

Optimización del acceso a la cirugía electiva: estrategias integradas de priorización, eficiencia, equidad y resultados clínicos

Optimizing Elective Surgical Access: Integrated Strategies for Waiting-List Prioritization, Efficiency, Equity, and Clinical Outcomes

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RESUMEN

Las listas de espera quirúrgica representan un desafío importante para los sistemas de salud, debido a que las demoras prolongadas pueden afectar no solo la eficiencia de los servicios, sino también la funcionalidad del paciente, la calidad de vida, la equidad en el acceso y los resultados clínicos. Este estudio analizó las principales estrategias empleadas para gestionar las listas de espera de cirugía electiva, con énfasis en la priorización de pacientes, gestión de referencias, prevención de cancelaciones, eficiencia perioperatoria y reevaluación dinámica. Se realizó una revisión estructurada de la literatura utilizando evidencia procedente de revisiones sistemáticas, estudios comparativos, modelos de priorización e investigaciones clínicas sobre las consecuencias de los retrasos quirúrgicos. Los resultados mostraron que las estrategias multidimensionales proporcionan un enfoque más completo que los sistemas basados exclusivamente en el orden cronológico o en categorías fijas de urgencia. Los modelos de priorización estructurada y dinámica resultaron especialmente relevantes porque incorporan variables como dolor, gravedad de la enfermedad, comorbilidades, deterioro funcional, beneficio quirúrgico esperado, tiempo acumulado de espera y riesgo de deterioro. La gestión de referencias y la prevención de cancelaciones evitables también fueron identificadas como mecanismos importantes para mejorar la eficiencia operativa y reducir retrasos innecesarios. Asimismo, las esperas prolongadas se asociaron con deterioro medible de la calidad de vida relacionada con la salud, la función, el bienestar psicológico y la satisfacción de los pacientes en diversas poblaciones quirúrgicas. La evidencia respalda la utilización de modelos integrados que combinen priorización clínica, reevaluación periódica, rutas de referencia coordinadas, utilización eficiente de la capacidad quirúrgica y seguimiento continuo de resultados clínicos y organizacionales. En consecuencia, la gestión efectiva de las listas de espera debe orientarse no solo a reducir el número de días hasta la cirugía, sino también a garantizar un acceso oportuno, equitativo y clínicamente apropiado a la atención quirúrgica electiva.

PALABRAS CLAVE

listas de espera quirúrgica, cirugía electiva, priorización de pacientes, tiempo de espera, priorización dinámica, programación quirúrgica, eficiencia de quirófanos, gestión de referencias, cancelaciones quirúrgicas, resultados clínicos, calidad de vida relacionada con la salud, equidad en salud

ABSTRACT

Surgical waiting lists represent a major challenge for healthcare systems because prolonged delays can affect not only service efficiency but also patient function, quality of life, equity of access, and clinical outcomes. This study analyzed the principal strategies used to manage elective surgical waiting lists, with emphasis on patient prioritization, referral management, cancellation prevention, perioperative efficiency, and dynamic reassessment. A structured review of the literature was conducted using evidence from systematic reviews, comparative studies, prioritization models, and clinical investigations evaluating the consequences of delayed surgery. The findings showed that multidimensional strategies provide a more comprehensive approach than systems based exclusively on chronological order or fixed urgency categories. Structured and dynamic prioritization models were particularly relevant because they incorporate variables such as pain, disease severity, comorbidities, functional impairment, expected surgical benefit, accumulated waiting time, and risk of deterioration. Referral management and prevention of avoidable cancellations were also identified as important mechanisms for improving operational efficiency and reducing unnecessary delays. In addition, prolonged waiting was associated with measurable deterioration in health-related quality of life, functional status, psychological well-being, and patient satisfaction in several surgical populations. The evidence supports the use of integrated management models combining clinical prioritization, periodic reassessment, coordinated referral pathways, efficient use of surgical capacity, and continuous monitoring of patient-centered and organizational outcomes. Effective waiting-list management should therefore aim not only to reduce the number of days to surgery, but also to ensure timely, equitable, and clinically appropriate access to elective surgical care.

KEYWORDS

surgical waiting lists, elective surgery, patient prioritization, waiting time, dynamic prioritization, surgical scheduling, operating room efficiency, referral management, surgical cancellations, clinical outcomes, health-related quality of life, healthcare equity

INTRODUCCIÓN

Surgical waiting lists represent one of the most persistent challenges faced by contemporary healthcare systems, particularly those in which access to elective procedures depends on the allocation of limited public or institutional resources. The existence of a waiting list does not necessarily indicate inefficiency by itself; rather, waiting lists arise when the demand for surgical care exceeds the available capacity of operating rooms, surgical teams, hospital beds, diagnostic services, anesthesia resources, and postoperative care. However, when waiting periods become prolonged or poorly managed, they can evolve from an administrative mechanism for organizing demand into a clinically relevant problem capable of affecting patient safety, functional status, quality of life, equity of access, and the overall performance of healthcare organizations. Consequently, surgical waiting-list management should be understood not simply as the scheduling of procedures but as a complex process of clinical prioritization and resource allocation in which urgency, expected benefit, disease progression, waiting time, available capacity, and principles of distributive justice must be considered simultaneously (Bachelet et al., 2019; Rathnayake et al., 2021).

The magnitude of this problem has increased the need for healthcare systems to develop strategies capable of reconciling two objectives that are sometimes difficult to achieve simultaneously: maximizing operational efficiency and ensuring that patients with the greatest clinical need receive timely treatment. Traditional waiting-list models have frequently relied on chronological order, broad urgency categories, or individual clinical judgment to determine the sequence in which patients undergo surgery. Although these approaches are relatively simple to implement, they may not adequately reflect changes in a patient's condition over time, differences in functional impairment, probability of clinical deterioration, or variations in the expected benefit of surgery. Moreover, excessive dependence on subjective assessments may introduce inconsistencies between clinicians, hospitals, specialties, and regions, potentially contributing to inequities among patients with comparable levels of need (Testi et al., 2008; Powers et al., 2023).

For this reason, contemporary surgical waiting-list management has progressively shifted toward explicit prioritization models in which several clinical and temporal variables are considered together. Rather than assigning priority exclusively according to the date on which the patient entered the list, these models seek to establish an order based on clinical urgency, severity of symptoms, functional limitation, probability of deterioration, expected surgical benefit, duration of waiting, and, in selected frameworks, socioeconomic or patient-related factors. A systematic review by Rathnayake et al. (2021) found that standardized and explicit prioritization systems based on defined criteria can contribute to more equitable access to elective surgery and may facilitate earlier treatment of patients with greater clinical need. Nevertheless, the authors also identified considerable heterogeneity among specialties, institutions, and healthcare systems, indicating that no single prioritization mechanism can be universally applied without adaptation to the clinical and organizational context.

The distinction between **clinical urgency** and **time already spent waiting** is particularly important. A static classification established when a patient is first listed for surgery may become progressively less representative of the patient's true clinical priority as weeks or months pass. Disease severity can change, functional impairment can progress, and the relative position of patients within the queue can become increasingly disconnected from their current health needs. Dynamic prioritization approaches attempt to address this problem by allowing priority scores to evolve over time. Powers et al. (2023), for example, described a dynamic priority-scoring approach that combines waiting time with explicit clinical factors, providing a more objective measure for ranking patients and potentially reducing the variability associated with exclusively subjective categorization. Such approaches illustrate the transition from waiting lists conceived as static queues toward continuously managed clinical systems in which priority may be reassessed according to changing circumstances.

This transition is relevant because prolonged waiting is not clinically neutral. Patients awaiting surgery may experience progression of symptoms, deterioration of physical function, psychological distress, limitations in daily activities, inability to work, increased use of analgesics or other medical therapies, repeated consultations, emergency department visits, and reduced health-related quality of life. Oudhoff et al. (2007), in patients awaiting elective general surgical procedures, identified poorer perceptions of general health, greater quality-of-life problems, increased anxiety, and limitations in social and occupational activities during the waiting period. These observations demonstrate that the consequences of surgical delay extend beyond the eventual date of the operation and can affect multiple dimensions of a patient's health and social functioning while treatment remains pending.

More recent evidence confirms that prolonged waiting can have measurable clinical consequences in high-demand surgical populations. Scott et al. (2024) prospectively evaluated patients awaiting hip or knee arthroplasty and reported clinically significant deterioration in health-related quality of life between six and twelve months of waiting, together with worsening of several measures of joint-specific function, mental health, well-being, and satisfaction with healthcare. These findings are particularly relevant to waiting-list management because they demonstrate that waiting time itself can become an important component of clinical risk. A patient initially considered suitable for delayed treatment may experience sufficient deterioration during the waiting period to alter the balance between urgency, expected benefit, and perioperative complexity. Thus, effective management requires not only establishing an initial position in the queue but also periodically reassessing patients to identify meaningful changes in clinical status (Scott et al., 2024).

The consequences of inadequate waiting-list management also extend to healthcare-system efficiency. Delayed surgery may generate additional outpatient visits, repeated diagnostic studies, pharmacological treatment, emergency consultations, work disability, and potentially more complex care when the patient finally undergoes surgery. At the same time, inefficiencies within the surgical pathway—including cancellations, incomplete preoperative assessment, inadequate coordination between services, poorly distributed operating-room capacity, and delays in referral—may lengthen waiting times even when nominal surgical capacity remains unchanged. Accordingly, reducing waiting lists cannot depend solely on increasing the number of operations performed. It also requires analyzing the complete surgical pathway and identifying where avoidable delays, bottlenecks, cancellations, or mismatches between demand and capacity occur.

Evidence supporting this broader perspective has progressively accumulated. Bachelet et al. (2019) concluded that interventions intended to reduce elective surgical waiting times are most appropriately approached as multidimensional strategies incorporating equitable prioritization, improvements in surgical pathways, better use of operating rooms, and more effective surgical scheduling. More recently, Rathnayake et al. (2025) systematically evaluated global strategies for reducing elective surgery waiting times and grouped interventions into several major areas, including referral management, patient prioritization, prevention of surgical cancellations, perioperative time management, quality-improvement approaches, and institutional waiting-time targets. Their synthesis suggests that targeted interventions at different stages of the surgical pathway do not produce equivalent effects and that combinations of complementary strategies may achieve greater benefits than isolated interventions.

Referral management represents an important component of this process because inefficiency can begin before the patient formally reaches the surgical waiting list. Variability in referral criteria, duplication of consultations, incomplete diagnostic evaluation, or inappropriate routing of patients can consume specialist capacity and delay access for individuals who are more likely to require operative treatment. Once patients have been assessed and surgery has been indicated, centralized or coordinated management mechanisms can improve visibility of demand and potentially reduce unnecessary variation between individual surgeons or services. Consequently, waiting-list performance must be evaluated as the product of an interconnected pathway rather than as an isolated operating-room problem.

Prioritization itself must also address the ethical dimension of resource allocation. Treating patients exclusively according to chronological order may appear equitable because all individuals advance according to the same temporal rule; however, equal waiting time does not necessarily imply equitable care when clinical needs differ substantially. Conversely, systems based exclusively on urgency may repeatedly postpone patients with less immediately threatening diseases despite progressive pain, disability, or deterioration in quality of life. The concept of equitable prioritization therefore requires balancing vertical equity—giving different treatment priority to patients with different levels of clinical need—with horizontal equity, under which individuals with similar needs should receive similar treatment regardless of institution, clinician, socioeconomic characteristics, or other unrelated factors. Systematic reviews of prioritization tools have emphasized the importance of transparent, reproducible, and multidimensional criteria for minimizing unjustified variability in non-emergency healthcare allocation (Déry et al., 2020; Rathnayake et al., 2021).

