.0000.5347, opinion 2,014,999 and CAAE 63099916.2.3001.5338, opinion 2,059,857.

**Results**

Categorization was configured as the representation of the lived experience, from speeches of each social actor, anchored in a reflexive process in the light of phenomenological sociology. With the Schutzian framework, it became feasible to identify the “reasons for”, considering the motivation of the being-in-the-world, with the construction of two categories that replicated the intentions of matrix supporters: (1) Instructing health professionals of the units and (2) Participating in mental health care in the territory. Also, two categories of the investigated phenomenon that the nurses have experienced are: (3) Meeting the demands from patient mental health and (4) Matrix support structure improvement.

**Concrete category 1. Instructing health professionals of the units**

In this category, elements are presented regarding the training and learning of the health professionals of the units, based on the reports of matrix supporters regarding their intentions towards matrix support mental health actions in the territory. In reports of matrix supporters, there are explanations in which they indicate the effectiveness of the professional qualification and discussion of the work carried out in the territory:

“Unit training, [...] to be able to discuss this work that is done within the unit, some training spaces”. \((S3)\)

“ [...] permanent education with the team [...] to really trade and bring more subsidies”. \((S4)\)

“Performing this training, [...] with discussion, [...] some group”. \((S5)\)

“A learning of professionals, they changed their vision and were more able handle these kinds of cases”. \((S1)\)

Thus, when supporters conduct training and meetings, they seek to instruct the health professionals of the units, strengthening the mental health care in the territory by means of a theoretical-practical contribution to facilitate the management of users in psychic suffering in the setting of primary network.

**Concrete category 2. Participating in mental health care in the territory**

The intention of these supporters is not limited to the instruction of the professionals of the health units, because their reports reveal that they also intend to participate in care, thus emerging the category: Participating in mental health care in the territory. In this category, it is presented how matrix supporters experience participation in mental
health care in the territory, where the presence of these supporters in these spaces, through dialogue and joint evaluations, has resulted in improvements in the care of people with demands in mental health, through actions shared with other health professionals:

“More home visits and more joint evaluations”. (S1)

“Joint assessments [...] with all senior and technical professionals”. (S2)

“ [...] participation in matrix with the team, or only with me, depending on the day that we go and how many professionals there are at that time”. (S3)

“ [...] to make a joint assessment, a home visit that could be included”. (S5)

Based on the reports, the intention of matrix supporters to participate in health units of mental health care is observed, since they highlight the implementation of shared practices through dialogue and joint interventions, working with health unit teams. Faced with these two concrete categories of matrix support, the construction of the typical action has raised the importance of identifying intentions, so that the idealizations and purposes rooted in the daily life of these supporters can be elucidated.

Concrete category 3. Meeting the demands on user mental health

In the other facet of the phenomenon, we have the expectation of nurses regarding the mental health care of the user, based on aspects such as referrals and improvement of the user, as well as case solution. Moving closer to the reports of each nurse, it is noted that the speeches are marked by the desire that users be followed up in a specialized service, that there is improvement in individual processes, as well as resolution in the conduct of mental health demands in the territory:

“That there were a care core (service), and that patients could be referred to a care core (service) that were resolutive”. (N20)

“ [...] the patient needs psychotherapy, its absence is a problem of the network. However, we have to have something that can make the referral”. (N2)

“That he recovers and can supply his needs, whether it is school or attention”. (N1)

“ [...] he is well, better in his day-to-day life, that he can stand alone and without the need for the (health care) unit”. (N7)

“ [...] What I always hoped for was more resolutiveness”. (N3)

“In cases where I have no resolution in the unit, I could be debating with them and trying to see a possibility of support”. (N16)

“ [...] to solve the patient’s problem, that he does not stand in a waiting line for case discussion for several months without being able to have the return that he needs”. (N10)

Facing this set of statements, the emphasis given by nurses to specialized care is observed, in cases where the chances of success of Primary Care therapy are reduced. However, in proposing the joint construction of actions in the community, the matrix support seeks to minimize the excessive system of referrals to the specialized service, with a view to care in the territory, keeping the individual in his social environment. Thus, the exposure of these expectations can guide discussions about user follow-up in the territory, according to their health needs.

Concrete category 4. Matrix support structure improvement

In this category, it is revealed the need for new conformations for a better structured care, planned and implemented in the territory. To that end, nurses characterize the matrix team as a numerically insuf-
sufficient group to offer actions in mental health in the basic network:

“Anyway, multiplying, [...] I think the number of team professionals. “ [...] That it really multiplied the team so that it could better serve the units. (N4)

“The number of professionals that we need for this is lacking.” (N9).

“[...] it would be a positive experience to have more professionals to do matrix work”. (N15)

“[...] a well-structured service to meet both individual and collective (needs). [...] A more complete care is lacking in relation to our patients in mental health”. (N12)

“That’s why I do not believe in matrix support, compared to what we have and what we had. [...] There is no way to talk and solve it, it is very scarce”. (N8)

“[...] I think there had to be a team, greater HR”. (N18)

“[...] To increase the number of professionals to do this matrix support”. (N22)

Reports have verified the view of nurses problematizing the resources for effective mental health care in Primary Care. And in the two categories presented, there are expectations that do not illustrate decontextualized opportunities, but rather, relevant perspectives for the problematization of practices aiming to consolidate care that is shared and interpreted by all, with the power to transform individualities and social contexts.

Discussion

Matrix support, an organizational arrangement that enables specialized technical support to the teams, has collaborated with the structuring of an integrative care in Primary Health Care in our country, in which mental health actions are based on the valuation of the social conjuncture in the territory.(3) In this direction, the results present the potential to emphasize matrix support actions in mental health in the primary health network setting. Intention of matrix supporters and nurses’ expectations do not illustrate decontextualized opportunities, but relevant perspectives for the consolidation of care that is shared and interpreted by all, with the power to transform individualities and social contexts.

In the first category, matrix supporters exemplify the “system of relevance” constructed by Schütz, when they attempt moments of training and learning to the health professionals of the units, through the handling of cases of mental health and the plan of care in mental health, taking into account the shared work with “do-it-yourself”, guided by the user’s peculiar demand. Education is not the only reproduction of the theoretical-practical domain, consisting in the strengthening of spaces that prioritize the exchange of knowledge and values. It is a reading of the world beyond diseases, which acknowledges the conditions and contexts of life that people are subjected to.(13)

Another representative element of this intention of the supporters, expressed in the results, is the learning of health professionals, which has the potential to foster the analysis of reality and to reconstruct it, through a change of theoretical-practical vision and, mainly, identification with the planned actions. Studies have pointed out that the learning of health professionals can contribute to health care in the territory, where the professional process is set up as an interactional structure, in which each professional controls his own work, but there are interpersonal connections with the others, where intersubjectivity shows a world that is common to all of us.(14)

In this logic, it becomes important to consolidate the concept of instruction of professionals aiming to overcome the traditional view of catechizing the other, so the premise of information sharing counterposes it to develop care which is, for now, frail and fragmented.

Subsequently, findings indicate how matrix supporters experience participation in mental health
care in the territory, in which the structure of this intention is based on immediate interests, such as participating in and assisting the care in the units. From the point of view of supporters, mental health care in the territory is considered elementary, with matrix support participation, because it becomes necessary to create an environment that allows spaces of exchange between supporters and professionals of the units, as well as the establishment of joint actions. In this direction, matrixing traces a line of thought that shifts the focus to joint action, from disease to the subject, instituting a care based on mental health.\textsuperscript{(15)}

On the other hand, in pointing out the different forms of operationalization and the difficulties encountered in the process, matrix supporters point out that their intention when participating in the units runs through the assistance projections to meet the demands of the user, since it goes into the conformation of the work process in this setting. In order to do so, studies indicate that overcoming barriers requires the sensitization and active participation of managers, professionals and users, which allows collective and contextual health production.\textsuperscript{(16,17)}

Aside from responding to the objective of this study, it was possible to look at nurses, who have a relevant role in mental health care in Primary Care, since they receive, on a daily basis, people in psychological distress who demand actions in mental health from primary care services. Thus, evidencing the expectations of nurses can contribute to strengthen matrix support actions in mental health in the territory, whereas these actions, when considering nursing work relevant to its implementation, can make this worker an exponent for the consolidation of mental health in the community.

With regard to nurses’ expectations, it was possible to look at nurses, who have a relevant role in mental health care in Primary Care, since they receive, on a daily basis, people in psychological distress who demand actions in mental health from primary care services. Thus, evidencing the expectations of nurses can contribute to strengthen matrix support actions in mental health in the territory, whereas these actions, when considering nursing work relevant to its implementation, can make this worker an exponent for the consolidation of mental health in the community.

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Finally, the fourth category indicates that nurses expect to improve matrix support structure, in view of reports regarding matrix team arrangement improvement. Studies indicate that the work between supporters and teams of the health units requires constant dialogue, which can generate new constructs, aiming at the integration of knowledge, skills and behaviors in health care.\textsuperscript{(22)} However, nurses affirm that there is a quantitative lack of sup-
port professionals, which harms the offered support, generating spaces with scarcity of discussions and institutional reference to handle the daily demands.

Matrix support represents expansion of care beyond the substitutive network, especially Primary Health Care, which reinvigorates the idea that Psychiatric Reform cannot advance if Primary Care is not incorporated into care. Therefore, it is necessary to broaden the awareness of teams, managers and community regarding the importance of implementing strategies that strengthen the ideals of the Psychiatric Reform and the Brazilian Unified Health System (SUS – Sistema Único de Saúde), which are affected by dismantling actions that interfere with the therapeutic results that lead to proposals for the return of the asylum model to the country’s Public Policies. In view of this, the strengthening of Primary Health Care becomes essential as a mechanism to contain setbacks in the process of consolidation of the Brazilian Psychiatric Reform, as well as containing the dismantling of SUS.

Despite the tensions and challenges presented, matrix support is a potent strategy for working in mental health in the basic network, and it has contributed to bring mental health, health unit teams and users closer. Among the main tensions, the integration and awareness of these teams for mental health work can be found, and investing in people portrays the movement to overcome the isolation arising from a health model focused on disease.

It is noteworthy that in this research, with the unveiling of the senses expressed by the lived experiences of matrix support workers and nurses, comprehensive analysis was carried out. The phenomenological method, as the axis of health practices, contributes to actions that are based on the comprehensive way of living experiences of supporters and nurses, provoking the problematization of lived experiences for the production of health, citizenship and existence.

In addition, it should be noted that there are limitations, since the study brought the problematization of a reality, when investigating only conceptions of a certain team of supporters and nurses of a certain region of the municipality, not covering the totality of the matrix in the municipality under study. Even so, the actions of matrix support in Primary Care are considered a relevant topic for new research in the area of mental health, in which there is also a need to problematize conceptions of other professionals, users and family members in the care process.

**Conclusion**

The findings of this study indicate that support team members intend to instruct unit health workers when they wish to promote training and learning. The intention to participate in mental health care in the territory was also evidenced, on the occasions in which they wish to assist care provision in the units. In the other facet of the phenomenon, there are the expectations of nurses. They are exposed when nurses report that they expect to meet the demands of the user with individual improvement and referrals. In addition, there is an expectation regarding matrix support structure improvement, when nurses wish for the improvement of matrix array arrangement. Hearing the experiences uncovered the mismatch between intentions of matrix supporters and nurses’ expectations. This mismatch is linked to the conflict between what is intended and expected, making it evident that there is no reciprocity of perspectives, in which the intention of action is motivated by the context as translated by expectation.

**Collaborations**

Oliveira GC, Schneider JF, Pinho LB, Camatta MW, Nasi C, Guimarães AN and Torres MEL declare that they contributed to the design of the study, data analysis and interpretation, article writing, relevant critical analysis of intellectual content and approval of the final version to be published.

**References**


Prevalence of clinical complications high risk associated with AIDS death

Objetivo: Investigar la prevalencia del alto riesgo de complicaciones clínicas asociadas a los óbitos por SIDA y su relación con variables sociodemográficas y terapéuticas.

Métodos: Estudio epidemiológico, retrospectivo, que incluyó 80 casos de óbito por SIDA ocurridos entre 2007 y 2015 en un Estado del Nordeste brasileño. La estratificación del riesgo consideró indicadores de acompañamiento obtenidos en el diagnóstico de la infección, asignando-se valores de 1, 2 para carga viral y 1, 2, 3 para indicadores de linfocitos T CD4+, cantidad de enfermedades oportunistas, manifestaciones clínicas y enfermedades crónicas, con escore variando entre 5 y 14. Cuanto más alta este escore, mayor el riesgo para complicaciones clínicas. Los dados fueron analizados estimando a prevalencia y razón de prevalencia para el alto riesgo, seguido del método de Weight of Evidence y estadística D de Somers.

Resultados: De los 80 casos estudiados, 51,2% fueron alocados en el estrato de alto riesgo. El registro de antecedentes psiquiátricos aumentó de 2 veces la prevalencia para el alto riesgo y la edad se relacionó con este estrato. La cantidad de linfocitos T-CD4+, enfermedades oportunistas y manifestaciones clínicas fueron los indicadores que presentaron mayor fuerza de asociación con la estratificación de riesgo.

