

## Postoperative care in reconstruction with flaps of a traumatic lower limb wound: scope review

*Cuidados pós-operatórios em reconstrução com retalhos de ferida traumática em membro inferior: revisão de escopo*

*Cuidados postoperatorios en reconstrucción con colgajos de herida traumática de miembro inferior: revisión del alcance*

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### ABSTRACT

**Objective:** to map postoperative care in reconstruction with surgical flaps of a traumatic wound in the lower limb. **Method:** Scope review developed according to the recommendations of the Joanna Briggs Institute Reviewer's Manual in reference databases, information portals and gray literature. Two search strategies were designed for the wide reach of publications. **Results:** ten postoperative care procedures were identified and related to specific moments in this phase. Being categorized into: 1) Care in the immediate postoperative period, 2) Care in the mediate postoperative period and 3) Transition of Care. **Conclusion:** although reconstructions with surgical flaps are a consolidated treatment, postoperative care is still incipient in terms of recommended care. There is no consensus on the implementation of care in postoperative management. The monitoring of surgical flaps, clinical or by devices, was the only care considered in all selected publications, considered essential in the postoperative period, regardless of the phase. **Descriptors:** Nursing; Postoperative Care; Wounds and Injuries; Surgical Flaps; Lower Extremity.

### RESUMO

**Objetivo:** mapear os cuidados pós-operatórios em reconstrução com retalhos cirúrgicos de ferida traumática em membro inferior. **Método:** revisão de escopo desenvolvida de acordo com as recomendações do *Joanna Briggs Institute Reviewer's Manual* em bases de dados referenciais, portais de informação e literatura cinzenta. Foram traçadas duas estratégias de busca para amplo alcance das publicações. **Resultados:** identificados dez cuidados pós-operatórios nas reconstruções com retalhos cirúrgicos em membro inferior relacionados a momentos específicos desta fase. Sendo categorizados em: 1) Cuidados no pós-operatório imediato, 2) Cuidados no pós-operatório mediato e 3) Transição do Cuidado. **Conclusão:** embora as reconstruções com retalhos cirúrgicos sejam um tratamento consolidado, a assistência pós-operatória ainda é incipiente quanto aos cuidados recomendados. Não há consenso sobre a implementação dos cuidados no manejo pós-operatório. O monitoramento dos retalhos cirúrgicos, clínico ou por dispositivos, foi o único cuidado contemplado em todas as publicações selecionadas, considerado essencial no pós-operatório independente da fase. **Descritores:** Enfermagem; Cuidados Pós-Operatórios; Ferimentos e Lesões; Retalhos Cirúrgicos; Extremidade Inferior.

### RESUMEN

**Objetivo:** mapear los cuidados postoperatorios en la reconstrucción con colgajos quirúrgicos de una herida traumática en miembro inferior. **Método:** revisión del alcance desarrollada según las recomendaciones del *Joanna Briggs Institute Reviewer's Manual* (Manual del Revisor del Instituto Joanna Briggs) en bases de datos referenciales, portales de información y literatura gris. Se diseñaron dos estrategias de búsqueda para el amplio alcance de las publicaciones. **Resultados:** se identificaron diez procedimientos de cuidados postoperatorios relacionados con momentos específicos de esta fase. Siendo categorizados en: 1) Atención en el postoperatorio inmediato, 2) Atención en el postoperatorio mediato y 3) Transición de la Atención. **Conclusión:** si bien las reconstrucciones con colgajos quirúrgicos son un tratamiento consolidado, los cuidados postoperatorios aún son incipientes. No existe consenso sobre la implementación de los cuidados en el manejo postoperatorio. El seguimiento de los colgajos quirúrgicos, clínico o por dispositivo, fue el único cuidado abordado en todas las publicaciones seleccionadas, considerado fundamental en el postoperatorio, independientemente de la etapa. **Descriptor:** Enfermería; Cuidados Posoperatorios; Heridas y Lesiones; Colgajos Quirúrgicos; Extremidad Inferior.

## INTRODUCTION

Musculoskeletal traumas result in disabilities and deaths with a significant impact on global health due to the high social cost and economic losses due to loss of productivity and life years. Among the external causes, unintentional injuries caused by traffic accidents are prominent in mortality and morbidity worldwide, being the eighth cause of death in the world and the main one in individuals under 45 years of age, with 90% occurring in mid- and low-income countries<sup>1-3</sup>.

