Esc Anna Nery 2016;20(1):38-47

Liver harvesting from the donor to the transplantee: A proposed protocol for nurses

Captação do fígado do doador para o transplante: Uma proposta de protocolo para o enfermeiro

Captación del hígado del donante para el trasplante: una propuesta de protocolo para el enfermero

Francisca Diana da Silva Negreiros[1]
Alice Maria Correia Pequeno Marinho[2]
José Huygens Parente Garcia[1]
Ana Patrícia Pereira Morais[2]
Maria Isis Freire de Aguiar[1]
Silvana Linhares de Carvalho[1]

1. Universidade Federal do Ceará. Fortaleza - CE, Brazil.
2. Universidade Estadual do Ceará. Fortaleza - CE, Brazil.

Abstract

Objective: To propose a clinical protocol model for nurses in liver harvesting for transplant. **Methods:** A descriptive study, qualitative in nature, held in Fortaleza, in the period from June to August 2014. Interviews were carried out and observing the work of nurses in a referral hospital in Ceará. The data was processed through the thematic analysis and provided the construction of the proposed Protocol pilot, analysed by nurses for the final version. **Results:** The study allowed the construction of a protocol, with specific actions that permeate the harvesting procedure, specifically the stage of organ removal, streamlining interventions and making them safer and more uniform in the liver harvest-transplantation process. **Conclusions:** The proposal of a protocol concerning liver harvesting for transplant is a systematization assistance model with the potential to codify the actions of the nurse in the harvesting and transplantation process.

Keywords: Liver Transplantation; Tissue and Organ Harvesting; Nurses; Protocols.

Resumo

Objetivo: Propor um modelo de protocolo assistencial para o enfermeiro da captação do fígado para transplante. **Métodos:** Pesquisa descritiva, de natureza qualitativa, realizada em Fortaleza, no período de junho a agosto de 2014. Foram realizadas entrevistas e observação do trabalho dos enfermeiros em hospital de referência do Ceará. Os dados foram trabalhados por meio da análise temática e subsidiaram a construção da proposta piloto do protocolo, apreciado pelos enfermeiros para versão final. **Resultados:** O estudo permitiu a construção de um protocolo, apresentando ações específicas, que permeiam o procedimento de captação, especificamente a etapa da retirada do órgão, dinamizando as intervenções e tornando os procedimentos mais seguros e uniformes no processo captação-transplante de fígado. **Conclusões:** A proposta de um protocolo referente à captação do fígado para transplante é um modelo de sistematização da assistência com potencial para instrumentalizar as ações do enfermeiro no programa captação-transplante.

Palavras-chave: Transplante de Fígado; Coleta de Tecidos e Órgãos; Enfermeiros; Protocolos.

Resumen

Objetivo: Proponer un modelo de protocolo clínico para enfermeros para el proceso de captación de hígado para trasplante. **Métodos:** Investigación descriptiva, cualitativa, realizada en Fortaleza, entre Junio y Agosto de 2014. Fueron realzadas entrevistas y observación del trabajo de los enfermeros en un hospital de referencia en Ceará. Los datos fueron procesados a través del análisis temático y subsidiaron la construcción de la propuesta piloto del protocolo, apreciado por los enfermeros para la versión final. **Resultados:** El estudio permitió la construcción de un protocolo, con acciones específicas sobre el procedimiento de captación, específicamente la etapa de extracción del órgano, dinamizando las intervenciones y haciéndolas más seguras y uniformes en el proceso captación-trasplante. **Conclusión:** La propuesta de un protocolo relativo a la captura del hígado para trasplante es un modelo de sistematización de la asistencia con potencial para instrumentalizar las acciones del enfermero en el programa captación-trasplante.

Palabras clave: Trasplante de Hígado; Recolección de Tejidos y Órganos; Enfermeros; Protocolos.

Corresponding author:
Francisca Diana da Silva Negreiros.
E-mail: negreiros.diana@gmail.com

Submitted on 07/24/2015.
Accepted on 12/24/2015.

DOI: 10.5935/1414-8145.20160006

INTRODUCTION

This study presents a proposal for a protocol for the practice of nurses in harvesting during the removal of the liver for transplantation. The purpose of this protocol is to provide nurses who participate in the organ extraction team information to enable them to act more safely and agilely, allowing for better communication and preventing adverse events in the harvesting-transplantation process.

The construction and implementation of protocols should be understood as a theoretical and practical support tool, contributing to the planning and evaluation of care and, consequently, the quality of care[1].

In recent years, there have been many advances in the transplantation sector, both nationally and internationally. In 2014, 29,534 organ transplants were performed in the United States of America (USA), 6,729 of which were liver transplants[2]. In the same period, 7,898 organ transplants were carried out in Brazil, with 1,755 liver transplants. In the field of organ and tissue donation, Brazil is a world leader, mainly because it represents the largest public transplant system in the world and is in second place in total number of liver transplants, behind only the United States[3].