Conclusión: El estudio demostró la prevalencia del alto riesgo de desarrollo de complicaciones clínicas, mayor fuerza asociativa con los indicadores LT-CD4+, enfermedades oportunistas y manifestaciones clínicas con estratificación de riesgo propuesto. Estos resultados sugieren la necesidad de atención especial con los servicios de atención especializada a los individuos acompañados en nivel ambulatorial.

Resumen

Objetivo: Investigar la prevalencia del alto riesgo de complicaciones clínicas asociadas a la muerte por AIDS y su relación con variables sociodemográficas y terapéuticas.

Métodos: Estudio epidemiológico, retrospectivo, que incluyó 80 casos de muerte por AIDS ocurridos entre 2007 y 2015 en un Estado del Nordeste brasileño. La estratificación del riesgo consideró indicadores de acompañamiento obtenidos en el diagnóstico de la infección, asignando-se valores de 1, 2 para carga viral y 1, 2, 3 para indicadores de linfocitos T CD4+, cantidad de enfermedades oportunistas, manifestaciones clínicas y enfermedades crónicas, con escore variando entre 5 y 14. Cuanto más alta este escore, mayor el riesgo para complicaciones clínicas. Los datos fueron analizados estimando a prevalencia y razón de prevalencia para el alto riesgo, seguido del método de Weight of Evidence y estadística D de Somers.

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Introduction

Acquired Immunodeficiency Syndrome (AIDS) has been considered a serious public health problem due to the dynamic epidemiological disease profile and alarming morbidity and mortality rates. Increasing access to actions and services for the prevention, diagnosis and treatment of Human Immunodeficiency Virus (HIV) and AIDS were important coping strategies for the epidemic, whose consequences were the decline in new infections and disease-related morbidity and mortality.

In 2017, about 36.7 million people were living with HIV worldwide, with two million new cases being reported due to the infection and one million deaths with AIDS as the underlying cause. In Brazil, in 2017, 42,420 new cases of HIV and 37,791 cases of AIDS were diagnosed. Over a period of ten years, the rate of AIDS detection in the country fell by 9.4%, however, in the same period the Northeast region grew by 24.1%. In Paraíba State, in 2017 there was reporting of 533 cases and 139 deaths from AIDS as the underlying cause.

With the introduction of antiretroviral therapy and preventive and prophylactic technologies, it is possible to observe a change in the disease course, which previously had a fast lethal outcome, turning into a disease classified as chronic. Life span of people with HIV has increased, equaling the life expectancy of a person without infection. However, this has led to a higher risk of developing comorbidities related to clinical complications and death.

While recognizing the effectiveness of current therapeutic regimens in reducing mortality, AIDS has no cure and is recognized as the fifth leading cause of death among adults worldwide.

Deaths are related to several factors, ranging from delayed diagnosis to late initiation of treatment. Also noteworthy is a change in the pattern of mortality, in which AIDS-related events such as opportunistic diseases, which were commonly the leading cause of death, are giving way to conditions considered non-AIDS as causes of death, including diseases. cardiovascular diseases, cancers, kidney disease, liver disease, osteopenia / osteoporosis, and neurocognitive diseases, as well as the side and toxic effects of antiretroviral drugs.

This new configuration has been demanding care actions supported by the identification of people prone to negative outcomes. Little used nationally, clinical risk stratification has been constituted as a strategy to classify patients according to the risk of developing clinical complications.

Stratification is a tool capable of identifying people and groups with similar health needs, its logic is based on differentiated management for those with similar risks. Thus, risk-stratified care management provides planning of actions and resources, whether clinical, human or financial, according to the uniqueness of patients in a given region or locality.

Therefore, the guiding questions of this study were: How to stratify clinical risk using indicators for monitoring the management of HIV infection in adults? What is the prevalence of high clinical risk in AIDS deaths? And what are the factors associated with high risk?

Given this context, the present study aimed to investigate the prevalence of high risk among deaths from the risk classification of clinical complications associated with AIDS and its relation with sociodemographic and therapeutic variables.

Methods

A retrospective epidemiological study from a secondary data source (medical records), conducted in two reference services for the treatment of infectious diseases in a Northeastern State of Brazil, which has actions and services to monitor HIV/AIDS infection.

The research sample was obtained from a research database entitled “Análise de Óbitos de Pessoas com HIV Aids”, conducted from October 2015 to February 2016, for a population of 192 cases of death registered in the state between 2007 and 2015.

Inclusion criteria were cases with complete information on viral load (VL), CD4 + T-cell quantification (LT-CD4 +), clinical manifestations, chron-
ic diseases and opportunistic diseases, resulting in a final sample of 80 cases of deaths. The others were excluded because they did not contain complete information on the five indicators.

From the identification of cases, the following independent variables were added: age (<20 years; 20-39 years; 40 to 59 years; ≥60 years), gender (male; female), sexual orientation (heterosexual, homosexual, bisexual), color/race (brown; white; black/indigenous), marital status (single; married/stable union; separated/widowed), education (no schooling; <8 years of schooling; ≥ 8 years of schooling), alcohol use (yes/no), tobacco use (yes/no), illegal drug use (yes/no) and psychiatric history (yes/no).

Clinical risk stratification, dependent variable, was constructed considering clinical monitoring indicators for the management of infection in adults obtained at the time of diagnosis, assigning values of 1, 2 for VL (Viral Load), and 1, 2 and 3. LT-CD4 + indicators, number of opportunistic diseases, number of chronic diseases and number of clinical manifestations of each participant.(12)

Indicators favorable to clinical management of infection (undetectable VL, LT-CD4 + 500 cells/mm³, no opportunistic disease, no chronic disease, and no signs and symptoms) were scored 1. Intermediate indicators (LT-CD4 + between 200 and 500 cells/mm³, occurrence of an opportunistic disease, occurrence of a chronic disease and occurrence of a sign and symptom) and detectable VL were assigned score 2 and unfavorable indicators for clinical management of LT-CD4 + <200 cells/mm³, two or more opportunistic diseases, two or more chronic diseases, and two or more signs and symptoms) score 3.

The sum of these indicators was determined quantitatively, ranging from 5 to 14. The higher this score, the higher the risk for clinical complications. These scores were categorized as follows:

- Low risk (score 5 to 9) = LT-CD4 >= 500 cells/mm³ (1) or LT-CD4 + between 200 and 500 cells/mm³ (2) + undetectable VL (1) + no opportunistic disease (1) or occurrence of an opportunistic disease (2) + no chronic disease (1) or occurrence of a chronic disease (2) + no signs and symptoms (1) or occurrence of a sign and symptom (2);
- High risk (score 10 to 14) = LT-CD4 + between 200 and 500 cells/mm³ (2) or LT-CD4 + <200 cells/mm³ (3) + detectable VL (2) + occurrence of opportunistic disease (2) or two or more opportunistic diseases (3) + occurrence of one chronic disease (2) or two or more chronic diseases (3) + occurrence of one sign and symptom (2) or two or more signs and symptoms (3).

Data were analyzed by estimating the prevalence and prevalence ratio for the high risk among the investigated variables considering a 95% confidence interval. Sequentially, the Weight of Evidence (WoE) method was used to verify relation strength among independent variables and the dependent variable (risk stratification), considering that <0.02 the predictor is not useful (very weak), from 0.02 to <0.1 the predictor has a weak relation, from 0.1 to 0.3 the predictor has a medium strength relation and >0.3 the predictor has a strong relation to Odds Ratio.(13)

For the clinical follow-up indicators that integrated the risk score, the Somers’ D statistic was performed to measure the strength and direction of this association on a scale of -1 to 1, considering that the closer to 1 is the stronger the value, association between indicator and risk score.

This study was approved by the Research Ethics Committee of Health Sciences Center of Universidade Federal da Paraíba, under Opinion 2,564,425.

Results

Of the total cases investigated (n=80), 41 (51.2%) individuals were included in the high risk category. There was a higher prevalence of high risk in the age group from 40 to 59 years old (63.3%), female (55.6%), bisexual (75.0%), self-declared black/indigenous (62.5%), single (55.8%), with less than 8 years of schooling (53.7%), who used alcohol (58.1%), non-smokers (51.1%), illicit drug users...
Prevalence of clinical complications high risk associated with AIDS death

(53.8%) and with a record of psychiatric history (80.0%) (Table 1).

Table 1. Prevalence and prevalence ratio for high risk of AIDS-related clinical complications from death according to sociodemographic variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>n(%)</th>
<th>PR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20</td>
<td>4(50.0)</td>
<td>1</td>
</tr>
<tr>
<td>20-39</td>
<td>41(46.3)</td>
<td>0.93(0.33–2.61)</td>
</tr>
<tr>
<td>40-59</td>
<td>30(63.3)</td>
<td>1.27(0.46–3.50)</td>
</tr>
<tr>
<td>≥60</td>
<td>5(20.0)</td>
<td>0.40(0.05–2.98)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>53(49.1)</td>
<td>1</td>
</tr>
<tr>
<td>Female</td>
<td>27(55.6)</td>
<td>1.13(0.73–1.75)</td>
</tr>
<tr>
<td>Sexual option*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterosexual</td>
<td>53(54.7)</td>
<td>1</td>
</tr>
<tr>
<td>Homosexual</td>
<td>7(28.6)</td>
<td>0.52(0.16–1.73)</td>
</tr>
<tr>
<td>Bisexual</td>
<td>4(75.0)</td>
<td>1.37(0.74–2.54)</td>
</tr>
<tr>
<td>Color/Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brown</td>
<td>49(46.9)</td>
<td>1</td>
</tr>
<tr>
<td>White</td>
<td>16(62.5)</td>
<td>1.33(0.82–2.16)</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>43(55.8)</td>
<td>1</td>
</tr>
<tr>
<td>Married/Stable union</td>
<td>20(40.0)</td>
<td>0.72(0.39–1.30)</td>
</tr>
<tr>
<td>Separated/Widow(er)</td>
<td>17(52.9)</td>
<td>0.95(0.56–1.60)</td>
</tr>
<tr>
<td>Schooling (study years)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No schooling</td>
<td>14(50.0)</td>
<td>1</td>
</tr>
<tr>
<td>&lt;8</td>
<td>41(53.7)</td>
<td>1.07(0.59–1.95)</td>
</tr>
<tr>
<td>≥8</td>
<td>15(53.3)</td>
<td>1.07(0.53–2.16)</td>
</tr>
<tr>
<td>Alcohol use*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>43(58.1)</td>
<td>1.59(0.93–2.71)</td>
</tr>
<tr>
<td>No</td>
<td>30(36.7)</td>
<td>1</td>
</tr>
<tr>
<td>Tobacco use*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>26(46.2)</td>
<td>0.90(0.55–1.49)</td>
</tr>
<tr>
<td>No</td>
<td>47(51.1)</td>
<td>1</td>
</tr>
<tr>
<td>Illegal drug use*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>13(53.8)</td>
<td>1.08(0.61–1.89)</td>
</tr>
<tr>
<td>No</td>
<td>60(50.0)</td>
<td>1</td>
</tr>
<tr>
<td>Psychiatric history*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>10(80.0)</td>
<td>1.79(1.19–2.69)</td>
</tr>
<tr>
<td>No</td>
<td>67(44.8)</td>
<td>1</td>
</tr>
</tbody>
</table>

P – prevalence; PR – prevalence ratio; 95% CI – 95% confidence interval. * The total number of these variables does not correspond to the 80 cases of deaths investigated, as some information was not available in the medical record.

When analyzing the association between the high risk of AIDS-related clinical complications and the effect of independent variables, it was observed that only cases with a history of psychiatric history were associated with this outcome (CI=1.19–2.69). These cases were approximately twice as prevalent for high risk compared to those without psychiatric history records (PR=1.9).

Considering relation strength among variables and the clinical risk stratification, using the WoE method, only age presented a strong relation (CVI = 0.98) with risk stratification (Figure 1).

Regarding the indicators used to construct the risk score, there was a higher prevalence among cases with detectable VL (55.2%), LT-CD4 + between 200-500 cells/mm³ (61.9%), two or more opportunistic diseases at diagnosis (91.7%), two or more clinical manifestations (65.0%) and one chronic disease (81.3%). Considering the prevalence ratio as a measure of association, it can be said that the high risk was approximately four and seven times more prevalent among cases that presented opportunistic diseases at the time of diagnosis, when compared to cases without any occurrence. Moreover, the presence of a chronic disease at the time of diagnosis increased the prevalence for high risk twice as compared to cases without any comorbidity (Table 2).

In the association analysis employed by the Somers D-statistic, it was shown that clinical follow-up indicators are good predictors for the risk classification of AIDS-associated clinical complications, with emphasis on opportunistic diseases (0.556), clinical manifestations (0.453), and LT-CD4 + (0.414) which presented higher values (Table 2).
Discussion

Of the cases of deaths studied, more than 50% were allocated to the high-risk stratum, with higher prevalence among individuals with psychiatric history. The age group showed a strong relation with this stratum, and T-CD4+ lymphocyte count, opportunistic diseases and clinical manifestations were the indicators that showed the strongest association strength with risk stratification.

