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REVIEW

Effectiveness of prehabilitation in the postoperative period: limitations of application and impact on recovery

Eficacia de la prehabilitación en el postoperatorio: limitaciones de aplicación e impacto en la recuperación

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ABSTRACT

Introduction: postoperative prehabilitation currently represents an innovative strategy with wide application in comprehensive surgical management, especially in patients undergoing high-risk procedures. Therefore, we proposed to analyze the effectiveness of prehabilitation in the postoperative period, as well as the limitations of its application in the surgical context and its impact on patient recovery.
Method: a literature review was conducted, allowing for an exhaustive examination of indexed databases such as SCOPUS, PUBMED, SciELO, and Latindex, obtaining a sample of 30 studies that met the eligibility criteria, organized in an Excel matrix for analysis using the CASPe method.
Results: the integration of prehabilitation programs into postoperative care faces challenges that hinder their timely and efficient implementation in surgical centers, including organizational issues, resource constraints, lack of policies and specialized professionals, and infrastructure limitations. However, their incorporation has a positive impact on reducing complications, improving physical and emotional well-being, and shortening hospital stays.
Conclusions: comprehensive care in surgical centers is changing the safety paradigm, focusing on innovative interventions such as prehabilitation programs that, through interprofessional collaborative work and timely and effective management of services, enable a comprehensive approach to patients. This requires the development of standardized protocols, continuous training, as well as the design of interventions adapted under the supervision of a multi- and interdisciplinary team to each need according to the surgical specialty.

Keywords: Surgery; Prehabilitation; Preoperative Rehabilitation.

RESUMEN

Introducción: la prehabilitación postoperatoria actualmente representa una estrategia innovadora, con una gran aplicación en el manejo quirúrgico integral, especialmente en pacientes con intervenciones de alto riesgo; por lo que se propuso analizar la eficacia de la prehabilitación en el postoperatorio, así como las limitaciones de su aplicación en el contexto quirúrgico, y el impacto en la recuperación de los pacientes.
Método: fue de revisión bibliográfica que permitió el examinar de manera exhaustiva en bases indexadas como SCOPUS, PUBMED, SciELO y Latindex, obteniendo una muestra de 30 estudios que cumplieron criterios

de elegibilidad, organizados en una matriz en Excel para su análisis por el método CASPe.
Resultados: la integración de programas de prehabilitación en el postoperatorio enfrenta retos que dificultan su implementación oportuna y eficiente en los centros quirúrgicos, esto a nivel organizativos, recursos, carencia de políticas y profesionales especializado, así como la infraestructura; no obstante, su incorporación presenta un impacto positivo en la reducción de complicaciones, mejora el bienestar físico y emocional, y disminuye la estancia hospitalaria.
Conclusiones: la atención integral en los centros quirúrgicos está cambiando el paradigma de la seguridad, centrado en intervenciones innovadoras como los programas de prehabilitación que, a través del trabajo colaborativo interprofesional, así como la gestión oportuna y efectiva de los servicios, posibilitan un abordaje integral de las personas, lo que, se hace necesario el desarrollo de protocolos estandarizados, formación continua, así como el diseño de intervenciones adaptadas bajo el seguimiento de un equipo multi e interdisciplinario a cada necesidad según la especialidad quirúrgica.

Palabras clave: Cirugía; Prehabilitación; Rehabilitación Preoperatoria.