It is worth pointing out that liver transplantation is a highly complex therapy indicated to reverse terminal liver disease when there is no alternative treatment, in which the diseased liver is removed, the liver graft is introduced and hemodynamic changes are re-established[4,5].

The development of a well-established transplant program depends on the performance of various professionals in various stages, from identification of potential donors to the realization of transplants and their outpatient follow-up[3]. As part of the multi-professional team, it can be seen that the nurse plays a decisive role in the success of a transplant program, acting in the process of organ donation and with the candidates and transplant recipients, whether in a clinical nursing role and/or as coordinator[6].

Thus, clinical nurses need to develop core competencies for the complexity of care in the various stages of the pre-transplant, intraoperative and post-transplantation periods, outpatient follow-up, live donors, professional development, professional practice and ethics[7]. The responsibilities of the nurse in the donation process includes participation in obtaining organs and tissues.

The harvesting of organs can be divided into eight stages, with the first identifying the potential donor with brain death. The second step is the compulsory notification to the Centre for Notification, Harvesting and Distribution of Organs and Tissues (CNCDO) of the potential donor. The third stage describes the evaluation of the donor based on clinical history, laboratory and serological tests, the viability of the organs, as well as tests the compatibility with possible receivers. Then the family is consulted about the donation. The fourth step is to transmit the information of the donor to the Centre for Transplants (CT). In the fifth step, the CT sends a list of registered recipients, selected from their technical registration and compatible with the donor[8].

In the sixth stage, the CT informs the transplantation teams of the existence of the donor and selected receiver. In the seventh stage, the teams extract the organs in the harvesting hospital. After the procedure, they are transported to the hospitals for transplantation. Finally, in the eighth stage, the body is returned to the family[8].

In the search of scientific databases, revision in the collections of the Virtual Health Library (VHL) were performed on the theme of this study, using the Descriptors in Health Sciences (DeCS): "liver transplant" *and* "collection of tissue and organs" *and* "nurses" *and* "protocols", and there were no documents found. When mentioned in the *United States National Library of Medicine* (PubMed) descriptors in *Medical Subject Headings* (MESH): "*Liver Transplantation" and "Tissue and Organ Harvesting" and "Nurses" and "Clinical Protocols"* publications were not found. Therefore, this study is significant because it enhances the scientific evidence for liver harvesting, as it concerns the organ removal stage.

In light of these considerations and in order to provide assistance in nursing and better quality of care, the guiding question of this study was: What are the actions performed by nurses in the removal of livers for transplantation? In this way, this study aimed to propose a clinical protocol model for nurses in harvesting livers for transplantation.

METHODS

This article is an excerpt of the dissertation entitled "Nurses' skills in liver transplantation process in a referral hospital in Ceará", which was performed with nurses working in the liver transplant service at a referral hospital for transplants in Fortaleza-Ceará, an institution considered to be the largest centre for liver transplants in Latin America[9].

It is a descriptive study with a qualitative approach. The qualitative approach is the method that investigates the principles of history, relationships, representations, beliefs, perceptions and opinions of the people[10].

The participants were 31 nurses who worked in the liver transplant outpatients, gastroenterology clinic, transplant clinic, operating room, postoperative intensive care unit. As inclusion criteria, at least two years working with transplantation was adopted, considering that this period allows for the development of skills necessary for assisting in the harvesting-transplantation process. Exclusion criteria considered nurses who were absent for medical or personal reasons during the data collection period, or those who refused to be part of the study.

Data was collected from June to August 2014 through semi-structured interviews and non-participant observation. Semi-structured interviews contain topics that guide a conversation between two or more speakers conducted by an interviewer, in order to build information relevant to an object of topic research[10]. A script and a digital voice recording device were used for the

interview, and during non-participant observation of activities involving the liver removal process, a field diary and checklist were used.

After transcribing the responses in full, thematic analysis was adopted for data processing, following the stages of pre-analysis, exploration of the material and treatment of results, inference and interpretation[10]. This process revealed the nursing practice in day-to-day harvesting. From then on, it was possible to sort and summarize the latent content generating inputs for the purpose of nursing systematization for liver harvesting for transplantation, concerning the stage of organ removal.

The second stage consisted of the construction of the proposed protocol shared with the research subjects, developed in five phases: 1. Development of pilot protocol proposal, based on data from the observation checklist, interviews and analysis of the material with foundation in literature; 2. Analysis of the proposed elements for the pilot protocol by the study's participating nurses; 3. Receipt of professionals' contributions regarding the protocol proposal, with their alterations and discussion, to better understand the content; 4. Forwarding the proposal to the Board of Nursing, for consideration and approval, with a deadline for return of the protocol; 5. Receipt and discussion of the proposed amendments, with final construction of the protocol, considering the structural aspects, theoretical integration and care practice.

