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Literature Review on Nursing Diagnosis and Care in the Postoperative Period of Liver Transplantation

Revisão de Literatura sobre Diagnóstico e Cuidados de Enfermagem no Pós-Operatório de Transplante Hepático

Revisión de la Literatura sobre Diagnóstico y Cuidados de Enfermería en el Postoperatorio de Trasplante Hepático

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RESUMO

Objetivo: identificar e analisar os diagnósticos de enfermagem mais comuns e as intervenções de cuidado no pós-operatório imediato de pacientes submetidos a transplante hepático. **Metodologia:** trata-se de uma revisão integrativa da literatura que seguiu etapas sistemáticas, incluindo a formulação do tema, a busca em bases de dados, triagem e avaliação crítica dos estudos encontrados. Foram analisados artigos publicados nos últimos 10 anos que abordam diretamente os diagnósticos e cuidados de enfermagem no contexto de transplante hepático. **Resultados:** foram identificados diagnósticos de enfermagem como risco de infecção, déficit de autocuidado, e troca de gases prejudicada, entre outros. As principais intervenções incluem monitoramento constante, administração de medicamentos, e suporte emocional. O estudo destaca a importância da atuação especializada da enfermagem para prevenir complicações e promover a recuperação dos pacientes. **Conclusão:** o uso sistemático dos diagnósticos de enfermagem e a capacitação contínua da equipe de enfermagem são essenciais para garantir a segurança e a recuperação de pacientes no pós-operatório de transplante hepático. A prática baseada em evidências e uma abordagem personalizada são fundamentais para o sucesso do cuidado.

Descritores: NANDA, Diagnostico de enfermagem; Transplante hepático; Cuidados de enfermagem.

ABSTRACT

Objective: to identify and analyze the most common nursing diagnoses and care interventions in the immediate postoperative period of patients undergoing liver transplantation. **Methodology:** this is an integrative literature review that followed systematic steps, including topic formulation, database search, screening, and critical evaluation of the found studies. Articles published in the last 10 years directly addressing nursing diagnoses and care in the context of liver transplantation were analyzed. **Results:** nursing diagnoses such as infection risk, self-care deficit, and impaired gas exchange were identified, among others. The main interventions include constant monitoring, medication administration, and emotional support. The study highlights the importance of specialized nursing care to prevent complications and promote patient recovery. **Conclusion:** the

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systematic use of nursing diagnoses and the continuous training of the nursing team are essential to ensure the safety and recovery of patients in the postoperative period of liver transplantation. Evidence-based practice and a personalized approach are crucial for successful care.
Descriptors: NANDA, Nursing diagnosis; Liver transplantation; Nursing care.

RESUMEN

Objetivo: identificar y analizar los diagnósticos de enfermería más comunes y las intervenciones de cuidado en el postoperatorio inmediato de pacientes sometidos a trasplante hepático. **Metodología:** se trata de una revisión integrativa de la literatura que siguió pasos sistemáticos, incluyendo la formulación del tema, búsqueda en bases de datos, selección y evaluación crítica de los estudios encontrados. Se analizaron artículos publicados en los últimos 10 años que abordan directamente los diagnósticos y cuidados de enfermería en el contexto del trasplante hepático. **Resultados:** se identificaron diagnósticos de enfermería como riesgo de infección, déficit de autocuidado e intercambio de gases alterado, entre otros. Las principales intervenciones incluyen monitoreo constante, administración de medicamentos y apoyo emocional. El estudio destaca la importancia del cuidado especializado de enfermería para prevenir complicaciones y promover la recuperación de los pacientes. **Conclusión:** el uso sistemático de diagnósticos de enfermería y la capacitación continua del equipo de enfermería son esenciales para garantizar la seguridad y recuperación de los pacientes en el postoperatorio de trasplante hepático. La práctica basada en evidencia y un enfoque personalizado son fundamentales para el éxito del cuidado.
Descriptores: NANDA, Diagnóstico de enfermería; Trasplante hepático; Cuidados de enfermería.

INTRODUCTION

The human being, since the earliest civilizations, has sought modifications in the morphology and structure of the body to ensure survival, such as the replacement of a failing organ with a healthy one extracted from another individual. This procedure represents one of the greatest advances in medical science, with a significant impact on the understanding of the biological universe, opening a new chapter in human history: that of the chimera man, or homo novo, where the original structure is modified to tolerate a foreign organ.[1]

The era of liver transplants in humans is recent, beginning about 40 years ago with the pioneering work of Starzl, who performed the first human liver transplant in 1963.[2] Since then, studies in the field of transplantation have intensified, achieving progressively better results due to the development of new immunosuppressive agents, especially with the discovery of cyclosporine, the advancement of knowledge about the immune system, and the factors involved in rejection.[1]

Liver transplantation is considered one of the most complex surgeries today, as it interferes with numerous functions of the body.[3] Currently, it is the most complex therapeutic procedure in

the surgical arsenal because the liver, being one of the largest organs in the body, performs various vital functions, impacting multiple systems of the body.[3] [4] The success of the transplant depends on a complete hospital infrastructure and a trained multidisciplinary team to care for severely debilitated and immunosuppressed patients.[4] Liver transplantation aims to ensure the survival of patients with irreversible liver damage when no other treatment options are available.[5]

There are two basic principles regarding transplantation: the first is of a social nature, as there is no transplant without a donor; the second is that the transplant does not begin or end in the operating room, requiring specific care for the transplanted patient. It is one of the most challenging procedures, and due to its extreme complexity, it requires the effort and dedication of a large team of professionals.[2]

The goal of liver transplantation is to prolong the patient's life, providing an acceptable quality of life and restoring their health.[6] After the transplant, the recipient is admitted to the Intensive Care Unit (ICU), where they remain, on average, for 24 to 48 hours. During this period, the same care provided to any critically ill patient undergoing extensive abdominal surgery is required, but the multisystemic changes resulting from liver disease and the period of hepatic function absence during the intraoperative period must also be considered.[3]