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According to data from the *Global Burden of Disease*, accidents cost nearly 1% to 5% of the Gross Domestic Product in developing countries, resulting in 78.2 million non-fatal injuries that warrant medical care. Although only 11.7% of the traffic accidents whose outcome is not death require hospitalization, they account for 97% of the total of life years with disabilities resulting from injuries. They mostly encompass fractures of several types, with more than one-fourth in lower limbs, totaling 3.8 million cases<sup>3</sup>.

In Brazil, it is an important cause of morbidity and mortality and, despite the stationary trend in the total mortality rates, the same was not reflected in the hospitalization rates, which are frequently associated with serious injuries to the lower limbs and exposed fractures, resulting in extended occupation of surgical and intensive care beds, mainly from 2015 onwards. Due to their etiology and difficult resolution, these injuries are called “complex traumatic wounds” and are characterized by extensive skin loss and impaired tissue viability, in addition to contusions, lacerations and major crushing, with exposure of noble tissues<sup>4-6</sup>.

Their treatment requires multiple surgeries, and reconstruction procedures with surgical flaps are the first-choice option. It is complex and prolonged and involves several aspects that influence therapy, hospitalization time, outcome and conditions when leaving the hospital; requiring specific interventions throughout its course<sup>7,8</sup>.

Failures in the postoperative period represent a potential risk of complications, leading to new procedures and increasing hospitalization times and compromising the patient's health status. Early recognition of the signs of complications and the adoption of immediate actions can mark the difference between successful and unsuccessful reconstructions. Regarding this period, it is up to nurses to evaluate, identify, plan and implement the interventions aiming to prevent or minimize unfavorable results and potentiate the therapeutic process<sup>9-11</sup>.

In the field of reconstructions, knowledge evolved from the discoveries about vascularization to the implementation of safe surgical techniques, types, indications and ideal time to perform them. Specialties such as Oncology, especially in the breast and head/neck areas, have accrued plenty of experience in optimizing procedures in contrast to the absence of robust data on postoperative management<sup>12,13</sup>.

A multicenter study carried out in the United States of America (USA) and the United Kingdom reveals a significant variation in care for patients during the postoperative period with surgical flaps, a fact attributed to the lack of research studies and publications on care and its effects. This finding is corroborated by a study developed in Latin America that examined the techniques and management of flaps for covering traumatic wounds in lower limbs with exposed tibia fractures, supporting the demand for training and optimization in the allocation of tools and resources for health professionals who work in this area<sup>14-16</sup>.

At the national level, studies in the Traumatology and Orthopedics areas focus on surgical techniques for stabilizing fractures, whereas reconstructive plastic surgery prioritizes the investigation of safe techniques that produce better results. Research studies related to post-surgical care in lower-limb traumatic wound reconstruction with surgical flaps are practically nonexistent. In the Nursing field they deal with the care of patients using devices and undergoing conservative treatments for traumatic wounds, without mentioning any care measures related to surgical reconstructions<sup>16,17</sup>.

Although reconstructions are recognized as indispensable resources in the treatment of traumatic wounds and established knowledge, the reality marked by inconsistency and scarcity of theoretical frameworks on postoperative management to support the practice is a challenge for nurses and represents an important assistance obstacle in implementing safe care and optimizing patients' outcomes.

A preliminary research in Medline (via PubMed), Cochrane Databases of Systematic Reviews, PROSPERO and the Joanna Briggs Institute Database of Systematic Reviews Implementation Reports, without time frame or language exclusion and registered at the Open Science Framework (OSF) in <https://osf.io/bstfm/>, did not identify ongoing or completed reviews on these care measures, only studies on surgical techniques and complications, citing the importance of specific care, although without describing them.

Therefore, the objective of this scoping review was to map post-surgical care in lower-limb traumatic wound reconstruction with surgical flaps.

## METHOD

This is a scoping review conducted according to the *Joanna Briggs Institute* (JBI) methodology, which allows mapping and identifying knowledge gaps. The protocol of this review was registered at the *Open Science Framework* (OSF) with the following DOI identifier: 10.17605/OSF.IO/VD52T<sup>18</sup>.

The review question was guided by the PCC mnemonic rule (P: Population, C: Concept, and C: Context), which influences the inclusion criteria and mapping of the terms to define the search strategy. In the case of this review, the “Population” were defined as adult patients in the postoperative period of lower-limb traumatic wound reconstructions

with surgical flaps, the “Concept” corresponded to care measures and Nursing assistance related to the postoperative period of reconstructions with local and free surgical flaps, and to complex lower-limb traumatic wounds resulting from traffic accidents. All therapeutic actions/interventions directly related to the patients were considered post-surgical care measures, and the “Context” was the hospital environment.

