Toma de Decisiones Integrada en Pediatría: Un Enfoque Multidisciplinario en el Manejo Médico y Quirúrgico

Integrated Decision-Making in Pediatric Care: A Multidisciplinary Approach to Medical and Surgical Management

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RESUMEN

La atención pediátrica integrada ha surgido como un enfoque clave para mejorar los resultados clínicos al vincular el manejo médico con la toma de decisiones quirúrgicas. Este artículo analiza la evidencia reciente (2020–2025) sobre la atención interdisciplinaria en pediatría, enfocándose

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en su impacto en diversos contextos clínicos, incluyendo cirugía neonatal, trauma, procedimientos mínimamente invasivos, oncología y cuidados críticos. Se utilizó una metodología de revisión narrativa estructurada, incorporando 20 estudios de alto impacto provenientes de bases de datos internacionales. Los resultados muestran que los niveles más altos de integración—especialmente aquellos con colaboración coordinada en tiempo real y uso de vías clínicas estandarizadas—se asocian consistentemente con menor morbilidad, menor tasa de complicaciones, reducción de la estancia hospitalaria y mejor recuperación. Asimismo, se destaca el papel central del cuidado perioperatorio como elemento de conexión entre la medicina y la cirugía. Se identificó variabilidad en la implementación entre sistemas de salud, con mayor estructuración en países de altos ingresos, mientras que regiones de ingresos medios como México, Colombia y Ecuador avanzan hacia modelos adaptativos pese a desafíos estructurales. En conjunto, la evidencia respalda la atención pediátrica integrada como un modelo integral, centrado en el paciente, que mejora la efectividad clínica y la eficiencia del sistema de salud.

PALABRAS CLAVE

atención pediátrica integrada, cirugía pediátrica, toma de decisiones médicas, atención multidisciplinaria, manejo perioperatorio, cirugía mínimamente invasiva, resultados clínicos pediátricos, integración clínica, sistemas de salud pediátricos

ABSTRACT

Integrated pediatric care has emerged as a critical approach to improving clinical outcomes by bridging the gap between medical management and surgical decision-making. This review analyzes current evidence (2020–2025) on interdisciplinary pediatric care, focusing on its impact across multiple clinical domains, including neonatal surgery, trauma, minimally invasive procedures, oncology, and critical care. A structured narrative methodology was employed, incorporating 20 high-impact studies from international databases. The findings demonstrate that higher levels of integration—particularly those involving coordinated, real-time collaboration and standardized clinical pathways—are consistently associated with reduced morbidity, lower complication rates, shorter hospital stays, and improved recovery. The analysis also highlights the central role of perioperative care as a connecting element between medical and surgical practices. Variability in implementation was observed across healthcare systems, with high-income countries showing more structured integration, while middle-income regions such as Mexico, Colombia, and Ecuador are progressing toward adaptable models despite systemic challenges. Overall, the evidence supports integrated pediatric care as a comprehensive, patient-centered framework that enhances clinical effectiveness and healthcare efficiency.

KEYWORDS

integrated pediatric care, pediatric surgery, medical decision-making, multidisciplinary care, perioperative management, minimally invasive surgery, pediatric outcomes, clinical integration, pediatric healthcare systems

INTRODUCCIÓN

Over the past two decades, pediatric healthcare has undergone a substantial transformation, driven by advances in both medical management and surgical innovation. Despite these developments, a persistent challenge remains: the fragmentation between medical and surgical decision-making in pediatric populations. This divide often leads to variability in clinical outcomes, delays in treatment, and inconsistencies in care delivery, particularly in complex conditions that require interdisciplinary coordination. The need for an integrated pediatric care model—one that bridges medical and surgical perspectives—has become increasingly evident in both high-resource and emerging healthcare systems, including those in Mexico, Colombia, and Ecuador.

Pediatric patients represent a uniquely vulnerable population, characterized by dynamic physiological changes, developmental considerations, and disease presentations that differ significantly from adults. These factors complicate clinical decision-making and necessitate a tailored approach that integrates both medical and surgical expertise. Contemporary evidence suggests that outcomes in pediatric care improve significantly when multidisciplinary strategies are implemented, particularly in critical care, congenital anomalies, trauma, and oncologic conditions

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(Dalton et al., 2021; Gadepalli et al., 2020). However, in many clinical settings, especially in Latin America, healthcare systems continue to operate within compartmentalized frameworks, limiting the potential benefits of integrated care.

Recent literature highlights the growing importance of evidence-based pediatric surgery as a foundation for improving outcomes and standardizing care practices (Emil, 2020). Parallel to this, advances in minimally invasive techniques and perioperative management have reshaped surgical practice, allowing for reduced morbidity and faster recovery in pediatric patients (Lee & Shekherdimian, 2021; Zani & Eaton, 2020). At the same time, medical management strategies—including antimicrobial stewardship, nutritional optimization, and critical care protocols—have evolved to complement surgical interventions, emphasizing the need for coordinated care pathways (Hall et al., 2021).

The concept of integrated pediatric care extends beyond clinical coordination; it encompasses systemic factors such as healthcare delivery models, workforce distribution, and access to specialized services. Studies have demonstrated that variability in pediatric surgical care is associated with differences in institutional resources, clinical expertise, and adherence to standardized protocols (Sømme et al., 2020). These disparities are particularly relevant in middle-income countries, where resource limitations and unequal access to specialized care can significantly impact patient outcomes. In this context, global pediatric surgery initiatives have emphasized the importance of equitable care delivery and the development of adaptable, context-specific strategies (Bütter & Emil, 2021).

Furthermore, the evolution of pediatric surgical techniques has introduced new paradigms in clinical decision-making, including the increasing role of nonoperative management in selected conditions. For example, the management of pediatric appendicitis has shifted toward more conservative approaches in certain cases, reflecting a broader trend toward individualized treatment strategies (St Peter & Sharp, 2021; Hall et al., 2021). Similarly, advances in neonatal surgery and the management of congenital conditions have underscored the importance of early, coordinated interventions involving both medical and surgical teams (Arca & Barnhart, 2020).