In the immediate postoperative period, which comprises the first 24 hours after liver transplantation, the patient remains intubated, monitored, and under immunosuppressive therapy. This period requires numerous care measures, and significant postoperative complications are common.[7] These factors highlight the importance of a differentiated approach to these patients, with attention to details and individualities. The success of the procedure is directly related to the performance of the multidisciplinary team. The nurse must plan comprehensive care for these patients in an orderly and scientific manner, using the nursing process as a documented basis to meet the care needs, thereby achieving the proposed goals for this patient profile.[7]

To unify nursing care across various hospital shifts, it is essential to standardize language and information. This need can be met by using nursing diagnoses, which describe actual or potential health problems that nurses, based on their training and experience, are qualified and authorized to address.[7]

Nursing diagnoses constitute a structured way of identifying the problems detected by the nurse. Through nursing interventions, these care activities are made visible and contribute to

restoring the altered balance in the health-disease process, thereby achieving the desired professional autonomy and valuing the work provided.[8]

Given this scenario, the contribution of studies on nursing diagnoses in post-transplant patients and their relationship with the quality of life and survival of these patients is evident. Recognizing the complexity of the care required by these patients, this study was conducted because it is believed that the identification of nursing diagnoses in a group of patients enables the understanding of altered human responses, contributing to the development of targeted and individualized nursing interventions.

Understanding that these issues directly influence the quality of nursing care, the objective of this study was to identify, through the literature, the nursing diagnoses in the immediate postoperative period of patients undergoing liver transplantation, as well as the most frequent nursing care measures in this context.

Based on the presented objective, the research question for a literature review study could be formulated as follows: what are the most common nursing diagnoses and recommended nursing care measures in the immediate postoperative period of patients undergoing liver transplantation, according to the literature?

This question directs the study to identify and analyze the specific nursing diagnoses and care measures that have been highlighted in the scientific literature, ensuring that the research is focused and relevant to the clinical context.

METODOLOGY

This study followed an integrative literature review, conducted in several systematic steps. First, the research topic was formulated, and then the inclusion and exclusion criteria for the studies were established. The subsequent steps included database searches, study screening, critical evaluation of the found articles, and the description of the articles that met the established criteria.

This review was based on the protocol proposed by the Joanna Briggs Institute,[9] using the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR).[10] The study followed these steps: 1) identification of the research question; 2) mapping of knowledge production; 3) selection of knowledge production; 4) data analysis; 5) synthesis and presentation of data (JBI, 2020).

To formulate the research question, the PCC strategy (P – Population, C – Concept, and C – Context) was used; P (Adults undergoing liver transplantation.), C (Nursing diagnoses and nursing care in the immediate postoperative period.), C (Nursing care in a hospital environment, specifically in the immediate postoperative period of liver transplantation.); Defined as: the most common nursing diagnoses and the recommended nursing care in the immediate postoperative period of patients undergoing liver transplantation?

To gather the scientific production, the following electronic databases were used: Literatura Latino-Americana e do Caribe em Ciências da Saúde (LILACS), Medical Literature Analysis and Retrieval System Online (MEDLINE), Base de Dados de Enfermagem (BDENF), and the Scientific Electronic Library Online (SciELO). The search was conducted using specific descriptors: nursing diagnosis, NANDA, nursing diagnosis, liver transplantation, and nursing care, both separately and in combination, using the boolean operator AND.

The inclusion criteria adopted for the selection of studies were: original articles, published in the last 10 years (2010-2020), nationally, available in full text, in Portuguese, and directly addressing the proposed topic. The selected articles were analyzed and discussed to assess the coherence, agreement, or disagreement among the authors regarding the studied topic.

Temporal delimitation is crucial to ensure that the reviewed information is up-to-date and reflects the most recent scientific and technological advances. In the health field, where practices and knowledge evolve rapidly, it is essential that the review is based on contemporary studies that can provide an accurate and relevant view of current practices.

The first analytical step consisted of a comprehensive search in the mentioned databases, using the previously defined descriptors to identify relevant articles. The second step involved filtering the studies: filtering by year, title, and abstract. In this phase, the titles and abstracts of the articles were read, duplicate articles were excluded, and the full texts of the selected articles were read for final inclusion in the study.

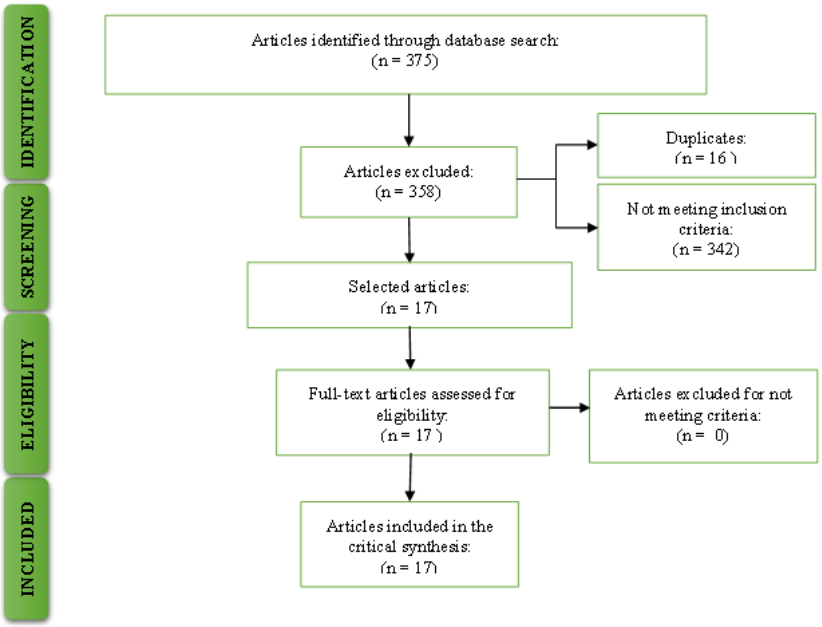
In addition to the search and filtering steps, a critical evaluation of the articles included in the review was carried out. This evaluation involved analyzing the methodology used in the studies, the relevance of the findings to the proposed topic, and the quality of the presented evidence. The articles were classified according to methodological robustness, clarity in presenting results, and the clinical relevance of the conclusions. The extracted data were

organized in a table to facilitate comparison between the studies and the identification of the main nursing diagnoses and care described in the literature.