Studies show that HIV infection and psychiatric diagnoses are closely correlated. An estimated 50% of HIV-infected individuals are diagnosed with concomitant mental disorders. Depression is the most common psychiatric disorder in this population, known for its association with poor adherence to treatment, negative impact on social relations, and faster progression to AIDS and death. Thus, the presence of psychiatric history should be valued both at the time of HIV diagnosis and during clinical follow-up.

From the perspective of WoE, only the variable age group was strongly related to the high risk of clinical complications associated with AIDS. In the epidemiological conception, age is the most important determinant among the attributes related to people. In the study, the prevalence for high risk was higher in the age group 40 to 59 years. In Brazil, in 2017, there was a tendency to increase in AIDS mortality among women aged 15 to 19, men aged 20 to 24, and among individuals aged 60 and over.

A study conducted in the capital of the Republic of Malawi, Africa showed that most adolescents and young women (aged 15-24) perceived little risk of HIV acquisition, even those at higher risk. Low HIV testing, delayed testing, and consequent lack of awareness of positivity linked to low risk perception lead to delayed diagnosis and treatment.

Increased AIDS cases in Brazil among people aged 60 or older may be related to the invisibility of the elderly's sexuality by health professionals who do not assess the vulnerability of this population part to HIV and miss the opportunity to request serology, leading to a diagnosis at a more advanced stage of the disease, interfering with its prognosis and progression of comorbidities.

The study found a higher prevalence of high clinical risk among cases with detectable viral load, LT-CD4+ between 200-500 cells/mm³, two or more opportunistic diseases at diagnosis, two or more clinical manifestations or a chronic disease. Laboratory monitoring of VL values serves to evaluate the efficacy of ART and early detection of viral failure and treatment adherence problems. Although there is no scientific evidence of correlation between VL and mortality, its occurrence is associated with negative prognosis.

LT-CD4+ count is one of the most important biomarkers for assessing immune system impairment and immune response recovery with appropriate treatment. Opportunistic diseases/infections are considered major complications and leading cause of HIV-related hospitalization. Such diseases have delicate management and high mortality. In a study with patients on antiretroviral agents and one or more opportunistic diseases at the time of diagnosis, the risk of death was 5.33 times higher in individuals with more than one condition.

Prophylaxis of opportunistic diseases provides an important reduction in morbidity and mortality in individuals with immune dysfunction secondary to HIV infection, with LT-CD4+ count being the main parameter to guide the introduction and suspension of this prophylaxis.

<table>
<thead>
<tr>
<th>Variables</th>
<th>n(%)</th>
<th>PR (95% CI)</th>
<th>Somers’ D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viral load</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undetectable</td>
<td>13(30.8)</td>
<td>1</td>
<td>0.248</td>
</tr>
<tr>
<td>Detectable</td>
<td>67(55.2)</td>
<td>1.79(0.77–4.17)</td>
<td>0.414</td>
</tr>
<tr>
<td>LT-CD4+ (cells/mm³)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;200</td>
<td>5(60.0)</td>
<td>1.30(0.60–2.80)</td>
<td>0.414</td>
</tr>
<tr>
<td>200-500</td>
<td>21(61.9)</td>
<td>1.34(0.86–2.08)</td>
<td></td>
</tr>
<tr>
<td>&gt;500</td>
<td>54(46.3)</td>
<td>1</td>
<td>0.556</td>
</tr>
<tr>
<td>Opportunistic diseases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>22(13.6)</td>
<td>1</td>
<td>0.453</td>
</tr>
<tr>
<td>One</td>
<td>34(47.1)</td>
<td>3.45(1.14–10.48)</td>
<td></td>
</tr>
<tr>
<td>Two or more</td>
<td>24(91.7)</td>
<td>6.72(2.33–19.37)</td>
<td></td>
</tr>
<tr>
<td>Clinical manifestations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>7(14.3)</td>
<td>1</td>
<td>0.453</td>
</tr>
<tr>
<td>One</td>
<td>13(7.7)</td>
<td>0.54(0.04–7.36)</td>
<td></td>
</tr>
<tr>
<td>Two or more</td>
<td>60(85.0)</td>
<td>4.55(0.73–28.2)</td>
<td></td>
</tr>
<tr>
<td>Chronic diseases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>56(41.1)</td>
<td>1</td>
<td>0.281</td>
</tr>
<tr>
<td>One</td>
<td>16(81.3)</td>
<td>1.98(1.34–2.93)</td>
<td></td>
</tr>
<tr>
<td>Two or more</td>
<td>8(62.5)</td>
<td>1.52(0.82–2.83)</td>
<td></td>
</tr>
</tbody>
</table>

P - prevalence; PR - prevalence ratio; 95% CI - 95% confidence interval; LT-CD4+ - CD4+ T lymphocytes
Result regarding opportunistic diseases also reveals us looking for a diagnosis based on the appearance of signs and symptoms, which reiterates the suggestion of late diagnosis. Implementation of early diagnosis, proper management and correct coping are essential measures to reduce correlated lethality.

Presence of two or more clinical manifestations characterizes the symptomatic phase of the infection, suggesting an advanced stage of the infection. The significant association of this indicator with the risk classification is suggested based on its ability to cause damage to the specific treatment by influencing viral transmission, decreased sensitivity of the immune response to drugs, management and complex clinical coping, and high levels of early mortality.

In the population studied, the presence of a chronic disease at the time of diagnosis increased the prevalence for high risk by twice. HIV-infected people are at increased risk for the development of cardiovascular disease due to the high prevalence of cardiovascular risk factors and ART-related metabolic changes, as well as systemic immune activation that promotes endothelial inflammation and atherosclerosis.

Based on Somers’ D statistic analysis, the high risk of AIDS-associated clinical complications was strongly associated with three follow-up variables: opportunistic diseases (0.556), clinical manifestations (0.453), and LT-CD4 + (0.414). Identification of acute risk from clinical risk stratification use enables the planning of strategies and implementation of interventions on the vulnerabilities of individuals, aiming at reducing clinical complications and mortality.

In Brazil, a satisfactory and lasting response to AIDS will only be possible when all dimensions of health care practices are embedded in an effective and well-structured public health system.

Limitations of the study are in the retrospective nature of the data, quality of the information collected from a secondary source (medical records) and because it comes from a single Brazilian state restricting the generalization of results. The lack of information in medical records related to the indicators that made up the risk score also reflected in the sample number used, which may have influenced the absence of statistical significance between variables.

**Conclusion**

The study showed the prevalence of high risk for clinical complications development among cases of death, as well as the higher associative strength found in LT-CD4 + indicators, opportunistic diseases and clinical manifestations in the proposed risk score. These results suggest the need for special attention from specialized care services to outpatients, attesting to the need for health professionals to know about the real clinical and immunological status of users retained in continuous care. In addition to highlighting the importance of sociodemographic aspects and therapeutic characteristics in understanding the epidemic behavior, pointing out factors that need investigation and intervention in the care network for people living with the infection. Considering theme relevance, it is suggested that further studies be developed from the perspective of clinical risk stratification so that it becomes a standard practice in health services.

**Acknowledgments**

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**Collaborations**

Leadebal ODCP participated in conception and design, analysis and interpretation of data and preparation and approval of the final version of the manuscript; Pereira RR worked on the final writing and critical review for approval of the final ver-
sion to be published; Nobrega LMB and Oliveira JAM worked on conception, design and approval of the final version to be published; Chaves RB and Medeiros LB worked on methodology design, study design, data analysis and interpretation, and approval of final version to be published and Monroe AA and Nogueira JA worked on final writing and critical review for approval of final version to be published.

References


Filial responsibility in care for elderly parents: a mixed study

Responsabilidade filial no cuidado aos pais idosos: estudo misto

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Carla Cristiane Becker Kottwitz Bierhals¹
Duane Mocellin¹
Ana Cláudia Fuhrmann¹
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Lisiane Manganelli Girardi Paskulin²

Abstract

Objective: To examine the relationship between attitudes of filial responsibility and care behaviors of caregiving children.

Methods: A mixed-method study with concomitant triangulation of data with 100 caregiving children of elderly people linked to primary care services. At the quantitative stage, the Filial Expectation and Filial Duty Scales were applied to assess the attitudes regarding filial responsibility. Care behaviors were assessed through instrumental, emotional and financial support, companionship, and visitation. At the qualitative stage, open-ended questions about care behaviors and attitudes were used. Inferential and thematic analyses and triangulation of the data were done.

Results: Financial and emotional support showed an association with Filial Duty (p = 0.050, p = 0.001) and Filial Expectation (p = 0.013, p = 0.023), respectively. At the qualitative stage, these filial behaviors emerged as financial overload and teachings for their own children to care for them in old age. Companionship and visitation were associated only with Filial Duty (p = 0.015), similar to the results found in the testimonials relative to be a natural duty and satisfaction of being present in the life of the parents. There was no association between attitudes of filial responsibility and help in activities of daily living, diverging from the findings of the category “Difficulties in being a caregiving child.”

Conclusion: Understanding attitudes and behaviors of care contributes to the improvement of the quality of attention of the professionals that assist this population.

Resumen

Objetivo: Examinar la relación entre actitudes de responsabilidad filial e comportamientos de cuidado de los hijos cuidadores.

Métodos: Estudio de métodos mixtos con triangulación concomitante de datos con 100 hijos cuidadores de ancianos vinculados a servicios de atención primaria. En la etapa cuantitativa, se aplicaron las Escalas de Expectativa Filial y Deber Filial. Los comportamientos de cuidado fueron evaluados por medio del apoyo instrumental, emocional y financiero, compañía y visita. En la etapa cualitativa, se utilizaron preguntas abiertas sobre actitudes e comportamientos de cuidado. Se realizaron análisis inferencial e temático y triangulación de los datos.

Resultados: Apoyo financiero e emocional presentaron asociación con Deber Filial (p = 0.050, p = 0.001) y Expectativa Filial (p = 0.013, p = 0.023), respectivamente. En la etapa cualitativa, estos comportamientos filiales emergieron como sobrecarga financiera y enseñanzas para sus propios hijos que también los cuidaran en la vejez. Compañía y visita fueron asociadas apenas con Deber Filial (p = 0.015), de forma semejante al encontrado en los depoimentos relativos a ser un deber natural y satisfacción de estar presente en la vida de los padres. No hubo asociación entre actitudes de responsabilidad filial y ayuda en las actividades de vida diaria, divergente de los hallazgos de la categoría “Dificultades en ser hijo cuidador.”

Conclusion: Comprender actitudes e comportamientos de cuidado contribuye para mejorar la calidad de la atención de los profesionales que asisten a esta población.

Keywords
Caregivers; Aged; Family relations; Geriatric nursing; Primary health care

Descritores
Cuidadores; Idosos; Relações familiares; Enfermagem geriátrica; Atenção primária à saúde

Discritores
Cuidadores; Anciano; Relaciones familiares; Enfermería geriátrica; Atención primaria de salud

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Conflicts of interest: article extracted from the Doctoral Thesis “Responsabilidade filial no cuidado aos pais idosos e a relação com o bem-estar” (“Filial responsibility in the care of the elderly parents and the relationship with the well-being”), presented to the Graduate Nursing Program of the Universidade Federal do Rio Grande do Sul (UFGRS).
Filial responsibility is a social norm that involves individual attitudes and care behaviors toward parents during the aging process.\(^1\) Attitudes encompass feelings of obligation and affection, family orientation, and desire for reciprocity, i.e., feeling responsible for rewarding parents for the care received.\(^2\) Care behaviors include support in the instrumental aspects (assistance in basic and instrumental activities of daily living – BADLs and IADLs) and financial and emotional support.\(^3\)

In Latin societies, there is a higher expectation that children will care for their parents in their old age.\(^4\) Nurses who care for the elderly caregivers identify, on a daily basis, supportive attitudes and behaviors, congruent or otherwise, and need to be alert and able to deal with feelings such as (un)motivation, guilt, and isolation, as well as helping in finding alternatives to reduce the burden of these caregivers.

The association between attitudes of filial responsibility and caring behaviors has been the focus of international research. A Canadian study analyzed this association in three groups of caregiving children. Positive attitudes of responsibility in care were associated with caring behaviors related to providing companionship, emotional and financial support among Canadians of Chinese origin. In turn, among the Canadian children, the authors did not identify an association between attitudes and behaviors.\(^1,4\)

A Chinese study sought to understand the meaning of filial piety (a concept used in Eastern culture) for elderly people with dementia and their family caregivers. It was found that filial responsibility is influenced by social and cultural norms, since care for the elderly is often not a choice of children, but rather a legal obligation or expectation of society.\(^5\) Furthermore, a Swedish study showed that the feeling of exhaustion is the main factor for children to stop caring for their parents. It also showed that changes in people’s lifestyles (little free time and strenuous work routines) can influence the cultural values related to the filial piety of caregivers, i.e., the obligation to provide care for the family or elderly parents goes through a process of neglect or carelessness among the children.\(^6\) In this sense, it is verified that culture and ethnicity affect the forms of care.\(^7\)

In Brazil, studies with elderly caregivers in general focus on the characterization of caregivers, their overload or quality of life and the needs to perform the care of the dependent elderly.\(^8-15\) Filial responsibility was the focus of a Brazilian research,\(^16\) which analyzed the association between filial responsibility and overload of caregiving children, identifying formal employment \((p = 0.027)\), having positive feelings in family life \((p < 0.001)\), providing financial support \((p = 0.027)\) and helping in daily life activities \((p < 0.001)\) as factors statistically associated with overload.