The research question was as follows: “Which are the care/Nursing assistance measures for adult patients in the post-surgical period of lower-limb traumatic wound reconstruction with surgical flaps in the hospital environment?”.

The search was conducted on February 22<sup>nd</sup>, 2022, went through three stages and included studies with no time frame or language limitation. Initially, the search was limited to the following databases: MEDLINE, via PUBMED (Pubmed Central da National Library of Medicine), LILACS (*Literatura Latino-Americana e do Caribe em Ciências da Saúde*), CINAHL (Cumulative Index to Nursing and Allied Health Literature) and SCIELO (Scientific Electronic Library Online), using the “Nurs\*”, “Postoperative care” and “Flaps” descriptors connected with AND Boolean operators to identify the words contained in the titles, abstracts, index terms and descriptors used. The search resulted in a reduced number of retrieved records, as some publications did not specify certain care measures such as Nursing assistance; aiming to expand its reach, two strategies were defined, described in Figure 1.

STRATEGIES	TERMS	
<b>Strategy 1</b>	<b>MESH</b>	<b>DeCS</b>
<b>P</b> (Adult patients in the post-surgical period of lower-limb traumatic wound reconstruction with surgical flaps)	("Lower Extremity"; "Lower Limbs"; "Membrum inferius" "Injury"; "Tibial Fractures" "Fractures, Bone"; "Broken Bones"; "Fracture, Bone") AND ("Surgical Flaps"; "Tissue Flap, Free")	("Extremidade Inferior"; "Membros Inferiores"; "Miembro Inferior"; "Traumatismos da Perna"; "Traumatismos de la Pierna"; "Lesões da Perna"; "Lesiones de la Pierna"; "Fraturas da Tibia"; "Fracturas de la Tibia" "Fraturas Ósseas"; "Fracturas Óseas"; "Lower Extremity") AND ("Retalhos Cirúrgicos"; "Colgajos Quirúrgicos" OR "Colgajos de Tejidos Libres"; "Surgical Flaps")
<b>C</b> (Care measures related to the post-surgical period)	"Postoperative Care"; "Postoperative Procedure"; "Postoperative"; "Postoperative Period"	"Cuidados Pós-Operatórios"; "Cuidados Posoperatorios"; "Assistência Pós-Operatória"; "Asistencia en el Período Posoperatorio"; "Atención Posoperatoria"; "Período Pós-Operatório"; "Posquirúrgico"; "Postoperatorio"; "Postoperative Period"
<b>C</b> (Hospital environment)	"Hospitalization"	"Hospitalización"; "Hospitalização"; "Hospitalization"
<b>Strategy 2</b>	<b>MESH</b>	<b>DeCS</b>
<b>P</b> (Adult patients in the post-surgical period of lower-limb traumatic wound reconstruction with surgical flaps)	("Lower Extremity"; "Lower Limbs"; "Membrum inferius" "Injury"; "Tibial Fractures" "Fractures, Bone"; "Broken Bones"; "Fracture, Bone") AND ("Surgical Flaps"; "Tissue Flap, Free")	("Extremidade Inferior"; "Membros Inferiores"; "Miembro Inferior"; "Traumatismos da Perna"; "Traumatismos de la Pierna"; "Lesões da Perna"; "Lesiones de la Pierna"; "Fraturas da Tibia"; "Fracturas de la Tibia" "Fraturas Ósseas"; "Fracturas Óseas"; "Lower extremity") AND ("Retalhos Cirúrgicos"; "Colgajos Quirúrgicos" OR "Colgajos de Tejidos Libres")
<b>C</b> (Care measures related to the post-surgical period)	("Postoperative Care"; "Postoperative Procedure"; "Postoperative"; "Postoperative Period") AND (Nurses OR Nurse OR Nursing OR Nursings)	("Cuidados Pós-Operatórios"; "Cuidados Posoperatorios"; "Assistência Pós-Operatória"; "Asistencia en el Período Posoperatorio"; "Atención Posoperatoria"; "Período Pós-Operatório"; "Posquirúrgico; Postoperatorio"; "Postoperative Care") AND (Enfermagem OR enfermeir* OR Enfermeria* OR Enfermer* OR Nursing)
<b>C</b> (Hospital environment)	"Hospitalization"	"Hospitalización"; "Hospitalização"; "Hospitalization"

FIGURE 1: Search strategies and terms corresponding to the PCC mnemonic rule. Rio de Janeiro, RJ, Brazil, 2022.

