Chapter 131

Profile of Brazilian scientific publications on drug interactions in the Intensive Care Unit: a literature review

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ABSTRACT
Research Question: What has Nursing published and debated about ICU drug interactions?
General and specific objectives respectively: Conduct a survey of articles published in magazines and/or periodicals. To analyze the profile of nursing publications on ICU medication interactions.
Hypothesis: There are few nursing publications on drug interactions in the ICU.
Type of study: Cross-sectional, descriptive, retrospective, integrative review.

Keywords: Nursing. Intensive Care Unit. Pharmacology.

1 INTRODUCTION

This paper focuses on the discussion of the profile of Brazilian scientific publications on drug interactions in the Intensive Care Unit. The Intensive Care Unit is an emergency care unit that operates 24 hours a day during the seven days of the week, including holidays. Within this unit several services are provided, such as clinical care, medications, surgical procedures, physiotherapy, psychology, speech

therapy, nutrition, nursing, imaging services, dentistry, and social service. The physical structure of the ICU consists of isolation room, nursing station, purge, laboratories, meeting room, visitors waiting room, and surgery rooms (1).

Regarding the nursing station, it should be located in an area that allows access and circulation of health professionals, such as nurses, to monitor the status of patients and administer medications. This space also needs furniture that allows the development of the activities of these professionals in a way that minimizes work accidents. Furthermore, the work overload in the Intensive Care Unit, which is one of the most complex units because it treats several types of diseases and traumas, can also contribute to the nurses' illness through stress, which is one of the causes of the emergence of other diseases, such as the Burnout Syndrome (2-4).

To perform the activities inherent to the function of the Intensive Care Unit it is necessary to have a team of health professionals who are physically, emotionally and qualified, through training that favors excellent care to the user of public health. Thus, the nursing team is formed by nurses and nursing technicians and assistants who are allocated in the ICUs according to the percentage of beds in them. According to Resolution no. 189 of 1996 - COFEN (Federal Council of Nursing) in its 5th article, states that intensive care should be performed by approximately 55.6% by nurses and 44.4% by nursing technicians.(5,6)

The nursing team acts, inside the Intensive Care Unit, monitoring the patient's vital signs in order to reestablish their health and thus be able to be discharged from the hospital. This service must follow the protocols of humanized care and the Nursing Process, which will serve to guide this professional in the preparation and organization of this care, in which the nurse needs to use all the human, pharmacological, and technological resources for the benefit of the patient admitted to one of the ICU beds. These resources must be managed because this environment is not favorable for the stay of any person, even more in a delicate state of health, due to noise.(7,8)

Among the resources used by nurses to provide care to the patient and, consequently, the prompt vital recovery, is the pharmacological one, which is based on the administration of chemical compounds, with therapeutic effect, existing in certain drugs, such as antibiotics and analgesics. The manipulation of these drugs in the patient can be done orally, nasally, cutaneously, and intravenously. To perform drug administration, in the Intensive Care Unit, the nursing team, especially nurses, needs to know the main drugs and their indication to treat certain diseases.(9)

The manipulation of drugs and also of the instruments for their application in patients, as in the case of intravenous administration and gastrointestinal intubation, plays an important role in restoring the patient's health. In the case of gastrointestinal intubation, the nursing team needs to have even more knowledge about this procedure, because although this intubation occurs in an area that is not dangerous to the patient's life, such as the nasal area, it can compromise the healing process when not properly

administered. This may occur when the drug has a solid or capsule formulation that hinders its passage through the tube (10).

The justification for the research that originated this study was due to the interest in knowing which studies and publications have been made about drug interactions in the Intensive Care Units (ICU). With this research we will be able to provide information, both to the academic community and to health professionals and the population in general, about the themes that are being discussed by professionals, such as nurses, in the ICU.

Considering the above, it is necessary to answer the research's guiding question: What has Nursing published and discussed about drug interactions in the Intensive Care Unit?

1.1 HYPOTHESIS

There are few nursing publications on drug interactions in the Intensive Care Unit.

1.2 GENERAL AND SPECIFIC OBJECTIVES

To conduct a survey of articles published in journals and/or periodicals on drug interactions in the Intensive Care Unit. To analyze the profile of nursing publications on drug interactions in the Intensive Care Unit.

1.3 TYPE OF STUDY

The type of study used to develop this research was a descriptive one, which consists of the observation, recording, analysis, and organization of the data obtained, and an integrative review, which searches for and analyzes scientific productions on a given theme with the objective of obtaining new data on professional practice and research in the scientific field, as well as a cross-sectional and retrospective study on works that deal with the theme addressed (11,12).

To do so, these works were retrieved from research and publication sites such as Scielo, Google Scholar, and health journal sites such as Revista Brasileira Medicina do Trabalho, Revista Hospital Universitário de Pernambuco.

2 THE INTENSIVE CARE UNIT AND DRUG INTERACTIONS

In this chapter we will talk a little about pharmacology applied to nursing in the Intensive Care Unit and the drug interactions performed in the Intensive Care Unit. According to Brunton & Hilal-Dandan (13) "The object of pharmacology is broad and includes knowledge of: origin, physical and chemical properties, composition, physiological actions, absorption, fate, excretion and therapeutic use of drugs.

2.1 PHARMACOLOGY APPLIED TO NURSING IN THE INTENSIVE CARE UNIT

The nursing team of a healthcare unit, such as the Intensive Care Unit, plays a fundamental role in the performance of patient care that is prescribed both by the nurse, in the case of obstetric nurses who are authorized by COFEN, through Law no. 7.498 of 1986, and by the physicians responsible for the patient (14). One of these cares refers to the administration of drugs that will act in the combat of diseases and traumas that in their majority have drugs in their composition, such as Beta-lactam antibiotics. For this, the nurse needs to know the groups of drugs described in Chart 1 - Groups of Drugs, to be able to perform this prescription, p. 11. (15)

Table 1 - Groups of Drugs

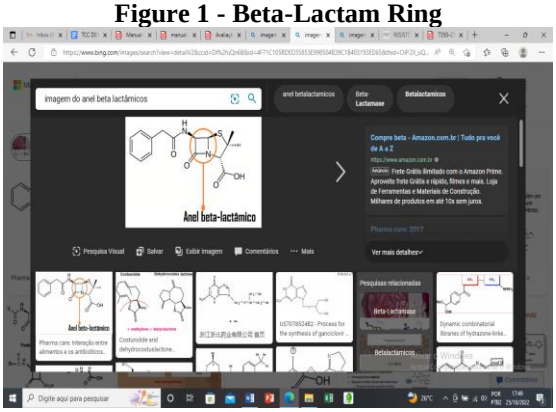
Antibacterials	Penicillins, Benzylpenicillins and Phenoxymethylpenicillin.
Antifungals	Amphotericin B, Anidulafungin.
Antivirals	Antiretrovirals, Protease Inhibitors.
Antiparasitic	Anthelmintics and Albendazole.