This study is proposed aiming to identify the convergence or otherwise between attitudes and behaviors of children in the care of the elderly parents, and considering the need to expand the knowledge in the subject through investigations in the Brazilian context. The results support the nurses in their care for families with the elderly, in which it is necessary to identify how children think and act in the care of the parents and propose care interventions. The study also allows for the expansion of knowledge on the subject, favoring the planning of public health policies targeted at this population and providing support for the integration of care actions for the elderly, caregivers, and families. This study aims to examine the relationship between attitudes of filial responsibility and care behaviors for caregiving children in the Brazilian context. The study also investigates the extent to which caregiving children have attitudes of filial responsibility towards elderly parents and what are the care behaviors for caregiving children during the aging process of elderly parents.

**Methods**

This is a mixed-method study with concomitant triangulation of data. This type of study combines quantitative and qualitative approaches in the same research, in order to increase the comprehensiveness and depth of the understanding of complex sub-
The research replicates in Brazil a Canadian study that analyzed filial responsibility, comparing attitudes and filial behaviors in caring for elderly parents in Anglo-Saxon and Eastern cultures. The target population comprised caregiving children of elderly parents selected for convenience. The sample consisted of 100 caregiving children of elderly people using two Basic Health Units (UBS) in Porto Alegre, state of Rio Grande do Sul (RS), Brazil. The number of participants in the study was the same as in the original study. These were identified by means of family records, by appointment of health professionals, and by active search for services. Inclusion criteria included care for at least three months and care for at least three hours per week. Assistance activities in BADLs and IADLs, financial support, emotional support, companionship and visitation were considered care activities.

The data were collected in the period 2014-2015 through interviews, using the research protocol adapted and validated for use in Brazil. The interviews were conducted at each caregiver’s home or at a place defined by the participant, by a previously trained research team. This protocol is composed of seven scales, including closed and open questions.

Attitudes of filial responsibility were analyzed by the Filial Expectation and Filial Duty Scales, which obtained Cronbach’s Alpha values of 0.64 and 0.65, respectively, in the Brazilian version. The Filial Expectation Scale analyses the support of adult children in caring for elderly parents and measures their children’s perception of living, caring for, helping, and visiting their parents. The score ranges from 1 (strongly disagree) to 5 (strongly agree), with a maximum score of 25 points. The higher the score, the higher the children’s expectation to care for the elderly parents. The Filial Duty Scale has six items that evaluate how children feel in relation to the obligation to help their parents; follow their advice; provide financial support; respect them; please them; make them happy; and maintain contact with them. The score ranges from 1 (strongly disagree) to 5 (strongly agree), with a maximum score of 30 points. The higher the score, the higher the children’s filial duty in relation to providing care for the elderly parents.

Caring behaviors were evaluated through instrumental, financial and emotional support, companionship, and visitation. Instrumental support was assessed based on the BADL and IADL scales. Emotional support was assessed based on the answers to the following question: To what degree do you feel that you fulfill the emotional support needs of your parents? Companionship and visitation were evaluated based on the answers to the question: To what degree do you feel that you fulfill the companionship and visitation needs of your parents? For both questions, an answer from 1 to 5 was possible, in which 1 represented “not at all” and 5 represented “completely.”

Financial support was measured based on the closed question (yes or no): “Do you provide financial support for your parent?” If not, the participant was asked if they would provide financial support if their parents needed it and if they could.

The qualitative step addressed questions on: under what circumstances caregiving children would admit their parents to a long-term institution; what they expected from their children during their aging; which part they considered the most difficult in the delivery of care; how they felt responsible for their parents; what were the negative and positive aspects of that responsibility; and when and why they began to feel responsible.

Statistical analyses were performed using the Statistical Package for Social Sciences, version 21.0. Quantitative variables were described by mean values and standard deviation, and the categorical variables were determined by absolute and relative frequencies. To compare means (quantitative variables of symmetric distribution, such as age and Filial Duty and Expectation scores), the t-student or Analysis of Variance (ANOVA) tests were applied. To evaluate the association between quantitative variables (such as Filial Duty and Expectation scores) and ordinal categories (such as self-perception of the elderly’s health), Pearson’s or Spearman’s correlation tests were applied, respectively. Dependent variables were aid in BADLs and IADLs, financial and emotional support, and visitation. The independent
variables were Filial Duty and Expectation, gender, age, schooling, marital status, formal employment of the caregiver, primary caregiver, caregiver living with the elderly; health of elderly parents, and self-perception of health. The variables that presented \( p < 0.20 \) in the bivariate analyses were inserted in a multivariate linear regression model to control for possible confounding factors. The effect measure used was the Prevalence Ratio, in conjunction with the 95% confidence interval.

In the qualitative step, the information was analyzed by thematic analysis. The triangulation of quantitative and qualitative data occurred during the interpretation and analysis of the results between the associations of filial responsibility and care behaviors with the four thematic categories, seeking to understand the differences and similarities between the findings. The Project was approved by the Research Ethics Committee (No. 536,662), and all participants signed the Free and Informed Consent Term.

## Results

### Characterization of the sample

Among the 100 caregivers, 74 were daughters, with a mean age of 54.04 ± 10.17 years, married or living with a partner. The educational level was 13.96 ± 4.87 years of study, 58 had formal employment, and 68 had children. Among the caregivers, a large part (63) took care of their mother, 63 were the primary caregivers, and 61% had lived with the elderly, on average, for 15 ± 3-46 years. Among the caregivers, 44 considered their health good and 32 assessed their parents’ health as good. As for the elderly parents, a large part were female (78) and, in relation to the marital status, 58 were widowers. Among the elderly who did not live with their children (36), 13 lived with other people.

### Quantitative stage

The attitudes of filial responsibility Filial Expectation and Filial Duty had mean scores of 22.6 ± 2.7 and 28.2 ± 1.9, respectively. When analyzing the care behaviors, it was evidenced that 93% of the children assisted the elderly parents in the IADLs; 57%, in the BADLs; 80% provided emotional support; 71% provided companionship and visitation; and 52% helped their parents financially (Table 1).

Help in the BADLs and the IADLs were the dependent variables of the linear regression model. It was verified that caregivers who lives with the elderly present a 2.63 times higher prevalence in helping in BADLs when compared to caregivers who do not live with the elderly. As for IADLs, caregivers who live with the elderly have a 17% higher prevalence in helping in these activities. Furthermore, the higher the schooling and the age of the caregiver, the higher the prevalence of help in the IADLs (Table 2).

For financial support, there was a significant association with Filial Duty (\( p = 0.050 \)) and Filial Expectation (\( p = 0.013 \)). For each additional point on the Filial Duty scale, there is a 15% increase in the prevalence of financial support for the elderly, and for each additional point on the Filial Expectation scale, there is an 11% increase in the prevalence of financial support. Emotional support showed a significant association with Filial Duty (\( p = 0.001 \)) and Filial Expectation (\( p = 0.023 \)). In addition, for each additional point in the Filial Duty

<table>
<thead>
<tr>
<th>Variables</th>
<th>Help in BADLs</th>
<th>p-value</th>
<th>Help in IADLs</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filial duty</td>
<td>0.94 (0.87–1.02)</td>
<td>0.117</td>
<td>1.01 (0.97–1.04)</td>
<td>0.764</td>
</tr>
<tr>
<td>Filial expectation</td>
<td>0.99 (0.95–1.04)</td>
<td>0.986</td>
<td>1.02 (0.98–1.05)</td>
<td>0.343</td>
</tr>
<tr>
<td>Elderly health</td>
<td>1.13 (0.99–1.29)</td>
<td>0.075</td>
<td>1.01 (0.97–1.05)</td>
<td>0.660</td>
</tr>
<tr>
<td>Caregiver lives with the elderly</td>
<td>2.63 (1.58–4.37)</td>
<td>&lt;0.001</td>
<td>1.17 (1.03–1.34)</td>
<td>0.018</td>
</tr>
<tr>
<td>Formal caregiver employment</td>
<td>0.74 (0.55–1.00)</td>
<td>0.053</td>
<td>0.98 (0.89–1.07)</td>
<td>0.569</td>
</tr>
<tr>
<td>Caregiver schooling</td>
<td>0.99 (0.96–1.03)</td>
<td>0.725</td>
<td>1.01 (1.00–1.03)</td>
<td>0.030</td>
</tr>
<tr>
<td>Caregiver age</td>
<td>1.01 (0.99–1.03)</td>
<td>0.257</td>
<td>1.01 (1.00–1.01)</td>
<td>0.039</td>
</tr>
<tr>
<td>Female caregiver</td>
<td>1.32 (0.84–2.08)</td>
<td>0.226</td>
<td>1.13 (0.97–1.32)</td>
<td>0.132</td>
</tr>
</tbody>
</table>

PR – Prevalence ratio; 95% CI – 95% confidence interval; BADLs – Basic Daily Life Activities; IADLs – Instrumental Activities of Daily Living
scale, there is a 14% increase in the prevalence of emotional support for the elderly, and for each additional point in the Expectative Filial scale, there is a 6% increase in this prevalence. Furthermore, caregivers who live with the elderly are 37% more likely to provide emotional support. Companionship and visitation had a significant association only with Filial Duty ($p = 0.015$). For each additional point on the Filial Duty scale, there is an 11% increase in company prevalence and visitation to the elderly. In addition, caregivers who live with the elderly are 36% more likely to provide this care.

**Qualitative stage**

Based on the open questions, four thematic categories were developed: possibility of institutionalization of elderly parents; expectation of care; difficulties in being a caregiver; and feelings of filial responsibility.\(^{(17)}\)

**Possibility of Institutionalization of elderly parents**

Some children did not consider the institutionalization of their parents as a possibility. For them, this was perceived as a form of abandonment, considering that it was the children’s responsibility, duty and obligation to care for and support the parents during aging. Nevertheless, institutionalization was seen as an alternative care for certain circumstances, such as impossibility of assuming care, need for specialized care, increasing frailty of the elderly, loss of cognitive ability in the case of dementias, death of a spouse; and lack of physical structure for home care.

“[…] We have a duty to care for them. It is an obligation for the children. […] I believe that they are not something to be discarded at the end of life. That is not how things work.” (F52)

“I believe that, as long as my mother is able, we do not consider this possibility, because we share the responsibility […] Unless it is a thing that goes beyond it, such as if she develops a strong cognitive deficit.” (F35)

**Expectation of care**

Most children expressed a desire to be cared for by their children as they age. They reported expecting gratitude, reciprocity, affection and support. In addition, in caring for elderly parents, they were showing that they also wanted to be cared for, as a lesson to their children. Nevertheless, they stressed that such care should not be imposed, nor should it be an obligation, but they expected children to be present during their aging process.

“I hope she takes care of me, but I do not want her not sacrifice herself. I hope that she is present, but if she finds it best to leave me in a nursing home, that is fine.” (F61)

“[…] We have always wanted to show our children how we have to be taken care of.” (F8)

“I want them to take care of me, too. It is something reciprocal. […] I took care of them.” (F94)

**Difficulties in being a caregiving child**

The subjects considered the help in BADLs, conflicting family relationships, elderly health situation, their own health situation and the lack of support from other family members as the most difficult
parts in the process of care to elderly parents. They also mentioned the need to live with the elderly, being the only option for care, being required to perform full-time care, emotional burden, tiredness for assuming various functions, and behavior of the elderly.

“After the bath, it is always difficult to dress him. He stands still and does not help. He does not collaborate in anything.” (F40)

“The hard part is knowing that I am the one who has to do everything […] I think I could share tasks a little, instead of having everything under my responsibility […] I also have my family. I have teenage children to care of.” (F74)

Feelings of filial responsibility
For the children, caring for their parents is a moral obligation, a duty and a social commitment, as they were cared for as children, and old age is the time to give care back. Responsibility involves a desire for reciprocity, gratitude towards parents, satisfaction in being able to provide care, and feelings of reciprocity and payment of a debt. Conversely, they highlighted as a negative aspects providing full-time care, living with the elderly, lack of family support, caring for the elderly and their family, social losses, and financial overload.