A full search in the sources was performed in the second stage, based on the terms mapped and the strategies defines, combined with OR and AND Boolean operators. In the third, the reference lists of the studies were checked, aiming to detect supplementary bibliographies and additional sources that subsidized development of the review, although they were not included in it.

The research was conducted in the reference databases, information portals and Gray Literature, namely: *Biblioteca Virtual em Saúde* (BVS) and its main databases (*Literatura Latino-Americana e do Caribe em Ciências da Saúde* – LILACS, and others); PubMed® and *Pubmed Central of the National Library of Medicine and Scientific Electronic Library Online* (SciELO); CAPES Journals Database resorting to the following databases: *Elsevier (Embase and Scopus)*, *Clarivate Analytics (Web of Science)*, *Ebsco (Academic Search Premier – ASP, and Cumulative Index to Nursing and Allied Health Literature – CINAHL)*. The following integrating databases were also employed: *Epistemonikos (Database of the best Evidence-Based Health Care)* and the *Science.gov (USA.gov for Science - Government Science)* Gray Literature portal, in

addition to a search for diverse evidence in the *National Institute for Health and Care Excellence* (NICE). The lists of references were checked in the publications selected to identify studies that were not found in the database search.

Experimental and quasi-experimental studies, randomized and non-randomized clinical trials, before-and-after, chronological, cross-sectional and prospective and retrospective cohort studies, economic evidence, case-control and case study, observational descriptive, qualitative research, clinical practice guidelines and convergent care research were included. In addition to that, guidelines, indicators and protocols were used, among other types of Gray Literature, such as theses and dissertations.

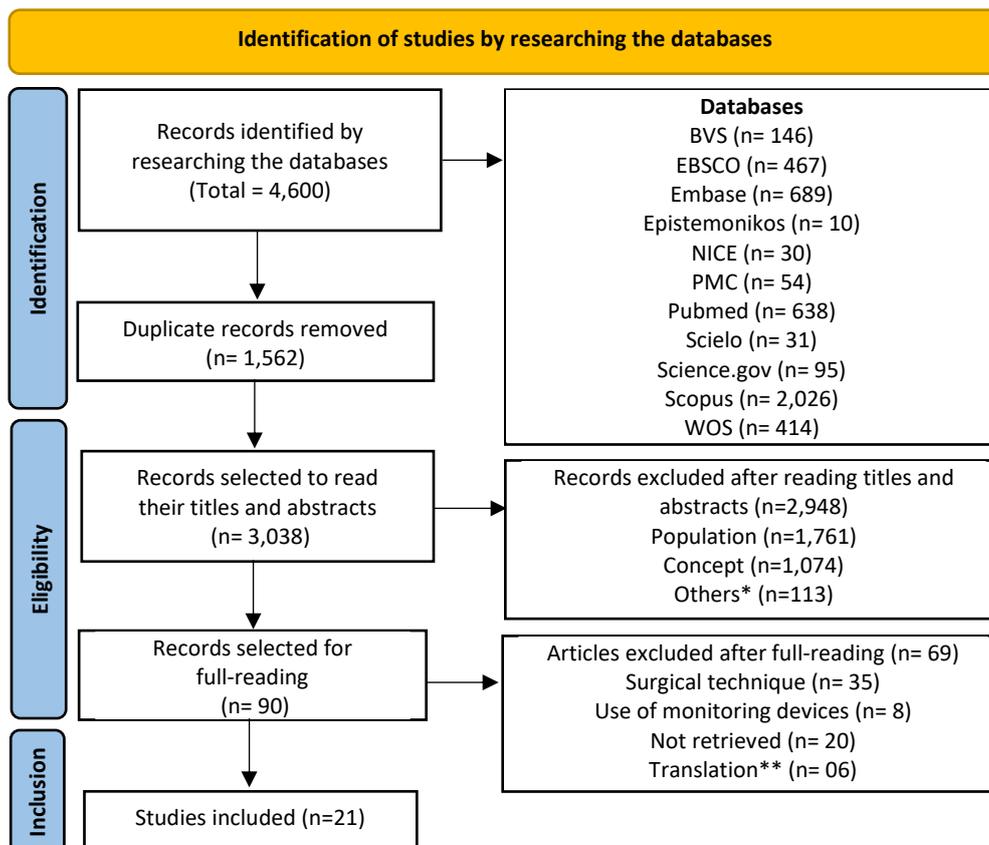
For selection of studies, the *Endnote* manager was used to identify duplicates and the *Rayyan* app, *Blind On* mode, to carry out the selection process in charge of two independent reviewers, by reading the titles and abstracts. Any and all disagreements were solved through a discussion between the reviewers, with no need to add a third one.