Source: prepared by the author.

However, within this group of drugs, the nurse is authorized to prescribe drugs, in a direct way, i.e. those that do not require a physician's transcription, that belong to the antibacterial and antifungal groups.

Within the group of antibacterials, according to Azevedo (16) "The beta-lactams are a group of antibiotics that are defined by the presence of the beta-lactam ring, and are a class of high importance due to their excellent therapeutic efficacy and low toxicity. ". The presence of this ring, Figure 1 - Beta-Lactam Ring, p. 12, in this compound, enables several functions such as the drug's action processes on the bacteria, the reduction of toxicity in the patient and mainly in acting on the resistance of certain bacteria to beta-lactams.

Figure 1 - Beta-Lactam Ring



Source: beta lactam ring image - Bing images

However, even with the presence of the beta-lactam ring, there are several cases of patients who showed resistance to the use of antibiotics, such as benzylpenicillins, which have beta-lactams in their composition in health centers such as the Intensive Care Unit. This resistance is the cause for prolonging

the patient's hospital stay or even his death in this health unit, since the treatment, through the use of an antibiotic, is unable to have an effect and fight the bacteria that cause the inflammatory process. (17)

2.2 DRUG INTERACTIONS IN THE INTENSIVE CARE UNIT

The use of drugs in an Intensive Care Unit is necessary for the treatment of various diseases and traumas presented by users of the Unified Health System (SUS) and the private network. However, the joint administration of two or more of these drugs can cause various reactions such as drug interactions (DIs) that can be beneficial or harmful to the patient's health, such as death. Regarding harmful MIs, they may result from the reduction or complete elimination of the effect of one drug by another, and the patient's health condition may worsen dramatically if this is not diagnosed as soon as possible. (18)

Drug interactions can be classified as mild, moderate, and severe depending on the patient's health status and also on the drugs present in the medications. According to a study carried out by Cavalcante *et al*. (19), in an Intensive Care Unit, the main drug interactions are between: bromopride and fentanyl, bromopride and midazolam; midazolam and omeprazole, and midazolam and noradrenaline. Of these interactions, those between bromopride and fentanyl, bromopride and midazolam had the highest percentage, reaching 29% of the patients whose medical records were checked.

The appearance and level of drug interactions, within the Intensive Care Units, may also be observed using the parameter time as a way to measure their occurrence in patients since their arrival in these units. According to the research carried out by Santos (20), it was observed that drug interactions start to occur around the third or fourth day of intention and that the factors age, gender and cause of admission must be taken into consideration for this diagnosis. Moreover, it was also observed that there are greater chances of recurrence of drug interactions when the patient is hospitalized for the second time, within a 30-day interval, due to the patient's physical weakness due to the illness and also due to drug interactions previously experienced.

Regarding the age aspect, according to studies by Brixner (21), who were hospitalized in an Intensive Care Unit, the elderly aged approximately 60 years had medical prescriptions for medications that culminated in drug interactions, such as morphine. The clinical picture presented in the study reveals that most of the patients had chronic diseases, such as Chronic Obstructive Pulmonary Disease (COPD) that increase the chances of the occurrence of MI's due to the need for the administration of several medications to carry out their treatment.

3 THE BRAZILIAN SCIENTIFIC PRODUCTION ABOUT DRUG INTERACTIONS IN THE INTENSIVE CARE UNIT

The Intensive Care Unit has great representation in the care and aid in the search for healing of diseases and traumas suffered by people of both sexes, age, social class, race and creed. To be able to offer

this service, several professionals, both in the health and administrative areas, need to be aware of the studies, treatments, and medications developed at each moment to be able to perform their functions and thus provide a humanized care to these users (22).

Two of these professionals, who have great importance in ICU care, are the nurse and the pharmacist, who are responsible, respectively, for triage and release of medications for the treatment of diseases in these units. The pharmacist is responsible not only for releasing and administering medications, but also for prescribing and guiding the nursing team on how to proceed in handling and applying these medications and on how to take care of possible adverse reactions of the drugs they contain. Thus, it is necessary that he knows the scientific productions, as shown in Chart 1- Brazilian Scientific Production on Drug Interactions in the Intensive Care Unit, p. 15-19, about drug interactions that are occurring.(23,24)

Chart 1 - Brazilian Scientific Production on Drug Interactions in the Intensive Care Unit

NUMBER OF PAPERS FOUND: 76				
NUMBER OF PAPERS ANALYZED: 25				
NO.	**TITLE**	**AUTHOR**	**DATE**	**RESULT**
1	Potential Drug Interactions in Intensive Care Unit Patients.	Carvalho REFL *et al.*	2012	The study showed that the prevalence of drug-drug interactions was high in the hospitals investigated and that the chance of interaction increased with the number of drugs prescribed, number of diagnoses, and age over 60 years.
2	Anti-Infective Drug Utilization Profile and Potential Drug Interactions in an Intensive Care Unit.	Batista LM, Nóbrega RC, Ribeiro NKR.	2012	It was found that the use of anti-infectives in the ICU is common, and a frequent association between them was observed in order to obtain therapeutic success. Moreover, the occurrence of potential IM involving the prescribed anti-infectives was identified.
3	Evaluation of Potential Drug Interactions Involving Antimicrobials in an Intensive Care Unit of a Public Teaching Hospital in João Pessoa- PB.	Nóbrega, RC.	2013	The results showed that among the most prescribed antifungal and antiviral drugs were, respectively: fluconazole (61.5%) and acyclovir (100%). Regarding antibacterial drugs, teicoplanin (13.6%) was obtained, followed by ceftriaxone and meropenem (both with 11.7%). Of the prescriptions evaluated, 30.65% had at least one MI, being these pharmacokinetic (67.6%), pharmacodynamic (21.6%) and of unknown pharmacokinetic profile (10.8%). Most of the MI's found had excellent scientific documentation (43.24%), rapid onset time (43.2%) and moderate severity (62.2%)
4	Prevalence of drug interactions in intensive care units in Brazil.	Carvalho REFL, Reis AMM, Faria LMP, Zago KSA, Cassiani SHB.	2013	Within 24 hours 70.6% of the patients had at least one drug interaction. The number of drug interactions detected in 24 hours was 2299 and in 120 hours was 2619. Midazolam, fentanyl, phenytoin, and omeprazole were the drugs with the highest frequency of drug interactions.
5	Identification and characterization of drug interactions in prescriptions from the intensive care unit	Cedraz KN, Santos Junior MC.	2014	Of the 28 prescriptions analyzed, 2 showed no drug interactions, while 26 showed some drug interactions, resulting in 99 potential drug interactions, with the most commonly