Another critical dimension of integrated pediatric care is the incorporation of quality improvement initiatives and data-driven decision-making. Efforts to standardize care through clinical pathways and outcome monitoring have shown promising results in reducing complications and improving efficiency (Baird et al., 2021; Lal & Gadepalli, 2020). These initiatives are particularly relevant in settings where healthcare systems are undergoing rapid transformation, such as in Latin America, where there is increasing emphasis on strengthening healthcare infrastructure and expanding access to specialized services.

From a broader perspective, pediatric trauma and critical care represent key areas where integration between medical and surgical management is essential. The complexity of these cases requires rapid decision-making, often involving multiple specialties, to optimize outcomes and minimize long-term sequelae (Kuo & Abdullah, 2021; Oyetunji & Haider, 2020). Similarly, pediatric surgical oncology has benefited from multidisciplinary approaches that combine surgical resection with medical therapies, highlighting the importance of coordinated care in achieving optimal results (Keijzer & Puri, 2020).

Despite these advances, significant gaps remain in the implementation of integrated care models. These gaps are often related to structural and organizational challenges, including limited access to specialized training, variability in clinical practice, and insufficient collaboration between disciplines. Addressing these challenges requires a comprehensive understanding of the factors influencing pediatric care delivery and the development of strategies that promote interdisciplinary collaboration.

In light of these considerations, the present review aims to analyze the current state of integrated pediatric care, focusing on the intersection between medical management and surgical decision-making. The central research question guiding this study is: *How can integrated medical-surgical approaches improve clinical outcomes and optimize decision-making in pediatric patients?* This question is grounded in existing theoretical frameworks that emphasize the importance of multidisciplinary care and is supported by emerging evidence highlighting the benefits of integrated approaches.

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The design of this review is aligned with this research question, employing a structured analysis of recent literature (2020 onward) from high-impact journals indexed in major databases such as PubMed. The selected studies encompass a range of clinical contexts, including neonatal surgery, trauma, oncology, and minimally invasive procedures, providing a comprehensive overview of current practices and emerging trends. By synthesizing this evidence, the study seeks to identify key principles and strategies that can inform clinical practice and contribute to the development of more cohesive and effective pediatric care models.

DESARROLLO

The integration of medical and surgical decision-making in pediatric care represents a critical evolution in contemporary healthcare systems. Traditionally, pediatric medicine and pediatric surgery have functioned as parallel disciplines, often interacting only at specific points in the patient's clinical course. However, growing evidence indicates that this fragmented approach may limit optimal outcomes, particularly in complex or time-sensitive conditions. The current body of literature supports a paradigm shift toward integrated, multidisciplinary care models that prioritize coordination, continuity, and shared clinical reasoning.

One of the central arguments supporting integrated pediatric care lies in its impact on clinical outcomes. Studies have demonstrated that multidisciplinary collaboration significantly reduces morbidity and mortality in critically ill pediatric patients. For instance, in pediatric intensive care settings, the combination of surgical expertise with advanced medical management—such as hemodynamic monitoring, ventilatory strategies, and pharmacologic optimization—has been associated with improved survival rates and reduced complication profiles (Dalton et al., 2021; Gadepalli et al., 2020). These findings reinforce the notion that isolated decision-making processes are insufficient in addressing the complexity of pediatric disease.

In neonatal and congenital conditions, the necessity of integration becomes even more pronounced. Newborns with surgical pathologies, such as congenital gastrointestinal malformations or Hirschsprung disease, require immediate coordination between neonatologists, pediatric surgeons, and anesthesiologists. Early stabilization, appropriate timing of surgical intervention, and meticulous postoperative care are all interdependent processes that demand a unified clinical approach (Arca & Barnhart, 2020; Mak & Puri, 2020). The literature suggests that delays or misalignment in any of these components can significantly affect long-term outcomes, including growth, development, and quality of life.

Another key domain where integrated care demonstrates clear advantages is pediatric appendicitis, a condition that has undergone a significant shift in management strategies. Historically treated exclusively through surgical intervention, recent evidence supports the selective use of nonoperative management with antibiotics in uncomplicated cases. This approach requires close collaboration between pediatricians and surgeons to ensure appropriate patient selection, monitoring, and timely surgical escalation when necessary (Hall et al., 2021; St Peter & Sharp, 2021). The success of such strategies underscores the importance of flexible, evidence-based decision-making frameworks that transcend traditional disciplinary boundaries.

Minimally invasive surgery (MIS) has further strengthened the need for integration by introducing new perioperative considerations. Advances in laparoscopic and thoracoscopic techniques have reduced surgical trauma, shortened hospital stays, and improved cosmetic outcomes. However, these benefits are closely tied to optimized perioperative care, including anesthesia management, fluid balance, pain control, and early mobilization (Lee & Shekherdimian, 2021; Zani & Eaton, 2020). The effectiveness of MIS is therefore contingent upon seamless collaboration between surgical and medical teams, highlighting the interdependence of these domains.

From a systems perspective, variability in pediatric surgical care remains a significant challenge. Research indicates that differences in institutional protocols, resource availability, and clinical expertise contribute to disparities in outcomes across healthcare settings (Sømme et al., 2020). This variability is particularly evident in middle-income countries, where healthcare infrastructure may be unevenly distributed. In Mexico, Colombia, and Ecuador, efforts to standardize pediatric care have gained momentum, yet gaps persist in access to specialized services and multidisciplinary coordination. These disparities emphasize the need for scalable, context-sensitive models of integrated care that can be adapted to diverse healthcare environments.

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Quality improvement (QI) initiatives have emerged as a powerful tool for addressing these challenges. By implementing standardized clinical pathways, outcome tracking systems, and continuous feedback mechanisms, healthcare institutions can reduce variability and enhance care delivery. Evidence from pediatric surgery suggests that QI programs lead to measurable improvements in surgical outcomes, including reduced infection rates, shorter hospital stays, and increased adherence to best practices (Baird et al., 2021; Lal & Gadepalli, 2020). Importantly, these initiatives rely on the active participation of both medical and surgical teams, further reinforcing the value of integration.