To conduct and report this review, the PRISMA-ScR checklist was used with elaboration of the explanatory flowchart of the stages that show the totality of the bibliographic searches and the process to select and include the studies<sup>19</sup>.

## RESULTS

A total of 4,600 publications were identified; after removing duplicates, they accounted for 3,038 records. After reading the titles and abstracts, 2,948 studies were excluded, as follows: 1,761 did not correspond to the population (cancer patients and animals); 1,074 were unrelated to the concept (development of surgical techniques) and 113 had no abstract or access to it. Most of the titles referred to reconstruction techniques in traumatic injuries resulting from wars. These publications belong to North American and French military databases, which can justify inaccessibility. Thus, 90 publications were screened.

Figure 2 shows the article selection flow.



**Note:** \*Not retrieved: Full-texts not available due to limited access to the French and North American military governmental databases. \*\*Translation: Texts only available in Chinese, Polish and Russian whose translations, first into English and then into Portuguese, impaired and limited data interpretation.

**Figure 2:** Flowchart with the results of the process to select the articles and other publications. Rio de Janeiro, RJ, Brazil, 2022.

The following materials were excluded in the full-reading stage: 35 for addressing care measures related to surgical techniques; 8 on training nurses to use monitoring devices; 20 due to unavailable access to the full texts and 6 for only being available in their native language - Chinese (3), Polish (1) and Russian (2), which presented distortions in interpretation when translated into English and Portuguese, totaling 69 exclusions. Eventually, 21 studies were included in the review.

The publications selected had their data extracted and grouped according to the following information: code, title, author(s), journal/year, database/source and country. The main objectives and answers to the research questions were also synthesized (Figures 3 and 4).

SYNTHESIS CORRESPONDING TO THE OBJECTIVES OF THE STUDIES SELECTED – Findings A until L		
Code	Objectives	Answer to the research question
A <sup>20</sup>	To assess safety and efficacy of all the early compression modalities in lower-limb reconstructions with free flaps.	Compression does not seem to be associated with a higher rate of flap loss and may reduce pain when used during conditioning* (circulatory adaptation) of the reconstructed limb. There is no evidence of an association with other clinical benefits.
B <sup>21</sup>	To describe a fitted compression sock for patients with lower-limb fractures with external fixation devices subjected to free-flap reconstruction.	Its use assists in reducing post-surgical edema. Maintenance in a hospital or outpatient environment regardless of applying load on the reconstructed limb. It is easy to apply, affordable and adaptable to the patients' needs.
C <sup>22</sup>	To assess the impact of compression on micro-circulation of free flaps, on the edema and on pain during conditioning.	Associated with conditioning, compression improves flap micro-circulation and reduces edema and pain.
D <sup>23</sup>	To assess the efficacy of clinical monitoring of reconstructions with free flaps.	Reference standard for clinical monitoring. Difference in the false-positive rates (with no vascular impairment), according to the recipient area.
E <sup>24</sup>	To identify and assess the techniques commonly used to monitor free flaps.	Presentation of monitoring techniques that can be used by little experienced Nursing teams, reducing variability across users.
F <sup>25</sup>	To describe current and experimental methods to monitor free flaps.	Some monitoring methods are not routinely used in health services. Systemic evaluation of the patients is as important as evaluating the flap.
G <sup>26</sup>	To examine the diverse evidence of early <i>versus</i> late conditioning in lower-limb reconstructions with free flaps and to assess the regimes used.	Physiological benefit in micro- and macro-circulation of the flaps. Initiation and periodicity of a training regime is still uncertain, although it seems appropriate to start it on the 3 <sup>rd</sup> postoperative day.
H <sup>27</sup>	To report the experience with a conditioning regime in lower-limb reconstructions with fasciocutaneous flaps.	It is safe to use post-surgical care protocols, they do not lead to any increase in the number of complications and they reduce the hospitalization times.
I <sup>28</sup>	To show that early ambulation and conditioning do not affect lower-limb free flap survival.	With careful monitoring, ambulation and conditioning from the 1 <sup>st</sup> postoperative day can be performed safely and without flap loss.
J <sup>29</sup>	To evaluate if early initiation of compression and conditioning regimes affects the result of lower-limb reconstructions with free flaps.	No impairment was observed in the flaps. Early initiation of the combined interventions did not affect circulation and allowed the patient to move, improving comfort and reducing the hospitalization time and socioeconomic costs.
K <sup>30</sup>	To describe the current trends in the conditioning regimes of lower-limb reconstructions with free flaps used by Canadian surgeons.	There is no consensus on the conditioning regimes among Canadian surgeons.
L <sup>31</sup>	To describe the physiological mechanisms that contribute to the increase in the failure rate of free flaps for lower limbs; to discuss the protocols currently used in several institutions; and to discuss new techniques and protocols that can reduce hospitalization time and optimize the functional result.	Early conditioning does not negatively impact flap survival; compression is a useful addition; clinical monitoring is sufficient; weight-bearing ambulation can be initiated after conditioning if there is no orthopedic restriction.