	of a public hospital in Feira de Santana, BA.			involved drugs being: Midazolam, 5-Acetylsalicylic Acid, Fentanyl, and Dipyrone. The most frequent drug interactions were: Fentanyl + Midazolam; Dipyrone + Enoxaparin; Midazolam + Omeprazole; Acetylsalicylic Acid + Regular Human Insulin. According to severity were found: 5 contraindicated, 31 major, 58 moderate, and 5 minor. 29 drug interactions had excellent documentation, 39 good, 31 reasonable, and none with unknown documentation The simultaneous use of Fentanyl + Midazolam may result in additive respiratory depression. The use of Metoclopramide + Haloperidol may increase the risk of extrapyramidal reactions or neuroleptic malignant syndrome.
6	Potential Drug Interactions in an Adult Intensive Care Unit of a Public State Hospital.	Baroni MMF, Gimenes AHDS, Rodrigues PJN.	2014	A total of 289 prescriptions were analyzed, and of these, 65.40% presented some potential drug interaction. These were classified according to severity as: contraindicated 8 (0.97%), severe 412 (50.25%), moderate 347 (42.32%) and minor 53 (6.46%). In addition to severity, they were characterized according to available documentation. Potential drug interactions were characterized as to the risk involved with cardiotoxicity and central nervous system related problems being 57.3% of the 948 risks identified. The management and monitoring strategies for each potential drug interaction were also characterized, being the dose adjustment of one or both interacting drugs and the monitoring of signs and symptoms the most frequent with 69.05%.
7	Prevalence and clinical significance of enteral drug-nutrition interactions in Intensive Care Units.	Carvalho REFL *et al.*	2014	Of these, 320 patients, with 24 hours of hospitalization, were using NE, and 20 (6.3%) presented drug-NNE interaction. Of the 504 patients with 120 hours of hospitalization, 39 (7.7%) presented drug-NE interactions. The most frequent potential drug-NE interactions were phenytoin-NE, levothyroxine-NE and warfarin-NE.
8	Evaluation of adverse clinical events due to drug interactions in an intensive care unit of a university hospital.	Barreto RR *et al.*	2015	Of the 200 individuals, 35 (17.5%) were classified in the group of hepatopathic patients, 68 (34%) nephropathic patients, and 97 (48.5%) without hepatopathies or nephropathies (SHN). The groups had a mean age of over 60 years and length of stay greater than 20 days. We identified 449 drug-drug interactions, of which more than 75% were of the drug-drug type, with the highest occurrence 289 (64.4%) in the SHN group. We observed 79 AEs, whose respiratory depression and hypo- or hyperglycemia were the most frequent. The amount of drugs prescribed and action on CYP450, as well as length of stay and Charlson comorbidity index, were the variables with the highest occurrence of ACEs in MI.

9	Adverse events from potential drug interactions in an intensive care unit of a teaching hospital.	Alvim MM, Silva LA, Leite ICG, Silvério MS.	2015	Daily prescriptions of 82 patients were analyzed, totaling 656 prescriptions. Of the total number of prescribed medications, 25% were antimicrobials, being meropenem, vancomycin and ceftriaxone the most prescribed. The most consumed antimicrobials, according to the methodology of daily dose defined per 100 patient-days, were cefepime, meropenem, sulfamethoxazole + trimethoprim, and ciprofloxacin. The average number of interactions per patient was 2.6. Among the interactions, 51% were classified as contraindicated or of important severity. Highly significant interactions (clinical value 1 and 2) stood out, with a prevalence of 98%.
10	Drug Interactions Among Drugs Most Frequently Prescribed in an Adult Intensive Care Unit.	Leal DCP, Scrignoli CP, Teixeira VCMC.	2016	Of the 211 prescriptions analyzed, 150 (71.1%) presented some interaction among the most prescribed drugs. In 7.6% of the prescriptions, drug interactions of greater severity were found, in 60.2% interactions of moderate severity, in 3.3% interactions of lesser severity, and 28.9% of the prescriptions did not present interactions between the most prescribed drugs.
11	Identification and Evaluation of Potential Drug Interactions in Patients of the Intensive Care Unit of Alcides Carneiro University Hospital.	Gomes AMP.	2016	The results obtained show that the emergence of interactions in ICU has high prevalence. The use of associations that may cause drug interactions is justified by their risk/benefit, which must be evaluated by the pharmacist and the healthcare team.
12	Assessment of potential drug interactions in the adult ICU setting.	Damascena RS, Silva JS.	2017	The results showed a high rate of side effects of drug interactions, raising the debate for a greater attention in prescriptions, in order to minimize this problem.
13	Potential intravenous drug interactions in intensive care.	Mesquita MGR, Moreira MB, Stipp MAC, Paes GO	2017	The sample was composed of 319 prescriptions and sub-samples of 50 prescriptions. It was found that the average number of medications per patient was 9.3 records, and it was evidenced a higher probability of drug interactions inherent to polypharmacy. The study identified serious drug interactions, such as the concomitant administration of Tramadol with selective serotonin reuptake inhibitors (e.g. Metoclopramide and Fluconazole), increasing the risk of seizures due to their epileptogenic actions, as well as the simultaneous use of Ranitidine-Fentanyl®, which can cause respiratory depression.
14	Nurses' Knowledge of Drug Interactions in Intensive Care Units.	Lima Neto AV, Silva IG, Mendes E.	2017	It was identified that 90% of the nurses knew how to define drug interactions, and 100% attributed the importance of this knowledge to the process of patient care by nursing, but reported not having the necessary practice or training to manage complications resulting from them.
15	Evaluation of Antimicrobial Prescriptions and their Drug Interactions in Patients of the Neopediatric Intensive	Lopes BL.	2017	A total of 206 medical records were analyzed, 112 (54.3%) were male patients. The age range of the patients varied from newborn to 11 years and 5 months. Of the total, 50.4% used antimicrobial, 37.8% used