The proposed study follows the principles of bioethics recommended in the National Health Council Resolution Nº 466, from December 2012, and was approved by the Ethics Committees for Research of Ceará State University and the Walter Cantídio University Hospital under the substantiated opinions Nº 617.676 and Nº 646.428, respectively. Participants signed the Terms of Free and Informed Consent, being guaranteed the confidentiality of information and anonymity of their identities.

RESULTS AND DISCUSSION

The thematic category selected for analysis, from the data collected, was named "harvest-transplantation process: role of nurses in liver removal".

Harvest-transplantation process: role of nurses in liver removal

Within the realm of transplant nursing tasks, standing out in particular is the harvesting of livers for transplant. The duties of the nurse as an organ-removal staff member begin when the CNCDO communicates the existence of a potential donor to the transplantation institution. From then, the nurse organizes all the necessary materials for the organ's perfusion and storage, with the knowledge that all the materials must be properly prepared according to each specification in order to maintain the quality and integrity of the harvested organ, according to the responses:

> *When there is a donor, we get and check all the material in the pharmacy and sterilization centre and take it to the harvest hospital (1N).*

> *Everything happens when the Transplant Centre confirms a donor, then the nurse will arrange all the material to take it to the donation site (14N).*

When removal of organs occurs in different institution than where the transplantation will take place, nurses must take a pre-prepared case with specific disposables for the procedure and a cooler containing frozen and icy 0.9% saline, regular ice and the preservation solution[11].

The nurse reported that they must be available to travel if the donor is located in other territories, noting the time of transport, land and/or air, established by CNCDO for transportation to the harvest hospital, as in the replies:

> *Then, we go to the hospital, either here in Fortaleza, in another state or in the interior of Ceará. Wherever the donor is, we go. (2N).*

> *Organ donation can be here in the capital, in the interior or in other states, the harvesting professionals already know this and speed up everything to save time (11N).*

> *Thankfully, the Government provides air transport for the team when the harvest is outside the Capital, which streamlines the beginning of transplantation (29N).*

The Organ Procurement Organizations (OPO) or CNCDO inform the respective teams as to which organs will be removed as well as the time to begin the procedure. Punctuality of the teams in relation to the hospital arrival time and the commencement of the donor surgery is highly recommended, as delays in starting the donor surgery affects the outcome of the transplant[12].

The statements showed that the nurse and the surgeon assigned to the organ removal go to the hospital where the potential donor is. In the operating room, the nurse checks the required clinical and laboratory evaluations and records the information on the donor sheet, as mentioned by the interviewed:

> *At the harvesting hospital, we note the data on the donor sheet and check the documents with the professional responsible for organ harvesting (1N).*

> *I know that when the nurse arrives at the harvest site, she will check the donor exams and documents, then note the data in the form she brings (22N).*

At the organ harvesting hospital, the health professionals must previously check the donor documents, such as brain death declaration, multiple organ donation authorization, multiple organ donor information sheet, blood type, blood test report and complementary exam reports (angiography, electroencephalography, transcranial doppler and/or scintigraphy)[12,13].

After checking the documents and examination, the nurse moves on to organizing the organ perfusion event, being responsible for the preparation of the perfusion table/Back Table

and providing bottles for blood collection (laboratory examination and blood culture), grafts (arterial and venous) and liver material for biopsy, as shown by the statements:

> *I'll organize the perfusion table, the Back Table, and then you have to break the ice and set up the instruments, put out the solutions and control the perfusion. Also you collect blood for biochemistry, blood typing, graft culture (1N).*
>
> *The harvesting nurse is responsible for the perfusion and setting up the table to receive the liver, she works very much in sync with the doctor (8N).*

The nurse in the operating room where the organ harvesting is to be held prepares the preservation solutions, as well as setting up the auxiliary table for the organ preparation, containing a basin with sterile ice, a hammer, plastic bags, irrigation instruments, a catheter, surgical wire, cardiac tape and surgical instruments[11].

However, the field observation showed that visual and manual evaluation by the surgeon is a decisive criterion to proceed with the donation-transplant process. If the surgeon says that the liver is inappropriate to be transplanted, the nurse informs the liver-graft contraindication to the medical and nursing staff of the receiving hospital. In turn, when the liver is suitable for transplant, the nurse helps the doctor to prepare the organ on the Back Table, then packs it correctly into the cooler and transports it to the transplant hospital.

On the Back Table, the organ should be placed inside a sterile plastic bag containing preservation solution and placed in a stainless bowl containing frozen sterile saline solution. After completing the preparation, the bag containing the graft is placed inside another sterile plastic bag and both are sealed and packed in an insulated box with regular ice[11,13].

The nursing professional assists the surgeon and is responsible for the preparation of the organ and its transportation to the hospital where the receiver is, keeping it at a temperature of 4°C. It is worth noting that one of the factors responsible for the success of the transplant is undoubtedly the organ preservation method. Proper preservation gives the graft a good quality, so that it quickly recovers its functions while minimizing the occurrence of dysfunction and/or graft failure[11].