**Note:** \*Conditioning refers to the placing the reconstructed lower limb in a hanging position below the horizontal plane - against gravity - when the patient is in a sitting or standing position for circulatory adaptation and to the gravitational effects on the flap. All designed to gradually subject the flap to increased venous pressure resulting from gravitational forces.

**FIGURE 3:** Synthesis corresponding to the objectives of the studies selected A until L and the answers to the research questions. Rio de Janeiro, RJ, Brazil, 2022.

SYNTHESIS CORRESPONDING TO THE OBJECTIVES OF THE STUDIES SELECTED – Findings M until U		
Code	Objectives	Answer to the research question
M <sup>32</sup>	To ask surgeons who perform lower-limb reconstructions with free flaps regarding monitoring and conditioning regimes.	The interventions are connected to the profile of each service, with a trend towards conservative protocols, regardless of the type of reconstruction.
N <sup>33</sup>	To describe a post-surgical conditioning management protocol for lower-limb reconstructions with free flaps.	General recommendations to help health professionals and patients, as well as less experienced surgeons, in post-surgical management of the reconstruction procedures. It is important to define a care protocol for successful reconstructions and to restore lower-limb function.
O <sup>34</sup>	A research study on management of lower-limb reconstructions with free flaps during the first postoperative week in the main health services from the United Kingdom.	There is no consensus regarding post-surgical management; the patients are subjected to different treatments in each unit. The suggestion is to adopt a protocol applied by an experienced surgeon.
P <sup>35</sup>	To create and test a simple visual model for the communication between the Surgical and Nursing teams in the postoperative period of reconstructions with free flaps.	To unify, formalize and standardize communication between the teams in terms of flap monitoring and, consequently, to improve the results.
Q <sup>36</sup>	To describe free flaps, advantages and disadvantages of reconstruction procedures, perioperative care (pre-, intra- and post-), the most common complications and transitional care.	The care to be provided to patients subjected to a reconstruction procedure is complex and challenging. Knowledge is fundamental to achieve the best possible results.
R <sup>37</sup>	To describe, from perioperative care planning, complications, fracture management, psychological aspects and transitional care for orthopedic patients subjected to reconstructions with free flaps.	Monitoring and observation by experienced teams exerts an influence on positive results for the patients. It is a task in expansion and nurses need knowledge and updates.
S <sup>38</sup>	To devise and teach a learning session for the Nursing team on the basic principles of free flaps and post-surgical care. To create a monitoring protocol for free flaps in order to standardize Nursing assistance.	The teaching program resulted in improvements in the Nursing assistance provided to patients subjected to reconstruction procedures, such as increased early detection of ischemia symptoms.
T <sup>39</sup>	To describe monitoring methods for free flaps.	Clinical monitoring is the pillar of post-surgical care, although other devices complement this traditional approach. It is important to be aware of them and know how to use them.
U <sup>40</sup>	To describe basic principles of free flaps and of nurses' performance in perioperative care.	Importance of improved performance of the perioperative stages, as they exert an influence on positive results.

**FIGURE 4:** Synthesis corresponding to the objectives of the studies selected from M until U and the answers to the research questions. Rio de Janeiro, RJ, Brazil, 2022.

They are articles written in the English language from journals that are a reference in the Reconstructive Microsurgery, Plastic Surgery and Orthopedics areas. They were predominantly published from 2005 to 2021 (91%), with only 9% in the 1990s. Nearly 70% come from north America, 22% from the United Kingdom and 4% from the Netherlands. Finally, 90% refer to micro-surgical free flaps. The types of study are as follows: systematic review (5), narrative review (5), clinical trial (2), experts' opinion (3), cross-sectional (2), case series (1), case report (1), cohort (1) and methodological (1).