	Care Unit of a Teaching Hospital			1 to 3 drugs, 80.7% had some type of drug interaction. The highest prevalence of drug interaction was of moderate degree, represented by the association of Ampicillin and Gentamicin (75.0%).
16	Drug interactions and consequent pharmaceutical interventions in the Intensive Care Unit of a private hospital in Macapá, Amapá.	Costa ERG *et al*.	2018	It was observed that most interactions in both adult and neonatal ICU were considered moderate risk. Pharmacokinetic interactions were more common in the adult ICU, while pharmacodynamic interactions predominated in the neonatal ICU. Management of the drug administration schedule was the most appropriate intervention for most cases of drug interactions.
17	Drug interactions in the intensive care unit of a reference hospital in the South of Tocantins - Brazil.	Marques CRP.	2018	1,195 (81.07%) prescriptions had MI. Of those that had MI 3,908 (69.30%) represented Moderate MI, 996 (17.67%) Mild MI, 683 (12.11%) Severe MI, and 52 (0.92%) Contraindicated.
18	Evaluation of the Drug Interactions Profile and Associated Factors in Prescriptions from Intensive Care Unit Patients.	Damascena RS, Dutra APR, Lemos LMA.	2019	A total of 1485 drug interactions were found in the prescriptions of 52 patients who were hospitalized during the document analysis period of this study. These were quantified, had their frequency analyzed and classified according to their relevance as Secondary, Moderate, Important and Contraindicated.
19	Factors associated with potential drug interactions in an Intensive Care Unit: a cross-sectional study.	Cortes ALB, Silvino ZR.	2019	From the 60 medical records analyzed, 244 prescriptions were selected. In them, 846 potential drug interactions were identified, related to high surveillance drugs and 33 high surveillance drugs. Of the 112 pairs of interactions identified, the most recurrent were tramadol and ondansetron, midazolam and omeprazole, regular insulin and hydrocortisone, fentanyl and midazolam, and regular insulin and noradrenaline. The variables polypharmacy, length of stay, and some specific medications were associated with high surveillance drug interactions.
20	Importance of the clinical pharmacist in reducing drug interactions to the oncology patient in the intensive care unit.	Galindo JA et *al*.	2020	It was evidenced that due to the large number of drugs, the risk of MI in oncologic patients are high, because they can affect the plasma monitoring of drugs. Several classes of drugs can interact with chemotherapeutic agents, an example is the interaction of methotrexate with a nonsteroidal anti-inflammatory drug (NSAID), because their joint administration can cause an obstruction of the excretion channel of the antineoplastic drug.
21	QT Interval Prolonging Drug Interactions in Intensive Care Unit: Cohort of Elderly.	Bezerra SRA.	2020	The frequency of death among patients exposed to IMP QT was 38.5% and whose predictors were the occurrence of septic shock ($p<0.001$), the use of loop diuretic ($p=0.048$), the use of antibiotics ($p=0.049$), the occurrence of "contraindicated" IMP QT ($p=0.006$).
22	Associated factors for potential clinically significant drug interactions in adult intensive care.	Maia JM *et al*.	2020	Results: A total of 81.8% (n=251) were exposed to at least one major or contraindicated IMp. More than one-third (37.4%) of these participants were exposed to six or more IMp. Medications with action on the nervous system collaborated to a

				higher probability of greater and/or contraindicated IMp. Elderly (p=0.006), male (p=0.028), and polymedicated (<0.001) individuals were more likely to be exposed to at least one major or contraindicated IMp.
23	Analysis and identification of the main predominant drug interactions in the intensive care unit of a private hospital.	Bezerra JV *et al.*	2020	Hospital prescriptions of 86 patients were analyzed, totaling 242 prescriptions in which 676 moderate level, 257 mild level, and 78 severe level interactions were observed.
24	Evaluation of prescriptions and possible drug interactions in an adult intensive care unit in a hospital in the northwestern region of Paraná.	Lopes-Ortiz MA, Tinido PCF.	2020	The results found show a very high number of drug interactions in prescriptions, which reinforces the importance of the clinical pharmacist in ICUs, acting actively in a multidisciplinary team, in order to minimize the prescription of drugs with high risk of drug interaction and thus ensure a better quality of life and health for the hospitalized patient.
25	Potential Drug Interactions in an Intensive Care Unit in the Interior of Minas Gerais: a cross-sectional study	Teixeira LHS, Máximo MP.	2021	3.5 prescriptions analyzed per patient. At least one PIFF was detected in prescriptions from 48 patients, totaling a prevalence of 84% in the sample analyzed. Among the pIFFs found, those classified as major severity (55%) and reasonable documentation (67%) were more prevalent, according to the Micromedex®. There was a statistical correlation between the number of medications and the prevalence of pIFFs ($\rho = 0.784$; $p < 0.001$). The prevalence of pIFFs in the sample analyzed by this study was high.

Source: prepared by the author.

Through research and analysis of the studies produced on what surrounds the theme on drug interactions, present in Chart 1- Brazilian Scientific Production on Drug Interactions in the Intensive Care Unit p. 15-19, we have the following considerations. There is a large number of MI involving the simultaneous combination of drugs, in several hospitals that took part in the study, in the treatment of patients with 60 years of age. Among the combined use of these drugs, which gave rise to an MI, are the antimicrobials and anti-infectives, such as teicoplanin, which was administered three drugs simultaneously and at least one MI was found.(2, 25-28)

Regarding the occurrence of drug interactions in patients admitted to Intensive Care Units, in the interval of 24 hours approximately 70% of these patients had at least one drug interaction. In these first 24 hours almost 2300 drug interactions were totaled and in 120 hours it increased to 2619, showing that the first 24 hours are propitious for the emergence of these interactions due to the high administration of drugs to treat and stabilize the patient's health. Among the drugs most commonly seen in prescriptions are Midazolam, Acetylsalicylic acid, Fentanyl, and Dipyrone, followed by Fentanyl + Midazolam; Dipyrone + Enoxaparin; Midazolam + Omeprazole; Acetylsalicylic acid + Regular Human Insulin. In relation to the

degree of dangerousness approximately 7% are part of the group of prescriptions of greater severity.(29-34)

We also identified studies reporting and justifying the occurrence of drug interactions given their risk/benefit to the treatment and improvement of the patient in an ICU. However, this risk-benefit provided by the combination of two or more drugs and resulting in drug interactions brings high rates of side effects, leading to discussions about care when prescribing drugs that have certain drugs that, when in contact with others, may cause reactions that will further damage the patient's health.(35,36)

Some of these drug interactions occur through the administration of Tramadol combined with creatinine inhibitors, such as Metoclopramide and Fluconazole, which can result in seizure episodes and respiratory complications when administered with Ranitidine-Fentanyl®. In addition, it has also been found the risk of side effects with the combined use of drugs consisting of drugs such as Metoclopramide + Haloperidol that may cause an extrapyramidal reaction that can be diagnosed through symptoms such as high fever and muscle rigidity. (5,37,26)

Regarding the process of medical prescriptions, we identified, through the analysis of the papers, that approximately 80% of them present some type of drug interaction. From this percentage, approximately 676 to 3900 prescriptions presented moderate MI, 257 to 996 mild MI, and 78 to 683 severe MI, besides 52 contra indications. The studies also highlight the need and importance of the presence of the pharmacist within Intensive Care Units to reduce the number of MI's. (38-42)

Another observation made was the existence of Potential Medication Interactions (PDIs) in the ICU due to treatments in patients, especially males and those over 60 years of age. Drugs that have compounds that act directly on the nervous system are the ones most related to PDIs. Moreover, PMI is responsible for a large number of deaths in intensive care units, which are caused, according to Bezerra (43), by the lack of knowledge of professionals who prescribe drugs that, when in contact, act to cause the onset of a UTI (44,45).