Subsequently, the results of the selected studies were discussed in an integrated manner, aiming to identify common patterns in nursing diagnoses in the immediate postoperative period of liver transplantation. The most frequently recommended nursing care and the main interventions to minimize risks and complications associated with this critical period were also highlighted. The differences and similarities in the study findings were carefully analyzed to provide a comprehensive view of the current state of knowledge on the topic.

The flowchart presented in Figure 1 is an example of a flow diagram used in systematic reviews or integrative literature reviews to illustrate the study selection process.

Figure 1 - Flowchart of the phases of article selection included. Rio de Janeiro, RJ, Brazil, 2021.



Source: Research authors, 2022.

To ensure the validity of the results, the inclusion and exclusion criteria were rigorously applied, and the quality of the studies was assessed using standardized evaluation tools, such as the Critical Appraisal Skills Programme (CASP). Studies that exhibited serious methodological flaws, such as the absence of clear participant selection criteria or lack of control over relevant

variables, were excluded from the review. This ensured that only high-quality evidence studies were included in the final analysis.

This type of flowchart is essential to demonstrate the transparency of the study selection process in a systematic or integrative review. It allows other researchers to understand how the studies were selected, ensuring that the methodology is rigorous and that the review results are based on high-quality evidence. Additionally, it facilitates the reproduction of the review by other scientists, reinforcing the study's credibility.

The data extraction process included identifying the main nursing diagnoses, descriptions of care interventions, and the reported clinical outcomes. These data were compared and synthesized to create a consolidated view of best practices in caring for patients undergoing liver transplantation. Data analysis revealed a series of common diagnoses, as well as specific interventions that proved effective in reducing complications and improving postoperative outcomes.

RESULTS AND DISCUSSION

After completing this analysis process, to better understand the discussion, an informative Chart 1 (described below) was created with the 13 articles that aligned with the objective proposed in this study, selected based on the theme and characteristics present in their content, such as: title, year of publication, employed methodology, objectives that best aligned with the focus of this research, as well as results and discussion that corroborated or refuted the information found on the topic.

The complexity of liver transplantation (LT) is widely recognized in the literature, being considered one of the most challenging surgical procedures due to its requirement for robust hospital infrastructure and a highly qualified multidisciplinary team. The success of the transplant is closely related to the team's ability to manage complications, which are often more severe and varied than those encountered in other major abdominal surgeries.

The immediate postoperative period (IPO), comprising the first 24 hours after the procedure, is particularly critical. During this time, patients remain under anesthesia and artificial ventilation, requiring intensive monitoring. Continuous surveillance of vital signs and drainages, along with precise management of interventions, is fundamental to prevent or detect early complications that may compromise the graft or body systems such as the respiratory, cardiovascular, and digestive systems.

In this context, the nurse's role is vital, focusing on the implementation of interventions that meet the patient's immediate needs, including both physical and psychological aspects. Attention to psychological needs is especially important, as patients face significant stress due to the invasive nature of the surgery and uncertainty about recovery.

Furthermore, the transfer of the patient to the Intensive Care Unit (ICU) during the immediate postoperative period is a standard procedure, given the level of intensive care required. Admission to the ICU involves complete and continuous laboratory assessment, with frequent reassessments, especially in unstable patients. Intraoperative data, such as the volume of blood transfusions and saline solutions administered, the use of vasopressors, urine output, and hemodynamic complications, are crucial to guide the intensive care team in optimizing ongoing treatment.

Author Name	Manuscript Title/Year	Method	Objectives	Results
Ramos IC, et al.	Nursing care in the postoperative period of liver transplantation: identifying nursing diagnoses (2011).	Documentary research.	To identify nursing diagnoses in the immediate postoperative period of patients undergoing liver transplantation.	The identification of nursing diagnoses provides measurable criteria for evaluating the care provided, supports and directs care, facilitates research and teaching, delineates the independent nursing roles related to the therapeutic plan, and contributes to the expansion of a body of nursing knowledge, which is why it should be increasingly valued and implemented by nurses.
Oliveira NSP, et al.	Nursing diagnoses of post-liver transplant patients in outpatient follow-up (2019).	Descriptive, quantitative study.	To identify the nursing diagnoses of post-liver transplant patients in outpatient follow-up.	Of the patients, 102 (66.7%) were male with a median age of 55 years. Cirrhosis caused by hepatitis C virus was the main indication for transplantation. Eleven nursing diagnoses were identified, with the most frequent being: Risk of infection, Ineffective protection, Risk of unstable blood glucose,

				Risk of impaired liver function.
Amaral B, et al.	Approach to the initial postoperative period of liver transplantation: an institutional point of view (2019).	Review article.	To discuss the clinical profile of the recipient, early complications, and their appropriate management, as well as overall management in the first hours after transplantation.	During the surgical procedure, liver transplantation is characterized by three stages: the hepatectomy phase, the anhepatic phase, and the reperfusion phase. The latter is critical, with most imbalances due to increased right ventricular pressure and intracranial pressure, arrhythmias, potassium overload, cytokine overload, embolisms, and worsening coagulopathy.
Aguiar MIF, et al.	Psychosocial aspects of quality of life in liver transplant recipients (2018).	Descriptive, cross-sectional study with a quantitative approach.	To evaluate the psychosocial dimension of quality of life in patients before and after liver transplantation.	There was an improvement in post-transplant quality of life levels in all four domains evaluated (<0.0001), with the greatest increase in scores for the domains: concern (55.5 vs 87.9) and stigma of liver disease (58.6 vs 93.7).
Borges MCLA, et al.	Unveiling nursing care for liver transplant patients in an intensive care unit (2012).	Exploratory research with a qualitative approach.	To understand the perception of the nursing team regarding the care actions implemented in a postoperative ICU that attends to liver transplant patients.	Nursing care for liver transplant patients involves broad technical and psychosocial aspects, requiring knowledge and experience.