INTRODUCTION

Postoperative prehabilitation currently represents an innovative strategy with a wide range of applications in the context of comprehensive surgical management, especially in patients undergoing high-risk procedures that may have effects and complications that increase their morbidity and mortality. Therefore, this is addressed through a multidisciplinary approach that includes physical, nutritional, psychological, and educational interventions before surgery, with the aim of optimizing the patient's functional condition to reduce post-surgical complications.[1]

In this sense, this model, as opposed to the traditional approach that focuses exclusively on the post-surgical phase, is considered key in programs such as Enhanced Recovery After Surgery (ERAS), which enables shorter hospital stays, better recovery, and fewer postoperative sequelae.[2]

It should be noted that the timely implementation of these programs greatly reduces morbidity and mortality; however, their integration requires structural adaptations, equitable access to services, and specialized training for the healthcare professionals who make up the surgical teams.[3,4]

On the other hand, this model should focus on policies for coordinating different services, teams, and multi- and interdisciplinary professionals, promoting the combination of activities, therapeutic exercises, pharmacotherapy, follow-up, and continuous monitoring, which makes it possible to preserve the benefits acquired during the preoperative phase. However, its application must be aligned with the different phases of the perioperative period, and the main challenge is its structural integration into health systems, especially in complex surgical contexts.[5,6]

In addition, prehabilitation has emerged as an essential component of perioperative care, marking a paradigm shift towards a proactive, personalized, and multidisciplinary strategy that promotes interventions that optimize the functional and physiological capacity of the patient before surgery, with the aim of improving clinical outcomes, reducing complications, and accelerating the return to functionality.[7]

It should be noted that these programs not only improve clinical indicators but also promote more humane, preventive, and long-term results-oriented surgical care. In turn, it is necessary to transform policies involving operational capacity, the incorporation of emerging technologies, equity of access, and standardization of protocols to ensure the quality and safety of individuals.[8] Therefore, we proposed to analyze the effectiveness of prehabilitation in the postoperative period, as well as the limitations of its application in the surgical context and its impact on patient recovery.

METHOD

A qualitative study was conducted using a descriptive design based on a literature review, which allowed for the analysis and interpretation of the findings of the selected articles.[9] The population consisted of scientific publications, and a sample of 30 studies was selected, considering criteria such as total content availability, publication period, and compliance with previously established inclusion and exclusion criteria.

Inclusion criteria

- Studies with quantitative, qualitative, or mixed approaches.
- Publications written in Spanish, English, or Portuguese.
- Articles examining the application of prehabilitation in the surgical context during the last five years.

Exclusion criteria

- Documents belonging to gray literature.
- Clinical trials and thesis work.

For the bibliographic search, specific equations were constructed in indexed databases such as SCOPUS, PUBMED, SciELO, and Latindex. These equations combined Boolean operators (AND and OR) with keywords in Spanish, English, and Portuguese related to prehabilitation, postoperative, post-surgical, perioperative, applications, efficacy, impact, and recovery.

The selection and evaluation process was carried out independently by three researchers and subsequently supervised by an additional team responsible for validating compliance with the established criteria and resolving any discrepancies. The information extracted was systematized in a matrix developed in Microsoft Excel, where data such as the following were collected: a) characteristics of the article (year of publication, type of study, URL, database); b) limitations (organizational, resources, infrastructure, policies, regulations, protocols, professional); and c) impact (on recovery, health status, hospital stay, presence of complications, and effects). These were analyzed using the CASPe method.

DEVELOPMENT

Limitations in the application of postoperative prehabilitation in surgical centers

The integration of prehabilitation programs in the postoperative period faces significant challenges that hinder their timely and efficient implementation in surgical centers. In this regard, at the organizational level, there is a lack of standardized protocols according to surgical specialties that establish specific follow-up processes and activities.[10]

It should be noted that the absence of specialized multi- and interdisciplinary collaborative teams in surgical centers complicates the establishment of effective strategies of this type, considering the fragmentation of roles, the lack of assertive communication between services and professionals for implementation, as well as the limitations of clinical leadership for their application.[11]

On the other hand, the lack of adequate facilities, specific equipment, and support technologies significantly limits the scalability of these programs, considering the realities of health systems in low-income countries in terms of the costs of technological investment and training implementation, which generates inequality in access. This is compounded by weak policy support and guidelines that institutionalize prehabilitation as part of a comprehensive surgical approach, leading to inconsistencies in implementation and making it difficult to obtain funding.[12,13]