Regarding the issue of lack of knowledge about the composition of medications that have different drugs but that in contact cause MI, a study revealed that 90% of nurses claim to know how to recognize MI. They also recognize the importance of nurses having this knowledge to be able to perform their work better and thus provide humanized care to patients. However, they report that they do not have the specific and necessary training to combat the side effects of MIs. (46)

The concern of these nurses is due to the high risk of drug interactions in patients who are already in a delicate state of health, such as those being treated for cancer because the drugs inhibit the action of chemotherapy (47).

Another survey carried out was in relation to the degree of severity of drug interactions in both adult and neonatal ICU, in which a moderate risk was found in both. Regarding the observation of patient treatment, it was concluded that pharmacokinetic interactions, in which one drug alters the physiological

process, from absorption to excretion of the other drug, are more present in the adult ICU and pharmacodynamic interactions in the neonatal ICU (48).

Next, we analyzed another study that discussed the existence of drug interactions in a group of patients with or without chronic liver or kidney disease, aged 60 years or older, and with a hospitalization period of more than 20 days. Among the patients evaluated, it was found that the highest amount of drug interactions occurred in patients who had no disease in either of these two organs, which is surprising since this group ingested a smaller amount of drugs and consequently the occurrence of MIs should be reduced. (49)

4 DISCUSSION

Through the analysis of papers related to drug interactions, it was possible to observe that their occurrence is greater when antimicrobial and anti-infectious drugs are combined, in which we believe it is necessary to administer them separately to avoid the emergence of an MI. Furthermore, we observed that all the papers analyzed deal with the incidence of MI during the first 24 hours of the patient's stay in an ICU for the treatment of chronic diseases. In this case, we believe that the administration of medications with drugs that contribute to MI should be avoided, but according to Gomes (35) its use is given to the risk benefit of these drugs.

The risks of using these drugs, such as tramadol, can have side effects and cause other diseases, such as seizures or breathing problems, which in our view is not justified to suffer these side effects to take care of another disease. There was also a consensus regarding the types of MIs discriminated into mild, moderate, and severe, and the need for a pharmacist to avoid them. At this point, the presence of nurses trained about MIs is important both to avoid them and to treat them.

Another topic addressed in one of the papers was the occurrence of pharmacokinetic MI in adult ICU patients and pharmacodynamic MI in neonatal ICU patients. However, we did not find other papers discussing this topic that we believe does not have as much relevance as the others.

5 CONCLUSION

This study focuses on the discussion about the profile of Brazilian scientific publications on drug interactions in the Intensive Care Unit. To this end, a survey was conducted of articles published in journals and/or periodicals, between 2013 and 2021, on the theme addressed. During the search we found 76 papers, such as articles, monographs, and dissertations, and among these we analyzed 25 papers to support our study.

In addition, we also analyzed that the profile of nursing publications on IMs in the Intensive Care Unit, in this same period, are focused on the types of IMs and the amount of existing prescriptions that lead to the occurrence of an IM. Through the analysis we were also able to identify some patterns of studies,

such as the survey of the quantity of MIs occurring in the first 24 hours of the patient's stay being greater compared to those that appear after that time. It was also possible to analyze that there are few nursing publications on drug interactions in the Intensive Care Unit.

Therefore, through this study, it is possible to understand the importance of prescribing, administering, and monitoring medications that contain drugs with high potential to promote a drug-interaction, so that they are handled in such a way that drug-interactions are reduced, as well as the patient's length of stay in the ICU. As a future study proposal, we intend to conduct a research in an Intensive Care Unit in Maceió, Alagoas, to survey the quantity and types of drug interactions occurring in this unit and the measures taken so that this does not occur.

REFERENCES

1.**Estrutura Física da UTI: entendo como funciona**. Portal Educação, 2022. Disponível Em: Estrutura física na UTI: entenda como funciona - Blog do Portal Educação (portaleducacao.com.br). Acesso em: 24.10.2022.

2.Biato C, Paladini M, Schmidt DRC, Pais JD, Oliveira AR. Qualidade de vida no trabalho e burnout em trabalhadores de enfermagem de Unidade de Terapia Intensiva. Ver. Bras. Enferm, Brasília 2013 jan-fev; 66(1): 13-7. Doi: https://doi.org/10.1590/S0034-71672013000100002. Disponível Em: https://www.scielo.br/j/reben/a/rVtwWtKF8LZ3bww3WGSDXND/?format=pdf&lang=pt. Acesso em: 21.10.2022.

3.Batista OMA, Silva RSS, Madeira MZA, Fernandes MA, Brito BAM, Carvalho NAR. Riscos ocupacionais entre trabalhadores de enfermagem em Unidade de Terapia Intensiva. Rev Bras Med Trab. 2017;15(3):267-75. DOI: 10.5327/Z1679443520170027. Disponível Em: https://cdn.publisher.gn1.link/rbmt.org.br/pdf/v15n3a12.pdf. Acesso em: 21.10.2022.

4. Canever BP, Massaroli R, Martini JG, Massaroli A, Lazzari DD, Oliveira SN. Trabalho de enfermagem em unidade de terapia intensiva e sua interface com a sistematização da assistência. Escola Anna Nery Revista de Enfermagem 19(2) Abr-Jun 2015. Doi: https://doi.org/10.5935/1414-8145.20150033. Disponível Em: https://www.scielo.br/j/ean/a/4w6FhMDx7nZNq4WYFxpGpbz/?format=pdf&lang=pt. Acesso em: 21.10.2022.

5. Calil ASG, Jericó MC, Perroca MG. Composição da equipe de enfermagem em Unidades de Terapia Intensiva. Acta Paul Enferm 2011;24(2):199-205. Doi: https://doi.org/10.1590/S0103-21002011000200007. Disponível em: https://www.scielo.br/j/ape/a/Y6xMbXdBYrbDMbcvPyGPX9J/?format=pdf&lang=pt. Acesso em: 21.10.2022.

6. Resolução COFEN Nº 189/96. Normatiza em âmbito Nacional a obrigatoriedade de haver Enfermeiro em todas as unidades de serviço onde são desenvolvidas ações de Enfermagem durante todo o período de funcionamento da instituição de saúde [internet]. [citado 2009 Set 6]. Disponível em: http://www.mp.ba.gov.br/atuacao/ cidadania/gesau/legislacao/temas/resolucoes/ resolucao_189_96.pdf. Acesso em: 21.10.2022.

7. Alves BO, Andrade RV, Ouchi JD, Lupo APR, Fogaça MB. O PAPEL DO ENFERMEIRO NA UNIDADE DE TERAPIA INTENSIVA DIANTE DE NOVAS TECNOLOGIAS EM SAÚDE. Revista Saúde em Foco – Edição nº 10 – Ano: 2018. Disponível Em: portal.unisepe.com.br/unifia/wp-content/uploads/sites/10001/2018/07/054_O_PAPEL_DO_ENFERMEIRO_NA_UNIDADE_DE_TERAPIA_INTENSIVA.pdf. Acesso em: 21.10.2022.