Fragoso, L. V. C., Galvão, M. T. G., & Caetano	Care for liver transplant patients in light of Roy's theoretical Chartwork (2010).	Convergent care research of a qualitative type.	To describe the systematization of nursing care for a liver transplant patient according to Roy's adaptation theory in the physiological mode.	The evaluation of behaviors and stimuli allowed the development of the following nursing diagnoses: ineffective breathing pattern, imbalanced nutrition - less than body requirements, constipation, impaired physical mobility, self-care deficit for bathing/hygiene, deficient fluid volume, ineffective protection, risk of infection, impaired skin integrity, impaired memory, ineffective sexuality pattern. The main nursing interventions for the identified diagnoses include: administration of analgesics, fluid and nutritional monitoring, wound care, infection protection, fluid control, health education, and active listening.
Pereira CS, et al.	Perme scale as a predictor of functionality and complications after ICU discharge in patients undergoing liver transplantation (2018).	Prospective observational study.	To evaluate the Perme scale score for mobility as a predictor of functionality and complications in the postoperative period of patients undergoing liver transplantation.	There was a predominance of male patients, with a mean age of 58.4 ± 9.9 years. The most prevalent underlying pathology was cirrhosis due to hepatitis C virus (23.3%). Significant associations were recorded between mechanical ventilation time and the Perme scale at ICU discharge ($r = -0.374$; $p = 0.042$) and between the number of physical therapy sessions ($r = -0.578$; $p = 0.001$). When comparing the results of the initial assessment and at hospital discharge, there was a significant improvement in functionality ($p < 0.001$).

Leite AMC, et al.	Factors related to quality of life in transplant patients (2019).	Descriptive, quantitative, and cross-sectional study.	To evaluate the influence of socioeconomic factors and those inherent to transplantation on the perception of quality of life in patients undergoing organ transplants.	The results showed that having an income above 2 minimum wages presented a significant difference compared to participants with lower incomes. Married individuals showed a significant difference in the psychological domain compared to other marital statuses. Liver transplant recipients showed a significant difference in self-assessment compared to other transplant recipients.
Mota, L. A. N. D., Cruz, M. A. S., & Costa, C. A. O.	Management of the therapeutic regimen - construction of a flowchart to support clinical decision-making: a qualitative study (2016).	Qualitative study.	To develop a clinical decision support flowchart for nursing management of the therapeutic regimen for liver transplant patients.	The flowchart includes areas such as medication regimen, dietary regimen, lifestyle habits, and complications. The specifications of the interventions in these areas reached a consensus among over 90% of nurses, aiming at continuity of care.
Vesco NL, et al.	Healthcare-associated infections and associated factors in the postoperative period of liver transplantation (2018).	Retrospective, descriptive study with a quantitative approach.	To identify the incidence of healthcare-associated infections and their associated factors during the first month after the postoperative period in adult patients undergoing liver transplantation.	Of the evaluated patients, 15 (28.3%) developed an infection during the first month, with the most prevalent being clinical sepsis (n=6; 37.4%), followed by respiratory tract infection (n=3; 18.8%), urinary tract infection (n=3; 18.8%), surgical site infection (n=3; 18.8%), and finally, bloodstream infection (n=1; 6.2%).
Mota, L., Bastos, F. S., & Brito, M. A. C	The liver transplant patient: nursing therapies in follow-up (2018).	Qualitative, retrospective study.	To identify the focuses and interventions implemented by nurses in response to the identified care needs of	The most frequently identified nursing focus is susceptibility to infection (67.30%), with interventions primarily focused on education. The

			liver transplant patients.	majority of the implemented interventions (57.07%) fall within the scope of observation.
Oliveira, L.F, et al.	Liver transplantation: nursing interventions in the postoperative period (2010).	Literature review.	To identify the main nursing problems and diagnoses and propose nursing interventions for patients in the postoperative period of liver transplantation.	Regarding nursing problems, 1 article was found; for diagnosis, 1 master's thesis and 1 article were found; regarding nursing care, only 1 article was found.
Quaglio, W. H., Bueno, S. M. V., & de Almeida, E. C.	Difficulties faced by the nursing team in caring for transplant patients: an integrative literature review (2017).	Literature review.	To conduct an integrative review of the difficulties faced by the nursing team in caring for transplant patients.	227 articles were found, but only five answered the guiding question: difficulties pointed out by the nursing team in caring for transplant patients.

Chart 1 - General characteristics according to authors, research title, year, objectives, and results of studies on nursing audit and records and nursing audit published from 2010 to 2020 - Brazil.

The complexity of the surgical procedure in liver transplantation (LT), and its success depends on a complex hospital infrastructure and a multidisciplinary team trained in the procedure and the care of severely debilitated patients.[9-10] The care directed at this group involves specific approaches that differ from those used in other major abdominal surgeries.[11-12]

The immediate postoperative period of these surgeries, such as liver transplantation (LT), comprises the first 24 hours after the surgical procedure. It is a period during which the patient is under the effects of anesthesia and artificial ventilation, requiring intensive care and constant monitoring of vital signs and drainage.[13]

In this context, the nurse's care is directed towards implementing interventions aimed at preventing or early detection of surgical complications, graft issues, and various systems such as respiratory, cardiovascular, digestive, infectious, among others. It is also important to address psychological needs.[14]

The literature supports the importance of a robust hospital infrastructure and a trained team of professionals to manage patients undergoing LT. Studies like that of Oliveira et al. (2019) highlight the most common nursing diagnoses, such as the risk of infection and ineffective protection, which require specific interventions to ensure patient stability in the immediate postoperative period. Furthermore, the review by Amaral et al. (2019) describes the complexity

of the transplantation phases, from hepatectomy to reperfusion, highlighting the hemodynamic challenges faced during surgery, which can directly impact the postoperative period.

Nursing care in this context goes beyond technical aspects, also involving attention to the psychological needs of patients. Borges et al. (2012) emphasize that nursing care for liver transplant patients requires not only technical knowledge but also skills to address the psychosocial dimensions of care. Early identification of complications and actions on identified nursing diagnoses, as highlighted by Ramos et al. (2011), are crucial for the success of the transplant and patient recovery.