Solutions for safeguarding the liver include *ViaSpan (Belzer), Celsior, Custodiol, Euro Collins* and *Soltran*. In the field study, the most widely used solution was *Custodiol*. According to a systematic review study and meta-analysis that examined the impact of using solution on primary graft dysfunction, ischemic-type biliary lesions and patient survival rates, *Custodiol* solution had a similar effect to *Celsior*[14].

When the nurse returns to the transplant hospital, they deliver the cooler containing the liver to the nurse in the operating room, the grafts (venous and arterial) and material for biopsy, bottles with blood (laboratory exam and blood culture) and a donor sheet, as well the information necessary for safe transplantation, as shown by the reports:

> *At the receiver's hospital we deliver the donor sheet, the organ, grafts, donor exams to the OR nurse, checking the packaging, and then go over any occurrence in the harvesting (2N).*
>
> *I always receive from the harvesting nurse an insulated box with the liver, the grafts, flasks of blood, donor data and I check the storage (10N).*
>
> *Here, the routine is we receive the organ and all the donor's material that the harvesting nurse brings, and always check the packaging and labels (27N).*

The operating room health professional will welcome the harvesting professional, receiving the donor organ and blood sample, and at that time the main information of the graft, such as the organ packaging, donor data records, integrity and identification of packaging are rechecked[13].

The work of nurses in the donor liver removal stage is very important for realization of the transplant because their activities improve the harvest-transplantation process by speeding it up and causing no risk to the donated organ, thus contributing to better post-transplant recovery of the patient.

Protocol proposal presentation for nurses in liver harvesting

This study enabled the development of a protocol with specific actions that permeate the harvesting procedure, specifically at the stage of organ removal, in order to ensure the success of the transplant.

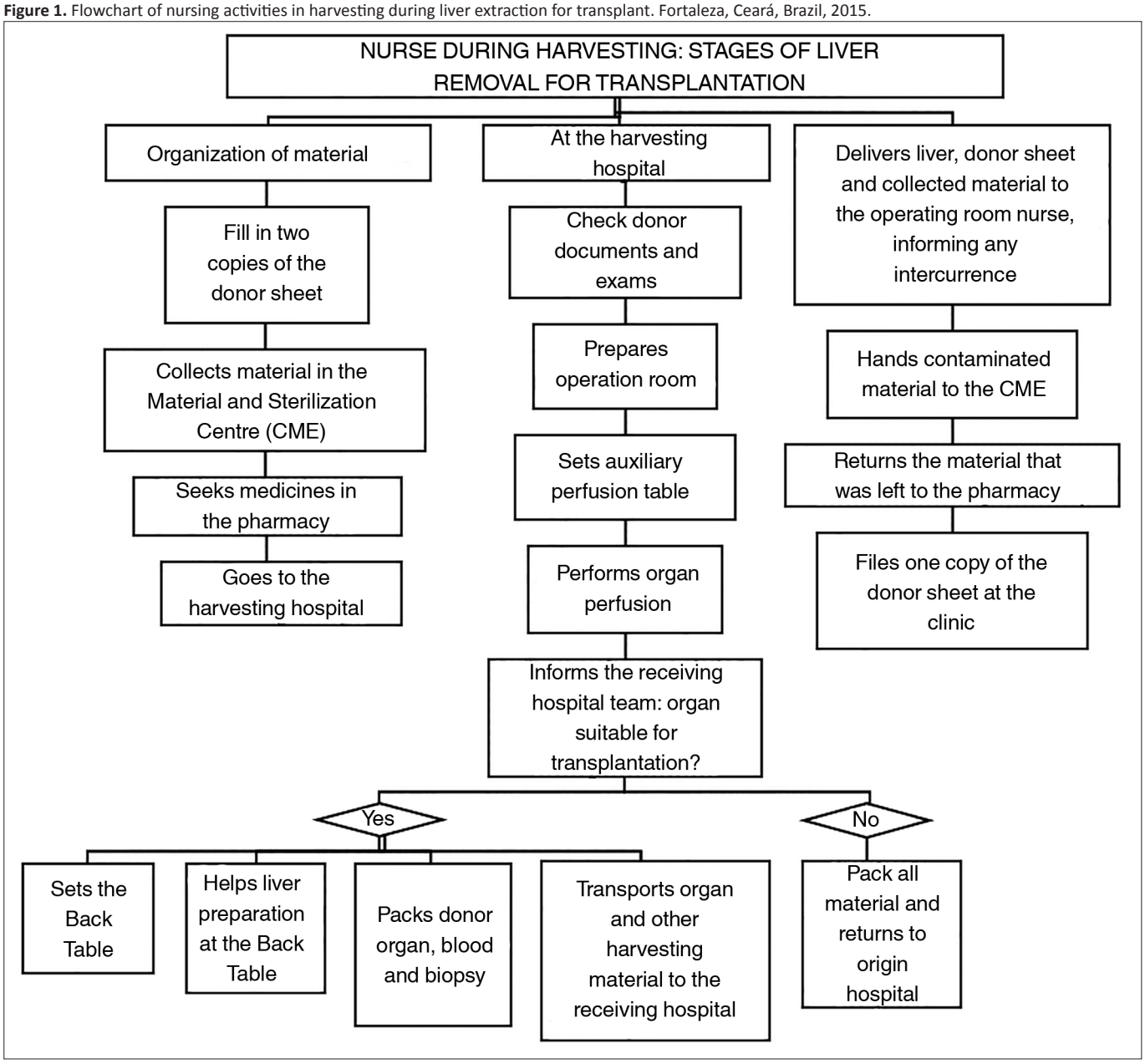
The assistance of nurses in the liver removal team revealed a specific and necessary care for organ grafting. Currently, there is concern about the certification of healthcare facilities regarding basic protocols, standards and procedures to guide assistance[15].