8. Dutra HS, Pinto LMC, Farah BF, Jesus MCP de. Utilização do processo de enfermagem em unidade de terapia intensiva: revisão integrativa da literatura. hu rev [Internet]. 24º de janeiro de 2017 [citado 22º de outubro de 2022];42(4):245-52. Disponível em: https://periodicos.ufjf.br/index.php/hurevista/article/view/2413. Acesso em: 21.10.2022.

9. Mafé MCL. ADMINISTRACIÓN DE FÁRMACOS POR SONDA NASOGÁSTRICA, FUNCIÓN ENFERMERA REVISIÓN BIBLIOGÁFICA NARRATIVA. 38 fls. Trabalho de Conclusão de Curso em Enfermagem. Soria, 12 de Julio de 2019. Disponível Em: https://uvadoc.uva.es/bitstream/handle/10324/39087/TFG-O-1737.pdf?sequence=1&isAllowed=y. Acesso em: 21.10.2022.

10. Caetano JA, Ramos DC, Nascimento JC, Freitas BMG, Teles LMR, Miranda MDC. Avaliação do desempenho da equipe de enfermagem na administração de fármacos via intubação gastrointestinal. Rev. Eletr. Enferm. [Internet]. 30º de setembro de 2012 [citado 23º de outubro de 2022];14(3):570-8. DOI: https://doi.org/10.5216/ree.v14i3.12691. Disponível em: https://revistas.ufg.br/fen/article/view/12691. Acesso em: 21.10.2022.

11.Salomon DV. Como fazer uma monografia. 12. ed. São Paulo: Martins Fontes, 2010.

12.Mendes KDS, Silveira RCCP, Galvão CM. Revisão integrativa: método de pesquisa para a incorporação de evidências na saúde e na enfermagem. Texto contexto - enferm. 2008, 17(4), 758-764. Doi: https://doi.org/10.1590/S0104-07072008000400018. Disponível Em: SciELO - Brasil - Revisão integrativa: método de pesquisa para a incorporação de evidências na saúde e na enfermagem Revisão integrativa: método de pesquisa para a incorporação de evidências na saúde e na enfermagem. Acesso em: 21.10.2022.

13. Brunton L, Hilal-Dandan R. **Manual de Farmacologia e Terapêutica de Goodman & Gilman** - 2ed. AMGH Editora, 2015.

14. Conselho Federal de Enfermagem (BR). Lei nº 7.498, de 25 de junho de 1986. Dispõe sobre a regulamentação do exercício da Enfermagem e dá outras providências. Disponível em: – LEI N 7.498/86, DE 25 DE JUNHO DE 1986 Conselho Federal de Enfermagem - Brasil (cofen.gov.br). Acesso em: 25.10.2022.

15. Cardoso VNS, Travassos JA, SILVA GBG, Souza JS, Leite WO. Farmacologia aplicada ao conhecimento do profissional enfermeiro dentro da estratégia saúde da família. Research, Society and Development, [S. l.], 9(12), p. e40691211321, 2020. Doi: https://doi.org/10.33448/rsd-v9i12.11321. Disponível em: https://rsdjournal.org/index.php/rsd/article/view/11321. Acesso em: 21.10.2022.

16.Azevedo SMM. **Farmacologia dos Antibióticos Beta-lactâmicos**. 70 FLS. Dissertação (mestrado em Ciências Farmacêuticas) - Universidade Fernando Pessoa, Porto, 2014. Disponível em: https://bdigital.ufp.pt/bitstream/10284/4412/1/PPG_21378.pdf. Acesso em: 21.10.2022.

17.Fontinele DRS, Rodrigues TS, Santos AMR, Lima PC, Moura MEB, Goiano PDOL. Resistência Bacteriana á Antibióticos na Unidade de Terapia Intensiva: Revisão Integrativa. Rev Pre Infec e Saúde, 2018; 4:7350. DOI: https://doi.org/10.26694/repis.v4i0.7350. Disponível em: RESISTÊNCIA BACTERIANA À ANTIBIÓTICOS NA UNIDADE DE TERAPIA INTENSIVA: REVISÃO INTEGRATIVA | Rodrigues | Revista Prevenção de Infecção e Saúde (ufpi.br). Acesso em: 25.10.2022.

18. Fonseca Junior NC, Lúcio MP, Viana LS. Analise de interações medicamentosas em unidade de terapia intensiva em hospital de referência do nordeste brasileiro. REAS/EJCH | Vol.Sup.18 | e116. DOI: https://doi.org/10.25248/reas.e116. Disponível Em: https://acervomais.com.br/index.php/saude/article/view/116/48. Acesso em: 21.10.2022.

19.Cavalcante ALC, Sousa AB, Oliveira JDML, Nobre CA, Melo OF, Siqueira RMP. Análise de interações medicamentosas potenciais em pacientes de unidade de terapia intensiva de um hospital de ensino de Sobral. REAS/EJCH | Vol. Sup.17, e320, 2019. Doi: https://doi.org/10.25248/reas.e320. Disponível Em: https://acervomais.com.br/index.php/saude/article/view/320/227. Acesso em: 21.10.2022.

20.Santos MHBA. Análise de interações medicamentosas potenciais e de eventos adversos a medicamentos em uma unidade de terapia intensiva. 117 fls. Dissertação (Trabalho de Conclusão de Curso de Epidemiologia em Saúde Pública) - Departamento de Epidemiologia e Métodos Quantitativos em Saúde,

da Escola Nacional de Saúde Pública Sergio Arouca, na Fundação Oswaldo Cruz, 2017. Disponível Em: https://www.arca.fiocruz.br/bitstream/handle/icict/24086/ve_Mario_Henrique_ENSP_2017.pdf?sequence=2&isAllowed=y. Acesso em: 21.10.2022.

21. Brixner B, Garske CCD, Freitas AP, Schneider APH. Avaliação das interações medicamentosas potenciais em prescrições de pacientes em Unidade de Terapia Intensiva. Revista Saúde e Pesquisa, v. 9, n. 3, p. 483-490, set./dez. 2016. **DOI:** https://doi.org/10.17765/1983-1870.2016v9n3p483-490. Disponível Em: https://periodicos.unicesumar.edu.br/index.php/saudpesq/article/view/5399/2915. Acesso em: 21.10.2022.