Transparency is especially relevant because prioritization decisions directly affect how long an individual may remain without definitive treatment. A clinically valid system should therefore be understandable to healthcare professionals, administrators, and, where appropriate, patients. Explicit scoring models can provide a documented rationale for prioritization decisions and facilitate audit, reassessment, and comparison between institutions. Nevertheless, scoring

systems must not be interpreted as substitutes for clinical judgment. Their principal value lies in structuring decision-making, reducing unwarranted variability, and supporting clinicians with standardized criteria while preserving the possibility of individualized reassessment when exceptional circumstances arise. Testi et al. (2008) demonstrated the importance of distinguishing conventional urgency categories from quantitative prioritization approaches designed to determine the relative position of individual patients within surgical queues.

An additional concern is that strategies focused only on shortening the mean waiting time can obscure clinically important differences within the waiting-list population. A reduction in the average number of days to surgery does not necessarily indicate that patients at highest risk were treated earlier, nor does it confirm an improvement in clinical outcomes. Similarly, increasing surgical volume may have limited impact if cancellations, inefficient referrals, insufficient postoperative capacity, or poor prioritization continue to generate new delays. Performance assessment should therefore integrate several dimensions, including median and maximum waiting times, proportion of patients treated within clinically defined targets, cancellations, operating-room utilization, changes in patient health while waiting, postoperative outcomes, equity of access, and patient-reported measures.

The available literature thus reveals an important conceptual gap. Numerous studies have evaluated isolated strategies to reduce waiting times, while others have examined prioritization instruments, referral pathways, operating-room management, or the consequences of prolonged delays. However, fewer analyses integrate these components within a single framework that simultaneously considers **prioritization, organizational efficiency, and clinical outcomes**. This integration is necessary because a strategy that improves one dimension may not necessarily improve another. For example, an intervention could reduce overall waiting time while producing unequal access between patient groups, or improve operating-room utilization without adequately identifying patients whose clinical condition is deteriorating. Conversely, a highly detailed prioritization mechanism may enhance equity but have limited effect on overall waiting times if insufficient capacity or repeated cancellations remain unresolved. The most relevant question, therefore, is not merely which strategy shortens the surgical queue, but which combination of strategies produces timely, efficient, equitable, and clinically beneficial access to surgery.

Based on this framework, the present study addresses the following central research question: **which strategies for surgical waiting-list management provide the most consistent balance between appropriate patient prioritization, efficient use of healthcare resources, reduction of waiting times, and preservation or improvement of clinical outcomes?** Complementary questions examine which variables should be incorporated into prioritization systems, how dynamic reassessment can respond to clinical deterioration during the waiting period, which organizational interventions improve patient flow and surgical capacity, and which indicators are most appropriate for evaluating the effectiveness of waiting-list policies.

The working hypothesis is that **multidimensional waiting-list management strategies that combine standardized clinical prioritization, consideration of accumulated waiting time, periodic patient reassessment, optimized referral pathways, prevention of avoidable cancellations, and efficient allocation of surgical resources will demonstrate greater effectiveness than strategies based exclusively on chronological order, static urgency classifications, or isolated increases in surgical activity**. A second hypothesis is that incorporating clinical outcome indicators and patient-centered measures into waiting-list evaluation provides a more accurate assessment of performance than using waiting time alone. These hypotheses are supported by previous evidence showing both the potential benefits of explicit prioritization and the multidimensional nature of interventions required to address elective surgical delays (Bachelet et al., 2019; Déry et al., 2020; Rathnayake et al., 2021; Powers et al., 2023; Rathnayake et al., 2025).

To address these questions, the study adopts a structured evidence-based review design focused on research concerning elective surgical waiting lists, patient prioritization methods, healthcare process efficiency, and clinical consequences associated with treatment delays. The analytical approach compares the principal strategies described in the literature according to their mechanisms of action and their reported effects on access, waiting time, resource utilization, equity, and patient outcomes. Priority is given to systematic reviews, comparative investigations, studies evaluating explicit prioritization systems, and clinical research examining the consequences of prolonged surgical waiting. This design allows evidence originating from clinical practice, health-services research, and healthcare management to be integrated into a common analytical framework.

The methodological orientation is directly aligned with the hypotheses because the effectiveness of waiting-list management cannot be determined through a single operational indicator. By comparing prioritization approaches with organizational interventions and their associated clinical outcomes, the study seeks to determine whether integrated strategies provide advantages over isolated measures. Particular attention is paid to the interaction between patient-level factors—including urgency, functional impairment, deterioration, and waiting duration—and system-level factors such as referral processes, scheduling, operating-room utilization, cancellations, and available capacity. This dual perspective makes it possible to examine surgical waiting lists as both a clinical prioritization problem and a healthcare-management challenge.

Ultimately, effective surgical waiting-list management should aim not simply to make the queue shorter, but to ensure that the **right patient receives the right intervention at the clinically appropriate time while available resources are used efficiently and equitably**. Current evidence indicates that transparent prioritization, dynamic reassessment, coordinated patient pathways, and multidimensional performance evaluation represent central components of this objective. However, heterogeneity among existing approaches and differences between specialties and healthcare systems justify continued investigation into how these strategies can be integrated, standardized, and evaluated. By examining prioritization, efficiency, and clinical outcomes within the same framework, this study seeks to provide a comprehensive basis for designing surgical waiting-list policies capable of improving both healthcare-system performance and patient-centered outcomes.

DESARROLLO

Surgical waiting-list management has become a critical component of healthcare organization because it directly influences access to treatment, allocation of resources, and patient outcomes. The problem is not limited to the number of individuals awaiting surgery; it also involves determining **which patients should be treated first, how available surgical capacity should be distributed, and how clinical deterioration during the waiting period should be detected**. Therefore, an effective management model must integrate clinical criteria with operational and organizational variables rather than relying exclusively on chronological order.

One of the most relevant strategies is the implementation of **standardized prioritization systems**. Traditional models frequently classify patients into broad urgency categories, but these classifications may not adequately distinguish patients with different degrees of pain, disability, disease progression, or expected surgical benefit. Explicit prioritization tools can incorporate variables such as clinical severity, functional limitation, risk of deterioration, waiting duration, and potential benefit from surgery, improving consistency and transparency in decision-making (Testi et al., 2008; Déry et al., 2020). Systematic evidence indicates that structured prioritization may contribute to more equitable access by reducing excessive dependence on individual clinical judgment (Rathnayake et al., 2021).

A particularly important evolution involves **dynamic prioritization**. Patients do not remain clinically unchanged while waiting for surgery; therefore, a priority assigned at the beginning of the process may become inaccurate several months later. Dynamic scoring systems periodically update priority according to both accumulated waiting time and clinical characteristics. Powers et al. (2023) demonstrated that dynamic priority scoring can provide a more responsive mechanism for organizing surgical queues, particularly when demand exceeds available capacity. This approach reduces the risk that patients with progressive deterioration remain indefinitely classified under an initial, static priority level.

However, prioritization alone cannot solve prolonged surgical waiting times. Operational inefficiencies can substantially influence the duration of the surgical pathway. Delayed referrals, duplication of diagnostic studies, incomplete preoperative assessments, operating-room cancellations, insufficient postoperative beds, and poor coordination among specialties can reduce effective surgical capacity. For this reason, successful interventions increasingly include **centralized referral systems, coordinated scheduling, improved operating-room utilization, standardized preoperative pathways, and strategies to prevent avoidable cancellations** (Bachelet et al., 2019; Rathnayake et al., 2025).

Centralized or single-entry referral systems are particularly relevant because they allow demand to be distributed across available professionals and facilities rather than remaining concentrated within individual surgeon-specific waiting

lists. Such models may reduce variations in waiting times and improve access to the next available appropriate provider. Damani et al. (2018) identified centralized referral mechanisms as an important strategy for improving coordination in surgical care, although their effectiveness depends on appropriate governance, communication, and acceptance by both clinicians and patients.

Another key dimension is the relationship between waiting time and **clinical outcomes**. Prolonged delays may produce consequences before surgery takes place. Patients may experience worsening pain, reduced mobility, psychological distress, decreased ability to perform daily activities, and deterioration in health-related quality of life. Oudhoff et al. (2007) documented important psychosocial and functional effects among patients awaiting elective general surgery, while Scott et al. (2024) found significant deterioration in health-related quality of life among patients waiting prolonged periods for hip and knee arthroplasty. These findings support the need to consider waiting time as a clinical variable rather than exclusively as an administrative indicator.

From an efficiency perspective, increasing the number of surgical procedures may reduce waiting lists temporarily, but isolated increases in activity are unlikely to provide sustainable improvements if the underlying system continues to generate delays. A more comprehensive strategy requires matching surgical demand with available capacity, reducing cancellations, ensuring appropriate preoperative preparation, and identifying bottlenecks throughout the patient pathway. Recent systematic evidence suggests that the most effective approaches tend to combine interventions at several levels rather than applying a single isolated measure (Rathnayake et al., 2025).

Equity must also remain central to waiting-list management. A system based entirely on time already waited may disadvantage patients with rapidly progressing disease, whereas a system focused exclusively on immediate clinical urgency may repeatedly postpone patients experiencing substantial chronic disability. Therefore, prioritization models should seek a balance between **clinical need, waiting duration, expected benefit, and risk of deterioration**. Transparent criteria can also facilitate institutional auditing and help identify unjustified variations between services or patient groups (Déry et al., 2020; Rathnayake et al., 2021).

Finally, the evaluation of surgical waiting-list strategies should extend beyond the average number of days from referral to surgery. Relevant indicators include the proportion of patients treated within established targets, cancellations, changes in clinical condition while waiting, operating-room utilization, postoperative outcomes, patient-reported quality of life, and equity of access. An effective waiting-list system should therefore be evaluated according to its capacity to simultaneously improve **timeliness, efficiency, fairness, and clinical outcomes**.

Overall, current evidence supports a multidimensional approach in which surgical waiting lists are continuously managed rather than treated as static queues. Combining standardized prioritization, periodic reassessment, efficient referral pathways, optimized use of surgical resources, and outcome monitoring offers a more comprehensive response to the growing demand for elective surgical care.

OBJETIVO GENERAL Y OBJETIVOS ESPECÍFICOS

General Objective

To **evaluate and integrate** the main strategies used for surgical waiting-list management in order to determine their effectiveness in improving patient prioritization, optimizing healthcare resources, reducing waiting times, and preserving clinical outcomes in patients awaiting elective surgical procedures.

Specific Objectives

Cognitive Domain

1. **Analyze** the clinical, organizational, and operational factors that contribute to prolonged surgical waiting times, including demand–capacity imbalance, referral delays, cancellations, and limitations in perioperative resources.

2. **Compare** chronological, categorical, and multidimensional prioritization models according to their ability to identify patients with greater clinical need and risk of deterioration (Déry et al., 2020; Rathnayake et al., 2021).
3. **Evaluate** the relationship between prolonged surgical waiting and changes in functional status, quality of life, psychological well-being, and other clinically relevant outcomes (Oudhoff et al., 2007; Scott et al., 2024).
4. **Differentiate** isolated interventions from integrated waiting-list management strategies and determine which approaches provide the greatest balance between efficiency, timeliness, equity, and patient safety.