Based on these data, it can be concluded that the effectiveness of nursing care in the immediate postoperative period of liver transplantation depends on careful planning, based on accurate diagnoses and evidence-based interventions, which underscores the need for continuous training of the nursing team and a hospital environment prepared to face the complex challenges associated with this procedure.

Due to these peculiarities and being a major surgical procedure, the patient is transferred to the intensive care unit (ICU) in the immediate postoperative period.

Regarding the admission of these patients to the ICU, a complete laboratory evaluation is necessary, and a reassessment is generally conducted between 6 and 12 hours after admission for stable patients; however, for unstable patients, it should be repeated as frequently as necessary.[11] The amounts received of blood transfusion and saline solution, the need for vasopressors, urine output, general hemodynamic characterization, and intraoperative complications are important information for the ICU.[11]

Fluid balance is also crucial in the care of this newly transplanted patient. Monitoring the timing and control of vital signs and blood glucose levels, care of drains and catheters, airway suctioning, laboratory tests collection, and maintenance of reverse isolation are some of the numerous activities performed by the nursing team in intensive care. Thus, nursing care for post-transplant patients is considered highly technically complex.[15]

Furthermore, the importance of nursing care in administering medications, particularly immunosuppressants, and guiding the transplant patient so they can successfully continue the immunosuppression regimen at home, is emphasized.

Special attention from the nursing team is required due to the risk of hemodynamic instability in these patients. The author notes that nursing problems, diagnoses, and interventions

are mainly concentrated in the integumentary, digestive, pulmonary, renal, and neurological systems.[16]

It is very important that the nurse opts for an individualized, detailed, and differentiated approach to the transplanted patient, as previously mentioned, the success of the procedure is not only related to the surgical act but also to the performance of a trained multidisciplinary team.[14]

Managing the patient undergoing liver transplantation (LT) in the immediate postoperative period requires meticulous attention and a highly specialized approach from the multidisciplinary team, especially nursing. The need to transfer these patients to the Intensive Care Unit (ICU) immediately after surgery reflects the complexity and risks associated with the procedure. Continuous evaluation and reassessment, as highlighted in the text, are fundamental for monitoring hemodynamic stability and early identification of possible complications.

The literature confirms this approach. Studies like those of Mota et al. (2016) and Vesco et al. (2018) emphasize the importance of rigorous monitoring of vital parameters, fluid balance, and administration of immunosuppressants, which are essential for preventing graft rejection and ensuring patient recovery. Additionally, maintaining reverse isolation and performing care with drains and catheters are described as essential practices in intensive care routines, aligning with the recommendations of Oliveira et al. (2010) on nursing interventions in the postoperative period of liver transplantation.

Another crucial aspect is the individualization of care. Borges et al. (2012) and Aguiar et al. (2018) emphasize that care should be tailored to the specific needs of each patient, considering both clinical conditions and psychosocial aspects. This includes not only technical management but also effective communication with the patient and their family, guiding them on the use of immunosuppressants and the need for adherence to post-discharge treatment.

The complexity of care is even more evident when considering the diagnoses and interventions related to the integumentary, digestive, pulmonary, renal, and neurological systems, which require a nursing team not only technically trained but also with skills to make quick and accurate decisions in high-complexity situations.

Therefore, the success of liver transplantation is intrinsically linked to the quality of nursing care in the immediate postoperative period. Nursing practice, based on continuous evaluation and targeted interventions, is essential to ensure patient stability and prevent

complications, confirming the importance of an individualized approach and the need for a highly trained team to meet the demands of such vulnerable patients.

The nurse should plan their care in a systematic manner to ensure the continuity of comprehensive care. It is essential to use the nursing process and nursing diagnoses (ND) for standardizing care.[17]

The nursing process includes data collection, nursing diagnosis, planning, outcome establishment, intervention, and evaluation. Nurses use data collection and clinical judgment to formulate hypotheses or explanations about actual or potential problems, risks, and/or opportunities for health promotion. All these steps require knowledge of concepts underlying nursing science before identifying patterns in clinical data or making accurate diagnoses.[18]

Continuing the discussion, it is essential to highlight the importance of systematizing nursing care through the Nursing Process (NP) and Nursing Diagnoses (ND), which serve as fundamental pillars to ensure the quality and continuity of care. The standardization of care provided by these tools allows for a more organized and efficient approach, ensuring that all the patient's needs are met comprehensively and individually.

The Nursing Process, as described, consists of several interconnected stages: data collection, nursing diagnosis, planning, outcome establishment, intervention, and evaluation. Each of these stages requires not only technical skills but also deep scientific knowledge and the ability to make clinical judgments. This is particularly relevant in the context of liver transplantation, where the patient's condition can change rapidly, requiring immediate and precise interventions.

Studies like those of Ramos et al. (2011) and Oliveira et al. (2019) highlight that using nursing diagnoses allows for a clearer and more objective assessment of the patient's condition, facilitating the identification of actual or potential problems. This, in turn, directs interventions more precisely, ensuring that nursing actions are evidence-based and tailored to the specific needs of each patient.

Data collection and clinical judgment, as the initial parts of the Nursing Process, are fundamental for formulating hypotheses about the patient's health problems. These elements allow the nurse to identify patterns in clinical data and develop diagnoses that address not only immediate problems but also prevent future complications.

Thus, the systematization of care through NP and ND not only ensures that all aspects of the patient's health are monitored and treated but also facilitates communication among members of the multidisciplinary team. This ensures that all professionals involved in care have a clear and shared understanding of the patient's health status, contributing to more cohesive and effective care.

Continuity of care and comprehensiveness are primary goals in nursing, and using systematized processes and standardized diagnoses is a proven strategy to achieve these goals. Therefore, it is emphasized that nurses should be well-trained and familiar with these tools, ensuring that nursing practice is not only technically competent but also scientifically grounded.