22. Backes MTS, Backes DS, Erdmann AL, Büscher A. O CUIDADO INTENSIVO OFERECIDO AO PACIENTE NO AMBIENTE DE UNIDADE DE TERAPIA INTENSIVA. Esc Anna Nery (impr.)2012 out - dez; 16 (4):689 – 696. Doi: https://doi.org/10.1590/S1414-81452012000400007. Disponível Em: https://www.scielo.br/j/ean/a/mwTzKbFYCSTDYztddYXLz4L/?format=pdf&lang=pt. Acesso em: 21.10.2022.

23. Heineck I, Hegele V, Pilau R. Atuação do Farmacêutico Clínico em Unidade de Terapia Intensiva Adulto: Uma Revisão da Literatura. Rev. Bras. Farm. Hosp. Serv. Saúde São Paulo v.5 n.1 19-24 jan./mar. 2014. Disponível Em: https://www.rbfhss.org.br/sbrafh/article/view/182. Acesso em: 21.10.2022.

24. Cardina LSM, Matos VTG, Resende GMS, Toffoli-Kadri MC. Caracterização das prescrições medicamentosas em unidade de terapia intensiva adulto. Rev Bras Ter Intensiva. 2012; 24(2):151-156. Doi: https://doi.org/10.1590/S0103-507X2012000200009. Disponível em: https://www.scielo.br/j/rbti/a/FbYfqqrbVz8z7vBvVXfhKqG/?format=pdf&lang=pt. Acesso em: 21.10.2022.

25. Carvalho REFL, Vieira LB, Reis AMM, Faria LMP, Cassiani SHB. Interações Medicamentosas Potenciais em Pacientes de Unidades de Terapia Intensiva. Rev Ciênc Farm Básica Apl., 2012;33(3):401-408. Disponível Em: http://rcfba.fcfar.unesp.br/index.php/ojs/article/view/277/275. Acesso em: 21.10.2022.

26. Alvim MM, Silva LA, Leite ICG, Silvério MS. Eventos adversos por interações medicamentosas potenciais em unidade de terapia intensiva de um hospital de ensino. Rev Bras. Ter. Intensiva. 2015;27(4):353-359. Doi: https://doi.org/10.5935/0103-507X.20150060. Disponível Em: https://www.scielo.br/j/rbti/a/PXC8F3gm76xkw6R86JpsXbJ/?format=pdf&lang=pt. Acesso em: 21.10.2022.

27. Nóbrega, RC. AVALIAÇÃO DE INTERAÇÕES MEDICAMENTOSAS POTENCIAIS ENVOLVENDO ANTIMICROBIANOS EM UNIDADE DE TERAPIA INTENSIVA DE UM HOSPITAL PÚBLICO DE ENSINO DE JOÃO PESSOA – PB. 42 fls. Monografia (Trabalho de Conclusão de Curso em Farmácia) - Centro de Ciências da Saúde, da Universidade Federal da Paraíba, João Pessoa, 2013. Disponível Em: https://repositorio.ufpb.br/jspui/bitstream/123456789/543/1/RCN11072014.pdf. Acesso em: 21.10.2022.

28. Lopes BL. AVALIAÇÃO DE PRESCRIÇÕES DE ANTIMICROBIANOS E SUAS INTERAÇÕES MEDICAMENTOSAS EM PACIENTES DA UNIDADE DE TERAPIA INTENSIVA NEOPEDIÁTRICA DE UM HOSPITAL DE ENSINO. 51 fls. Monografia (Trabalho de Conclusão de Curso em Farmácia) - Universidade de Santa Cruz do Sul, 2017. Disponível Em: https://repositorio.unisc.br/jspui/bitstream/11624/1641/1/Bruna%20Lidiane%20Lopes.pdf. Acesso em: 21.10.2022.

29. Batista LM, Nóbrega RC, Ribeiro NKR. PERFIL DE UTILIZAÇÃO DE ANTI-INFECCIOSOS E INTERAÇÕES MEDICAMENTOSAS POTENCIAIS EM UNIDADE DE TERAPIA INTENSIVA. Rev Bras. Farm. Hosp. Serv. Saúde. São Paulo v.3 n.3 28-32 jul./set. 2012. Disponível Em: [PDF archive.org]. Acesso em: 21.10.2022.

30.Carvalho REFL, Reis AMM, Faria LMP, Zago KSA, Cassiani SHB. Prevalência de interações medicamentosas em unidades de terapia intensiva no Brasil. Acta Paul Enferm. 2013; 26(2):150-7. Doi: https://doi.org/10.1590/S0103-21002013000200008. Disponível Em: https://www.scielo.br/j/ape/a/C3d5ztWJ9ryJQc8kDHF9XVw/?format=pdf&lang=pt. Acesso em: 21.10.2022.

31.Cedraz KN, Santos Junior MC. Identificação e caracterização de interações medicamentosas em prescrições médicas da unidade de terapia intensiva de um hospital público da cidade de Feira de Santana, BA. Rev Soc Bras Clin Med. 2014 abr-jun;12(2):124-30. Disponível Em: http://www.sbcm.org.br/revistas/RBCM/RBCM-2014-02.pdf#page=25. Acesso em: 21.10.2022.

32. Carvalho REFL, Reis AMM, Faria LMP, Oliveira RC, Zago KSA, Cavelagna MF. Prevalência e significância clínica de interações fármaco-nutrição enteral em Unidades de Terapia Intensiva. Rev Bras Enferm. 2014 jan-fev; 67(1): 85-90. Doi: https://doi.org/10.5935/0034-7167.20140011. Disponível Em: https://www.scielo.br/j/reben/a/Ydtf53NDQ8BkwpMmKfdDTbQ/?format=pdf&lang=pt. Acesso em: 21.10.2022.

33.Baroni MMF, Gimenes AHDS, Rodrigues PJN. Interações Medicamentosas Potenciais em Unidade de Terapia Intensiva Adulto de um Hospital Púbico Estadual. Rev. Bras. Farm. Hosp. Serv. Saúde São Paulo 5(4), 19-24 out./dez. 2014. Disponível Em: https://rbfhss.org.br/sbrafh/article/view/207. Acesso em: 21.10.2022.

34.Leal DCP, Scrignoli CP, Teixeira VCMC. INTERAÇÕES MEDICAMENTOSAS ENTRE FÁRMACOS MAIS PRESCRITOS EM UNIDADE DE TERAPIA INTENSIVA ADULTA. Rev. Bras. Farm. Hosp. Serv. Saúde São Paulo v.7 n.2 26-30 abr./jun. 2016. Disponível Em: https://rbfhss.org.br/sbrafh/article/view/252. Acesso em: 21.10.2022.