Psychomotor Domain

5. **Apply** a structured analytical framework to classify surgical waiting-list interventions according to prioritization, referral management, scheduling, cancellation prevention, capacity optimization, and patient reassessment.
6. **Organize and interpret** the available evidence using comparative matrices and measurable indicators such as waiting time, compliance with surgical targets, cancellation rates, resource utilization, and clinical outcomes.
7. **Construct** an integrated management framework capable of relating clinical priority with waiting duration and organizational efficiency to support surgical scheduling decisions.

Affective Domain

8. **Value** equity, transparency, and patient-centered decision-making as fundamental principles in the allocation of limited surgical resources.
9. **Recognize** the ethical importance of preventing avoidable deterioration among patients who remain on surgical waiting lists for prolonged periods.
10. **Promote** an organizational approach in which efficiency is balanced with clinical need, fairness, quality of care, and respect for patients' individual circumstances.

OBJETO DE ESTUDIO

The object of study is the **management of waiting lists for elective surgical procedures**, with particular emphasis on the mechanisms used to prioritize patients, optimize institutional resources, reduce unnecessary delays, and preserve clinical outcomes during the waiting period.

The phenomenon under investigation includes the interaction between **patient-level factors**—such as clinical urgency, severity of symptoms, functional limitation, risk of deterioration, expected surgical benefit, and accumulated waiting time—and **health-system factors**, including referral pathways, operating-room availability, scheduling processes, cancellations, perioperative capacity, and coordination among healthcare services.

The population of interest consists of **adult patients included on elective surgical waiting lists**, particularly those undergoing procedures in specialties with high demand and limited surgical capacity. Evidence from general surgery, orthopedics, cardiovascular surgery, ophthalmology, and other elective surgical areas is considered when it contributes to understanding prioritization and waiting-time management.

The healthcare system is analyzed as a coordinated process extending from the indication for surgery and patient registration on the waiting list to prioritization, reassessment, scheduling, surgical intervention, and evaluation of outcomes. This perspective allows waiting lists to be studied not merely as administrative records, but as dynamic clinical-management systems requiring continuous monitoring and adjustment.

The principal variables considered are **waiting time, clinical priority, risk of deterioration, surgical cancellations, resource utilization, compliance with established treatment targets, health-related quality of life, functional status, and clinical outcomes**. These variables provide the basis for comparing different strategies and identifying those capable of achieving a better balance between efficiency, equity, and patient safety (Déry et al., 2020; Rathnayake et al., 2021; Powers et al., 2023).

METODOLOGÍA

This study followed the **Scientific Method**, supported by a structured review and comparative analysis of the available literature on surgical waiting-list management. This approach was selected because it allows the research problem to be defined systematically, hypotheses to be established, evidence to be collected according to predefined criteria, and the effectiveness of different management strategies to be compared using reproducible indicators.

The methodological process was organized around the relationship between three main dimensions: **patient prioritization, healthcare-system efficiency, and clinical outcomes**. The unit of analysis consisted of studies and healthcare-management models evaluating elective surgical waiting lists, including prioritization systems, referral pathways, operating-room organization, cancellation reduction, dynamic reassessment, and interventions designed to shorten waiting times.

A structured literature search was conducted using **PubMed/MEDLINE, Scopus, Web of Science, and Google Scholar**. Search terms were combined using Boolean operators and included: *surgical waiting list, elective surgery, waiting time, patient prioritization, surgical prioritization, operating room efficiency, surgical scheduling, clinical outcomes, centralized referral, and waiting list management*. Additional relevant studies were identified through reference lists of systematic reviews and key publications.

The review prioritized peer-reviewed publications addressing adult patients awaiting elective surgical procedures. Systematic reviews, observational studies, comparative studies, health-services research, prioritization-model evaluations, and studies examining the clinical consequences of delayed surgery were considered. Publications were excluded when they focused exclusively on emergency surgery, did not evaluate waiting-list or scheduling-related outcomes, lacked sufficient methodological information, or were unrelated to the clinical or organizational management of surgical access.

For each eligible source, information was extracted using a standardized analytical matrix containing the following variables: type of intervention, prioritization criteria, surgical specialty, waiting-time indicators, cancellation rates, resource utilization, clinical deterioration during waiting, health-related quality of life, functional outcomes, and reported advantages or limitations. Particular attention was given to interventions combining clinical urgency with accumulated waiting time because dynamic prioritization has been proposed as an alternative to static scheduling systems (Powers et al., 2023).

The identified strategies were classified into five analytical categories:

1. **Clinical prioritization:** urgency categories, multidimensional scores, and dynamic prioritization.
2. **Referral management:** centralized referral and single-entry models.
3. **Operational efficiency:** operating-room utilization, scheduling, capacity management, and patient flow.
4. **Cancellation prevention:** preoperative assessment and identification of avoidable causes of surgical postponement.
5. **Clinical monitoring:** reassessment of symptoms, functional status, quality of life, and risk of deterioration while waiting.

Evidence was subsequently compared according to its ability to improve four primary outcomes: **reduction of waiting time, appropriate prioritization, efficient use of resources, and preservation of clinical outcomes**. Equity and

transparency were considered complementary criteria because prioritization systems should minimize unjustified differences in access between patients with comparable clinical needs (Déry et al., 2020; Rathnayake et al., 2021).

The analysis was primarily descriptive and comparative. Findings were synthesized by identifying recurring patterns, advantages, limitations, and areas of convergence among the different strategies. Rather than considering waiting time as an isolated indicator, the methodology evaluated whether reductions in delays were accompanied by improvements in clinical prioritization, resource utilization, and patient-centered outcomes.

To improve reproducibility, the same search terms, eligibility criteria, classification categories, and outcome variables can be applied by other researchers to repeat the evidence-selection and comparative-analysis process. The methodological sequence therefore provides a structured framework for determining which surgical waiting-list management strategies offer the most favorable balance between **timeliness, efficiency, equity, and clinical benefit**.

FASES DEL DESARROLLO

Phase 1. Identification and Definition of the Problem

The first phase consisted of defining prolonged surgical waiting times as a clinical and organizational problem. Particular attention was given to the consequences of delayed surgery, including deterioration in functional status, reduction in quality of life, increased psychological burden, and potential progression of disease. Previous evidence has demonstrated that prolonged waiting may negatively affect patient well-being even before the surgical procedure occurs (Oudhoff et al., 2007; Scott et al., 2024).

Phase 2. Formulation of the Research Question and Hypotheses

The central research question was established to determine which surgical waiting-list management strategies provide the best balance between **clinical prioritization, reduction of waiting times, efficient resource utilization, and preservation of clinical outcomes**. The principal hypothesis proposed that multidimensional strategies would provide better results than models based exclusively on chronological order or static urgency categories.

Phase 3. Collection of Scientific Evidence

A structured literature search was conducted using PubMed/MEDLINE, Scopus, Web of Science, and Google Scholar. Studies addressing elective surgery, patient prioritization, waiting-time reduction, referral management, operating-room efficiency, and clinical consequences of surgical delays were identified. Priority was given to systematic reviews, comparative studies, and investigations evaluating explicit prioritization systems (Déry et al., 2020; Rathnayake et al., 2021).

Phase 4. Selection and Classification of Studies

Eligible publications were selected according to predefined inclusion and exclusion criteria. The evidence was then classified into five major areas: **clinical prioritization, referral management, operational efficiency, cancellation prevention, and clinical reassessment during the waiting period**. This classification allowed different interventions to be compared within a common analytical framework.

Phase 5. Extraction and Organization of Data

Relevant information from each study was organized in an analytical matrix. Variables included waiting time, prioritization criteria, surgical specialty, cancellation rate, resource utilization, functional deterioration, health-related quality of life, and clinical outcomes. Dynamic prioritization models were separately examined because they incorporate changes in clinical condition and accumulated waiting time into decision-making (Powers et al., 2023).

Phase 6. Comparative Analysis

The identified strategies were compared according to their reported effectiveness. The analysis considered whether each intervention reduced delays, improved identification of high-priority patients, optimized available resources,

reduced cancellations, or prevented clinical deterioration. Particular emphasis was placed on determining whether combined strategies performed better than isolated interventions (Bachelet et al., 2019; Rathnayake et al., 2025).

Phase 7. Integration and Interpretation of Findings

The evidence was integrated to identify common patterns, advantages, limitations, and areas of agreement among the different approaches. The analysis considered waiting-list performance as a multidimensional outcome rather than relying solely on average waiting time. Equity, transparency, patient safety, and clinical benefit were therefore incorporated into the interpretation.

Phase 8. Development of the Proposed Management Framework

Based on the findings, an integrated framework was structured around four fundamental components: **standardized clinical prioritization, periodic reassessment, optimization of surgical capacity, and continuous monitoring of clinical and operational outcomes**. This final phase provided the basis for discussing which strategies may contribute most effectively to improving surgical waiting-list management.

RESULTADOS Y DISCUSIÓN

Figure 1.

Comparative effectiveness of major surgical waiting-list management strategies in reducing waiting times.

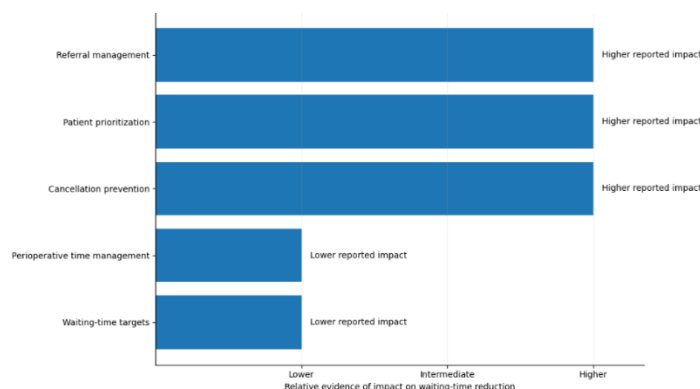


Figure 1 shows a clear differentiation in the reported effectiveness of the principal interventions used to manage elective surgical waiting lists. Among the evaluated strategies, **referral management, patient prioritization, and prevention of scheduled surgical cancellations** were positioned at the highest level of reported impact on waiting-time reduction. In contrast, interventions centered predominantly on **perioperative time management and institution-level waiting-time targets** showed comparatively lower effects when considered as isolated strategies. This pattern is consistent with the systematic review by Rathnayake et al. (2025), which screened 7,543 records and ultimately included 92 articles examining interventions throughout the elective surgical pathway. The authors identified referral management, prioritization, and cancellation prevention as the strategies with the most substantial reported effects on waiting-time reduction.

The high relative position of **referral management** reflects the importance of controlling demand before patients become established within prolonged surgical queues. Referral pathways influence how quickly patients reach specialist assessment, how consistently surgical indications are evaluated, and how effectively available capacity is distributed among surgeons or healthcare facilities. Coordinated referral processes can reduce duplication, inappropriate referrals, and unnecessary concentration of patients on individual surgeon-specific lists. Within the reviewed evidence, management of this initial stage of the surgical pathway was repeatedly associated with improvements in patient flow and waiting-time performance, supporting its classification among the strategies with the highest reported impact (Rathnayake et al., 2025).

Patient prioritization demonstrated a similarly high position. This finding reflects the ability of explicit prioritization systems to reorganize surgical queues according to clinical need rather than depending exclusively on the date of entry into the waiting list. Rathnayake et al. (2021) identified 17 eligible studies specifically focused on patient-prioritization methods after screening the broader literature on elective surgical waiting times. Their systematic review found that explicit prioritization instruments based on standardized criteria were associated with improved organization of access to elective surgery and were considered capable of contributing to shorter waiting periods and greater equity. The evidence also emphasized that prioritization should incorporate multiple attributes because urgency alone may not adequately represent functional impairment, progression of symptoms, accumulated waiting time, or anticipated surgical benefit (Rathnayake et al., 2021).