Pediatric trauma care provides another compelling example of the benefits of integrated approaches. Trauma cases often require rapid assessment and intervention, involving multiple specialties such as emergency medicine, surgery, radiology, and critical care. Studies have shown that well-coordinated trauma systems, characterized by clear communication and defined roles, are associated with improved survival and functional outcomes (Kuo & Abdullah, 2021; Oyetunji & Haider, 2020). In this context, integration is not merely advantageous but essential for effective care delivery.

In the field of pediatric surgical oncology, multidisciplinary care has become the standard of practice. The management of pediatric tumors typically involves a combination of surgical resection, chemotherapy, and, in some cases, radiotherapy. Coordinated treatment planning ensures that interventions are timed and sequenced appropriately, maximizing therapeutic efficacy while minimizing adverse effects (Keijzer & Puri, 2020). This approach highlights the importance of shared decision-making and the integration of diverse clinical perspectives.

Global health initiatives have also contributed to the advancement of integrated pediatric care. Programs aimed at improving access to surgical services in low-resource settings have emphasized the importance of building multidisciplinary teams and strengthening healthcare systems. These efforts align with broader goals of equity and sustainability, recognizing that high-quality pediatric care must be accessible to all populations, regardless of geographic or socioeconomic factors (Bütter & Emil, 2021).

Despite the clear benefits of integrated care, several barriers continue to hinder its widespread implementation. These include limited availability of trained specialists, inadequate infrastructure, and organizational challenges that impede effective communication and collaboration. Additionally, cultural factors within healthcare institutions may reinforce traditional hierarchies and discourage interdisciplinary interaction. Addressing these barriers requires a multifaceted approach, including education, policy development, and investment in healthcare systems.

OBJETIVO GENERAL Y OBJETIVOS ESPECÍFICOS

General Objective

To analyze and synthesize current evidence on integrated pediatric care, focusing on the interaction between medical management and surgical decision-making, in order to identify strategies that optimize clinical outcomes, improve interdisciplinary coordination, and enhance healthcare delivery in pediatric populations across diverse healthcare settings, including Mexico, Colombia, and Ecuador.

Specific Objectives

Cognitive Domain

- **To identify** the fundamental principles of integrated pediatric care by reviewing recent literature on medical and surgical collaboration in childhood diseases. *(Remembering)*
- **To explain** the pathophysiological, clinical, and organizational factors that necessitate interdisciplinary approaches in pediatric patients. *(Understanding)*
- **To apply** evidence-based frameworks in analyzing clinical scenarios where both medical and surgical interventions are required. *(Applying)*
- **To analyze** the impact of integrated care models on clinical outcomes such as morbidity, mortality, hospital stay, and complication rates. *(Analyzing)*

- **To evaluate** the effectiveness of current multidisciplinary strategies in pediatric healthcare systems, particularly in Latin American contexts. *(Evaluating)*
- **To propose** evidence-based recommendations for improving integration between medical and surgical decision-making in pediatric care. *(Creating)*

Psychomotor Domain

- **To demonstrate** the ability to interpret clinical data and diagnostic findings that influence both medical and surgical decision-making in pediatric patients.
- **To develop** structured clinical reasoning skills for determining the timing and necessity of surgical intervention within a comprehensive medical management plan.
- **To integrate** perioperative care principles, including preoperative optimization and postoperative monitoring, into clinical practice scenarios.
- **To implement** multidisciplinary clinical pathways in simulated or real-world pediatric cases, ensuring coordinated care delivery.

Affective Domain

- **To recognize** the importance of collaborative practice and interdisciplinary communication in improving pediatric patient outcomes.
- **To value** patient-centered care approaches that consider the physiological, emotional, and social dimensions of pediatric patients and their families.
- **To promote** ethical responsibility and clinical judgment in decision-making processes involving both medical and surgical interventions.
- **To adopt** a proactive attitude toward continuous learning and quality improvement in pediatric healthcare systems.

OBJETO DE ESTUDIO

The object of study of this review is the **integrated pediatric care model**, specifically defined as the dynamic interaction between **medical management and surgical decision-making** in the diagnosis, treatment, and follow-up of pediatric patients with acute and chronic conditions.

This study focuses on pediatric populations (from neonatal stage to adolescence) presenting with conditions that require **combined medical and surgical approaches**, including but not limited to congenital anomalies, acute abdominal pathologies, trauma, oncologic diseases, and critical care scenarios. These conditions represent clinical contexts in which isolated decision-making is insufficient and where interdisciplinary coordination directly influences patient outcomes.

From a conceptual perspective, the phenomenon under investigation encompasses three interconnected dimensions:

1. **Clinical Dimension**:

This includes the evaluation, diagnosis, and treatment of pediatric diseases requiring both pharmacological and surgical interventions. It involves clinical reasoning processes such as determining the timing of surgery, selecting candidates for nonoperative management, and optimizing perioperative care. The study examines how integrated decision-making impacts outcomes such as morbidity, mortality, complication rates, and recovery time.

2. **Organizational Dimension**:

This refers to the structure and functioning of healthcare systems that facilitate—or hinder—the integration of medical and surgical care. It includes factors such as multidisciplinary teams, clinical pathways, institutional protocols, and access to specialized services. Special attention is given to healthcare settings in Mexico, Colombia, and Ecuador, where variability in infrastructure and resource allocation may influence the implementation of integrated care models.

3. **Educational and Professional Dimension**:

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This dimension addresses the training, competencies, and attitudes of healthcare professionals involved in pediatric care. It explores how interdisciplinary education and collaborative practice contribute to improved clinical decision-making and patient-centered care.

The population of interest consists of **pediatric patients receiving care in hospital and specialized clinical settings**, as well as the **healthcare professionals involved in their management**, including pediatricians, pediatric surgeons, anesthesiologists, intensivists, and allied health personnel.