35. Gomes AMP. IDENTIFICAÇÃO E AVALIAÇÃO DE POTENCIAIS INTERAÇÕES MEDICAMENTOSAS EM PACIENTES DA UNIDADE DE TERAPIA INTENSIVA DO HOSPITAL UNIVERSITÁRIO ALCIDES CARNEIRO. 60 fls. Monografia (Trabalho de conclusão de curso em Farmácia) - Universidade Federal de Campina Grande, 2016. Disponível em: http://dspace.sti.ufcg.edu.br:8080/jspui/bitstream/riufcg/7812/3/ALICE%20MADILZA%20PALMEIRA%20GOMES%20-%20TCC%20BACHARELADO%20EM%20FARM%c3%81CIA%20CES%202016.pdf. Acesso em: 21.10.2022.

36.Damascena RS, Silva JS. Avaliação das interações medicamentosas potenciais no âmbito da UTI adulta. Id on Line Rev. Mult. Psic. V.11, N. 39. 2017. Disponível em: https://idonline.emnuvens.com.br/id/article/view/981/1397. Acesso em: 21.10.2022.

37. Mesquita MGR, Moreira MB, Stipp MAC, Paes GO. Potenciais interações de medicamentos intravenosos em terapia intensiva. Rev Esc Enferm USP · 2017;51:e03233. Doi: https://doi.org/10.1590/S1980-220X2016034803233. Disponível em: https://www.scielo.br/j/reeusp/a/sXTqnYnKBDR39mC5Q4CYCyM/?format=pdf&lang=pt. Acesso em: 21.10.2022.

38. Cortes ALB, Silvino ZR. Fatores associados a interações medicamentosas potenciais em um Centro de Terapia Intensiva: estudo transversal. Escola Anna Nery 23(3) 2019. Doi: https://doi.org/10.1590/2177-9465-EAN-2018-0326. Disponível Em: https://www.scielo.br/j/ean/a/ct9jpdg5WQv3qF6HNzQPmrJ/?format=pdf&lang=pt. Acesso em: 21.10.2022.

39. Marques CRP. Interações medicamentosas na unidade de terapia intensiva de um hospital de referência no Sul do Tocantins – Brasil. *REVISTA CEREUS*, *10*(3), 17-26, 2018. DOI:10.18605/2175-7275/cereus.v10n3p17-26. Disponível em: http://ojs.unirg.edu.br/index.php/1/article/view/2287. Acesso em: 21.10.2022.

40. Damascena RS, Dutra APR, Lemos LMA. Avaliação do Perfil das Interações Medicamentosas e os Fatores Associados em Prescrições Médicas de Pacientes Internados em Unidade de Terapia Intensiva. Id on Line Rev. Mult. Psic. V.13, N. 43, p. 543-558, 2019. Disponível Em: https://idonline.emnuvens.com.br/id/article/view/1554/2282. Acesso em: 21.10.2022.

41. Bezerra JV, Mesquita JC, Feitosa CLP, Macêdo KPC, Silva FVF, Oliveira GR et al. Análise e identificação das principais interações medicamentosas predominantes em unidade de terapia intensiva de um hospital privado. REAS/EJCH | Vol.Sup.n.45 | e994, 2020. Disponível Em: https://acervomais.com.br/index.php/saude/article/view/994/2539. Acesso em: 21.10.2022.

42.Lopes-Ortiz MA, Tinido PCF. Avaliação das prescrições e possíveis interações medicamentosas em uma unidade de terapia intensiva adulto em um hospital da região Noroeste do Paraná. *Brazilian Journal of Development*, *6*(9), 73550–73559, 2020. Disponível Em: https://www.brazilianjournals.com/ojs/index.php/BRJD/article/view/17518/14220. Acesso em: 21.10.2022.

43. Teixeira LHS, Máximo MP. POTENCIAIS INTERAÇÕES MEDICAMENTOSAS EM UMA UNIDADE DE TERAPIA INTENSIVA DO INTERIOR DE MINAS GERAIS: UM ESTUDO TRANSVERSAL. *Revista Farmácia Generalista / Generalist Pharmacy Journal*, *3*(1), 33-45, 2021. Disponível Em: http://publicacoes.unifal-mg.edu.br/revistas/index.php/revistafarmaciageneralista/article/view/1442. Acesso em: 21.10.2022.

44.Bezerra SRA. INTERAÇÕES MEDICAMENTOSAS PROLONGADORAS DO INTERVALO QT EM UNIDADE DE TERAPIA INTENSIVA: COORTE DE IDOSOS. 179 fls. Dissertação (Trabalho de Conclusão de Curso em saúde do Adulto – PROESA) - Escola de Enfermagem da Universidade de São Paulo, 2020. Disponível em: https://www.teses.usp.br/teses/disponiveis/7/7139/tde-25022021101807/publico/Sandro_Ritz.pdf. Acesso em: 21.10.2022.

45.Maia JM, Moraes JT, Trindade OM, Oliveira LA, Sanches C, Trevisan DD. Fatores associados para potenciais interações medicamentosas clinicamente significantes em terapia intensiva adulto. Medicina (Ribeirão Preto); 53(4):379-88, 2020. Disponível em: https://www.revistas.usp.br/rmrp/article/view/172186. Acesso em: 21.10.2022.

46.Lima Neto AV, Silva IG, Mendes E. O CONHECIMENTO DO ENFERMEIRO SOBRE INTERAÇÕES MEDICAMENTOSAS EM UNIDADES DE TERAPIA INTENSIVA. Revista de Enfermagem, 2017. Disponível Em: http://periodicos.pucminas.br/index.php/enfermagemrevista/article/view/17233/13055. Acesso em: 21.10.2022.

47. Galindo JA, Santana BNL, Gomes SAC, Souza EB, Silva JA, Silva GGS. Importância do farmacêutico clínico na diminuição das interações medicamentosas ao paciente oncológico na unidade de terapia

intensiva. Braz. J. Hea. Rev., Curitiba, v. 3, n. 5, p. 15542-15556 set./out. 2020. Disponível Em: https://www.brazilianjournals.com/ojs/index.php/BJHR/article/view/19182/15398. Acesso em: 21.10.2022.

48.Costa ERG, Silva DA, Soeiro SCL, Lima RR, Gomes MRF, Fujishima MAT et al. Interações medicamentosas e consequentes intervenções farmacêuticas na Unidade de Terapia Intensiva de um hospital privado em Macapá, Amapá. Vigilância Sanitária em Debate, 6(2), 2018, Abril-Junho, pp. 29-37 INCQS-FIOCRUZ. Disponível Em: https://www.redalyc.org/journal/5705/570562984005/570562984005.pdf. Acesso em: 21.10.2022.

49.Barreto RR, de Paula VC, Santos LJV, Silva AS, Maia MBS. Avaliação de eventos clínicos adversos decorrentes de interações medicamentosas em uma unidade de terapia intensiva de um hospital universitário. Boletim Informativo Geum, v. 6, n. 3, p. 83-90, jul./set. 2015. Disponível Em: https://revistas.ufpi.br/index.php/geum/article/view/4228/3041. Acesso em: 21.10.2022.