In relation to the post-surgical care measures mapped, the articles selected highlight the importance of monitoring the flaps, with 64% of the total. Weighing in the indirect citations— where it is referred to as essential although it is not the main study object – it reaches 100%<sup>23-25,29,31-40</sup>.

Compression of the flap and of the lower limb operated on encompasses 8 studies (38%) and is mentioned in 28%, accounting for 66% of the total selected. However, conditioning of the reconstruction encompasses 19% of the studies and is cited in 38%, totaling 57% of the publications<sup>20-22,26-34,36-40</sup>.

Care measures regarding positioning of the lower limb operated on correspond to 33% of the studies. In turn, restriction to the bed is mentioned in five papers, which represents 24%. In addition, referring to the patients moving, ambulation is a common aspect only in 14%<sup>31-33,34,36-39</sup>.

Regarding drug therapy, use of anticoagulants is mentioned in 14% of the publications, whereas analgesia is only cited as connected to pain evaluation and control in 19% of the articles. As for the direct care measures (thermal,

pressure and water controls); assessment of surgical wounds (donor and recipient areas); drain management and pain assessment stand out exclusively in publications by nurses and make up 28% of the total number of studies. Among them, only one study addresses care measures with the donor area and the main complications<sup>30,34,36-40</sup>.

Three articles present a full overview of perioperative care in reconstructions, among which one is specific to the Traumatology Nursing area, focusing on the assistance for orthopedic patients with traumatic wounds subjected to reconstructions with surgical flaps, highlighting care measures for traumatic wounds, fractures, fixation devices, mobilization and emotional disorders resulting from trauma<sup>36,37,40</sup>.

Dehospitalization or discharge planning is mentioned as a crucial moment when there is transitional care to another health context, being a fundamental strategy for care continuity at home, corresponding to 19% of the publications<sup>33,34,36,37,40</sup>.

Results show that the care measures mapped are related to the postoperative phases; based on this analysis, they were grouped into three categories: the first two referring to the immediate and mediate phases of the postoperative period and the third, to transitional care - referred to as discharge planning, due to the importance highlighted in the studies (Figure 5).

CATEGORIES	CARE MEASURES
<b>Category 1 - Care measures in the immediate postoperative period</b>	Flap monitoring <sup>23-25,29,31-40</sup>
	Positioning of the flap and of the lower limb operated on <sup>33,34,36-39</sup>
	Restriction to the bed <sup>36-39</sup>
	Anticoagulation <sup>30,34</sup>
	Vital signs control: Pain evaluation and analgesia <sup>36-40</sup>
<b>Category 2 - Care measures in the mediate postoperative period</b>	Compression of the flap and of the lower limb operated on <sup>20-22,30,31,33,36-40</sup>
	Flap conditioning <sup>26-34,37,39,40</sup>
	Moving <sup>31,33,34,37,39</sup>
	Surgical wound management (donor and recipient areas, complications, drains) <sup>36-40</sup>
<b>Category 3 - Transitional care</b>	Health Education actions – Discharge planning <sup>33,34,36,37,40</sup>

FIGURE 5: Categories and care measures resulting from the mapping. Rio de Janeiro, RJ, Brazil, 2022.

## DISCUSSION

The care measures mapped are predominantly related to the physiological response of the flaps to the implemented care and to how this can assist in determining treatment regimens. On the other hand, there is a focus on the perioperative period observed by the broad panorama of care measures that go beyond the exclusive focus on reconstruction and include everything from the initial evaluation of the patient to the guidelines for home-based care.

Monitoring the flaps is considered the essential and most important care measure during the postoperative period; in the immediate phase, it is a success or failure predictor, whereas in the mediate phase it indicates the ideal time to initiate compression/conditioning. It must be rigorous, especially in the first 48 hours, combining clinical observation and use of devices (implantable Doppler, thermography and others), which, although effective, depend on specific equipment (oftentimes not available in the health system). While clinical monitoring is simple, cost-free and solely depends on systematic examination of the flap, it is the only method applied in some reconstructive centers, leaving the assessment to experienced and trained surgeons and nurses<sup>11,14,15,17,24,41,43</sup>.

Positioning and restriction to the bed are precautions aimed at promoting circulation and preventing damage to the reconstruction. Lower extremities characteristically have low blood supply and, although they have their own vascular supply, the reconstructions are transferred and may require new vascular anastomoses in the recipient area; in addition, gravity acts on venous return and there is also the damage caused by the traumatic wound<sup>14,15,30,31,35</sup>.