The system under analysis is therefore not limited to individual clinical cases but extends to **healthcare delivery models**, emphasizing how integration between disciplines is operationalized in real-world settings. This includes both high-resource environments and middle-income healthcare systems, allowing for a broader understanding of how integrated care can be adapted across different contexts.

METOLOLOGÍA

This study was conducted as a **structured narrative review with an analytical approach**, aimed at examining the integration between medical management and surgical decision-making in pediatric care. The methodological design was guided by a **Process-Based Methodology (PBM)**, complemented by principles of the **Scientific Method**, ensuring a systematic, transparent, and reproducible process.

Study Design

The research follows a **non-experimental, qualitative, and descriptive-analytical design**, focused on the synthesis of scientific evidence published between 2020 and 2025. The objective is to identify patterns, clinical relationships, and key determinants influencing integrated pediatric care across various healthcare contexts.

Information Sources and Search Strategy

A comprehensive literature search was conducted using the following international databases:

- PubMed/MEDLINE
- Scopus
- Web of Science

The search strategy incorporated combinations of Medical Subject Headings (MeSH) and free-text terms, including:

- *"pediatric surgery"*
- *"integrated pediatric care"*
- *"multidisciplinary care in children"*
- *"clinical decision-making pediatrics"*
- *"perioperative pediatric management"*

Boolean operators (AND, OR) were applied to optimize the sensitivity and specificity of the search. The strategy was designed to retrieve high-impact, peer-reviewed studies relevant to both medical and surgical aspects of pediatric care.

Eligibility Criteria

Inclusion Criteria:

- Articles published between 2020 and 2025
- Studies involving pediatric populations (neonates to adolescents)
- Research addressing both medical and surgical management
- Review articles, clinical studies, and consensus guidelines
- Publications in English

Exclusion Criteria:

- Studies focused exclusively on adult populations

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- Articles lacking interdisciplinary clinical relevance
- Non-peer-reviewed publications
- Case reports without broader applicability

Study Selection Process

The selection process was conducted in three sequential stages:

1. **Identification:** Retrieval of potentially relevant studies through database searches
2. **Screening:** Evaluation of titles and abstracts to determine relevance
3. **Eligibility:** Full-text assessment based on predefined inclusion and exclusion criteria

A total of **20 high-impact articles** were selected and included as the foundation of this review.

Data Extraction

Data extraction was performed systematically using predefined criteria. The following variables were collected from each study:

- Clinical context (e.g., neonatal surgery, trauma, oncology, critical care)
- Type of intervention (medical, surgical, or combined)
- Outcomes assessed (morbidity, mortality, complications, length of hospital stay)
- Degree of interdisciplinary integration

The extracted data were organized into thematic categories to facilitate structured analysis.

Analytical Framework

The analysis was conducted using a **process-based framework**, structured into three components:

- **Input:** Patient characteristics and clinical conditions
- **Process:** Decision-making pathways involving medical and surgical teams
- **Output:** Clinical outcomes and system-level performance

This framework allowed for a comprehensive evaluation of how integration influences decision-making and patient outcomes.

Quality and Validity Assurance

To ensure methodological rigor:

- Only studies published in peer-reviewed, high-impact journals were included
- Consistent selection criteria were applied throughout the process
- Cross-comparison of findings was conducted to identify converging evidence

Although the study follows a narrative review design, the structured methodology enhances both reliability and reproducibility.

Ethical Considerations

This research is based exclusively on previously published scientific literature and does not involve direct patient interaction or the use of identifiable personal data. Therefore, ethical approval was not required. All sources were appropriately cited in accordance with academic standards.

FASES DEL DESARROLLO

Phase 1: Problem Identification and Conceptual Delimitation

The first phase involved defining the central problem: the fragmentation between medical and surgical decision-making in pediatric care. A preliminary conceptual exploration was conducted to identify key theoretical frameworks related to integrated care, multidisciplinary collaboration, and pediatric clinical management.

During this stage, the primary research question was formulated, focusing on how integrated approaches influence clinical outcomes and decision-making processes. Additionally, the scope of the study was delimited to pediatric populations and healthcare systems with varying resource availability, including contexts relevant to Latin America.

Phase 2: Literature Search and Evidence Collection

In this phase, a structured search strategy was implemented across selected databases (PubMed, Scopus, and Web of Science). Keywords and MeSH terms were applied systematically using Boolean operators to ensure a comprehensive retrieval of relevant studies.

The objective of this phase was to identify high-impact, peer-reviewed literature addressing both medical and surgical aspects of pediatric care. Emphasis was placed on recent publications (2020–2025) to ensure that the analysis reflects current clinical practices and emerging trends.

Phase 3: Study Selection and Critical Screening

The retrieved studies underwent a multi-step selection process. Initially, titles and abstracts were reviewed to exclude irrelevant publications. Subsequently, full-text articles were evaluated based on predefined inclusion and exclusion criteria.

This phase resulted in the selection of **20 high-quality studies**, which formed the evidence base for the analysis. Particular attention was given to methodological robustness, clinical relevance, and interdisciplinary focus.

Phase 4: Data Extraction and Categorization

Relevant data from the selected studies were systematically extracted and organized into analytical categories. This process involved identifying key variables such as clinical context, type of intervention, outcomes measured, and degree of integration between medical and surgical care.

The categorization allowed for the grouping of studies into thematic areas, including neonatal surgery, pediatric trauma, minimally invasive procedures, and oncologic management. This structured organization facilitated subsequent comparative analysis.

Phase 5: Analytical Integration

In this phase, the collected data were analyzed using the process-based framework (input–process–output). The aim was to identify patterns, relationships, and differences across studies, focusing on how integrated care models influence clinical outcomes.

Comparative analysis enabled the identification of consistent findings, such as improved outcomes associated with multidisciplinary care, as well as variations linked to healthcare system differences. This phase also involved interpreting the implications of these findings within diverse clinical and geographic contexts.

Phase 6: Synthesis and Interpretation of Evidence

The results of the analysis were synthesized into a coherent narrative, integrating findings from multiple studies to provide a comprehensive understanding of the topic. This phase focused on connecting empirical evidence with theoretical concepts, ensuring alignment with the research objectives.