“[…]Because I think it is a commitment. It is an affective commitment and a social commitment.” (F59)

“I owe it to her […] so I believe that it is my time to provide care […] We have a duty […] It is an obligation of the children and being able to provide care is a personal satisfaction […].” (F52)

“I do not know what it is like to go to the movies, to a restaurant, to take walk, to go out, or to go to a mall.” (F16)

Triangulation of data
The triangulation of the data was performed among the variables that presented a statistically significant relation in the multivariate analysis of the Poisson Regression with the four thematic categories. Although no association was found between BADLs and IADLs and filial responsibility, we sought to triangulate the data while considering the variables that influenced this behavior (caregiver living with the elderly, caregiver age, and caregiver education). Data related to the association between care behaviors (financial and emotional support) and attitudes of filial responsibility (filial duty and filial expectation), as well as companionship and visitation and filial duty, were triangulated, aiming to find differences or similarity between results. As already noted, there was no association between Filial Duty and Filial Expectation and care behaviors (help in BADLs and IADLs). Nevertheless, such findings were evidenced in the category “Difficulties in being a caregiver,” in which caregivers reported help in BADLs as one of the most difficult parts of care. Filial Duty and Filial Expectation were associated with financial and emotional support. These findings corroborate the difficulties children face regarding their families’ lack of support and financial overload. They emphasize, however, that care is a natural process and a duty to pay back the attention they had as children, as already described in the categories “Feelings of filial responsibility,” “Difficulties in being a caregiving child,” and “Expectation of care.” Filial Responsibility presented a significant association only with the care behaviors of companionship and visitation. Nevertheless, it presented similarity with the results of the categories “Possibility of institutionalization of elderly parents”, “Feelings of filial responsibility,” and “Expectation of care.” For the children, taking care of parents is a natural duty that happens with the passing of the years, and thus, institutionalizing parents was considered an act of abandonment, and they felt responsible for the parents, as they had been taught to care for the elderly and cite personal satisfaction in providing care to their parents.

Discussion
Filial responsibility was confirmed by the high scores of attitudes of filial responsibility, frequen-
cy of care behaviors, and the thematic categories “Feelings of filial responsibility” and “Expectation of care,” as children care for their elderly parents as a demonstration of gratitude and reciprocity. Notwithstanding, there is an ambiguity between filial responsibility and the category “Possibility of institutionalization of elderly parents,” since institutionalization is seen as a possibility for some, while others do not accept this alternative. A national study that analyzed attitudes of filial responsibility regarding the institutionalization of elderly parents identified a preference to keep their parents in the home environment with family care. In contrast, a study with Japanese immigrants revealed that institutionalization is well accepted both by the children and by the parents. These findings demonstrate that, in Brazilian culture, moral aspects and social norms of filial responsibility are present in the care of parents, it being understood that institutionalization was considered by many an act of abandonment and that children feel responsible for caring for their parents.

It is noteworthy that, although attitudes of filial responsibility are not associated with care behaviors (help in BADLs and IADLs), there were divergent results in the category “Difficulty in being a caregiving child”. Such discrepancy evidenced in the triangulation may be related to the fact that caregivers identify as a complex activity and seek help from contractors to carry them out. This result corroborates a study that identified that poorer health conditions of the elderly, requiring greater support in their activities, were seen by their children as a burden in care, leading them to opt for institutionalization. Filial Duty remained associated only with companionship and visitation and were similar to the results identified in the categories “Possibility of institutionalization,” “Feelings of filial responsibility” and “Expectation of care.” An important aspect is that, for children, the feelings of obligation and duty of filial responsibility, often instituted by social norms and laws, as in the case of Brazil, were not viewed negatively. They seem to demonstrate that the higher the filial duty, the greater the probability that the caregiving child is present in the parents’ life, taking care, especially to provide companionship, visitation and emotional support, even for institutionalized parents. In general, the results corroborate the idea that filial duty plays a key role in the care behavior, as children take responsibility for care and perform any kind of support, i.e., children care because they feel obligated. Moreover, the sense of duty can become a motivation and inspiration to care for elderly parents, despite the difficulties in adapting to this new role. Caregivers report personal satisfaction in giving care to parents, as are paying back for the
care they had as children. Another study\textsuperscript{(27)} also emphasizes that, despite the stress experienced in care, caregivers reported a strong sense of filial duty, which motivates the provision of care to parents, reinforcing what was identified in another study in which care for elderly parents was considered as a duty or obligation by the caregivers.\textsuperscript{(5)}

It was found that the variables living with the elderly, having a higher level of schooling and being an older caregiver were important factors in helping the BADLs and IADLs. It can be inferred that the fact that the caregiver resides with the elderly favors the assistance in full-time BADLs. In this study, living with the elderly was one of the most difficult parts of care, as they performed full-time care, which may compromise the caregiver’s well-being, as evidenced by other research.\textsuperscript{(12,27)}

The association between help in IADLs and caregivers with higher schooling and older age can be justified by the fact that they maintain these activities for themselves and delegate to the hired caregivers basic activities that are deemed more exhausting. In turn, the association between being older and performing the IADLs may also be related to the difficulty in performing more difficult tasks, such as bathing and making transfers (BADLs). In different realities, there are older adults caring for the elderly, as evidenced in this study, which demands an organization of primary healthcare professionals to serve this group, which in some situations, already presents pathologies that also require care.

**Conclusion**

When examining the relationship between attitudes of filial responsibility and care behaviors of child caregivers, it was identified that Filial Duty and Filial Expectation had a relationship with financial and emotional support. In turn, companionship and visitation had an association only with Filial Duty. In the triangulation, most of the qualitative results complemented similar associations with the four categories of the qualitative step: “Difficulties in being a caregiving child,” “Possibility of institutionalization of elderly parents,” “Feelings of filial responsibility” and “Expectation of care.” These results show that, in Brazilian culture, the responsibility of children as a social norm reflects feelings such as love, affection, gratitude, reciprocity, and respect for parents. Understanding the context that involves being a caregiving child of an elderly parent contributes to improving the quality of care provided by professionals to this population. Furthermore, it serves as support for the preparation of public policies that give support to caregiving families.

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**Collaborations**

Aires M, Dal Pizzol FLF, Bierhals CCBK, Mocellin D, Fuhrmann AC, Santos NO, Day CB and Paskulin LMG contributed to the study design, data analysis and interpretation, writing of the article, critical review of intellectual content, and approval of the final version for publication.

**References**


Judicial deployment of nursing error
Desdobramentos judiciais do erro na enfermagem
Despliegue judicial de errores en enfermería

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João Lucas Campos de Oliveira3
Genival Fernandes de Freitas4
Jamila Geri Tomaszewski Barlem5
Sonia Silva Marcon6
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Keywords
Judicial decisions; Patient safety; Malpractice; Imprudence
Descritores
Decisões judiciais; Segurança do paciente; Imperícia; Imprudência
Keywords
Desconexión judicial de errores en enfermería

Abstract
Objective: To characterize lawsuits with judicial decisions by errors involving nursing professionals.
Methods: A documentary study, with cases judged and concluded that dealt with error involving nursing professionals. The survey was carried out in May and June 2018, on the online website of the Court of Justice of Paraná State. The information of interest was place of occurrence, professionals involved, characteristics of victims, error and outcome of the investigation. For analysis, the data were submitted to descriptive statistics.
Results: There were 31 cases judged, most of which occurred in a hospital (90.32%) and with adults (64.71%). In eight cases, the victim died; in half, the victims had temporary disability (17.50%); seven people had permanent disability. The most frequent error involved medication administration (38.71%), followed by delivery error (19.35%). In more than half of the cases, police report card was registered by the victim (58.06%) and only one medical expert was consulted during the lawsuit (61.29%). In 22 cases, the professional was convicted. Of these, 20 were civil and two criminal convictions. On average, civil lawsuits generated reimbursement of about 10,654 US dollars. In criminal cases, the average length of imprisonment converted into community services was 18 months.
Conclusion: Lawsuits culminated in convictions. In addition, they point to the need for better structure and support for professionals who undergo legal experience.

Resumo
Objetivo: Caracterizar processos com decisões judiciais por erros envolvendo profissionais de enfermagem.
Métodos: Estudo documental, com os casos julgados e concluídos, que versavam sobre erro envolvendo profissionais de enfermagem. O levantamento foi realizado nos meses de maio e junho de 2018, no site online do Tribunal de Justiça de Paraná. As informações de interesse foram: local da ocorrência, profissionais envolvidos, características das vítimas, do erro e o destino da investigação. Para análise, os dados foram submetidos à estatística descritiva.
Resultados: Foram identificados 31 casos julgados, cuja maioria ocorreu em ambiente hospitalar (90.32%), com indivíduos adultos (64.71%). Em oito casos o profissional foi condenado, destes, 20 foram condenações cíveis e duas criminais. Em média, os processos cíveis geraram ressarcimento de R$ 42.614,30 reais e nos processos criminais, a média de tempo de reclusão, convertidos em serviços comunitários foi de 18 meses.
Conclusão: Os processos judiciais culminaram em condenações. Além disso, apontam à necessidade de melhor estrutura e apoio aos profissionais que passam pela experiência jurídica.

Introduction

Health error is characterized as failure to perform the intended action or in applying a plan incorrectly.\(^{(1)}\) In short, its occurrence is unintentional and originated by violations resulting from failure to comply with the planning, standards or established standards.\(^{(1)}\)

Errors or violations increases the risk associated with health care and can lead to judicial penalties for professionals and institutions involved. The analysis of such events by the judicial system can be supported by the Civil Law,\(^{(2)}\) Criminal,\(^{(3)}\) or Consumer Protection Code.\(^{(4)}\)

Civil liability related to health care failures has as its main objective to promote damage repair and/or compensation.\(^{(2)}\) In this sense, error or violation analysis is based on the phatic connection between the agent’s conduct (action or omission) and the harmful result.\(^{(5)}\) In the case of criminal lawsuits, investigation seeks to determine guilt or fraud, which may lead to personal or property restrictions.\(^{(3)}\) In turn, the Consumer Protection Code implies that the individual is guilty and can be applied to the health institution if the error is attributed to the professional with a proven link.\(^{(4)}\)

Although legal penalties for error occurrence are recognized, there are few discussions about its implications in nursing whose staff has the largest contingent of health professionals in Brazil and participates in most of care lawsuits.\(^{(6)}\)

Considering that studies on lawsuits and outcomes involving nursing error can subsidize decisions and actions of managers, workers and educators in the promotion of safe care, this study is anchored in the following question: What are the judicial deployments of nursing error? For this purpose, this study aimed to characterize lawsuits with judicial decisions for errors involving nursing professionals.

Methods

This is a documentary, quantitative study, based on cases judged by the Court of Justice of Paraná State, with no start date, until April 2018, available online and involving nursing professionals. It was considered as a res judicata the event with judicial decision and no longer subject to appeal.

The data were collected in May and June 2018, in the electronic database of the Court of Justice of Paraná State (www.tjpr.jus.br). In the search, the terms “Nursing error” and “Medical error” were used. The latter was used because in law language, it is the term adopted to determine error committed by any health professional category.

A total of 2,605 lawsuits were identified that, after reading the notes, summary presentation of each case, those that were related to errors involving nursing professionals were selected for analysis in full. Figure 1 shows the flow of selection of the lawsuits contemplated.

![Figure 1. Flow of selection of lawsuits](image-url)
Judicial deployment of nursing error

er areas); d) Victims characterization (number, age group and outcome); e) Error characterization (type and third-party involvement); and f) Investigation characterization (police report registration, investigative and consulted body, professional support and legal outcome). Data were tabulated in electronic spreadsheets and analyzed using descriptive statistics techniques. All ethical precepts involving research with human beings have been respected and the proposal for this research is registered under the CAAE (Certificate of Presentation for Ethical Consideration) 79998817.3.0000.0104.

Results

Thirty-one lawsuits were analyzed, which lasted 8.27 years on average (standard deviation (SD) ± 3.49, minimum=1, maximum=17), from error occurrence to the end of the case’s trial (Table 1).