Restriction to the bed presents a variation regarding its maintenance period. Some studies show a positive experience with three days of restriction while others keep the patient in bed for up to 21 days; the mean is seven days linked to viability of the flap, absence of vascular origin complications and limitation due to the orthopedic injury<sup>14,15,30,31,35</sup>.

Positioning of the limb operated on during the immediate postoperative period includes the following: elevation of the limb, non-compression of the pedicle and reconstruction, and non-traction of the anastomosis areas, through the use of support brackets and adequate handling. These care measures promote venous return - avoiding venous

congestion, one of the main causes of complications - and reduces pressure on the flaps and the reconstructed areas, favoring blood flow<sup>14,15,30,31,35</sup>.

Pain is variable and is related to the procedure and the systemic response, exerting a negative impact on flap survival. Its evaluation and control aim at providing comfort and safety, avoiding vasospasm and alerting the team about ischemia - characterized by severe pain even in the presence of adequate analgesia. Pain grading scales, periodic assessment and analgesic therapy protocols are indicated<sup>14,30,35</sup>.

Anticoagulation should be restricted to reconstructions with flaps that use a micro-surgical technique and depend exclusively on the blood supply to maintain their viability. The most used pharmacological agents are aspirin and low molecular weight heparin to prevent loss due to thrombosis, although there is no uniformity in the maintenance period, with a mean is 15 days<sup>30,31</sup>.

Conditioning is important for circulatory adaptation and to the gravitational effects on reconstruction, inducing neovascularization. The flap is subjected to a hanging position during previously stipulated periods and evaluated for tolerance. On average, it starts from the seventh postoperative day; time and frequency increase continuously if the physiological response of the flap is satisfactory<sup>20,22,30,42</sup>.

Compression has two main purposes: reduction of edema associated with venous congestion and aid in circulatory conditioning; therefore, it has indication, initiation and periodicity similar to conditioning. Its association and simultaneous use increases the hemodynamic response, favors healing and reduces the risk of flap loss<sup>20,22,30,31</sup>.

Mobilization and ambulation are directly linked to the orthopedic injury and to the type of flap. It is necessary to evaluate bone stability and associated restrictions, use of support devices, patient adaptation, type of reconstruction and its response to conditioning and compression. If there are no restrictions, it can be initiated concomitantly or after conditioning and compression<sup>11,16,17,30,31</sup>.

The care measures for the donor and recipient areas involve systematic assessment of viability, adaptive circulatory response, evolution of the healing process and presence of devices. Their management is dictated by the type of reconstruction that defines which type of healing and care measures will be applied to both. Choice of the appropriate topical therapy and periodicity to apply the dressings is linked to knowledge of the physiology of the flaps, as performance and complications are different in each phase. There is no description or reference to dressings used in the expected period of time or in the presence of complications, or frequency and period of reassessments<sup>15,30,35</sup>.

Transitional care from the hospital environment to the home is a crucial moment for the patient and the health team. Nurses are the professionals most involved in this care; their work begins with the patient's admission, enabling continuous learning during hospitalization. The actions are directed towards self-management in health related to the following: surgical wounds; recognition of signs of complications and infection; maintenance of the conditioning periods; use of compression; positioning; analgesia; and proper nutrition. Perioperative education is an important step in the patient's evolution, representing a fundamental intervention due to its positive impact on the clinical outcomes as it provides better preparation for the surgery and its consequences<sup>10,13,15,44</sup>.

## CONCLUSION

The review evidenced the main postoperative care measures and the absence of universal algorithms or protocols in the postoperative management of lower-limb traumatic wound reconstructions with surgical flaps. There is no consensus as to the specific courses of action; basically, the most experienced surgeon in each service directs the actions, which is reflected in the miscellany of interventions and divergent initiation or maintenance periods, reinforcing the importance of this research. Despite this panorama, nurses are highlighted in the integral evaluation of the patients, contemplating the clinical, emotional and social spheres.

Effective responses are essential to support decision-making and provide safety in the performance of care activities, contributing to the absence/reduction of avoidable complications. This study is a first and essential step in the search for diverse evidence to contribute to this scenario and, in the future, to support the elaboration of care models that can be implemented in the practice as a way to ensure patient care quality.

The development of new research studies will enable optimizing the Nursing care practice, both in meeting the patients' needs in a wide spectrum of postoperative care actions, and in empowering nurses, and consequently, their autonomy in the multiprofessional team.

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