Through the shared construction of the proposed protocol, it is possible to mention that the work of nurses in the liver removal team is of paramount importance for effective transplant because their attributes include contact with the donor hospital, verification of donor documentation, setting up the perfusion table/Back Table, storage and transportation of the organ, contact with the transplant hospital team as well as enabling greater control, speed and safety in the donation-transplantation process.

The nurse's responsibilities in harvesting during liver extraction for transplantation are shown schematically in the flowchart in Figure 1.

The medical/hospital equipment and surgical instruments required for extraction of the liver were listed. This material must be checked by the nurse before being transported to the harvest location (Table 1).

Figure 1. Flowchart of nursing activities in harvesting during liver extraction for transplant. Fortaleza, Ceará, Brazil, 2015.



The draft protocol presented distinguishes seven essential moments for carrying out the removal of the liver for transplantation, as shown in Tables 2, 3 and 4. The premise for the choice of the items contained in the developed instrument was to promote a greater chance of assertiveness in the relevant safety actions relating to nursing care.

This proposal met the requirements of the Basic Guidelines for Harvesting and Removal of Multiple Organs and Tissues, which reports that the success of the Transplant Program in our country depends on the organization and effective action of the donation-transplant process' participating teams[12].

This study's participating nurses also emphasized the importance of perfect articulation and timey implementation of all steps involved, from the moment the potential donor is confirmed to the organ's implementation, as any delay in the start of surgery can interfere with the success of the transplantation.

It is known that the daily duties of nursing permeate the various dimensions of care enriched by techniques and technologies. In this sense, the protocols represent the application of a type of technology targeted for health care and should be developed in a systematic and integrated manner, contributing to effective and efficient decision-making[1]. Thus, due to the complexity and

Table 1. Medical and hospital equipment and surgical instruments necessary for liver extraction for transplantation. Fortaleza, Ceará, Brazil, 2015

Material	Quantity
Physiological solution 0.9% 1000ml (Bag) - Frozen	08
Frozen ice bag	02
Preservation solution - Cold	05
Physiological solution 0.9% 500 ml (bag) - Cold	04
40X12 needle	05
Cefazolin 1g	02
Ceftriaxone 1g	02
Open system sterile urine collector	03
Equipment for organ perfusion (2-way)	03
Surgical tape	01
Cotton suture 0, needleless	02
Cotton suture 3-0 needleless	03
Prolene 5-0	02
Prolene 6-0	02
Cardiac tape	03
Blood culture flask	01
Sodium Heparin 5000UI/ml FR c/ 5 ml	02
Scalpel blade Nº 24	04
Large size plastic bag	02
Small size plastic bag	06
Needleless 20 ml syringe	06
Needleless 60 ml syringe	01
Urethral probe Nº 6	01
Urethral probe Nº 8	02
Urethral probe Nº 10	02
Urethral probe Nº 12	02
Vacuum Blood Collection tube with EDTA (lavender cap)	01
Vacuum Blood Collection tube gel separator 5 ml (red cap)	01
Uncuffed ETT No. 6.0	01
Uncuffed ETT No. 5.5	01
Sterile flask for biopsy and venous and arterial grafts	04
Sterile clear plastic bag, reinforced, 08 microns thickness, width 60 cm and height 90 cm	04
Sterile clear plastic bag, reinforced, 08 microns thickness, width 35 cm and height 45 cm	02
Cable Scalpel Nº 4*	01
Back Table box*	01
Hammer*	01
Reynald clamp*	04
Satinsky clamp*	01

* Surgical instruments.