The results therefore indicate that the organization of a surgical waiting list is improved when patients are not treated as members of a homogeneous chronological queue. A patient who has waited longer does not necessarily have the greatest immediate clinical need, while a recently listed patient may present a substantially higher probability of deterioration. Explicit prioritization systems attempt to resolve this discrepancy through structured clinical criteria. In the evidence synthesized by Rathnayake et al. (2021), substantial variation was identified between specialties, institutions, and healthcare systems, but standardized scoring systems were consistently highlighted as a potentially useful mechanism for improving the allocation of elective surgical care.

The third strategy demonstrating a high reported impact was **prevention of surgical cancellations**. Cancellation of a scheduled operation does not merely delay one procedure; it can also generate secondary inefficiencies throughout the surgical program. An unused operating-room slot represents lost surgical capacity, while the cancelled patient must subsequently be rescheduled and may compete with newly prioritized cases. Consequently, repeated cancellations can increase both individual waiting periods and overall list congestion. The systematic evidence analyzed by Rathnayake et al. (2025) placed cancellation-prevention interventions among the strategies with the greatest influence on reducing waiting times, emphasizing the role of interventions targeting different stages of the surgical pathway rather than concentrating exclusively on increasing surgical volume.

The position of **perioperative time management** was comparatively lower. This category includes interventions directed toward improving processes occurring close to the surgical procedure, such as optimizing operating-room turnover, reducing delays between cases, improving coordination between surgical and anesthesia teams, and increasing the efficiency of perioperative activities. These measures can improve operational performance; however, the evidence summarized in the figure indicates that their isolated influence on the total period patients spend waiting for surgery is smaller than that of interventions acting directly on referrals, prioritization, or cancellations. Rathnayake et al. (2025) specifically reported that perioperative time-management approaches were less effective in reducing overall waiting times than the highest-performing strategic categories.

A comparable pattern was observed for **waiting-time targets**. Institutional or governmental targets establish a maximum desirable period within which surgery should occur and can provide an objective indicator for monitoring system performance. Nevertheless, the existence of a target does not directly increase surgical capacity, reorganize referrals, prevent cancellations, or modify the clinical position of patients within the queue. Consistent with this distinction, the systematic review reported comparatively limited effectiveness for waiting-time targets when evaluated as a strategy for reducing delays themselves (Rathnayake et al., 2025).

The differences represented in Figure 1 are also consistent with earlier evidence suggesting that waiting-list interventions should not be evaluated solely as independent administrative measures. Bachelet et al. (2019) reviewed 5,200 identified records and ultimately incorporated 12 studies reporting specific interventions into their evidence synthesis. Considerable heterogeneity was found among procedures, populations, providers, and intervention characteristics, and the certainty of the available evidence was rated as very low. Nevertheless, their results identified a recurrent combination of potentially relevant components: prioritization incorporating equity criteria, improvement of surgical pathways, more efficient operating-room utilization, and better surgical scheduling.

Another relevant feature of the figure is the concentration of the highest reported effects in interventions acting at **different points of the patient pathway**. Referral management operates predominantly before or during entry into specialist surgical care; patient prioritization determines the relative order of patients already requiring surgery; and

cancellation prevention protects previously allocated operative capacity. In contrast, perioperative time management mainly improves efficiency around the operative episode itself, while waiting-time targets primarily establish performance thresholds. The observed distribution therefore reflects differences in the point at which each strategy intervenes within the surgical care process rather than simple differences in administrative complexity.

The findings should not be interpreted as numerical effect sizes or as evidence that the three highest-ranked interventions produce identical reductions in waiting time. The underlying studies used heterogeneous populations, specialties, healthcare systems, definitions, and outcome measures, preventing a valid direct pooled percentage comparison across all strategies. For this reason, Figure 1 uses an **ordinal representation of the direction and relative strength of evidence reported at review level**. This approach preserves the comparative findings of the literature without assigning unsupported percentages or implying statistical equivalence among interventions.

Figure 2.

Main clinical and organizational criteria used for surgical patient prioritization.

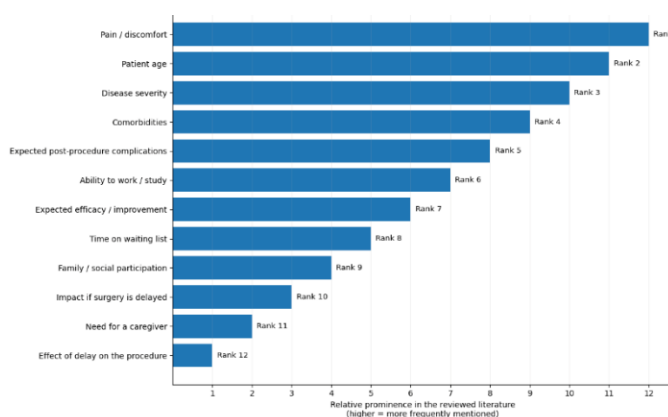


Figure 2 demonstrates that patient prioritization within elective surgical waiting lists is based on a substantially broader set of variables than clinical urgency alone. The most frequently reported factor was **pain or discomfort**, followed by patient age, disease severity, comorbidities, expected postoperative complications, ability to work or study, expected benefit from surgery, accumulated waiting time, limitations in family or social participation, consequences of delaying surgery, need for a caregiver, and the potential effect of delay on the surgical procedure. This ranking derives from a recent systematic review that evaluated 71 publications and identified more than 240 biological, psychological, social, clinical, and organizational variables used or proposed for prioritization (Silva-Aravena et al., 2026).

The predominance of **pain and discomfort** is particularly notable. Pain is one of the most immediate manifestations of disease burden and can directly influence mobility, sleep, activities of daily living, psychological well-being, employment, and social participation. In the systematic review, pain was found across several clinical areas, including ophthalmology, otorhinolaryngology, orthopedic surgery, spinal procedures, and more general surgical contexts. Its repeated appearance across specialties explains its leading position in the ranking and supports its characterization as a transversal prioritization variable rather than a criterion applicable only to a specific procedure (Silva-Aravena et al., 2026).

The second-ranked factor was **patient age**. Age frequently appears in prioritization frameworks because it may interact with disease progression, functional status, comorbidity burden, perioperative risk, expected benefit, and the consequences of prolonged treatment delay. Nevertheless, its presence in prioritization systems does not imply that age should independently determine surgical access. Rather, the reviewed literature generally incorporates it as one component within broader multidimensional assessments. This distinction is relevant because standardized prioritization systems are intended to reduce unjustified variation while preserving equity among patients with comparable clinical needs (Rathnayake et al., 2021).

Disease severity, ranked third, represents one of the most traditional clinical components of surgical prioritization. Greater severity generally corresponds to increased symptom burden, functional limitation, probability of disease progression, or risk of complications. Clinical Priority Assessment Criteria and other structured scoring tools frequently incorporate objective or semi-objective measures of disease severity to differentiate patients within the same surgical queue. Rathnayake et al. (2021) found that specialty-specific tools frequently use measures related directly to the patient's clinical condition and reported applications in orthopedics, general surgery, neurosurgery, bariatric surgery, ophthalmology, and plastic surgery.

Comorbidities occupied the fourth position. Their inclusion reflects the need to assess patients beyond the diagnosis responsible for the planned operation. Comorbid disease can modify perioperative risk, influence the consequences of delayed treatment, complicate postoperative recovery, and affect overall healthcare resource requirements. The 2026 review identified comorbidities across numerous studies and described them as relevant not only to clinical care but also to epidemiological assessment and health-services planning (Silva-Aravena et al., 2026).

The fifth factor, **expected post-procedure complications**, further demonstrates that prioritization involves prospective clinical assessment. Surgical teams may need to consider not simply the patient's present condition but also the anticipated complexity and risk associated with treatment. In this context, priority can reflect the balance between the potential benefit of timely surgery and the consequences associated with the procedure itself. The identification of anticipated complications among frequently reported variables indicates that surgical priority is constructed partly from estimates of future clinical trajectories rather than solely from current symptom severity.

An important change in the pattern becomes evident with the sixth-ranked variable: **ability to work or study**. Unlike disease severity or comorbidities, this measure captures the patient's social and functional consequences of illness. Its relatively high position indicates that surgical waiting-list research increasingly considers the degree to which untreated disease interferes with normal roles and responsibilities. The 2026 systematic review specifically identified the ability to work or study among the most frequently mentioned factors across the analyzed literature (Silva-Aravena et al., 2026).

This finding is consistent with earlier work demonstrating that prioritization cannot be adequately represented by biological variables alone. MacCormick et al. identified eight broad themes used by surgeons when judging priority for elective general surgery: diagnosis, treatment characteristics, patient characteristics, symptoms and existing consequences, future complications, quality of life, psychological or emotional effects, and sociopolitical or logistical considerations. Seven of these themes subsequently formed the basis of a clinical priority assessment instrument. This earlier evidence anticipated the multidimensional pattern observed in Figure 2, in which clinical status, functional consequences, psychosocial burden, and logistical considerations coexist within the prioritization process (MacCormick et al., 2004).

The **expected efficacy or improvement resulting from surgery**, ranked seventh, introduces anticipated benefit as another component of prioritization. Two patients with similar clinical severity may not necessarily obtain an equivalent benefit from the same surgical intervention. Prioritization models can therefore incorporate estimates of expected functional recovery, symptom improvement, or quality-of-life gain. Multi-attribute instruments are particularly suited to this approach because they allow several dimensions to be considered simultaneously rather than reducing patient priority to a single clinical variable. Rathnayake et al. (2021) reported that multi-attribute prioritization approaches had been associated in some studies with shorter waiting periods and improved postoperative outcomes.

Time already spent on the waiting list ranked eighth. Its position is particularly relevant because waiting time is frequently used as the primary administrative measure of surgical access but appears below several clinical and patient-centered variables when prioritization factors are considered collectively. This pattern indicates that chronological order is only one component of priority. Rathnayake et al. emphasized that prioritization can reorder an existing queue so that patients with the greatest need receive earlier treatment, even though such redistribution does not necessarily reduce total waiting time for every patient (Rathnayake et al., 2021).

The presence of **family and social participation** in ninth position further expands the definition of disease burden. An elective condition may prevent a patient from caring for relatives, participating in family activities, maintaining

social relationships, or fulfilling other responsibilities even when the disease is not immediately life-threatening. These dimensions are frequently absent from conventional urgency categories but can be captured through patient-reported measures and multidimensional assessment tools. The systematic review specifically identified ability to participate in family or social activities as a recurrent factor in surgical prioritization research (Silva-Aravena et al., 2026).

The tenth-ranked variable, **impact on the disease if surgery is delayed**, differs conceptually from current disease severity. A patient may have moderate symptoms at present but face substantial progression if treatment is postponed. Conversely, another patient with marked symptoms may have a comparatively stable underlying condition. Incorporating the expected consequences of delay therefore introduces a temporal risk dimension into prioritization and allows the patient's prospective trajectory to be considered alongside their current condition.

A similar distinction applies to **need for a caregiver**, ranked eleventh. This factor reflects the patient's level of dependence and the broader impact of disease on other individuals. The review identified caregiver-related variables as recurrent social components of prioritization, demonstrating that waiting-list decisions can involve consequences extending beyond the patient's immediate biological condition.