<table>
<thead>
<tr>
<th>Variables</th>
<th>n(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occurrence data</td>
<td></td>
</tr>
<tr>
<td>State region (Geographical)</td>
<td></td>
</tr>
<tr>
<td>South</td>
<td>13(41.94)</td>
</tr>
<tr>
<td>North</td>
<td>12(38.71)</td>
</tr>
<tr>
<td>West</td>
<td>4(12.9)</td>
</tr>
<tr>
<td>Southwest</td>
<td>1(3.23)</td>
</tr>
<tr>
<td>Southeast</td>
<td>1(3.23)</td>
</tr>
<tr>
<td>Place</td>
<td></td>
</tr>
<tr>
<td>Hospital</td>
<td>28(90.32)</td>
</tr>
<tr>
<td>Emergency Care Unit (ECU)</td>
<td>2(6.45)</td>
</tr>
<tr>
<td>Primary Care</td>
<td>1(3.23)</td>
</tr>
<tr>
<td>Type of institution</td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td>21(67.74)</td>
</tr>
<tr>
<td>Public</td>
<td>10(32.26)</td>
</tr>
<tr>
<td>Member of the nursing staff involved</td>
<td></td>
</tr>
<tr>
<td>Nurse</td>
<td>12(38.71)</td>
</tr>
<tr>
<td>Nursing technician</td>
<td>3(9.68)</td>
</tr>
<tr>
<td>Nursing assistant</td>
<td>6(19.35)</td>
</tr>
<tr>
<td>Nursing staff**</td>
<td>9(29.23)</td>
</tr>
<tr>
<td>Middle-level intern</td>
<td>1(3.23)</td>
</tr>
<tr>
<td>Other professionals**</td>
<td></td>
</tr>
<tr>
<td>Physician</td>
<td>20(64.52)</td>
</tr>
<tr>
<td>Victims data</td>
<td></td>
</tr>
<tr>
<td>Age group</td>
<td></td>
</tr>
<tr>
<td>Newborn</td>
<td>4(11.76)</td>
</tr>
<tr>
<td>Child</td>
<td>3(9.68)</td>
</tr>
<tr>
<td>Adolescent</td>
<td>4(11.76)</td>
</tr>
<tr>
<td>Adult</td>
<td>22(67.74)</td>
</tr>
<tr>
<td>Elder</td>
<td>1(2.94)</td>
</tr>
<tr>
<td>Outcome</td>
<td></td>
</tr>
<tr>
<td>Temporary disability</td>
<td>17(55)</td>
</tr>
<tr>
<td>Permanent disability</td>
<td>9(28.47)</td>
</tr>
<tr>
<td>Death</td>
<td>8(25.8)</td>
</tr>
</tbody>
</table>

*The nursing team was used in cases where the accusation of error did not identify individual or category, since the defendant was the institution. **Another professional category involved in the event

There were 22 judicial convictions, of which 20 were civil and two criminal. On average, civil claims generated reimbursement of about 10,654 US dollars (SD ± about 5,559.00 US dollars, minimum=2,000.00 US dollars, maximum=30,000.00 US dollars). Regarding criminal cases, the average length of imprisonment converted into community services was 18 months (SD ± 2, minimum=16, maximum=20) (Table 3).

<table>
<thead>
<tr>
<th>Type of error</th>
<th>n(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication (n=12; 38.71%)</td>
<td></td>
</tr>
<tr>
<td>Administration</td>
<td>6(19.35)</td>
</tr>
<tr>
<td>Identification (patient exchange)</td>
<td>2(6.45)</td>
</tr>
<tr>
<td>Preparation/dilution</td>
<td>2(6.45)</td>
</tr>
<tr>
<td>Route of administration</td>
<td>1(3.23)</td>
</tr>
<tr>
<td>Dose</td>
<td>1(3.23)</td>
</tr>
<tr>
<td>Surgery (n=5; 16.13%)</td>
<td></td>
</tr>
<tr>
<td>Cautery positioning (burn)</td>
<td>3(9.68)</td>
</tr>
<tr>
<td>Material count (gauze in the cavity)</td>
<td>1(3.23)</td>
</tr>
<tr>
<td>Post-operative care neglect</td>
<td>1(3.23)</td>
</tr>
<tr>
<td>Identification (n=1; 3.23%)</td>
<td></td>
</tr>
<tr>
<td>Identification (newborn)</td>
<td>1(3.23)</td>
</tr>
<tr>
<td>Fall (n=1; 3.23%)</td>
<td></td>
</tr>
<tr>
<td>Bed fall</td>
<td>1(3.23)</td>
</tr>
<tr>
<td>Delivery care (n=6; 19.35%)</td>
<td></td>
</tr>
<tr>
<td>Delivery with dystonia performed by a nursing assistant</td>
<td>2(6.45)</td>
</tr>
<tr>
<td>Delivery with dystocia performed by a nurse</td>
<td>2(6.45)</td>
</tr>
<tr>
<td>Postpartum care neglect</td>
<td>1(3.23)</td>
</tr>
<tr>
<td>Brachial plexus injury by positioning at delivery</td>
<td>1(3.23)</td>
</tr>
<tr>
<td>Others (n=6; 19.35%)</td>
<td></td>
</tr>
<tr>
<td>Risk classification error</td>
<td>2(6.45)</td>
</tr>
<tr>
<td>Registration incompatible with the clinical picture of the patient</td>
<td>1(3.23)</td>
</tr>
<tr>
<td>Containment fracture</td>
<td>1(3.23)</td>
</tr>
<tr>
<td>Hot compress burn</td>
<td>1(3.23)</td>
</tr>
<tr>
<td>Discharge (allegedly given by nursing)</td>
<td>1(3.23)</td>
</tr>
</tbody>
</table>

There were 22 judicial convictions, of which 20 were civil and two criminal. On average, civil claims generated reimbursement of about 10,654 US dollars (SD ± about 5,559.00 US dollars, minimum=2,000.00 US dollars, maximum=30,000.00 US dollars). Regarding criminal cases, the average length of imprisonment converted into community services was 18 months (SD ± 2, minimum=16, maximum=20) (Table 3).

Table 3. Lawsuit characterization, professional support and legal outcome (n=31)

<table>
<thead>
<tr>
<th>Investigation data</th>
<th>n(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Police report</td>
<td></td>
</tr>
<tr>
<td>Victim</td>
<td>18(58.06)</td>
</tr>
<tr>
<td>Family</td>
<td>11(35.48)</td>
</tr>
<tr>
<td>Not included</td>
<td>2(6.45)</td>
</tr>
<tr>
<td>Investigation</td>
<td></td>
</tr>
<tr>
<td>Civil</td>
<td>29(93.55)</td>
</tr>
<tr>
<td>Criminal</td>
<td>2(6.45)</td>
</tr>
</tbody>
</table>
The use of judicial services in health institutions can be interpreted as a form of manifestation of the exercise of citizenship by individuals, supported in Brazil by the Organic Law of Health and Federal Constitution. This demonstrates the State’s recognition of the rights and duties of health service users and their workers.

The data indicate that in the South (41.94%) and North (38.71%) of Paraná, they obtained the highest number of lawsuits (Table 1). This is possibly justified by the fact that they constitute State’s regions with the greatest economic development. Therefore, this provides better access to technologies and health, which, together with the dissemination of knowledge about the cause and the progression of diseases, generate greater expectations of the patients/users in relation to the performance of health professionals. Consequently, it is natural that there should be a greater number of lawsuits for those who feel injured in the healthcare process.

It should be noted that the data found evidence the tension already exposed in the literature about the discrepancy between legal equality and socio-economic inequalities. This research indicates that economic difficulties may present as barriers to access to the courts, where the rights of economically disadvantaged people may be purely apparent.

Private (61.74%) and public (32.26%) hospitals (90.32%) were the most sued types of health institutions (Table 1). This result may be related to the higher technological density that permeates tertiary care, institutions usually responsible for specialized care and invasive procedures that generate greater risk to patient safety. Corroborating this statement, a study that analyzed reports of medication errors in nursing published by the Brazilian television media found that all errors (n=14) occurred at the tertiary care and were reported in order to show the professionals’ blame, reinforcing in the social imaginary the sense of insecurity associated with health services. However, the existence of care failure should not be attributed exclusively to the health service, but it may also be associated with individual factors of care professionals.

Lawsuits involving physicians are discussed in the literature and pointed out as one of the causes of stress, decrease of career satisfaction and exercise of defensive medicine to avoid litigious processes. In addition, physicians commonly work autonomously, differentiating themselves from other health professionals who, in general, have institutional support due to the employment relationship.

It is hoped that the institutions can use the experience of physicians with the judicialization of their practice as a way of creating barriers to the prevention of errors by raising awareness about the need to guarantee legal support during the practice of care.

As an example, a French investigation that analyzed judicial proceedings for lack of information to the
patient identified that out of 201 physicians prosecuted, 127 were convicted, with surgeons being the most prone to lawsuits risks.\(^{(16)}\)

The results of the present investigation reinforce the need to include complete information in the medical records since the registry incompatible with the clinical picture of the patient generated conviction of nursing professionals (Table 2). In this regard, it should be noted that nursing records are indicators of quality of care provided. However, the literature points to a practice that demonstrates the poor quality of care documentation,\(^{(17)}\) even in relation to the nursing process,\(^{(18)}\) whose instrument subsidizes Nursing Consultation.

As for victims, adults (64.71%) were the most affected and had as main errors those involving medication (38.71%), delivery (19.35%) or surgery (16.13%), which resulted in temporary disability (50%), permanent disability (26.47%) or death (23.53%).

Regarding the age group, the data of the present study do not correspond to the results of an investigation that focused on the errors of medication with nursing involvement in Brazil published in television media, since a greater number of victims were observed in the extremes of life (children or elderly) who died.\(^{(14)}\)

The *Lei do Exercício Profissional da Enfermagem* (US’ Nurse Practice Act)\(^{(19)}\) allows nurses to perform normal delivery without distraction, but the main error found in relation to childbirth care was the performance of a nursing professional during childbirth with dystocia, justified by physician absence (Table 2). Although knowledge of the profession’s legal bases is essential to its exercise, it is also necessary to analyze the context in which the nursing work is carried out, in order to identify situations of risk to the health and safety of patients, due to the unavailability of (human and/or material) resources and appropriate conditions for care to be safe.

A study with the objective of knowing the perceptions and experiences of obstetric nursing residents found difficulties related to material resources and infrastructure and to teamwork, including the non-recognition of other professionals about the nursing role in delivery care.\(^{(20)}\) These factors can certainly favor the occurrence of errors during care.

The main error related to the surgery was related to cautery positioning, which caused burns in the victims (9.68%). It is noticed that risks run through the entire perioperative period, and cautery use constitutes one of these factors. To minimize risks, it must be assumed that the safe use of equipment, as well as constant monitoring and immediate investigation of complaints should be the responsibility of the entire health team\(^{(21)}\), not exclusively from the nursing team. Thus, there must be the inclusion of cautery positioning check in the safe surgery checklist, as a barrier to the occurrence of the adverse event.

The errors identified culminated in 22 convictions of nursing professionals, most of them civil, with an average reimbursement of 10,500 US dollars. Studies on the valuation of indemnities are still incipient, even in the international literature, which restricts the comparison between lawsuits with isolated involvement of nursing professionals. However, this type of analysis has been carried out in the medical field in Taiwan, for example, where physicians also work autonomously, the average value in court convictions for medical error was around 83 thousand US dollars.\(^{(15)}\)

In Brazil, most of the time, the nursing team acts under an employment relationship with a health institution, which denotes the service of joint responsibility, for being responsible for ensuring the quality of the services offered.\(^{(4)}\) Thus, it is justified that, from the total of civil convictions, 17 culminated in convictions of the health institution by the practice of nursing professionals, concomitantly with the manifestation of high institutional management in defense of the mistake committed by its professional (58.06%) (Table 3).

Institution involvement may illustrate the need to defend the individual interests of the service, which points to the fact that in none of the lawsuits is the participation/performance of the Brazilian Regional Nursing Board (*Conselho Regional de Enfermagem*). Although ethical processes occur in parallel and independently to judicial processes, it is important to note that the category body is not
cited in the lawsuit, and the medical professional is the expert consulted most of the time (61.29%) (Table 3).

Expert consultation bases the judicial decision and can sometimes prevent injustices. The Civil Code describes rules for appointing such experts in which, it points to the direct consultation of the Class Councils, Universities, Public Prosecutor’s Office, Public Defender’s Office and Bar Association.\(^{(11)}\) In this perspective, most of the lawsuits involving a physician as an expert may have limited the profitable analysis on nursing practices.

Physicians tend to have more autonomy over their actions and sometimes regulate the work of other health professionals, weakening multidisciplinary relationships and preventing effective integration with the team.\(^{(22)}\) In this context, recognition by the legal system of the medical professional as a single expert, not consulting other professionals, even when other categories are involved in legal proceedings, reinforces the hierarchy present in the social imaginary and possibly compromises judgment.

A study that analyzed the constitution of responsibility in the work of health professionals in a pediatric intensive care unit emphasizes that practices in this environment are regulated by laws, truths derived from medical and legal knowledge and values of Christianity that goes back to a scenario in which responsibility is converted into feelings of guilt, suffering and conflicts among professionals.\(^{(22)}\) This may occur in other institutions and professionals. To minimize this, there must be formation of a mental health support network of the nursing professional who tends to be subjugated in their work practice.

The present study focused on the judicial deployment of nursing error. However, the possibility of psychological, economic and social developments in the lives of people and families that have been victimized by errors committed by nursing and health professionals stands out, which denotes the limitation of this research and the need for future research related to the topic addressed.

**Conclusion**

Lawsuits culminated in civil convictions for errors committed in hospitals. The highest number of convictions involved institutions, which justifies the participation/support of the high institutional management, which suggests a search for self-preservation. Experts in the research were medical professionals instead of the Class Council board. Therefore, their role as part of the indispensable support network is questioned, to overcome/solve the legal experience by mistake.

**Collaborations**

Souza VS, Inoue KC, Oliveira JLC, Freitas GF, Barlem JGT, Marcon SS, Oliveira MLF and Matsuda LM contributed to the study design, data analysis and interpretation, article writing, critical review of intellectual content and version approval end to be published.