Table 2. Nursing actions in the organization of the material and checking of documents before the removal of livers for transplantation. Fortaleza, Ceará, Brazil, 2015

Organization of material and checking of documents before liver removal
Get the printing folder to be filled out at the harvesting hospital;
Confirm transport to the harvesting hospital;
Prepare the necessary material for harvesting;
Meet the nursing team that will participate in the organ removal;
Check the donor's documents and exams alongside the nurse from the Intra-hospital Commission of Organ and Tissue Donations for Transplant or the Organ Procurement Organization. With these documents, the Donor Sheet must be completed.

Table 3. Nursing actions in the preparation of the harvesting hospital environment, the auxiliary table, performing perfusion, preparing the Back Table and liver. Fortaleza, Ceará, Brazil, 2015

In preparing the environment
Deliver prophylactic antibiotic and sodium heparin 5000 IU/ml to the anaesthesiologist;
Request the following: 01 surgical apron, 02 large basins, 01 kidney dish, 01 needleless cotton suture 0, 01 impermeable sheet, 01 LAP (two main drapes, two sides, two secondary drapes), 01 side table, 01 packet of large compresses, 02 pairs of surgical gloves, 02 Backhaus clamps, 01 IV pole with four hooks or two brackets with 02 hooks each, 01 large milky-white trash bag, 01 sharp object collector.
In preparing the auxiliary table for infusion
Expose material on the auxiliary table in the following order: 01 LAP, 01 impermeable sheet, 01 surgical gown and 02 pairs of surgical gloves.
Perform antisepsis of hands and forearms;
Robe with sterile gown and two pairs of gloves;
Open on the table assist a large drape, impermeable sheet and then another large drape;
Cover serum support(s) with a sterile drape secured with the Backhaus clamp or the cotton suture, thereby avoiding equipment contamination at the time of perfusion;
Organize one basin next to the other with large compresses between them;
Mount the scalpel cable with #24 blade, keeping it in the external position of the right-side basin;
Position the hammer between the basins when not used;
Protect frozen physiological solution with the compresses and break them into small pieces, using the hammer;
Use the mounted scalpel handle to cut the frozen 0.9% saline bags and scrape the large chunks of ice, putting them in one of the bowls to cool the abdominal cavity as soon as the perfusion begins;
Assemble the perfusion system putting two Reynald clamps (tube) on each piece, with a nearby next to the dropper and the other below the air removal device;
Deliver to the circulating nurse the tips of the pieces requesting that they connect 04 0.9% frozen saline solutions at each end and place them on the IV pole hooks;
Undo the tube clamps cautiously in order to cool and remove the air from equipment. Only half the air removal device must be filled so that the flow and discharge of the solution into the basin or kidney dish can be seen;
Place one nelaton Nr. 12 probe at the end of the irrigation equipment to infuse the preservation solution through the portal vein and at the other a No. 06 endotracheal tube to infuse the preservation solution through the aorta artery, then deliver the ends of the equipment to the surgical technician;
Give the surgical technician 02 20 ml syringes and a kidney dish with 0.9% cold saline from the perfusion system, approximately 500 ml for washing the gallbladder and removing the bile;
Put a 20 ml syringe with needle for blood collection on the surgical technician's table;

Continued Table 3.

Ask the surgeon to collect blood and material for biopsy prior to perfusion;
Receive the collected materials from the surgeon and perform the following:
Deliver the exam collector containing the biopsy to the circulating nurse, requesting that they immerse it in formalin and then identify it with the donor's name, cause of death, blood type and date. The vial with the biopsy should be packed in two small plastic bags and placed in the cooler;
Connect the syringe to the 40X12 needle and give it to the circulating nurse requesting that they distribute blood in 01 EDTA tube, 01 gel tube and 01 vial for blood culture and then identify them.
Ask the circulating nurse to prepare the tubes with EDTA and gel in two small plastic bags and in the cooler, then put the vial containing blood for blood culture into two small plastic bags;
Test the drainage of the perfusion catheters, together with the surgeon, carefully releasing the tube clamps of the portal vein and aorta artery, then clamp them;
Ask the circulating nurse, on the verge of clamping the aorta, to remove the empty bags of physiological solutions and put 04 cold preservation solutions in each infusion entry.
At the time of perfusion
Start the perfusion when the aorta is clamped, checking the time and then writing down the onset of cold ischemia;
First release the clamp from one side of the infusion equipment that will irrigate the aorta, checking whether the flow is steady, and then release the other clamp of the portal vein, observing the air removal device drain. Tell the doctor if irrigation ceases or decreases. When the first side finishes, release the other;
Observe when draining of the preservation solution finishes and note end of perfusion;
Ask the circulating nurse during the perfusion process to compress the solutions to drain faster and thus decrease the time of perfusion, if necessary;
Ask the circulating nurse to immediately warn the OR nurse of the transplant hospital if the liver is feasible for implant, as per surgeon's information after completion of the infusion.
In preparing the Back Table
Place a big sterile bag over the basin, covering the edges of the basin;
Break the frozen saline into small pieces and place in the first large sterile bag over the basin;
Place the second large plastic bag over crushed ice, also covering the basin;
Place the third large plastic bag folded next to the bowl;
Request two pairs of sterile gloves for the surgeon, exposing them on the Back Table;
Organize the Back Table box' surgical instruments, threads, 60ml and 20ml syringes;
Leave all material organized and protected with a sterile field until the arrival of the liver.
In preparing the liver on the Back Table
Deliver the basin with sterile bags and crushed ice for the surgeon to place the liver;
Ask the surgeon to release the ends of the infusion equipment, place the irrigation tip of portal vein on the Back Table and dispose of the other equipment that was in the aorta artery;
Assist the surgeon in preparing the liver, noting the presence of lesions and anatomical variations and then register on the donor sheet;
Ask circulating nurse to put another preservation solution in the portal vein equipment;
First perfuse the portal vein with the nelaton Nr.12 probe, then the artery with a ferrule, and with the same ferrule perfuse the common bile duct;
Deliver the 60 or 20ml syringe to the surgeon to verify the integrity of the vessels;
Assist the physician to close the first bag, then tie the second bag, placing them in the third bag and tie all with cardiac tape;
Condition the liver in cooler containing ice cubes;