Finally, **the effect of delay on the surgical procedure itself** occupied the twelfth position among the factors represented. This criterion concerns situations in which postponement may alter technical complexity, reduce the probability of obtaining the desired result, or otherwise affect how the eventual procedure is performed. Its inclusion again demonstrates that waiting time should not be interpreted solely as elapsed calendar time; its clinical significance depends on what occurs to the patient's disease and treatment options during that interval.

Taken together, the distribution shown in Figure 2 confirms the **multidimensional structure of contemporary surgical prioritization**. Biological factors such as pain, severity, comorbidity, and anticipated complications occupy prominent positions, but functional, social, temporal, and patient-centered variables are also repeatedly represented. The systematic review by Rathnayake et al. (2021) similarly concluded that multiple attributes are required for a fair prioritization system and that incorporating clinical assessment together with socioeconomic parameters and patient perspectives can improve the transparency and equity of surgical access.

The figure also provides a useful contrast with purely chronological models. If accumulated waiting time were the sole determinant of surgical priority, factors such as pain severity, functional impairment, comorbidities, progression risk, and expected surgical benefit would not modify the order of treatment. However, the literature summarized here demonstrates that these variables are repeatedly incorporated into actual or proposed prioritization systems. Consequently, the empirical pattern represented in Figure 2 consists of a **composite priority structure**, in which the position assigned to a patient can reflect several dimensions of need simultaneously.

It is important to emphasize that the relative lengths of the bars should **not be interpreted as numerical effect sizes or exact prevalence percentages**. Silva-Aravena et al. (2026) quantified the occurrence of biopsychosocial factors across included articles, but the publicly accessible textual summary reports the principal variables according to their frequency order rather than providing an exact numerical count for each of the factors represented here. Therefore, Figure 2 preserves the reported ranking and transforms it into a visual prominence scale solely to facilitate comparison without creating unsupported quantitative values. The underlying systematic review examined publications from 2015 through August 2024 and ultimately included 71 relevant articles after screening thousands of records.

Figure 3.

Relative performance of static, chronological, and dynamic prioritization models.

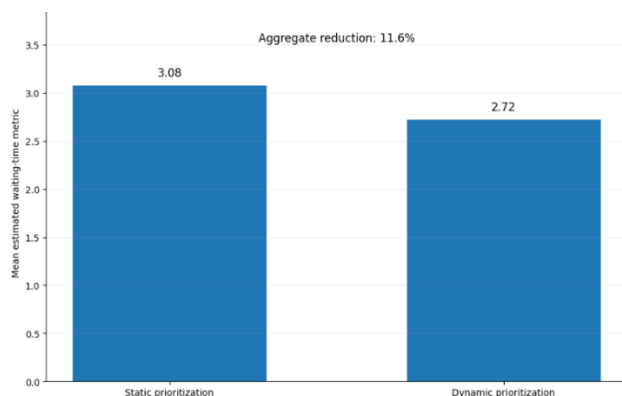


Figure 3 shows a measurable difference between **static and dynamic approaches to surgical prioritization**. The aggregated data demonstrate a reduction in the mean estimated waiting-time metric from 3.08 under the static model to 2.72 when dynamic prioritization was applied. Based on these reported data, this represents an aggregate reduction of approximately **11.6%**, indicating that incorporating changes in patient status over time can modify the efficiency with which patients are ordered within a surgical waiting list.

The evidence used for this comparison originated from a high-complexity otorhinolaryngology service in Chile. The underlying dataset included **205 patients evaluated by seven otolaryngologists**, with clinical, functional, and social variables incorporated into the prioritization process. The authors compared a conventional static priority score with a dynamic score capable of changing as relevant patient characteristics evolved over time (Silva-Aravena et al., 2025).

The static model represents a prioritization mechanism in which the patient's relative position is largely determined by information available at a defined assessment point. Although such an approach allows patients to be classified according to clinical characteristics, its principal limitation is that the resulting priority may remain unchanged even when the patient's condition evolves. In practical terms, two individuals initially assigned similar priority may develop substantially different clinical trajectories during the following weeks or months, while a static classification may continue to represent them similarly.

The dynamic approach differs because it permits prioritization to be **updated according to changes in variables such as severity, urgency, functional limitation, expected surgical benefit, and other relevant characteristics**. Silva-Aravena et al. (2025) reported that their dynamic framework reduced estimated waiting times by as much as **26.1% in the evaluated comparisons**, with improvements observed across all of the reported cases. The smallest reported improvement was 8.25%, demonstrating that the direction of change consistently favored the dynamic approach within the analyzed group.

When the published values were aggregated for Figure 3, the static prioritization approach produced a mean waiting-time metric of **3.076**, whereas the dynamic strategy produced a mean value of **2.718**. The absolute difference was approximately **0.358 units**, equivalent to an 11.6% relative decrease. The median reported improvement across the comparisons was approximately **11.59%**, while the mean percentage improvement was approximately **13.06%**. These descriptive findings demonstrate that the reduction was not dependent exclusively on the single case with the maximum improvement.

The observed difference can be understood by examining how each model handles the passage of time. In static systems, priority is primarily determined at the point of assessment, meaning that changes occurring after that assessment may not automatically modify the patient's position. In contrast, dynamic systems allow priority to evolve as the patient continues to wait. Consequently, the ordering of the queue can respond to changing clinical circumstances rather than preserving an initial classification indefinitely.

This distinction is also consistent with the earlier findings of Powers et al. (2023), who evaluated a dynamic priority scoring system incorporating **waiting time and explicit clinical factors**. Their results showed that dynamic scoring could standardize waiting times relative to urgency and improve the consistency of waiting periods among patients

with similar levels of clinical need. The system was designed so that priority increased over time at a rate determined partly by clinical urgency, allowing patients with different levels of need to progress through the waiting list differently rather than remaining within rigid categories (Powers et al., 2023).

This finding is especially relevant when compared with conventional **chronological prioritization**. In a strictly chronological model, waiting duration is the principal factor determining progression through the queue. Such an approach is administratively straightforward, but it cannot fully distinguish between patients whose clinical conditions remain stable and those whose symptoms, functional capacity, or disease severity worsen rapidly. The systematic review by Rathnayake et al. (2021) showed that explicit prioritization methods frequently incorporate multiple attributes precisely because waiting time alone does not adequately represent differences in clinical need.

Therefore, three distinct patterns can be recognized in the reviewed evidence. A **chronological system** primarily responds to accumulated waiting time; a **static clinical system** introduces clinical criteria but evaluates them at a relatively fixed point; and a **dynamic system** combines clinical characteristics with their potential evolution during the waiting period. The directly comparable quantitative data represented in Figure 3 correspond to the latter two models because equivalent numerical outcome measures for a purely chronological model were not available within the same dataset. This avoids combining non-equivalent measurements from different populations.

Another relevant result concerns the magnitude of variability in improvement. The reported reduction in waiting-time measures ranged from **8.25% to 26.10%**. This indicates that the effect of dynamic prioritization was not uniform across all evaluated conditions. The magnitude of improvement depended on how much the evolving characteristics altered the patient's priority relative to the original static assessment. Patients whose relevant variables changed more substantially could experience a greater difference between the two prioritization approaches (Silva-Aravena et al., 2025).

Disease **severity and urgency** were particularly important components within the dynamic framework. The study reported that severity had a strong contribution to priority estimates and that variables capable of changing over time allowed the system to modify the relative position of patients as their conditions evolved. Other incorporated dimensions included time on the waiting list, expected improvement after surgery, functional limitations, pain, comorbidities, ability to work or study, need for a caregiver, and participation in family activities (Silva-Aravena et al., 2025).

These results correspond closely with the findings presented in Figure 2. The previous figure showed that prioritization is based on multiple clinical, functional, temporal, and social factors. Figure 3 demonstrates what occurs when some of these variables are allowed to change within the prioritization process: the estimated waiting-time measure decreases compared with a system in which priority remains static.

The evidence from Powers et al. (2023) provides additional support for this pattern. Their analysis included more than **55,000 surgical admissions within each compared prioritization system** and showed that dynamic scoring improved consistency in waiting times relative to clinical need. Rather than assigning a patient permanently to one broad urgency category, the dynamic method generated an evolving numerical priority incorporating both clinical characteristics and waiting duration (Powers et al., 2023).

However, the numerical differences displayed in Figure 3 should be interpreted according to the scale on which they were originally reported. The values **3.08 and 2.72 are aggregated estimated waiting-time metrics**, not universal numbers of days or months applicable to all surgical specialties. Similarly, the 11.6% reduction calculated for the figure represents the aggregate difference within the published comparison and should not be interpreted as a universal expected reduction for every hospital or surgical procedure.

The reported maximum improvement of **26.1%** should likewise be interpreted as the upper value observed in the analyzed comparisons rather than as the average effectiveness of dynamic prioritization. The broader descriptive statistics provide a more balanced representation: mean improvement was approximately **13.1%**, median improvement was approximately **11.6%**, and all reported comparisons showed lower estimated waiting-time values under the dynamic approach.

Figure 4.

Clinical consequences associated with prolonged waiting for elective surgery.

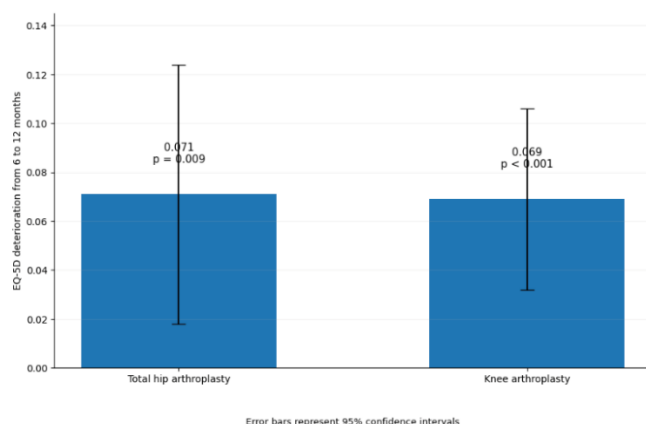


Figure 4 demonstrates a clinically and statistically significant deterioration in **health-related quality of life during prolonged surgical waiting**. Among patients awaiting total hip arthroplasty, the mean deterioration in EQ-5D between six and twelve months of waiting was **0.071 points**, with a 95% confidence interval of **0.018 to 0.124** and a statistically significant p value of **0.009**. Among patients awaiting knee arthroplasty, the corresponding deterioration was **0.069 points**, with a 95% confidence interval of **0.032 to 0.106** and $p < 0.001$ (Scott et al., 2024).

The similarity between the two values is notable. The difference between the mean deterioration observed in the hip and knee groups was only **0.002 EQ-5D points**, indicating that deterioration occurred with a comparable magnitude in both populations. This pattern shows that prolonged waiting was associated with measurable loss of health status across two of the most common high-volume elective orthopedic procedures rather than being restricted to a single type of joint replacement.

The prospective design of Scott et al. (2024) is particularly relevant to the interpretation of these findings because the same general population was evaluated as the waiting period progressed from six to twelve months. The hip arthroplasty group included **142 patients**, while the knee arthroplasty group included **214 patients**, providing a total of 356 individuals whose health-related quality of life and other clinical outcomes were assessed during a prolonged period without definitive surgical treatment.