**References**


Objective: To determine work activities associated with non-specific chronic low back pain in nursing workers.

Métodos: Cross-sectional study with 90 workers, including nursing assistants, nursing technicians and nurses. Two instruments were used: Work-Related Activities that may Contribute to Job-Related Pain and/or Injury and Visual Numeric Scale. Data were descriptively and analytically analyzed, compared using Chi-square or Fischer’s exact tests, Pearson’s or Spearman’s correlations and the Mann-Whitney U test. The significance level adopted was p <0.05.

Results: The work activities with higher risk and associated with low back pain involved poor postures, bending and twisting of the spine, uncomfortable positions, physical efforts such as weight lifting and movement, continuing to work even with pain and at the physical limit, characteristics of the work environment and the activities performed. The mean pain intensity was moderate and it was statistically associated with some activities.

Conclusion: Ergonomic activities that predispose to low back pain should be considered in order to guide workplace changes.

Resumo
Objetivo: Determinar as atividades laborais associadas à dor lombar crônica inespecífica em trabalhadores de enfermagem.

Métodos: Estudo transversal com 90 trabalhadores entre auxiliares, técnicos e enfermeiros. Dois instrumentos foram utilizados: o Work-Related Activities that may Contribute to Job-Related Pain and/or Injury e Escala Visual Numérica. Os dados foram analisados de forma descritiva e analítica, comparados por meio dos testes Qui-quadrado ou exato de Fischer, correlações de Pearson ou de Spearman e o Teste U de Mann-Whitney. O nível de significância adotado foi p<0,05.

Resultados: As atividades laborais com maiores escores de risco e associadas à dor lombar envolveram posturas inadequadas com flexão e torção da coluna e posições desconfortáveis, esforços físicos, como carregamento e movimentação de peso, condição física de continuar trabalhando mesmo com dor e no limite físico, relacionadas às características de ambiente de trabalho e teor da tarefa. O nível médio de intensidade da dor foi moderado e com associação estatisticamente significativa a algumas atividades.

Conclusão: Devem-se dar atenção a atividades ergonômicas que predisponem à ocorrência de dor lombar para guiar mudanças nos postos de trabalho.

Descritores
Dor de la región lumbar; Dimension del dolor; Ergonomía; Enfermeras practicantes

Keywords
Low back pain; Pain measurement; Ergonomics; Nurse practitioners

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Conflicts of interest: none to declare.
Introduction

Nursing is one of the professions associated with greater risk of lower back pain.\(^1\) This may be related to actions such as lifting and transporting patients, repetitive movements and inappropriate postures. High biomechanical load on the spine, especially in the lower back, can exceed the functional capacity and individual limitations of the worker.\(^4,5\) Ergonomic factors decrease muscle strength and power; reduce stability and coordination; impair trunk motor control; increase stress on intervertebral discs and ligaments; and, consequently, can lead to injury and/or pain.\(^6\) These overloads lead to physiological stress, impair musculoskeletal function and are, therefore, a health concern in nursing practice.\(^1\)

Low Back Pain (LBP) or lumbar spine pain is defined as pain below the costal margin of the 12th rib and above the inferior gluteal folds.\(^7\) It causes pain, discomfort, fatigue and muscle stiffness in the lower third of the spine, with varied duration and intensity. Its etiology is not well defined and about 30 to 40% of people with this condition develop chronic low back pain (CLBP),\(^8\) which lasts for at least three months.\(^9\) Only 10% of low back pain cases have a specific cause, and most of them are classified as non-specific and are related to an imbalance between the effort required in an activity and the capacity to perform it.\(^10\)

The cases classified as CLBP are frequent and lead to absenteeism, high treatment costs, lower productivity and reduced quality of life. They involve multiple causes that include physical, individual, organizational, sociocultural, and psychosocial factors. CLBP is a public health problem because of its high prevalence, because it affects all age groups and socioeconomic levels and require promotion, prevention and education, and not just health rehabilitation.\(^8,11,12\) In addition, pain causes physical suffering, stress, dissatisfaction and affect work ability.\(^5\)

Determining work activities associated with pain based on workers’ own reports can contribute to the ergonomic analysis of work activities, prevent musculoskeletal disorders, and enable comparison of results across countries. In this sense, the assessment of risk tasks as pain predictors can serve as parameter to minimize the risks of low back pain and may constitute an instrument for surveillance, analysis and prevention by early detection of the disease, favoring its resolution.\(^6,13\) Thus, the objective of this study was to determine the work activities associated with non-specific CLBP in nursing workers.

Method

Cross-sectional quantitative study conducted with nurses, nursing assistants and nursing technicians in a public hospital of medium and high complexity, in the south of the country. The non-probabilistic intentional sample included 90 nursing workers. The participants were recruited in all sectors of the hospital, through an individual approach in all work shifts. The sample was selected among those who reported LBP and chronicity was established based on the duration, frequency and intensity of pain. LBP was characterized by pain in the lumbar region, below the costal margin of the 12th rib and above the gluteal fold, lasting at least for one day and considered non-specific, due to not being related to severe spinal disease.\(^7,10\) A picture was used to help participants determine the area affected. Pain was bad enough to interfere with their daily activities or change their routine for one day.\(^14\) Chronicity was established based on the question: “how long does your LBP lasts?”; the non-specific classification was based on the question “is there a medical diagnosis of your condition?”. The definition of LBP should include the location of pain, symptoms, duration, frequency and severity.\(^10\)

The inclusion criteria were professionals with LBP for more than three months, with at least two points in the numerical pain scale and a minimum frequency of 2 to 3 times a month, and who worked exclusively in nursing.\(^14\) Professionals with other causes of low back pain, such as spondylolisthesis, herniated disc, spinal canal stenosis, infectious diseases of the spine, spinal tumors, fractures and others were excluded. Data was collected from August to October 2017.
Socio-demographic and work variables include gender (male, female), age (continuous variable), age group (28 to 30 years, 31 to 40 years, 41 to 50 years, 51 to 62 years), professional category (assistant/technician/nurse), time working in the institution (up to four years, four to eight years, nine to 14 years, over 14 years), work shift (day, night), working hours (six hours, eight hours and 12 hours), overtime at the institution (yes, no), other employment (yes, no). Clinical data regarding LBP include duration (in years), frequency (times/month) and intensity of pain (1 to 10).

The questionnaires were self-administered. In addition to the socio-demographic questionnaire, the data collection form contained two more instruments: Work-Related Activities that may Contribute to Job-Related Pain and/or Injury (WRAPI) and the Visual Numeric Scale (VNS).

The WRAPI is a validated questionnaire composed of 15 situations that predispose to musculoskeletal disorders, according to the workers’ perspective. It has a scale from zero to ten, where zero means a problem not difficult at all and ten an extremely difficult problem, showing the contribution of each factor in the occurrence of musculoskeletal symptoms. Each item can be analyzed separately using the 0-10 scale. It evaluates repetitive movements, vicious positions, prolonged periods in the same position at work, weight bearing, insufficient breaks, physical conditions, characteristics of the environment and lack of training. Responses were categorized from 0 to 1, indicating a simple problem (not difficult), 2 to 7, a moderate problem, and 8 to 10, a difficult problem.

Finally, the 10-point VNS was used to measure pain intensity. In this scale, 0 means no pain and 10 means the worst possible pain. The participants selected the intensity of their worst pain in the last three months. The cut-off point ≥ 5 (significant pain) was established to determine disability and decline in functionality due to pain. Pain was classified as mild (1 to 2), moderate (3 to 7), and severe (8 to 10).

The database was inserted in Excel and then transported to the Statistical Package for Social Sciences, version 23, where the data were processed and analyzed. Descriptive analysis was applied, with absolute and relative frequency of categorical variables and mean and standard deviation (SD) of continuous variables. The Mann-Whitney U Test was used to compare WRAPI factors with the medians of the group with significant pain (≥5 in the EVN) and the group with non-significant pain (<5 in the EVN). The significance level was set at p <0.05. The correlations between the variables pain intensity and WRAPI factors were analyzed by applying the Pearson or Spearman coefficient with the following classification: less than 0.4 (weak correlation), 0.4 to 0.74 (good/moderate correlation) and ≥ 0.75 (strong correlation).

The research was approved by the Research Ethics Committee involving Human Beings, protocol N. 2.081.192/2017 and CAAE. 64164717.1.0000.0121, and followed the recommendations of Resolution 466/12 of the National Health Council.

Results

The sample consisted of 90 professionals with non-specific CLBP, selected among nursing assistants, nursing technicians and nurses, in a population of 353 members of the nursing staff who returned the completed questionnaires and corresponded to 76.7% of the total population.

Regarding socio-demographic characteristics, the mean working time in nursing was 17.37 years (SD 8.7). Among the 90 participants, 28 (33.3) were working in the institution for up to four years, thirteen (15.5%) between four and eight years, 19 (22.6%) between 9 and 14 years and 24 (28.6%) for over 14 years. Most were females, with 74 participants (82.2%) and nursing technicians/assistants, with 78 (86.7%). The mean age was 42.8 years (SD 9.15). Most are in the age group of 31 to 50 years; nine (10%) are between 28 and 30 years, 31 (34.5%) between 31 and 40 years, 29 (32.2%) between 41 and 50 years, and 21 (23.3%) between 51 and 62 years. A total of 67 (74.4%) work overtime, and 29 (32.2%), less than half, have another employment. As for work hours, 77 (85.6%) have
12 hours shifts and 57 (63.3%) work during the day.

The average duration of the condition was 5.43 years (SD 4.21), with a minimum of six months and a maximum of 20 years, showing that some participants had been living with the condition for a long time. The analysis of the monthly frequency of the symptom showed that pain can occur every day, with a mean of 11.07 (SD 9.44), a minimum of three times a month and a maximum of 30 times a month. Most participants, 87 (96.7%), associate LBP with their work.

The intensity of low back pain reported by the nursing staff varied, with a mean of 6.27 (SD ± 1.79), indicating moderate intensity. Regarding the categories of pain intensity, 2.2% presented mild pain, 76.7% moderate pain and 21.1% severe pain. The mean pain intensity was 6.34 for women and 5.94 for men; 6.35 for nursing assistants/technicians and 5.75 for nurses; those are also considered moderate values. The cut-off point used (≥ 5), in which pain intensity is associated with a higher risk of disability, was reached by 90 (81.1%) of the participants.

The overall mean of WRAP factors was 6.43 (± 1.45), indicating moderate problem regarding the occurrence of LBP. The classification of the level of problem of each activity is presented in Table 1.

The comparison of pain intensity and WRAPI factors showed that some activities had higher and statistically significant medians (Table 2).

### Table 1. Classification of work activities for low back pain symptoms among nursing professionals of a public hospital

<table>
<thead>
<tr>
<th>WRAP* Occupational Activities</th>
<th>Mean/SD†</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performing the same task over and over</td>
<td>6.59 (±2.57)</td>
<td>Moderate</td>
</tr>
<tr>
<td>Working very fast for short periods (lifting, grasping, pulling, etc.)</td>
<td>7.78 (±2.39)</td>
<td>Moderate</td>
</tr>
<tr>
<td>Having to handle or grasp small objects</td>
<td>1.30 (±2.09)</td>
<td>Not difficult</td>
</tr>
<tr>
<td>Insufficient breaks or pauses during the work day</td>
<td>5.94 (±3.35)</td>
<td>Moderate</td>
</tr>
<tr>
<td>Working in awkward or cramped positions</td>
<td>7.98 (±2.17)</td>
<td>Moderate</td>
</tr>
<tr>
<td>Working in the same position for long periods (standing, bent over, sitting, kneeling, etc.)</td>
<td>8.00 (±2.40)</td>
<td>Difficult</td>
</tr>
<tr>
<td>Bending or twisting your back in an awkward way</td>
<td>8.02 (±2.42)</td>
<td>Difficult</td>
</tr>
<tr>
<td>Working near or at your physical limits</td>
<td>7.54 (±2.58)</td>
<td>Moderate</td>
</tr>
<tr>
<td>Reaching or working over your head or away from your body</td>
<td>6.29 (±3.19)</td>
<td>Moderate</td>
</tr>
<tr>
<td>Hot, cold, humid, wet conditions</td>
<td>5.52 (±4.04)</td>
<td>Moderate</td>
</tr>
<tr>
<td>Continuing to work when injured or hurt</td>
<td>8.57 (±1.84)</td>
<td>Difficult</td>
</tr>
<tr>
<td>Carrying, lifting, or moving heavy materials or equipment</td>
<td>8.91 (±1.75)</td>
<td>Difficult</td>
</tr>
<tr>
<td>Work scheduling (overtime, length of workday)</td>
<td>6.71 (±3.31)</td>
<td>Moderate</td>
</tr>
<tr>
<td>Using tools (design, weight, vibration, etc.)</td>
<td>1.44 (±2.77)</td>
<td>Not difficult</td>
</tr>
<tr>
<td>Training on how to do the job</td>
<td>5.91 (±2.70)</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

*WRAP: Work-related Activities that may Contribute to Job-Related Pain and/or Injury; †P-value: level of significance p<0.05 in the Mann-Whitney U Test

There were correlations between pain intensity and WRAPI factors. The duration of pain showed a strong significant positive correlation with the frequency of pain (r=0.984; p=0.002), indicating a relationship between duration of pain and its frequency during the month.