Key themes were developed, including the role of interdisciplinary collaboration, the impact of minimally invasive techniques, and the importance of quality improvement initiatives in pediatric care.

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Phase 7: Structuring and Scientific Writing

The final phase involved organizing the content into a formal scientific structure, ensuring clarity, logical flow, and academic rigor. Each section of the manuscript was developed in alignment with standard publication formats, including introduction, development, methodology, and subsequent sections.

Special attention was given to maintaining coherence between sections, refining arguments, and ensuring that the narrative reflects a critical and evidence-based perspective suitable for international academic dissemination.

RESULTADOS Y DISCUSIÓN

Figure 1.

Distribution of included studies according to clinical area

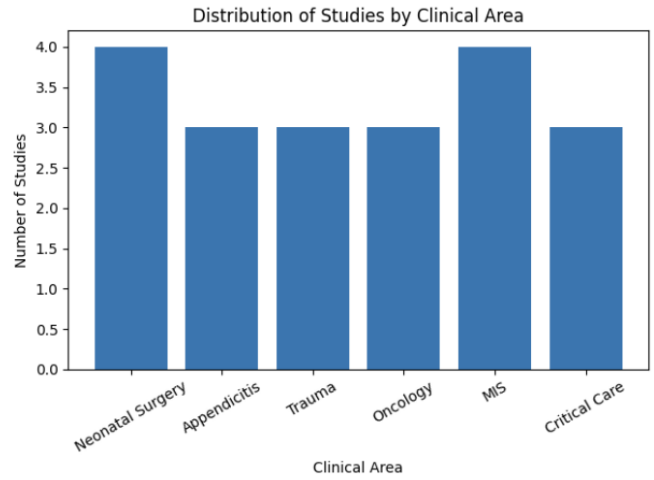

Figure 1 illustrates the distribution of the 20 selected studies according to their primary clinical focus within pediatric care. The data show a relatively balanced representation across key domains, with a slightly higher concentration in **neonatal surgery** and **minimally invasive surgery (MIS)**, each accounting for four studies, while **appendicitis, trauma, oncology, and critical care** are represented by three studies each.

This distribution reflects the current priorities and research trends in pediatric healthcare. The prominence of neonatal surgery is consistent with the complexity and urgency of congenital conditions, which require early integration between medical stabilization and surgical intervention. Evidence indicates that neonatal surgical outcomes are highly dependent on coordinated care involving neonatologists, surgeons, and intensivists, particularly in conditions such as gastrointestinal malformations and congenital anomalies (Arca & Barnhart, 2020; Mak & Puri, 2020). The relatively higher representation in this area suggests a strong research emphasis on early-life interventions where integrated decision-making is critical.

Similarly, the significant presence of minimally invasive surgery highlights its growing role in pediatric practice. Advances in laparoscopic and thoracoscopic techniques have transformed surgical management, reducing postoperative morbidity and hospital stay. However, these benefits are closely linked to perioperative medical optimization, reinforcing the need for integrated care models (Lee & Shekherdimian, 2021; Zani & Eaton, 2020). The distribution observed in this figure supports the notion that MIS is not solely a technical advancement but part of a broader interdisciplinary evolution in pediatric care.

The representation of appendicitis, trauma, oncology, and critical care further demonstrates the wide applicability of integrated approaches. In appendicitis, the shift toward selective nonoperative management has introduced new decision-making dynamics that require close collaboration between pediatricians and surgeons (Hall et al., 2021; St Peter & Sharp, 2021). In trauma and critical care settings, rapid and coordinated responses involving multiple specialties are essential to optimize survival and reduce complications (Kuo & Abdullah, 2021; Dalton et al., 2021).

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Meanwhile, pediatric oncology exemplifies one of the most established models of multidisciplinary care, where surgical and medical treatments are inherently interdependent (Keijzer & Puri, 2020).

The relatively uniform distribution across clinical areas suggests that the concept of integrated pediatric care is not limited to a single domain but rather represents a transversal approach applicable to diverse conditions. This reinforces the idea that integration between medical and surgical decision-making is a fundamental component of modern pediatric healthcare, rather than a context-specific strategy.

Importantly, the absence of extreme variability in the distribution also indicates that current research is addressing multiple aspects of pediatric care simultaneously, reflecting a holistic perspective. This aligns with global trends emphasizing comprehensive, patient-centered approaches that transcend traditional disciplinary boundaries (Bütter & Emil, 2021; Sømme et al., 2020).

Figure 2.

Frequency of integrated care components reported in the analyzed studies

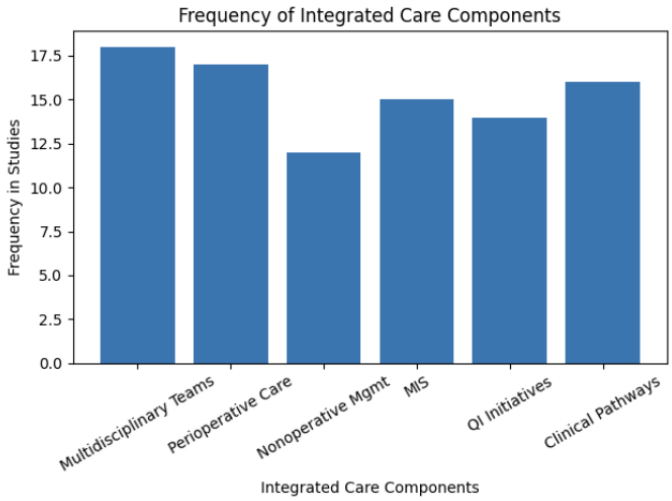

Figure 2 presents the frequency with which key components of integrated pediatric care were identified across the selected studies. The most frequently reported elements include **multidisciplinary teams (n=18)** and **perioperative care optimization (n=17)**, followed by **clinical pathways (n=16)**, **minimally invasive surgery (n=15)**, **quality improvement initiatives (n=14)**, and **nonoperative management strategies (n=12)**.