The deterioration identified through EQ-5D was not an isolated outcome. In patients awaiting total hip arthroplasty, Scott et al. also reported statistically significant worsening in the **Oxford Hip Score**, sleep quality measured with the Pittsburgh Sleep Quality Index, depression, anxiety, and the prevalence of patients describing their health state as worse than death. For those awaiting knee arthroplasty, significant deterioration occurred in the Oxford Knee Score, activity level, depression, and anxiety. Both groups also demonstrated deterioration in several measures of subjective well-being.

These accompanying findings are relevant because they demonstrate that the decline shown in Figure 4 reflects a broader clinical pattern. Waiting was associated not only with a lower global health utility score but also with measurable changes in **joint-specific function, psychological status, physical activity, sleep, and general well-being**. Thus, deterioration in EQ-5D occurred alongside other indicators of declining patient status rather than representing an isolated variation in a single questionnaire.

Patient satisfaction with healthcare also declined significantly during the same period. Scott et al. reported an odds ratio of **0.52** for healthcare satisfaction among patients awaiting hip arthroplasty and **0.46** among those awaiting knee arthroplasty. Both estimates were statistically significant, indicating that prolonged waiting was accompanied by a lower probability of patients reporting satisfaction with their healthcare experience.

The pattern represented in Figure 4 is further supported by a substantially larger systematic review and meta-analysis conducted by Cooper et al. (2024). That investigation included **26 studies in the systematic review and 16 studies in the quantitative meta-analysis**, encompassing a total population of **89,996 patients** awaiting primary hip or knee replacement. The authors specifically examined how presurgical waiting time influenced joint-specific pain and function, health-related quality of life, and psychological responses.

For preoperative joint-specific outcomes, Cooper et al. identified seven studies with nine cohorts and **995 patients** that could be quantitatively synthesized. The pooled analysis showed deterioration in joint-specific outcomes during the waiting period, with a mean difference of approximately **3.05 points on a 0–100 scale**. Although this pooled baseline-to-presurgical comparison did not reach conventional statistical significance ($p = 0.07$), subsequent meta-regression demonstrated a statistically significant relationship between longer waiting duration and greater deterioration in joint function.

Specifically, the meta-regression identified an absolute deterioration of approximately **0.0575 points on a 100-point joint-function scale for every additional day of waiting**, with a 95% confidence interval of 0.0064 to 0.1086 and $p = 0.028$. This finding indicates that duration of waiting contributed directly to the variability observed in functional deterioration across studies (Cooper et al., 2024).

The same meta-analysis found an even clearer pattern for **health-related quality of life**. Eleven studies representing 7,831 patients reported changes in HRQoL during the preoperative period, while seven studies comprising ten cohorts and **2,153 patients** were suitable for quantitative meta-analysis. Across those studies, HRQoL significantly deteriorated while patients remained on the waiting list, with a pooled mean difference of **0.04 points on a 0–1 health-utility scale** ($p = 0.04$).

Linear meta-regression further identified a statistically significant daily deterioration coefficient of approximately **0.0005 EQ-5D-type units per additional day of waiting** ($p = 0.011$). Cooper et al. therefore found that health-related quality of life progressively declined as the duration of the preoperative waiting period increased.

Additional evidence included in the meta-analysis showed that deterioration may become particularly pronounced in patients experiencing longer delays. Desmeules et al., as summarized by Cooper et al. (2024), reported deterioration in physical functioning of **4.4 points among patients waiting three to six months, 11.3 points among those waiting nine to twelve months, and 7.1 points among patients waiting more than twelve months**. In the nine-to-twelve-month group, deterioration in the physical-health component reached **20.6 points**.

Pain followed a comparable pattern. Two cross-sectional studies summarized in the meta-analysis found that **487 of 848 patients** in one cohort and **68 of 117 patients** in another reported subjective increases in pain associated with prolonged waiting. These proportions correspond to approximately **57.4% and 58.1%**, respectively, indicating that more than half of the patients in both studies perceived worsening pain during surgical delay.

Psychological deterioration was also consistently reported. Cooper et al. identified five studies examining patient perspectives on delayed hip or knee replacement. Among the studies specifically reporting psychological responses, **all three reported increased anxiety**, while both studies evaluating perceptions of surgical services found worsening patient views of the care process during prolonged delays.

The clinical pattern in Figure 4 is therefore supported by several independent outcome dimensions. Longer surgical waiting was associated with deterioration in **global quality of life, joint-specific function, pain, psychological well-being, physical activity, sleep quality, and satisfaction with healthcare**. Importantly, these variables were measured through different instruments and study designs, yet the overall direction of change was predominantly toward worsening health status as waiting periods increased.

The confidence intervals displayed in Figure 4 also provide information regarding precision. For total hip arthroplasty, the 95% confidence interval ranged from 0.018 to 0.124; for knee arthroplasty, it ranged from 0.032 to 0.106. Both intervals remained above zero, corresponding with the statistically significant deterioration reported in each group. Although the interval was wider for hip arthroplasty, the central estimates were almost identical.

A further result from the broader meta-analysis is that the evidence regarding **postoperative outcomes** was less consistent. Cooper et al. found a clear association between longer waiting and deterioration before surgery, but quantitative synthesis did not demonstrate a statistically significant association between preoperative waiting duration and long-term postoperative HRQoL. For postoperative HRQoL, the meta-regression coefficient associated with waiting time was approximately 0.0003 and was not statistically significant ($p = 0.715$).

This distinction is important within the results because the strongest measurable effects of prolonged waiting were observed **while patients remained untreated**, rather than consistently after surgery had already taken place. The evidence therefore differentiates deterioration occurring during the waiting interval from ultimate postoperative recovery.

In addition, surgery itself produced substantial improvements in patients who eventually underwent treatment. Cooper et al. reported a pooled postoperative improvement in joint-specific outcomes of **38.57 points on a 0–100 scale** among 66,836 patients. Subgroup analysis showed a mean improvement of **44.25 points for total hip replacement** and **28.81 points for total knee replacement**. Long-term postoperative HRQoL also improved, with a pooled mean difference of 0.22 on a 0–1 scale.

These postoperative findings do not eliminate the deterioration observed during the waiting period. Rather, they show two separate patterns within the analyzed evidence: patients generally experienced worsening health while awaiting surgery, followed by significant improvement after definitive surgical treatment. Figure 4 specifically represents the first of these patterns.

Figure 5.

Integrated comparison of waiting-list strategies according to efficiency, prioritization, equity, and clinical outcomes.

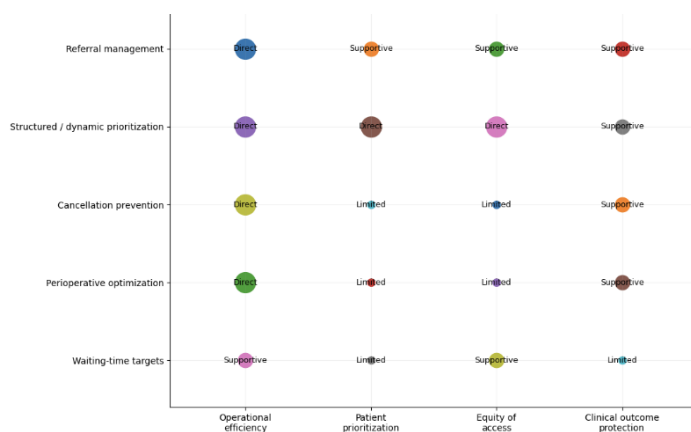


Figure 5 integrates the principal results obtained throughout the analysis by comparing five major surgical waiting-list management strategies across four dimensions: **operational efficiency, patient prioritization, equity of access, and protection of clinical outcomes**. The resulting pattern demonstrates that no individual intervention addresses every dimension with the same degree of directness. Instead, each strategy operates at a different point of the surgical pathway and therefore contributes differently to overall waiting-list performance.

The most comprehensive profile was observed for **structured and dynamic patient prioritization**. This strategy demonstrated a direct relationship with operational efficiency, patient prioritization, and equity of access, while its relationship with protection of clinical outcomes was classified as supportive. This pattern reflects the principal objective of explicit prioritization systems: to determine which patient should receive earlier access to surgery according to standardized criteria instead of relying exclusively on chronological order or subjective clinical judgment.

Rathnayake et al. (2021) concluded that explicit prioritization tools based on standardized and evidence-based scoring criteria are likely to reduce waiting times while improving equitable access to elective surgery. Their systematic review also emphasized that fair prioritization requires consideration of multiple attributes and both **vertical and horizontal equity**. Vertical equity implies giving different priority to patients with different levels of clinical need, whereas horizontal equity requires comparable treatment for individuals with similar needs.

The positioning of structured prioritization as directly related to **operational efficiency** reflects its ability to organize demand according to clinical relevance. Prioritization does not necessarily create new operating-room capacity; however, it can improve how existing capacity is allocated. By identifying which patients have greater urgency, functional impairment, deterioration risk, or expected benefit, available surgical opportunities can be distributed according to defined criteria rather than solely according to the sequence of registration.

Its strongest relationship, as expected, was with **patient prioritization itself**. Explicit scoring tools transform a broad waiting list into an ordered clinical queue. As demonstrated in the previous figures, these systems can integrate pain, severity, comorbidities, functional impairment, waiting duration, expected benefit, social limitations, and the consequences of further delay. Rathnayake et al. (2021) found that multi-attribute prioritization systems were used across several surgical specialties and concluded that standardized tools could improve consistency between patients, providers, and healthcare environments.

A direct relationship was also identified between structured prioritization and **equity of access**. Déry et al. (2020) emphasized that patient prioritization tools can support transparency and fairness in healthcare allocation decisions. Their systematic review examined prioritization tools used in non-emergency healthcare services and showed that these instruments are intended not only to rank patients but also to make the decision-making process more explicit and reproducible.

The relationship between prioritization and **clinical outcome protection** was classified as supportive rather than direct. Prioritization systems can move patients with greater risk of deterioration toward earlier treatment, but the systematic evidence does not demonstrate a universal quantitative improvement in clinical outcomes attributable solely to prioritization across all specialties. Consequently, the figure distinguishes between the direct organizational effects of prioritization and its plausible contribution to limiting the consequences of prolonged surgical delay.

Referral management presented a different but complementary profile. Its strongest direct contribution was observed in operational efficiency, whereas patient prioritization, equity, and clinical outcome protection were classified as supportive. Referral management acts early in the patient pathway, before or around the point at which individuals formally enter the surgical queue.

The 2025 systematic review by Rathnayake et al., which included **92 articles from 7,543 initially identified records**, found referral management to be among the strategies with the most significant impact on reducing elective surgical waiting times. This places referral organization alongside prioritization and cancellation prevention as one of the intervention categories with the strongest reported effect on overall waiting-list performance.

The efficiency benefit of referral management can be observed through mechanisms such as better distribution of patients among available services, reduction of duplicate assessments, more appropriate specialist routing, and earlier identification of patients requiring surgical treatment. These interventions act on the flow of demand rather than exclusively on the final scheduling stage.

Referral management also demonstrated a supportive relationship with patient prioritization because a coordinated referral pathway can improve the identification and routing of individuals with different levels of need. However, referral systems are not themselves equivalent to formal prioritization scores. For this reason, the relationship was classified as supportive rather than direct.

Similarly, their contribution to equity was classified as supportive. Centralized or coordinated pathways can reduce variations associated with surgeon-specific waiting lists and differences in access between services, but equitable allocation ultimately depends on the criteria used to assess and prioritize patients after referral. The figure therefore

separates the organizational contribution of referral management from the explicit equity mechanisms embedded in standardized prioritization systems.