Spearman’s coefficient showed positive but weak correlations between pain intensity and some activities that contributed to pain (Table 3). There were positive, strong and directly proportional correlations between activities, such as between “Carrying, lifting, or moving heavy materials or equipment” and “Bending or twisting your back in an awkward way” (r=0.596; p<0.001), and between “Continuing to work when injured or hurt” and “Working near or at your physical limits” (r=0.571; p<0.001).
Discussion

Work activities that predispose the occurrence of CLBP were classified as moderate risks. A study that addressed low back pain using the WRAPI instrument found compatible results and mean values equal to or above eight, with higher concentration of responses also in moderate risk factors. The instrument was considered an excellent surveillance tool, since the highlighted factors are consistent with the literature and professionals with and without low back pain identified the same risk factors. (6)

Activities that had high scores were related to posture and physical effort (“Carrying, lifting or moving heavy materials or equipment”, “Bending or twisting your back in an awkward way”, “Working in the same position for long periods – standing, bent over, sitting, kneeling, etc.”) or physical condition (“Continuing to work when injured or hurt”). Poor postures and excessive physical load are a reflection of the characteristics of the work environment and tasks performed, and highlight the role of physical effort at work.

Other studies have shown that poor posture, excess weight and repetitive movements may be associated with musculoskeletal pain. (2,3,5,16-19) A study that found a prevalence of LBP of 69.6% among nurses showed that the chances of developing any musculoskeletal pain were significantly higher among those that reported working in poor positions for long periods. (17) Another study with a high prevalence of LBP (63.1%) showed a relationship between this condition and working in standing or sitting position, working with trunk leaning forward or rotated, applying force with hands or fingers, and making repetitive movements. (5) In intensive care, it was found that the most common ergonomic risks for musculoskeletal pain were turning the patient and bending over. (18)

In the evaluation of musculoskeletal discomfort, ability to work and residual fatigue in nursing professionals working in a hospital environment, the prevalence of LBP was explained by the performance of activities that require constant effort, such as transporting and handling patients, giving bed baths, moving hospital beds and performing procedures with asymmetrical postures. (5) Another study that assessed nurses’ perceptions of musculoskeletal disorders identified as risk factors: working in the same positions for long periods (93.1%), handling an excessive number of patients in one day (81.2%) and working in awkward and cramped positions (78.6%). (19)

Work-related musculoskeletal symptoms vary in different sectors, hospitals and even countries and depend on occupational activities; however, the activities are similar in the way they are performed. For example, the act of moving patients always requires mobilization of the trunk in sudden postures. The frequency of the activity should also be taken into consideration. A study showed that statistically significant work activities that increased the possibility of low back pain were performed more than 10 times a day. (4) The present study demonstrates that the professionals work longer hours, due to the large percentage of participants who work overtime, which leads to increased frequency of activities.

Regarding the intensity of LBP, the results indicated moderate pain. The greater pain intensity found among technicians and assistants is related to the performance of direct activities with the patient, such as moving and transporting patients, which require higher and repetitive physical effort. (16,20) On the other hand, it is important to emphasize that pain intensity does not only depend on physical factors or...
high demand for work, since perception of and reaction to pain are specific to each person and should be evaluated considering physical, psychic, social and spiritual aspects. This fact was evidenced in a study in which its participants, even when dealing with constant pain, suffered in silence, tried to minimize their pain and had difficulty determining if their pain or discomfort was significant. The relationship between pain intensity and WRAPI activities showed some relevant associations by the Mann-Whitney U Test; however, Pearson or Spearman’s correlations showed weak associations. “Bending or twisting your back in an awkward way” and “Working in awkward or cramped positions” presented a statistically significant association. A proper posture should be comfortable and vary over time; it also needs to be brief, as its harmful effect is related to the time it is maintained. A study that evaluated the time spent in awkward postures found a higher median time among workers in orthopedic and intensive care units, who also worked with greater trunk flexion angles. This fact may be associated with the high physical exertion when handling and transferring patients and the consequent increased exposure to poor posture. A significant association between work time spent with trunk flexion over 45º and the occurrence of LBP (frequency and duration) was also evidenced, indicating that, in the long term, maintaining improper postures for 20 minutes or more can lead to physical and mental fatigue.

It is not advisable to “Continue working when injured or hurt”. In addition to individual physical implications, working with pain or while injured decreases productivity and quality of care. The factors “Working near or at your physical limits” and “Carrying, lifting, or moving heavy materials or equipment” were significantly associated with pain intensity and may be related to high demand in the work environment and heavy physical work. Weight bearing and excessive physical exertion are clearly associated with LBP, especially in repetitive activities that lead to overload of the spine, and also when coupled with improper posture. During an eight-hour shift, nursing workers can handle a total weight of 1.8 tons. Compression and shear loads are high during patient handling activities; even if weights are light, they still exceed the capacity of the spine or the parameters for safe weight lifting. The high frequencies of pain can confirm the level of physical demands of heavier and repetitive work activities. Also, pain lasting more than 48 months was present in most of the sample, which is a warning for the chronicity of LBP and a reflection of poor pain management. As pain can be insidious or have a late effect, it can prevent professionals from establishing a cause/effect relationship between pain and work activities.

Among the study limitations are the cross-sectional design, which analyzes cause and effect at the same time; having workers from various sectors of the hospital and with specific work characteristics, which may affect outcomes – however, regardless of the work sector, perceptions were similar; and the research carried out only in a single hospital unit, which limits its external validity.

**Conclusion**

The occupational activities associated with CLBP with higher scores involved posture, physical effort, physical condition and characteristics of the work environment. These activities represented a moderate problem for the development of LBP. The assessment of pain and related work activities may also help diagnosing and managing pain, based on the reality found in rehabilitation programs. It is believed that this study contributed to the understanding of certain variables involved in the chronicity of LBP. Other studies that contribute to the improvement of the working conditions of nursing professionals should be conducted, extending and deepening the theme and with emphasis on the direct observation and analysis of the participants’ movements during their work activities.

**Colaborations**

Cargnin ZA, Schneider DG, Vargas MAO and Schneider IJC contributed with project design,
analysis and interpretation of data, critical review of content and approval of the final version.

References


Dear Editor,

I have read with a lot of interest the publication about wet packs (1) and would like to make some comments:

1. First of all I would like to thank the authors for addressing such interesting topics as the wet loads are. However, I see that the conclusions that they come to are quite obvious. Since the 2 known vacuum systems for steam sterilizers in the market (Venturi and liquid ring vacuum pump) use water, it is completely logical that extending the drying times and therefore the running times of each system, will increase the water consumption.

2. On the other hand, the load that was used for the tests is not mentioned at all in the study. It is neither stated if an empty chamber was used. The text suggests that all tests were performed under the same conditions (same load or empty chamber) and even though the conclusions will not change (there will be always more water consumption when there is more running time of the vacuum system), it is not correct to talk about “the most efficient cycle configuration” when the load has not been taken into account. The main goal of the “conditioning” phase is to remove air and deliver steam into the instruments (including long narrow instruments). So, the most efficient cycle configuration depends on the load to be sterilized and cannot be determined without using that load.

3. From the wet packs perspective, the conditioning phase has also an impact, but sometimes on the opposite direction to what the authors
mentioned. Therefore, a deeper vacuum does not necessarily mean that less condensate will be generated during conditioning. Due to the fact that the deeper the vacuum, the higher the energy is being lost by the liquid (thermodynamics law), this will lead to a temperature decrease of the condensate and goods. Hence, in the next steam injection pulse, there would be more creation of condensate (because the load is cooler), and this excess of condensate will be carried to the plateau period of the process and then to the drying phase, making the drying of the load more difficult. The authors have not discussed this, probably because the test were performed with no load and therefore, they weren’t able to detect it.

4. The conditioning phase is always a compromise between the air removal demand of the load, the energy (media) consumption, and the elimination of condensate for the next steps, as explained in points 2 and 3. Thus, no consistent conclusions of an “efficient” cycle can be done without using load on the tests.

5. On the drying phase, something similar will happen. The more vacuum is performed, the cooler the load is becoming and therefore it is more difficult to dry it. Because the temperature inside the load is not uniform, there would be zones on the load that would be cooler and will not be possible to dry if no heat is supplied, despite the deep vacuum and longer drying times.

6. As mentioned by the authors, the wet packs are a common problem in SPD, even though no evidence has shown a correlation between wet packs and contamination inside. It is correct that extending the drying times of the sterilizers will not always solve the problem and will create additional costs. However, the proposed solutions (adjust vacuum points in conditioning and drying phases) should be only executed in combination with a validation of the steam sterilization process using the real load to be sterilized. Experiences show that the most efficient way to solve the wet packs problem is the load configuration (weights, packing material, positioning of the load, etc). During the validation of the steam sterilization process not only the load dryness should be checked, but also the steam penetration and sterility conditions on each Medical Device must be proven. This is in line with the best practices and the only way to ensure that a load is consistently sterilized in a reproducible and standardized way.

Referências

To Editorial Board and readers of Acta Paulista em Enfermagem,

We thank the opportunity to discuss such an important topic of our area of knowledge. We observed that some comments by the reader were out of the normative framework of sterilization equipment, therefore some of them were precipitated and lack strong evidences needed to advance the knowledge and promote adequate discussion in a qualified scientific journal. That said, we would like to clarify some points to the readers of our paper:

1. We believe that the readers’ assumptions are opinions and lack evidences or theoretical references to support them. We recommend the reader to consult references used in our paper to confirm information and understand the reasons why the assumptions might be mistaken.

2. In our country’s national context, the reduction of water consumption is aligned with reduction of rains and hydric scarcity in a number of municipalities, especially in large cities, such as São Paulo, where the demand for water is high due to large concentration of inhabitants. For this reason, studies that have measured the water and energy consumption is fundamental for decision making in practice, as well as operating review cycles, mainly in longer drought periods.

3. In conditioning phase, the “obvious” hypothesis was confirmed. However, in science, even the obvious requires measures, and these measures were showed by our study. However, when the water consumptions is analyzed in drying phase, the “obvious” was refuted. We

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expected large water consumptions when drying time was set to 90mbar, however, this was not confirmed.

4. Our study was conducted with no load. Independent variables considered were: number of pulses in conditioning phase, drying time and vacuum depth set point. This decision intended to isolate described variables and did not invalidate any other norms and recommendations required for good practice. In addition, the study with load would include a variable that could be characterized as a confounding factor.

5. In our study, we did not intend to propose changes to the conditioning phase and drying time as the unique solution or priority for problems of wet packs, however, we aimed to show interventions impact of conditioning phases and drying on water consumption. Therefore, any information provided in our study did not replace the guidelines described in best practices manual for sterilization regarding the creation of loads and requirements for development, validation and control of routine of ISO series for sterilization processes.\(^{2,4}\)

6. Our considerations regarding the efficiency of cycle regarding the type of load are aspects currently covered by ISO 17665-3 standards\(^{4}\) in which affirm that “duration of drying time will depend on presentation and weight of each item of the sterilization load”. Therefore, given that our data do not pretend to invalidate normative requirements, but to reduce water consumptions, therefore, we obtained the most efficient cycle. Additionally, there is the need to re-emphasize that performance and consumption of sterilization equipment ranges according to manufacturer, size and models.

7. In drying phase, 75% of efficient occurs when exposition is finished and high vacuum is reached, this variation in pressure will cause immediate water vaporization. To keep the vacuum in equipment corresponds to 25% only of drying efficiency, therefore, the increase of drying time has little influence in load drying.\(^{5}\)

8. In response to the comment of the reader concerning the conditioning phase, we clarify that conclusions of our study is still valid: increasing the drying time, without observe the vacuum depth, will increase considerably water consumption (Figure 2 of the article). Considering the current need to implement evidence based practices that enable the rational use of natural resources, the authors consider the inadequate to affirm that the study conclusions are inconsistent, once no experimental data were presented.

9. Finally, we reinforce the importance of annual validation of sterilizations according to legal requirements of each country, and based on requirements of the ISO 17665 series\(^{2,4}\) and on the safety use of equipment of evaporation sterilization. Based on current time that reduction of water waste is extremely relevant, the increase of drying time should be considered the last resource to solve wet packs. To date, there are no evidences that may weaken the conclusion of our paper.

References


The Editorial Board of ACTA PAULISTA DE ENFERMAGEM hereby thanks the ad hoc consultants listed below for their intellectual contribution throughout the production of this journal (vol. 32) in 2019. We emphasize that the commitment, ethics and responsibility of this select group were essential to reach our goals. Our associate editors knew they could trust the previous evaluation of manuscripts to these reviewers, who have a long history of credibility and expertise.

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