As is known, the nursing process consists of: data collection, nursing diagnosis, planning, implementation, and evaluation, which focus on individualizing care, based on theories and conceptual models. Among these stages, the nursing diagnosis has gained prominence for being a dynamic, systematic, organized, and complex stage, meaning not just a simple list of problems but a phase involving critical evaluation and decision-making.[9-13,19]

The identification of ND, according to NANDA, in the postoperative period of patients undergoing liver transplantation, is a tool that should be used for early detection of complications and prompt attention to affected human needs.[13]

The identification of nursing diagnoses provides measurable criteria for evaluating the care provided, supports and directs care, facilitates research and teaching, delineates independent nursing functions related to the therapeutic plan, and contributes to the expansion of a body of nursing knowledge, which is why it should be increasingly valued and implemented by nurses. The absence of systematized nursing care can harm the quality of care.[13]

During the analysis of the articles under study, it was possible to identify the diagnoses mentioned by the authors, and in Chart 2, it is possible to identify the altered domain and the nursing diagnoses.

Chart 2 - Main nursing diagnoses and associated problems in patients in the immediate postoperative period of liver transplantation

Altered Domain	Nursing Diagnosis	Problems
Nutrition	- Imbalanced nutrition: less than body requirements	Emotional; lack of appetite, orotracheal tube
Elimination and Exchange	- Impaired gas exchange	Orotracheal intubation

Activity and Rest - Impaired bed mobility - Decreased cardiac output - Ineffective tissue perfusion - Impaired spontaneous ventilation - Sleep deprivation	- Self-care deficit for bathing/hygiene	Muscle weakness, Pain
	Pain, Muscle weakness	
	Blood loss during the immediate postoperative period	
	Edema; jaundice	
	Pulmonary compromise	
	Pain; respiratory discomfort; anxiety; fear of death	
Perception and Cognition - Disturbed sensory perception	- Impaired verbal communication	Orotracheal intubation
	Mental confusion	
Coping/Stress Tolerance	- Anxiety	Pain; respiratory discomfort; anxiety; fear of death
Safety/Protection - Risk of aspiration - Impaired tissue integrity - Risk of perioperative positioning injury - Hypothermia	- Risk of infection	Catheters; drains; surgical wound
	Orotracheal intubation	
	Catheters; drains; surgical wound	
	Immediate postoperative period	
Comfort	- Acute pain	Acute pain
	- Nausea	

Source: Research authors, 2022.

NANDA Taxonomy II is organized into three distinct levels: domains, classes, and diagnoses. A domain refers to a specific area of activity, study, or interest within nursing practice. A Nursing Diagnosis (ND) is a clinical judgment about the responses of an individual, family, or community to actual or potential health problems or life processes and serves as the basis for planning the outcomes for which the nurse is responsible. NANDA Taxonomy II covers 13 domains, 47 classes, and 187 diagnoses.[18]

Below, the most frequently mentioned nursing diagnoses during the literature analysis are discussed. In addition to presenting the altered domain, the nursing care for addressing the problem is also highlighted.

Category 1 – Domain: Activity-Rest

Decreased cardiac output - Cardiovascular system

This Nursing Diagnosis (ND) is defined as the insufficient amount of blood pumped by the heart to meet the body's metabolic demands. For the analyzed patients, related factors include altered heart rate, altered preload and afterload, with defining characteristics such as edema, increased or decreased central venous pressure, weight gain, and oliguria.[18]

Hypotension is one of the most frequent clinical complications in the initial postoperative period and must be actively prevented and managed. During episodes of hypotension, graft ischemia may occur, compromising the recovery of its function.[11] When interpreting hypotension in these patients, the nurse should assess conditions such as hypovolemia, blood loss, and low peripheral vascular resistance caused by inflammation. Hemodynamic assessment, whether by invasive or non-invasive methods, is essential to establish the pathophysiological pattern and guide appropriate therapeutic interventions.

The nursing team is responsible for most of the record-keeping in the patient chart, and it is crucial that these notes are made accurately to ensure continuity of care and facilitate communication among healthcare professionals. The administration of vasoactive drugs is one of the indicated interventions in cases of severe hypotension, and regular monitoring of vital signs and recording in the fluid balance sheet are fundamental for controlling, evaluating, and reassessing this condition.[13]

Ineffective breathing pattern

This Nursing Diagnosis (ND) refers to inspiration and/or expiration that does not provide adequate ventilation, with related factors such as pain and body position.[18]

This diagnosis is associated with the mechanics of ventilation rather than with the processes of gas exchange and oxygen/carbon dioxide transport. Essential nursing interventions include maintaining the patient in a semi-Fowler's position, assessing arterial blood gases, checking thoracic expansibility (amplitude and symmetry) and the use of accessory muscles, performing lung auscultation, communicating capillary oxygen

saturation (SpO2) below normal parameters, assessing signs and symptoms of pulmonary infection and complications related to mechanical ventilation, and observing signs and symptoms of hypoxemia.[13]

Domain: Safety-Protection

Risk of infection

Being at increased risk of invasion by pathogenic organisms involves factors such as invasive procedures, destruction of natural barriers, increased environmental exposure, use of pharmaceutical agents (such as immunosuppressants), inadequate primary and secondary defenses, and the presence of chronic diseases.[18]

This risk was identified in 100% of the patients who participated in the analyzed studies. Patients undergoing liver transplantation face extensive and prolonged abdominal surgery, with risk factors related to the donor, the recipient, and the transplantation itself. Additionally, they are exposed to invasive procedures such as orotracheal intubation, venous and arterial catheters, urinary and nasogastric tubes, and abdominal drains. These patients, often malnourished and anemic due to the underlying disease, are also subjected to immunosuppressive and anesthetic therapies for long periods.[11-13]

The risk of infection in the early phase after liver transplantation is multifactorial and constitutes one of the main causes of postoperative morbidity and mortality.[13-14] Infection is a predictable event in the post-transplant period and tends to occur chronologically. In the first week, the most common infections are bacterial, related to catheters (30.0%), pneumonia (25.0%), biliary infection (15.0%), and surgical wound infection in 10.0% of patients.14 Prolonged stays in intensive care, prolonged use of antibiotics, surgical complications requiring prolonged use of catheters, drainage systems, and enteral and/or parenteral nutrition are also important risk factors to consider.[14]

Infections represent the greatest risk of death for liver transplant recipients, and the evaluation of these infections is often complex and challenging for healthcare professionals.[14]