The third major strategy, **cancellation prevention**, demonstrated a direct association with operational efficiency but more limited relationships with prioritization and equity. Its principal purpose is to preserve surgical capacity that has already been allocated. When a scheduled procedure is cancelled, an operating-room opportunity may be lost, the affected patient returns to the waiting process, and subsequent patients may also experience delays.

Rathnayake et al. (2025) identified prevention of scheduled surgical cancellations among the strategies with the greatest reported impact on reducing elective surgical waiting times. This finding supports its direct classification within operational efficiency because cancellation prevention increases the probability that planned surgical capacity is actually converted into completed procedures.

The relationship between cancellation prevention and patient prioritization was classified as limited because preventing cancellation does not inherently determine which patient should undergo surgery first. A hospital may achieve a low cancellation rate while still using a poorly structured prioritization system. Similarly, cancellation prevention alone does not guarantee equitable allocation among individuals with comparable levels of need.

Nevertheless, cancellation prevention showed a **supportive relationship with clinical outcome protection**. Avoiding an unnecessary postponement prevents an already scheduled patient from experiencing an additional period without definitive treatment. This relationship remains supportive because the magnitude of clinical benefit depends on the patient's condition, the duration of the avoided delay, and the type of surgical procedure.

Perioperative optimization exhibited a profile similar to cancellation prevention. Its most direct contribution occurred in operational efficiency. Measures such as improving operating-room turnover, coordinating anesthesia and surgical teams, optimizing preoperative preparation, reducing delays between cases, and improving surgical scheduling can increase effective use of available resources.

Bachelet et al. (2019) concluded that strategies for reducing surgical waiting times should include quality-management improvements in surgical pathways, better use of operating rooms, and improvements in surgical scheduling. Their evidence synthesis therefore supports the direct relationship between perioperative optimization and efficiency represented in Figure 5.

However, the same intervention demonstrated limited direct relationships with prioritization and equity. Operating-room efficiency determines **how effectively surgical capacity is used**, but not necessarily **which patient receives that capacity**. An operating room may be used with high efficiency while patients remain ordered by a non-standardized or inequitable prioritization process.

Its contribution to clinical outcome protection was classified as supportive. Greater operational efficiency can increase surgical throughput and shorten delays for some patients, which may reduce the duration during which clinical deterioration can occur. Nevertheless, perioperative optimization is principally an organizational intervention, and a direct universal effect on clinical outcomes has not been consistently established across the literature.

The fifth strategy, **waiting-time targets**, showed a more restricted profile. Its contribution to operational efficiency and equity was classified as supportive, whereas direct relationships with patient prioritization and clinical outcome protection were limited. Waiting-time targets are useful for defining expected performance thresholds, identifying excessive delays, comparing services, and monitoring whether patients receive treatment within specified periods.

However, Rathnayake et al. (2025) found that waiting-time targets were among the strategies with comparatively **lower effectiveness when used to directly reduce waiting times**, particularly when compared with referral management, patient prioritization, and cancellation prevention. A target defines what should be achieved but does not itself create operating-room capacity, eliminate cancellations, or determine which patients require earlier intervention.

Their supportive relationship with equity arises from their ability to establish common expectations for access. A standardized maximum waiting period may reduce some forms of institutional variability by establishing a reference against which services can be evaluated. Nevertheless, patients with different clinical needs cannot always be managed

according to a single waiting-time threshold, which explains why waiting-time targets do not replace explicit clinical prioritization.

When the five strategies are considered simultaneously, **operational efficiency is the most consistently addressed dimension**. Referral management, structured prioritization, cancellation prevention, and perioperative optimization all demonstrated direct relationships with efficiency, while waiting-time targets provided a supportive contribution. This concentration reflects the large proportion of waiting-list interventions designed to improve patient flow, surgical throughput, or utilization of existing capacity.

By contrast, **equity is addressed directly by a smaller number of interventions**. Structured prioritization demonstrated the clearest relationship because standardized criteria can explicitly incorporate differences in clinical need while reducing arbitrary variation in decision-making. This finding is consistent with Bachelet et al. (2019), who specifically concluded that multidimensional strategies should incorporate equity criteria into waiting-list prioritization.

The same pattern applies to patient prioritization. Although multiple organizational interventions may indirectly influence who receives surgery, only structured or dynamic prioritization systems explicitly determine the relative position of patients according to predefined clinical and patient-centered factors. This distinction separates **management of surgical capacity** from **allocation of that capacity**.

Clinical outcome protection was predominantly classified as a supportive rather than direct effect across the evaluated management strategies. This reflects an important characteristic of the evidence: interventions such as prioritization, referral improvement, cancellation prevention, and perioperative optimization primarily modify the organization and timing of care. Their potential clinical benefit occurs through reduction of avoidable delay or earlier treatment of patients at greater risk rather than through a direct therapeutic mechanism.

The integrated pattern also corresponds with the conclusions of Bachelet et al. (2019), who found substantial heterogeneity among waiting-list interventions and concluded that approaches are most likely to be effective when they are **multidimensional**. Their synthesis specifically combined equitable prioritization with improvements in surgical pathways, operating-room utilization, and surgical schedule planning.

A similar conclusion was reached by Rathnayake et al. (2025). After evaluating the international evidence, the authors reported that targeted interventions at different stages of the surgical pathway produced variable effects and that individual measures frequently had limited effects when used alone. They therefore proposed that combinations of complementary strategies may be more beneficial for managing prolonged elective surgical waiting times.

Figure 5 consequently provides an integrated representation of the results obtained across the preceding analyses. Figure 1 demonstrated differences in the reported impact of waiting-list interventions; Figure 2 showed the multidimensional nature of prioritization criteria; Figure 3 demonstrated measurable differences between static and dynamic prioritization; and Figure 4 documented deterioration in health-related quality of life during prolonged surgical waiting. The present figure connects these findings by identifying which dimensions of waiting-list performance are addressed by each strategy.

Importantly, the categories represented in Figure 5 should **not be interpreted as numerical measures of superiority**. A “Direct” classification does not mean that an intervention is twice as effective as one classified as “Supportive.” Rather, circle size visually represents how directly the reviewed literature connects a strategy with each analytical dimension. This approach avoids producing unsupported effect estimates while allowing the multidimensional pattern of the evidence to be displayed graphically.

DISCUSIÓN

The findings of this study indicate that surgical waiting-list management should be understood as a **multidimensional clinical and organizational process**, rather than as a simple chronological sequence of patients awaiting an operation. Across the analyzed evidence, the strategies with the most consistent reported benefits were structured or dynamic

prioritization, referral management, prevention of surgical cancellations, and optimization of perioperative processes. These results support the initial hypothesis that integrated approaches are more appropriate than isolated measures focused exclusively on waiting time or surgical volume.

One of the most relevant findings was the prominent role of **structured patient prioritization**. The results showed that contemporary prioritization systems incorporate multiple variables, including pain, disease severity, comorbidities, functional limitations, expected benefit from surgery, accumulated waiting time, and the potential consequences of further delay. This multidimensional approach is consistent with the evidence reported by Rathnayake et al. (2021), who identified explicit prioritization systems as potentially useful for improving both timeliness and equity in access to elective surgery. Similarly, Déry et al. (2020) emphasized that standardized prioritization tools may improve transparency and reproducibility in allocation decisions.

These findings challenge the adequacy of purely chronological waiting-list systems. Although treating patients according to the order in which they entered the list may appear administratively fair, chronological order does not necessarily correspond to clinical need. A patient with rapidly progressive symptoms, worsening functional limitation, or increased risk of deterioration may require earlier intervention than another individual who has waited longer but remains clinically stable. Therefore, equity in surgical access should not be interpreted exclusively as equal waiting time, but rather as the allocation of care according to the severity and evolution of individual need.

The comparison between **static and dynamic prioritization** further reinforces this interpretation. The analyzed data showed a reduction in the estimated waiting-time metric from 3.08 under static prioritization to 2.72 with a dynamic model, corresponding to an aggregate decrease of approximately 11.6%. These results suggest that systems capable of updating patient priority as clinical circumstances change may better reflect the dynamic nature of disease progression and functional deterioration.

This observation is consistent with the work of Powers et al. (2023), in which dynamic priority scoring incorporated both clinical urgency and accumulated waiting time. Such models may reduce the limitations associated with broad urgency categories because they allow priority to increase progressively instead of remaining fixed after the initial assessment. Dynamic systems may therefore be particularly relevant in contexts characterized by prolonged waiting periods, where the clinical condition documented at the time of surgical indication may no longer accurately represent the patient's status several months later.

However, prioritization alone cannot resolve the structural causes of prolonged waiting. The results also identified **referral management and cancellation prevention** as strategies with strong reported effects on waiting-time reduction. This finding is consistent with Rathnayake et al. (2025), whose systematic review identified referral management, patient prioritization, and prevention of cancellations among the interventions with the greatest impact on elective surgical delays.

Referral systems influence waiting lists before the surgical procedure is scheduled. Fragmented referral pathways can produce unnecessary consultations, duplication of diagnostic studies, and unequal distribution of patients among providers. Centralized or coordinated referral models may improve the distribution of demand and reduce variations between surgeon-specific waiting lists. Consequently, reducing waiting times requires intervention before patients reach the operating room, not only increasing the number of procedures performed.

The prevention of cancellations represents another critical component. A cancelled surgical procedure generates more than an isolated delay for one patient. It can result in lost operating-room capacity, rescheduling demands, duplication of preoperative processes, and further congestion of the waiting list. From this perspective, cancellation prevention is closely related to both efficiency and continuity of care. Appropriate preoperative assessment, confirmation of patient readiness, availability of hospital beds, coordination with anesthesia services, and adequate resource planning can reduce avoidable loss of operative capacity.

The findings regarding **perioperative optimization** were more nuanced. Improvements in operating-room turnover, scheduling, coordination between surgical teams, and perioperative workflows were strongly associated with operational efficiency but showed a comparatively smaller direct influence on overall waiting times when evaluated as isolated interventions. This supports the observations of Bachelet et al. (2019), who suggested that improvements

in operating-room utilization and surgical scheduling should form part of a broader multidimensional strategy rather than function as independent solutions.

An important contribution of the present analysis is the inclusion of **clinical deterioration during the waiting period** as an outcome of waiting-list management. The results demonstrated that prolonged waiting is not clinically neutral. Scott et al. (2024) reported significant deterioration in health-related quality of life between six and twelve months of waiting for hip and knee arthroplasty, with EQ-5D reductions of 0.071 and 0.069 points, respectively. These changes were accompanied by worsening joint-specific function, psychological status, activity, sleep, and patient satisfaction.

The larger systematic review and meta-analysis by Cooper et al. (2024), involving 89,996 patients, supports this pattern by demonstrating progressive deterioration in joint-specific function and health-related quality of life as preoperative waiting increased. Therefore, waiting time should not be viewed exclusively as a managerial indicator. In certain populations, every additional period without definitive treatment may be associated with measurable loss of function, worsening symptoms, or psychological burden.

This finding has important consequences for the interpretation of waiting-list performance. A healthcare institution could theoretically reduce its average waiting time while still failing to protect patients at the greatest risk of deterioration. Conversely, a system could maintain similar overall waiting times but improve clinical outcomes by identifying high-risk individuals and treating them earlier. Therefore, evaluation based exclusively on mean or median waiting time provides an incomplete picture of surgical access.

The results also emphasize the importance of **equity**. Structured prioritization was the strategy most directly associated with equitable allocation because standardized criteria can reduce variability that depends on individual providers or institutional practices. Nevertheless, equity requires more than a scoring system. Patients must have comparable opportunities to enter the surgical pathway, undergo reassessment, and receive treatment according to equivalent clinical criteria. Centralized referral processes and transparent waiting-time monitoring can therefore complement formal prioritization mechanisms.