Continued Table 3.

Seal the insulated box with tape, keeping the organ at 4°C;
Identify the cooler by putting a label with: name (donor's initials), Transplant Centre General Registration number (RGCT), date of harvest, cause of death, age, weight, blood type, aortic clamp time and which and what amount of preservation solution;
Receive venous and arterial grafts immersed in preservation solution from the surgical technician, packing it in the first sterile small bag;
Place the venous and arterial grafts packed in the first package in another secondary plastic bag;
Deliver the grafts the circulation nurse to identify the secondary packaging material type, with donor data (full name, blood type, date, weight, age, cause of death) and store in cooler near the liver.
Check and pack all contaminated materials in plastic bags;
Deposit needle stick materials in appropriate container;
Finish completing the donor sheet;
Fill in used medical and hospital supplies sheet;
Arrange transport to return to the hospital, with the materials properly prepared and organized on the push cart.

Table 4. Nurse's activities upon returning to the transplant hospital. Fortaleza, Ceará, Brazil, 2015

Upon returning to the transplant hospital
Deliver to the OR nurse in the transplant hospital: the cooler containing liver, grafts (arterial and venous), biopsy and tubes with blood sample (EDTA and gel); blood tube for blood culture; donor sheet from the OR, informing any complications.
Deliver left-over medical and hospital equipment and other solutions to the central pharmacy, with the used sheet filled, along with box push cart;
Deliver contaminated material to the CME purge;
File the donor sheet in the clinic.

specificity of the harvest-transplantation process, it is necessary that the interventions of the health team, and particularly nurses, adopt new technologies, the protocols, to direct clinical practices that are grounded in scientific foundations and adapted to the reality of each organizational health structure.

The elements shown in the protocol proposition revealed that the nurse's duties are heterogeneous, dynamic, autonomous and dialectical, where the knowledge, know-how, being and experience are in permanent articulation, requiring constant critical reflection and decision making on the part of this professional, whose goal is to respond to the contradictions and tensions present each day in the workplace environment.

The design and implementation of the assistance protocol for nursing in liver harvesting for transplant are of great importance. Its adoption can contribute to optimizing and streamlining assistance and to mitigate the variability of behavior, making safer and more uniform procedures for the harvest-transplantation process, besides offering support for hospital accreditation.

CONCLUSION

The elaboration of a protocol concerning the removal of the liver for transplantation represents a systematic model of a differentiated service, with the potential to equip the actions of nurses in the harvesting-transplantation program. The practice of nursing fosters methodologies capable of improving care, and the implementation of a protocol in the everyday activities of the professional adjusts the know-how in a systematic and scientific way, providing greater security and autonomy in their duties.

Considering the current concern for quality in health, standardization of nursing conduct guides professional practice, enabling the improvement of care, in addition to serving as a tool to assist in the teaching-learning process and in nursing research. Because of their wide-ranging areas of operation, the duties of nurses in the harvesting-transplantation program need to be problematized and published, with a nursing-specific approach that demands exploring the topic more deeply, allowing greater community perceptiveness.

The limitations of this study are in the area of its validation process, as it counted on the first stage of consideration and approval by the nurses involved in this process, using their field experience and the scientific literature in the construction protocol.

One hopes that this research will serve as an aid to other studies related to the theme in question, with significant deepening of the validation of the clinical protocol with basis in a methodological framework to underpin clinical practice, thus

configuring it as a scientific instrument to coordinate nursing activities in the harvesting-transplantation process, specifically in the stage of organ removal.