A common type of infection is urinary tract infection (UTI), often associated with prolonged use of an indwelling urinary catheter. The duration of catheterization is a crucial factor for colonization and infection, and immunosuppression may mask the classic signs of infection, making early intervention difficult.[20]

The main nursing care for this diagnosis includes preventive measures such as infection protection, care for catheters, wounds, and surgical wounds, with attention to signs of inflammation, purulent drainage, redness, warmth, and edema. Additionally, the interpretation of laboratory data is fundamental, and the nursing team must be trained to identify signs indicative of an infectious condition.[16]

Risk of aspiration

Decreased consciousness and the presence of gastrointestinal tubes are significant risk factors for the aspiration of gastrointestinal and oropharyngeal secretions, solids, or liquids into the tracheobronchial airways.[18] Decreased gastrointestinal motility, along with the presence of an endotracheal tube and increased gastric residue, also contribute to this risk.[21]

Although patients are kept fasting for the first 24 hours post-surgery, the decreased level of consciousness due to the prolonged effects of anesthetics and sedatives increases the risk of aspiration.[13]

Nursing interventions to mitigate this risk include elevating the head of the bed, monitoring abdominal distension, and ensuring that the endotracheal tube cuff is inflated. Additionally, upper airway suctioning and evaluation for the insertion of a nasogastric tube with siphoning are recommended practices to prevent aspiration-related complications.

Risk of shock

This diagnosis is related to the vulnerability to inadequate blood flow to body tissues, which can result in cellular dysfunction and pose a significant life-threatening risk, compromising the patient's health.[18]

The diagnosis of postoperative bleeding is made through both clinical evaluation and laboratory tests. Clinical signs such as tachycardia, hypotension, or blood loss through abdominal drains are initial indicators of suspicion, which can be confirmed by a reduction in hemoglobin levels.[11]

Early postoperative hemorrhage is defined as any bleeding that requires the administration of more than three units of red blood cell concentrate within 12 hours or necessitates a new surgical intervention. Causes may include poor graft function, dilutional coagulopathy, hypocalcemia, hypothermia, acidosis, hyperfibrinolysis, and surgical factors.[11] The main nursing care for this event includes rigorous monitoring of hemorrhage, volume administration as needed, and constant monitoring of the patient's vital signs.

Domain: Nutrition

Imbalanced nutrition: less than body requirements

This refers to the intake of nutrients insufficient to meet metabolic needs, with defining characteristics such as weight loss and anorexia, and related factors such as biological alterations.[18]

Specifically, patients whose liver, a vital organ related to three physiological processes: digestion, absorption, and metabolism, is newly implanted, may exhibit inadequate function. This would at least be a collaborative nursing problem or risk factor for nursing diagnoses related to the nutrition of these patients (13). The diagnosis of imbalanced nutrition was present in 70% of the patients, and the most frequent defining characteristics were related to their previous state, prolonged fasting in the postoperative period, and abdominal pain in the region of the surgical wound.[14]

Enteral feeding passage, nutritional monitoring, diet planning, and administration of the prescribed diet are the main nursing care actions to be performed.[13]

Risk of fluid volume imbalance

This diagnosis refers to the risk of alterations in body fluid balance, manifested by a possible decrease, increase, or rapid redistribution of intravascular, interstitial, and/or intracellular fluid. These alterations can result in fluid loss or gain, compromising the patient's health status.[18]

Active fluid volume loss, for example, can be identified by clinical signs such as dry mucous membranes, a common condition in patients who undergo deprivations such as reduced water intake, zero diet in the immediate postoperative period, and who present with a distended abdomen and hypoactive bowel sounds. Additionally, the use of diuretics intensifies the risk, making this diagnosis even more relevant in patients undergoing complex surgical procedures such as liver transplantation.[13]

Constant monitoring of the patient's fluid and nutritional balance becomes essential to avoid serious complications. Rigorous control of fluid balance through accurate recording of fluid intake and output is one of the main nursing interventions. It is also vital to maintain appropriate devices for venous access, ensuring that intravenous therapy is administered efficiently and safely.[14]

Attention to signs of fluid imbalance must be continuous, especially in the context of the immediate postoperative period, where the risk of complications is elevated. Fluid administration and monitoring of electrolyte levels are crucial preventive measures that help stabilize the patient and promote proper recovery, minimizing the risks of morbidity associated with these fluid alterations.

Domain: Comfort

Acute pain

Pain is an unpleasant sensory and emotional experience that arises from actual or potential tissue injury or is described in terms of such injury. It is related to factors such as biological, physical, and psychological injurious agents.[18]

Patients undergoing liver transplantation are particularly prone to experiencing postoperative pain, especially in the first 72 hours after surgery. This pain is often caused

by factors such as prolonged surgical positioning, extensive surgical incision, the presence of drains, and bed rest. Pain signs include patient verbalization, adoption of antalgic positions, facial and behavioral expressions of discomfort, as well as autonomic responses related to the surgical wound, drain site, and venous and arterial puncture sites.[13]

Postoperative analgesia after liver transplantation is essential to maintain effective pain control and thus accelerate postoperative recovery. However, analgesic needs vary widely among patients, making it crucial to titrate analgesics according to each patient's individual needs to achieve successful analgesia.[11]

The main nursing care in this context includes positioning the patient in a way that provides comfort, administering prescribed analgesics, monitoring vital signs, and controlling sedation levels.[14-16]

The study showed that nursing care aimed at pain relief, when combined with actions focused on improving oxygenation, relieving anxiety, and changing positions to improve lung expansion and comfort in bed, results in significant improvement in the overall pain experienced by the patient.[14]

Nausea

Nausea is an unpleasant subjective sensation that indicates the need to vomit and is often associated with factors such as drug use, gastric distension, and irritation.[18] This diagnosis was identified in five patients in the study. Postoperative nausea is highly correlated with the use of anesthetic and opioid analgesic medications, which are commonly administered during and after liver transplantation.[14] These substances can alter gastrointestinal motility and trigger the vomiting reflex, causing significant discomfort for the patient.