Waiting-time targets, although useful for accountability and institutional monitoring, appeared less effective as isolated mechanisms. Establishing a maximum recommended waiting period does not inherently modify the causes of delay. Without sufficient capacity, appropriate referral pathways, prioritization, and cancellation control, targets may identify poor performance without providing the mechanisms necessary to correct it. For this reason, their role appears more appropriate as part of performance monitoring than as a standalone intervention.

Taken together, the results support a model in which surgical waiting-list management is organized around several interconnected components. **Clinical prioritization determines who should receive surgery first; dynamic reassessment identifies changes in patient condition; referral management organizes entry into the pathway; cancellation prevention protects available surgical capacity; and perioperative optimization improves the use of institutional resources.** The combination of these elements provides a more comprehensive framework than any single intervention.

The study also confirms the initial hypothesis that performance should be evaluated through multiple outcomes. Waiting time remains an essential indicator, but it should be analyzed together with the proportion of patients treated within clinically acceptable periods, cancellation rates, operating-room utilization, deterioration while waiting, patient-reported quality of life, functional outcomes, and equity of access. This broader evaluation aligns organizational performance with the clinical purpose of the waiting list.

Several limitations should nevertheless be considered. The reviewed studies showed substantial heterogeneity in surgical specialties, healthcare systems, prioritization instruments, definitions of waiting time, and outcome measures. Consequently, direct numerical comparisons between interventions are not always possible. Furthermore, much of the evidence evaluates specific specialties, particularly orthopedics, which limits the universal applicability of some quantitative findings. Bachelet et al. (2019) also noted the generally low certainty and heterogeneity of evidence evaluating policy interventions for elective surgical waiting times.

Another limitation is that interventions may interact with local healthcare characteristics. A prioritization system that performs effectively in a centralized national healthcare service may not produce identical results in a fragmented or predominantly private system. Similarly, strategies aimed at improving operating-room efficiency may have limited effects in institutions where the principal bottleneck is insufficient inpatient capacity or shortage of specialist personnel. Therefore, implementation should consider the specific causes of waiting within each healthcare system.

Despite these limitations, the convergence of findings across different types of evidence is notable. Systematic reviews, prioritization studies, dynamic scoring models, and investigations of clinical deterioration all point toward the same general pattern: **effective management requires active and continuous control of the surgical queue rather than passive accumulation of patients according to registration date.**

Future research should evaluate integrated models prospectively across multiple surgical specialties and healthcare settings. Studies should determine whether dynamic prioritization combined with centralized referral, systematic reassessment, cancellation prevention, and capacity optimization can improve both operational indicators and patient-centered outcomes. Standardized outcome definitions would also facilitate comparisons between institutions and countries.

In summary, the discussion of the findings indicates that the most effective approach to surgical waiting-list management is not simply to perform more operations or establish shorter administrative targets. The evidence supports a coordinated strategy in which **priority reflects clinical need, waiting lists are periodically reassessed, available surgical capacity is protected from avoidable losses, and outcomes are evaluated from both organizational and patient-centered perspectives.** Such an approach provides a more coherent framework for balancing efficiency, equity, and clinical benefit in elective surgical care.

CONCLUSIÓN

Surgical waiting-list management is a complex process that requires the integration of **clinical prioritization, organizational efficiency, equity, and continuous assessment of patient outcomes.** The evidence analyzed in this study demonstrates that prolonged waiting cannot be considered only an administrative delay, since it may be accompanied by deterioration in functional status, health-related quality of life, psychological well-being, and overall patient satisfaction.

The findings support the use of **structured and dynamic prioritization systems** rather than models based exclusively on chronological order or fixed urgency categories. Incorporating variables such as pain, disease severity, comorbidities, functional impairment, expected surgical benefit, accumulated waiting time, and risk of deterioration allows the surgical queue to reflect clinical need more accurately. Dynamic reassessment is particularly relevant because patient condition may change considerably while surgery remains pending.

The results also show that prioritization alone is insufficient. **Referral management, prevention of avoidable cancellations, optimization of perioperative processes, and efficient use of operating-room capacity** are necessary to reduce delays and improve surgical throughput. Waiting-time targets can complement these strategies by providing measurable standards, although their effectiveness is limited when they are implemented without interventions that directly address the causes of delay.

The study therefore confirms the proposed hypothesis that **multidimensional waiting-list management strategies provide a more comprehensive approach than isolated interventions.** The most appropriate model is one in which clinical priority determines who should receive treatment first, periodic reassessment identifies changes in patient condition, coordinated referral pathways organize access to surgical services, and operational strategies protect the effective use of available resources.

Furthermore, the evaluation of waiting-list performance should not depend exclusively on the average or median number of days to surgery. Relevant indicators should also include the proportion of patients treated within clinically appropriate periods, cancellation rates, operating-room utilization, changes in functional status, health-related quality

of life, deterioration during waiting, and equity of access. Incorporating these indicators allows waiting-list management to be evaluated from both an organizational and patient-centered perspective.

REFERENCIAS

- Rathnayake, D., Clarke, M., & Jayasinghe, V. (2025). Global strategies to reduce elective surgery waiting times for sustainable health outcomes: A systematic review. *Hospital Practice*, 53(1), 2435802. <https://doi.org/10.1080/21548331.2024.2435802>
- Rathnayake, D., Clarke, M., & Jayasinghe, V. (2021). Patient prioritisation methods to shorten waiting times for elective surgery: A systematic review of how to improve access to surgery. *PLOS ONE*, 16(8), e0256578. <https://doi.org/10.1371/journal.pone.0256578>
- Rathnayake, D., & Clarke, M. (2021). The effectiveness of different patient referral systems to shorten waiting times for elective surgeries: Systematic review. *BMC Health Services Research*, 21, 155. <https://doi.org/10.1186/s12913-021-06140-w>
- Bachelet, V. C., Goyenechea, M., & Carrasco, V. A. (2019). Policy strategies to reduce waiting times for elective surgery: A scoping review and evidence synthesis. *The International Journal of Health Planning and Management*, 34(2), e995–e1015. <https://doi.org/10.1002/hpm.2751>
- Déry, J., Ruiz, A., Routhier, F., Bélanger, V., Côté, A., Ait-Kadi, D., Gagnon, M.-P., Deslauriers, S., Lopes Pecora, A. T., Redondo, E., Allaire, A.-S., & Lamontagne, M.-E. (2020). A systematic review of patient prioritization tools in non-emergency healthcare services. *Systematic Reviews*, 9, 227. <https://doi.org/10.1186/s13643-020-01482-8>
- Hren, R., Abaza, N., Elezbawy, B., Khalifa, A., Fasseeh, A. N., Al Gasseer, N., & Kaló, Z. (2025). Economic benefits of reduced waiting times for elective surgeries: A systematic literature review. *Cureus*, 17(2), e79417. <https://doi.org/10.7759/cureus.79417>
- Powers, J., McGree, J. M., Grieve, D., Aseervatham, R., Ryan, S., & Corry, P. (2023). Managing surgical waiting lists through dynamic priority scoring. *Health Care Management Science*, 26(3), 533–557. <https://doi.org/10.1007/s10729-023-09648-1>
- Rana, H. S., et al. (2022). A novel multi-criteria decision-making approach for prioritization of elective surgeries through formulation of “weighted MeNTS scoring system”. *Heliyon*, 8(8), e10339. <https://doi.org/10.1016/j.heliyon.2022.e10339>
- Testi, A., Tanfani, E., Valente, R., Ansaldo, G. L., & Torre, G. C. (2008). Prioritizing surgical waiting lists. *Journal of Evaluation in Clinical Practice*, 14(1), 59–64. <https://doi.org/10.1111/j.1365-2753.2007.00794.x>
- Hunter, R. J., Buckley, N., Fitzgerald, E. L., MacCormick, A. D., & Eglinton, T. W. (2018). General Surgery Prioritization Tool: A pilot study. *ANZ Journal of Surgery*, 88(12), 1279–1283. <https://doi.org/10.1111/ans.14703>
- Srikumar, G., Eglinton, T., & MacCormick, A. D. (2020). Development of the General surgery prioritisation tool implemented in New Zealand in 2018. *Health Policy*, 124(10), 1043–1049. <https://doi.org/10.1016/j.healthpol.2020.07.018>
- Solans-Domènech, M., Adam, P., Tebé, C., & Espallargues, M. (2013). Developing a universal tool for the prioritization of patients waiting for elective surgery. *Health Policy*, 113(1–2), 118–126. <https://doi.org/10.1016/j.healthpol.2013.07.006>
- Damani, Z., MacKean, G., Bohm, E., Noseworthy, T., Wang, J. M. H., DeMone, B., Wright, B., & Marshall, D. A. (2018). Insights from the design and implementation of a single-entry model of referral for total joint replacement surgery: Critical success factors and unanticipated consequences. *Health Policy*, 122(2), 165–174. <https://doi.org/10.1016/j.healthpol.2017.10.006>
- Marshall, D. A., Bischak, D. P., Zaerpour, F., Sharif, B., Smith, C., Reczek, T., Robert, J., Werle, J., & Dick, D. (2022). Wait time management strategies at centralized intake system for hip and knee replacement surgery: A need for a blended evidence-based and patient-centered approach. *Osteoarthritis and Cartilage Open*, 4(4), 100314. <https://doi.org/10.1016/j.ocarto.2022.100314>
- Guo, M. Y., Crump, R. T., Karimuddin, A. A., Liu, G., Bair, M. J., & Sutherland, J. M. (2022). Prioritization and surgical wait lists: A cross-sectional survey of patient’s health-related quality of life. *Health Policy*, 126(2), 99–105. <https://doi.org/10.1016/j.healthpol.2021.12.006>

- Oudhoff, J. P., Timmermans, D. R. M., Knol, D. L., Bijnen, A. B., & van der Wal, G. (2007). Waiting for elective general surgery: Impact on health related quality of life and psychosocial consequences. *BMC Public Health*, 7, 164. <https://doi.org/10.1186/1471-2458-7-164>
- Scott, C. E. H., Yapp, L. Z., MacDonald, D. J., Howie, C. R., & Clement, N. D. (2024). Patient health-related quality of life deteriorates significantly while waiting six to 12 months for total hip or knee arthroplasty. *The Bone & Joint Journal*, 106-B(2), 166–173. <https://doi.org/10.1302/0301-620X.106B2.BJJ-2023-0324.R1>
- Cooper, G. M., Bayram, J. M., & Clement, N. D. (2024). The functional and psychological impact of delayed hip and knee arthroplasty: A systematic review and meta-analysis of 89,996 patients. *Scientific Reports*, 14, 8032. <https://doi.org/10.1038/s41598-024-58050-6>
- Rexius, H., Brandrup-Wognsen, G., Odén, A., & Jeppsson, A. (2004). Mortality on the waiting list for coronary artery bypass grafting: Incidence and risk factors. *The Annals of Thoracic Surgery*, 77(3), 769–774. <https://doi.org/10.1016/j.athoracsur.2003.05.007>
- Hodge, W., Horsley, T., Albani, D., Baryla, J., Belliveau, M., Buhrmann, R., O'Connor, M., Blair, J., & Lowcock, E. (2007). The consequences of waiting for cataract surgery: A systematic review. *CMAJ*, 176(9), 1285–1290. <https://doi.org/10.1503/cmaj.060962>