REFERENCES

1. Paes GO, Mello ECP, Leite JL, Mesquita MGR, Oliveira FT, Carvalho SM. Care protocol for clients with respiratory disorder: tool for decision making in nursing. Esc. Anna Nery. 2014 abr/jun; 18(2):303-10.
2. United Network for Organ Sharing. Transplants by organ type. UNOS [on line] 2014 [cited 2015 Oct 14]. Available from: https://www.unos.org/about/annual-report/
3. Associação Brasileira de Transplantes de Órgãos. Dimensionamento dos transplantes no Brasil e em cada estado (2007 - 2014). 2014 [citado 2015 mar. 14]. Disponível em: http://www.abto.org.br/abtov03/Upload/file/RBT/2014/rbt2014-lib.pdf
4. Fonseca-Neto OCL. Clinical liver transplantation without venovenous bypass. ABCD Arq Bras Cir Dig[on line]. 2011 [cited 2015 Feb. 16]; 24(2):164-67. Available from: httphttp://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-67202011000200014&lng=enhttp://dx.doi.org/10.1590/S0102-67202011000200014
5. Mendes KDS, Rossin FM, Ziviani LC, Castro-e-Silva O, Galvão CM. Information needs of liver transplant candidates: the first step of the teaching-learning process. Rev. Gaúch. Enferm. [on line]. 2012 out/dez [cited 2015 out 11]; 33(4): [aprox. 10 telas]. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1983-14472012000400012&lng=pthttp://dx.doi.org/10.1590/S1983-14472012000400012
6. Mendes KDS, Roza BA, Barbosa SFF, Schirmer J, Galvão CM. Organ and tissue transplantation: responsibilities of nurses. Texto Contexto Enferm. [on line]. 2012 dez [cited 2015 Oct 11]; 21(4): [aprox. 9 telas]. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-07072012000400027&lng=enhttp://dx.doi.org/10.1590/S0104-07072012000400027
7. The Organization for Transplant Professionals (Natco). Core Competencies for the Clinical Transplant Nurse. Natco; 2010 [cited 2015 May 17]. Available from: http://www.natco1.org/Professional-Development/competencies.asp
8. Morais TR, Morais MR. Doação de órgãos: é preciso educar para avançar. Saúde debate [online]. 2012 out/dez [citado 2015 fev. 04];36(95): [aprox. 7 telas]. Disponível em: http://www.scielo.br/pdf/sdeb/v36n95/a15v36n95.pdf
9. Negreiros FDS. Competências de enfermeiro no processo de transplante hepático em hospital de referência do Ceará [dissertação]. Fortaleza (CE): Universidade Estadual do Ceará; 2015.
10. Minayo MCS. O desafio do conhecimento: pesquisa qualitativa em saúde. 13. ed. São Paulo: Hucitec; 2013.
11. Pereira WA. Manual de Transplantes de Órgãos e Tecidos. 4. ed. Belo Horizonte: Coopmed; 2012.
12. Associação Brasileira de Transplante de Órgãos. Diretrizes Básicas para Captação e Retirada de Múltiplos Órgãos e Tecidos da Associação Brasileira de Transplante de Órgãos [online]. São Paulo; 2009 [citado 2015 fev. 12]. Disponível em: http://www.abto.org.br/abtov03/Upload/pdf/livro.pdf
13. Ferraz Neto BH. Curso Prático de Extração, Perfusão e Acondicionamento de Múltiplos Órgãos para Transplante. São Paulo: Albert Einstein Hospital Israelita [online]. 2012 [citado 2015 maio 16]. Disponível em: http://www.einstein.br/Ensino/cursos-de-atualizacao/Documents/apostila-cetec-2012.pdf
14. Zuluaga GL, Agudelo RE, Tobon JJ. Preservation solutions for liver transplantation in adults: celsior versus custodiol: a systematic review and meta-analysis with an indirect comparison of randomized trials. Transplant Proc [on line] 2013 [cited 2015 May 16]; 45(1): [aprox. 8 telas]. Available from: http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0053737/
15. Munari DB, Parada CMGL, Gelbcke FL, Silvino ZR, Ribeiro LCM, Scochi CGS. Professional Master's degree in Nursing: knowledge production and challenges. Rev. Latino-Am. Enfermagem [on line]. 2014 mar/abr [cited 2015 Feb. 11]; 22(2): [aprox. 6 telas]. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-11692014000200204&lng=enhttp://dx.doi.org/10.1590/0104-1169.3242.2403

ERRATUM

In the article **Liver harvesting from the donor to the transplantee: A proposed protocol for nurses**, DOI number: 10.5935/1414-8145.20160006, published in **Escola Anna Nery Revista de Enfermagem** 2016;20(1):38-47, page 38, The authors Alice Maria Correia Pequeno Marinho and Ana Patrícia Pereira Morais are affiliates to Universidade Estadual do Ceará. Fortaleza - CE, Brazil and not to Universidade Federal do Ceará. Fortaleza - CE, Brazil.