The nursing team's role is crucial in managing this condition. In addition to providing comfort to the patient, nursing care should focus on the appropriate administration of antiemetic medications, which help control nausea and prevent episodes of vomiting. Continuous monitoring is essential to detect any signs of worsening, such as frequent

vomiting, which can lead to additional complications such as dehydration and electrolyte imbalances.

Furthermore, the approach should include non-pharmacological measures such as elevating the head of the bed and encouraging slow, deep breathing, which can help minimize the sensation of nausea. Educating the patient and their family about the importance of promptly reporting any nausea is also an important strategy to ensure effective and preventive management of this uncomfortable symptom.

Domain: Elimination-Exchange

Impaired gas exchange - Respiratory system

This ND is characterized by an excess or deficit in oxygenation and/or elimination of carbon dioxide at the alveolar-capillary membrane, with the main defining characteristic being abnormal arterial blood gases.[18]

Impaired gas exchange is detected by altered respiratory patterns, which can result in changes in blood gas levels, tachycardia, and agitation/confusion. In liver transplant patients, this diagnosis is closely related to the patient's pre-transplant condition, the severity of the clinical condition, and risk factors such as age, smoking habits, and others.[13]

Acute respiratory distress syndrome (ARDS) is one of the most severe respiratory problems after LT. Severe reperfusion syndrome, massive transfusion, long surgical period, and infection are important causes of ARDS. The management of respiratory complications, i.e., ARDS, primarily involves supportive therapy (antibiotics, oxygen therapy, prevention of hypervolemia, drainage of massive pleural effusions and ascites, and aspiration by bronchoscopy). However, if signs of respiratory failure are present, mechanical ventilation support should be initiated without delay.[11]

The main nursing care in this context includes respiratory monitoring, positioning, administration of analgesics, monitoring vital signs, and maintaining sedation, in addition to comprehensive and continuous vigilance.[14-16]

Domain: Perception/Cognition

Acute confusion

The abrupt manifestation of reversible disturbances in consciousness, attention, cognition, and perception that occur over a short period is a significant concern in the postoperative period of liver transplantation.[18]

The most frequently observed neurological complications after liver transplantation include encephalopathy, seizures, and intracranial hemorrhage. Inadequate graft function can result in the recurrence of encephalopathy, the exact etiology of which is often difficult to determine, as multiple factors may be involved, such as subarachnoid hemorrhage, meningitis, infarction, medullary necrosis, and cytomegalovirus infection. Seizures represent the second most common neurological complication, often preceded by some degree of encephalopathy, although other etiologies may also be present.[11]

The main nursing care for these patients includes rigorous monitoring of vital signs and neurological status, with special attention to controlling hallucinations and delirium. It is essential to promote cerebral perfusion, reduce anxiety, improve sleep quality, and ensure proper medication administration, in addition to maintaining glycemic and acid-base balance. The nursing team must also ensure a safe environment, implement seizure and fall precautions, and adopt measures to control the environment, creating conditions conducive to the patient's neurological recovery.[16]

Domain: Coping/Stress Tolerance

Anxiety

Anxiety is an unpleasant and vague sensation of discomfort or dread generated by perceptions of a real or imagined threat.[18] This diagnosis encompasses the feeling of uneasiness and apprehension that the individual perceives in response to an unspecified threat. Anxiety and fear are differentiated only by the absence or presence of a threat, respectively. In clinical practice, both feelings may coexist and produce the same

sympathetic response, such as altered heart rate, pupil dilation, sweating, tremors, and dry mouth.[13]

The nursing professional, in addition to dealing with physiological factors, must also be attentive to emotional factors, such as the fear of death experienced by these patients and family isolation, as the patient is in intensive care in the immediate postoperative period.[15]

Regarding the fear mentioned earlier and evidenced in the study as a frequent diagnosis, psychological evaluation should extend throughout the perioperative period, seeking to identify possible alterations early and offer appropriate interdisciplinary treatment to meet the demands that arise in each phase.[21-22]

As we have seen, nursing care for the transplanted patient in the intensive care unit requires that the nurse be trained to provide complex care, involving planning from bed preparation and admission to the unit, infection prevention in the postoperative period, and evaluation of the cardiovascular, respiratory, renal, respiratory, nervous, immune, endocrine, and hematopoietic systems.[14]

CONCLUSION

Based on the results and discussions presented, this study concludes that nursing care in the postoperative period of liver transplantation is a complex process that requires a high level of specialization and a systematic approach. The proper identification and use of nursing diagnoses are essential to guide individualized care, ensuring that the specific needs of each patient are effectively met, preventing complications, and promoting recovery.

The study also highlights that the immediate postoperative period of liver transplantation presents a series of unique challenges that demand a well-trained and capable nursing team. The complexity of the procedure, combined with the need for constant monitoring and the potential for severe complications, such as infections and organ dysfunction, underscores the importance of prompt and precise interventions. The

risk of infection, identified in 100% of the analyzed patients, emerges as one of the main diagnoses, reinforcing the need for continuous vigilance and effective preventive strategies to reduce morbidity and mortality.

Nursing interventions play a crucial role in managing postoperative complications. From monitoring vital signs and controlling fluid balance to administering medications and providing emotional support, these actions are fundamental to ensuring patient safety and recovery. The effectiveness of these interventions is directly related to the continuous training of the nursing team and their ability to make informed decisions in high-complexity situations.

The need for individualized care is another crucial aspect highlighted in this study. Each transplanted patient presents unique characteristics that need to be considered in the care plan, including physiological, psychological, and social factors. A personalized approach not only improves the quality of care but also contributes to patient adherence to treatment, resulting in better clinical outcomes.

The systematization of care through the use of the nursing process and nursing diagnoses is essential to ensure continuity and comprehensiveness of care. This systematization facilitates communication among members of the multidisciplinary team and ensures that nursing actions are evidence-based, significantly contributing to the safety and recovery of patients undergoing liver transplantation.

The study reaffirms the importance of specialized nursing care in the context of liver transplantation and the need for a careful and systematic approach to ensure the success of the procedure and the full recovery of patients. Evidence-based practice, continuous professional training, and the use of standardized nursing diagnoses and interventions are fundamental elements for achieving these objectives.

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