In addition, variability in the training, care experience, and attitude of healthcare personnel toward these innovative approaches directly impacts program fidelity and patient adherence, limitations that reveal the urgent need for comprehensive reforms in surgical planning, including investment in training, development of regulatory frameworks, and strengthening of infrastructure so that prehabilitation is not just a theoretical recommendation, but an effective and accessible clinical practice.[14,15]

Furthermore, varying patient profiles and clinical presentations make it difficult to implement activities such as physical exercise protocols, psychological therapy, or intensive pre-surgery nutritional interventions. In addition, the lack of support and follow-up networks reduces adherence to prehabilitation programs.[16,17] Similarly, low educational levels and poor health literacy in developing countries hinder understanding and adherence to these approaches.[18]

In another scenario, the time available between diagnosis and surgery, especially in oncological pathologies or surgical emergencies, makes it impossible to implement prior interventions, given that therapeutic windows are limited and do not allow for the establishment of a structured prehabilitation program without unnecessarily delaying the surgical procedure.[19, 20]

It should be noted that there is a methodological and scientific limitation related to the heterogeneity of the available studies and the lack of solid international consensus on the components, duration, and success metrics of prehabilitation. Despite advances, more high-quality evidence and multicenter studies are still needed to define challenges such as cost-effective, customizable, and reproducible schemes.[21]

Impact of postoperative prehabilitation on the recovery of surgical patients

The application of prehabilitation in surgical settings is transforming person-centered comprehensive care. In this sense, its incorporation into these settings accelerates the recovery of physiological functions and physical capacity and reduces postoperative deterioration, with positive effects in high-risk surgery patients, such as those undergoing trauma and oncology surgery.[22,23]

It should be noted that the integration of exercises according to the area of intervention, follow-up and psychological support, and education through effective communication has an impact on physical and mental health, bearing in mind that early rehabilitation improves the patient's mood, reassures the family, reduces

pain, and facilitates the person's autonomy in the post-surgical period.[24,25]

On the other hand, the application of this approach has a significant impact on reducing hospital stays, which reduces the risk of complications due to prolonged hospitalization, such as healthcare-associated infections, as well as optimizing resources, space, and bed availability.[26,27] In addition, it improves family well-being by speeding up the return home and reducing the effects associated with immobilization in clinical settings.[28]

It should be noted that prehabilitation interventions focused on nutritional status, exercise, lifestyle changes, follow-up and monitoring, as well as education and psychological support, have a lower incidence of complications, particularly respiratory, thromboembolic, and infectious complications. In turn, there is less use of opioids, fewer effects of delirium, and fewer transfusions in highly complex major surgical procedures.[29,30] Furthermore, not only does it reduce adverse events, but it also improves quality of life indicators, as well as patient and family satisfaction.[31,32]

Similarly, the combination of prehabilitation with technological tools has shown potential for personalizing and optimizing rehabilitation strategies, considering that the integration of artificial intelligence systems allows for the processing and planning of interventions based on data analysis and individual needs.[33,34] Consequently, these programs facilitate continuous and proactive patient monitoring, improving adherence to post-surgical instructions and ensuring follow-up and relapse prevention.[35,36]

CONCLUSIONS

Comprehensive care in surgical centers is changing the safety paradigm, focusing on innovative interventions such as prehabilitation programs which, through interprofessional collaboration and timely and effective service management, enable a comprehensive approach to patients, strengthening preoperative education, improving therapeutic adherence, and reducing postoperative complications.

However, their incorporation into healthcare institutions presents organizational, economic, and structural challenges, requiring an approach that integrates technological resources and trained healthcare personnel. Therefore, it is necessary to develop standardized protocols, ongoing training, and the design of tailored interventions under the supervision of a multidisciplinary and interdisciplinary team for each need according to the surgical specialty, which would improve well-being, quality of care, and reduce complications and reoperations.

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