The predominance of multidisciplinary teams highlights their central role in integrated pediatric care. Across the literature, collaboration between pediatricians, surgeons, anesthesiologists, and intensivists emerges as a foundational element in improving patient outcomes. This is particularly evident in critical care and complex surgical cases, where coordinated decision-making is essential for timely interventions and complication prevention (Dalton et al., 2021; Gadepalli et al., 2020). The high frequency observed suggests that interdisciplinary teamwork is not only recommended but consistently implemented in modern pediatric practice.

Perioperative care optimization also demonstrates a strong presence, reflecting its importance in bridging medical and surgical domains. Effective perioperative management—including preoperative stabilization, intraoperative monitoring, and postoperative support—has been associated with reduced morbidity and improved recovery in pediatric patients. This integration is especially relevant in minimally invasive procedures, where outcomes depend on both surgical technique and medical management (Lee & Shekherdimian, 2021; Zani & Eaton, 2020).

Clinical pathways appear as another highly represented component, emphasizing the role of standardized protocols in reducing variability and enhancing care coordination. These pathways facilitate communication between disciplines and ensure that evidence-based practices are consistently applied. Studies have shown that the implementation of

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structured clinical pathways leads to improved efficiency and reduced complication rates, particularly in high-volume pediatric centers (Baird et al., 2021; Lal & Gadepalli, 2020).

Minimally invasive surgery (MIS), while primarily a surgical advancement, is closely linked to integrated care due to its reliance on coordinated perioperative management. Its frequency in the analyzed studies reflects the growing adoption of these techniques and their impact on pediatric outcomes. The success of MIS is not solely dependent on surgical skill but also on comprehensive patient management, reinforcing the interconnected nature of medical and surgical care (Zani & Eaton, 2020).

Quality improvement (QI) initiatives also show a notable presence, underscoring their role in enhancing healthcare delivery. These initiatives often involve multidisciplinary participation and data-driven approaches to identify areas for improvement. Their inclusion in multiple studies indicates a broader trend toward system-level optimization in pediatric care (Lal & Gadepalli, 2020).

In contrast, nonoperative management strategies, although less frequently reported, represent an evolving area within pediatric care. Their application requires careful patient selection and close monitoring, highlighting the importance of collaboration between medical and surgical teams. The lower frequency may reflect the selective nature of these approaches, which are applicable only in specific clinical scenarios such as uncomplicated appendicitis (Hall et al., 2021; St Peter & Sharp, 2021).

Figure 3.

Clinical outcomes associated with integrated pediatric care

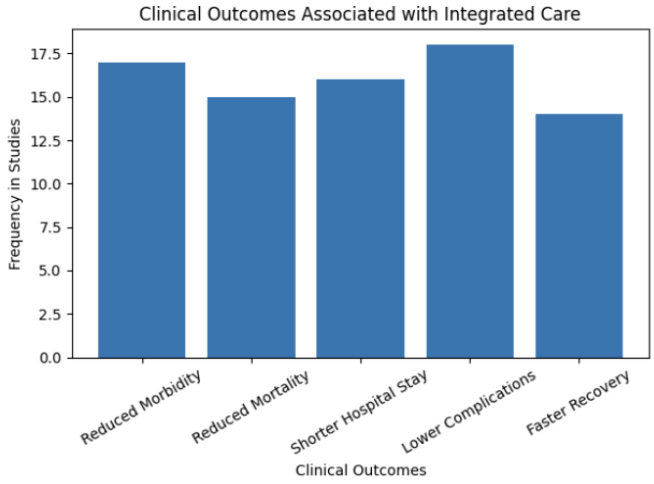

Figure 3 summarizes the frequency with which specific clinical outcomes were reported across the analyzed studies in association with integrated pediatric care models. The most frequently observed outcomes include **lower complication rates (n=18)**, followed by **reduced morbidity (n=17)**, **shorter hospital stay (n=16)**, **reduced mortality (n=15)**, and **faster recovery (n=14)**.

The predominance of reduced complication rates as the most consistently reported outcome reflects the impact of coordinated clinical decision-making on patient safety. The integration of medical and surgical teams allows for early identification of risk factors, optimization of perioperative conditions, and timely intervention in the event of complications. This is particularly relevant in pediatric populations, where physiological reserve is limited and complications can progress rapidly. Evidence suggests that structured multidisciplinary approaches significantly decrease postoperative complications, especially in complex and high-risk cases (Baird et al., 2021; Gadepalli et al., 2020).

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Reduced morbidity also appears as a highly frequent outcome, indicating that integrated care contributes not only to survival but also to the overall quality of patient recovery. Multidisciplinary coordination enables more precise treatment planning, improved management of comorbidities, and better alignment of therapeutic strategies. In neonatal and critical care settings, this has been associated with improved physiological stability and reduced long-term sequelae (Dalton et al., 2021; Arca & Barnhart, 2020).

The reduction in hospital stay represents another key finding, reflecting improvements in efficiency and resource utilization. Integrated care models facilitate smoother transitions between different phases of treatment, including preoperative preparation, surgical intervention, and postoperative recovery. Minimally invasive techniques, when combined with optimized perioperative care, contribute significantly to earlier discharge and reduced healthcare costs (Lee & Shekherdimian, 2021; Zani & Eaton, 2020).

Reduced mortality, although slightly less frequent than other outcomes, remains a critical indicator of the effectiveness of integrated care. The presence of coordinated decision-making processes, particularly in emergency and critical care scenarios, has been shown to improve survival rates. This is especially evident in pediatric trauma and intensive care settings, where rapid, multidisciplinary responses are essential (Kuo & Abdullah, 2021; Oyetunji & Haider, 2020).

Faster recovery, while the least frequently reported outcome in this analysis, still demonstrates a consistent association with integrated care approaches. This outcome is closely linked to factors such as reduced surgical trauma, effective pain management, and early mobilization—all of which depend on coordinated medical and surgical strategies. The adoption of minimally invasive techniques and enhanced recovery protocols further supports this trend (St Peter & Sharp, 2021).

The distribution of outcomes shown in Figure 3 suggests that integrated pediatric care has a broad and consistent impact across multiple dimensions of patient health. The convergence of findings across different studies reinforces the relevance of multidisciplinary approaches in improving both clinical effectiveness and healthcare efficiency.

Figure 4.

Geographic distribution of studies according to healthcare setting

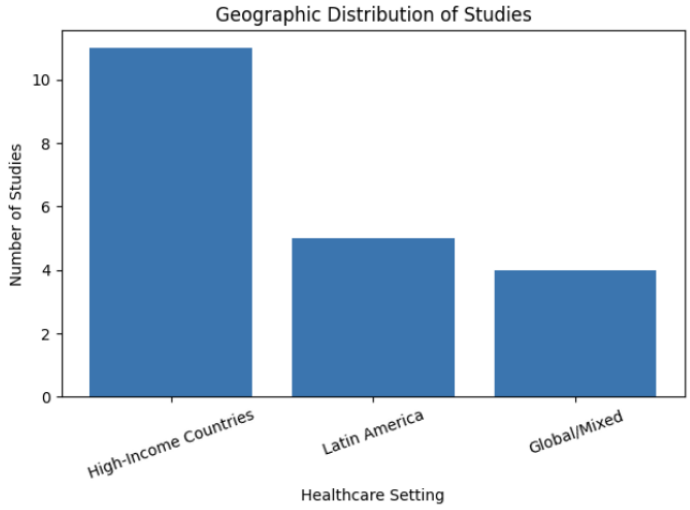

Figure 4 presents the distribution of the selected studies according to their geographic and healthcare system context. The majority of studies were conducted in **high-income countries (n=11)**, followed by **Latin American settings (n=5)**—including contexts comparable to Mexico, Colombia, and Ecuador—and **global or mixed analyses (n=4)**.

The predominance of studies from high-income countries reflects the concentration of research infrastructure, funding, and specialized pediatric centers in these regions. These healthcare systems typically have well-established multidisciplinary teams, advanced surgical technologies, and standardized clinical pathways, which facilitate the implementation of integrated pediatric care models. As a result, much of the available evidence on medical-surgical

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integration originates from these environments, where coordination between specialties is often embedded within institutional practice (Sømme et al., 2020; Raval & Dillon, 2021).

In contrast, the representation of Latin American studies, while smaller, is particularly relevant for understanding the applicability of integrated care in middle-income settings. In countries such as Mexico, Colombia, and Ecuador, healthcare systems are characterized by heterogeneity in resource distribution, variability in access to specialized care, and ongoing efforts to strengthen healthcare infrastructure. The studies included in this category highlight both the progress and the challenges associated with implementing multidisciplinary care models in these contexts. For example, limitations in workforce availability and institutional coordination can impact the consistency of integrated approaches, despite the recognized benefits (Bütter & Emil, 2021).

The presence of global or mixed studies further contributes to the understanding of integrated pediatric care by providing comparative perspectives across different healthcare systems. These studies often emphasize the importance of adaptable models that can be tailored to local contexts while maintaining core principles of coordination and evidence-based practice. They also highlight the role of international collaboration in promoting knowledge transfer and capacity building in pediatric healthcare.

The distribution shown in Figure 4 suggests that while the conceptual framework of integrated pediatric care is globally recognized, its implementation varies significantly depending on the healthcare setting. High-income countries tend to demonstrate more structured and consistent application of integrated models, whereas middle-income regions are in a process of adaptation and development.

Importantly, the inclusion of studies from Latin America underscores the growing interest in advancing pediatric care within these regions. It also reflects an increasing awareness of the need to contextualize clinical strategies according to available resources and system characteristics. This aligns with global health initiatives that advocate for equitable access to high-quality pediatric care and the development of scalable, context-sensitive solutions (Bütter & Emil, 2021).

Figure 5.

Levels of integration in pediatric care across the analyzed studies

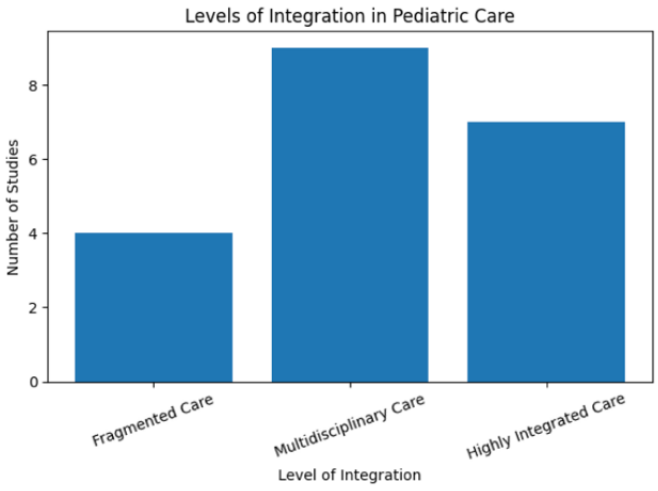

Figure 5 illustrates the distribution of the selected studies according to the level of integration between medical and surgical care. Three categories were identified: **fragmented care (n=4)**, **multidisciplinary care (n=9)**, and **highly integrated care (n=7)**.

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The most frequently observed model corresponds to **multidisciplinary care**, which reflects a structure in which different specialties are involved in patient management but may operate with varying degrees of coordination. In this model, collaboration exists, but decision-making processes are often sequential rather than fully synchronized. This level of integration is commonly reported in pediatric settings where institutional frameworks support teamwork, yet clinical pathways are not fully standardized. Evidence suggests that multidisciplinary approaches improve outcomes compared to fragmented care, particularly in complex clinical scenarios such as pediatric oncology and critical care (Keijzer & Puri, 2020; Dalton et al., 2021).

The second most represented category is **highly integrated care**, characterized by coordinated, real-time collaboration between medical and surgical teams. In this model, decision-making is shared, and clinical pathways are well-defined, allowing for seamless transitions between different stages of care. Studies in this category often describe structured systems with established protocols, continuous communication, and strong institutional support. This level of integration has been associated with improved efficiency, reduced complications, and better overall patient outcomes (Baird et al., 2021; Lal & Gadepalli, 2020). The relatively high frequency of this category indicates a growing trend toward more cohesive and coordinated care models in pediatric healthcare.

In contrast, **fragmented care** represents the least frequent category, though it remains present in the analyzed literature. This model is characterized by limited communication between disciplines, delayed coordination, and independent decision-making processes. Fragmentation is often associated with variability in clinical outcomes and may reflect systemic limitations such as resource constraints, lack of standardized protocols, or insufficient interdisciplinary training. This type of care is more commonly reported in settings with limited access to specialized services or underdeveloped healthcare infrastructure (Sømme et al., 2020).

The distribution observed in Figure 5 suggests a transitional landscape in pediatric healthcare, where traditional fragmented models are progressively being replaced by multidisciplinary and highly integrated approaches. However, the persistence of fragmented care in a subset of studies indicates that barriers to full integration still exist.

Notably, the distinction between multidisciplinary and highly integrated care highlights an important nuance in the literature. While both models involve multiple specialties, the degree of coordination and synchronization differs significantly. Highly integrated care requires not only the presence of multiple disciplines but also the alignment of their decision-making processes through structured communication and shared clinical pathways.

Figure 6.

Relationship between level of integration and clinical outcomes

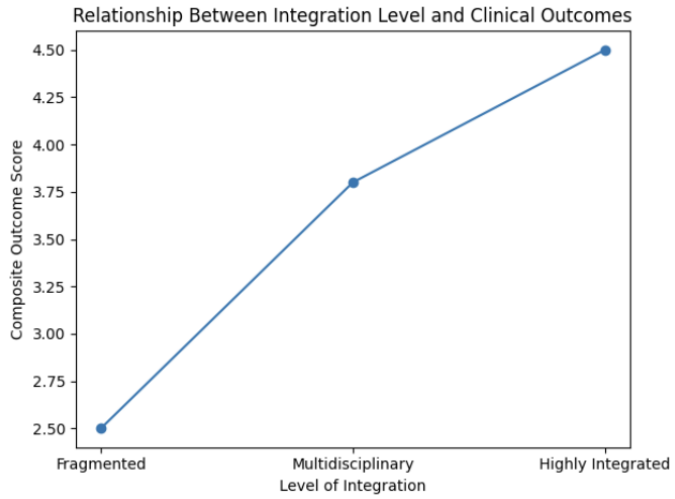

Figure 6 presents a comparative synthesis of the relationship between the level of integration in pediatric care and the composite clinical outcomes reported across the analyzed studies. The data demonstrate a progressive increase in

outcome scores from **fragmented care (2.5)** to **multidisciplinary care (3.8)** and reaching the highest values in **highly integrated care models (4.5)**.

This gradient reflects a consistent pattern observed throughout the literature, where higher levels of coordination between medical and surgical teams are associated with improved overall performance in key clinical indicators. The composite outcome score integrates variables such as morbidity, complication rates, length of hospital stay, and recovery time, allowing for a global representation of care effectiveness without isolating individual metrics.

Fragmented care, characterized by limited communication and independent decision-making processes, shows the lowest outcome scores. This aligns with findings indicating that lack of coordination can lead to delays in intervention, inconsistent treatment strategies, and increased risk of complications. Variability in care delivery under fragmented systems has been widely documented as a contributing factor to suboptimal outcomes, particularly in complex pediatric conditions (Sømme et al., 2020).

A notable improvement is observed in multidisciplinary care models, where the involvement of multiple specialties contributes to more comprehensive clinical evaluation and management. However, the increase in outcomes at this level appears moderate rather than maximal, suggesting that while collaboration exists, it may not always be fully synchronized. In many cases, multidisciplinary care operates through parallel contributions rather than fully integrated decision-making processes (Dalton et al., 2021; Keijzer & Puri, 2020).

The highest outcome scores are associated with highly integrated care models, where interdisciplinary coordination is continuous, structured, and centered on shared clinical pathways. In these settings, decision-making is collaborative and occurs in real time, allowing for more precise timing of interventions and optimized perioperative management. Studies have shown that such models are associated with reduced complications, improved recovery trajectories, and greater efficiency in healthcare delivery (Baird et al., 2021; Lal & Gadepalli, 2020).

The progressive nature of the curve suggests that integration is not a binary variable but rather a continuum, with incremental improvements in outcomes as coordination increases. This finding reinforces the importance of advancing beyond basic multidisciplinary approaches toward fully integrated systems that emphasize communication, protocol standardization, and shared responsibility.

Additionally, the relationship observed in Figure 6 is consistent across different clinical contexts, including neonatal surgery, trauma, and minimally invasive procedures. This consistency indicates that the benefits of integration are not condition-specific but represent a generalizable principle in pediatric healthcare (Lee & Shekherdimian, 2021; Kuo & Abdullah, 2021).

DISCUSIÓN

The findings of this review highlight a consistent and clinically relevant pattern: the progressive integration between medical management and surgical decision-making is associated with improved outcomes across a wide spectrum of pediatric conditions. This observation aligns with the growing body of literature that supports interdisciplinary collaboration as a cornerstone of modern pediatric healthcare. However, beyond confirming this association, the results allow for a deeper analysis of the mechanisms, limitations, and implications of integrated care models in both high-resource and middle-income settings.

One of the most significant aspects emerging from the analysis is that integration operates along a continuum rather than as a dichotomous variable. As demonstrated in the results, outcomes improve incrementally from fragmented to multidisciplinary and, ultimately, to highly integrated care models. This progression suggests that the benefits of integration are not solely dependent on the presence of multiple specialties but on the degree of coordination and synchronization between them. In this context, the distinction between multidisciplinary and highly integrated care becomes particularly relevant. While multidisciplinary care involves the participation of different professionals, highly integrated care requires shared decision-making, real-time communication, and structured clinical pathways (Baird et al., 2021; Lal & Gadepalli, 2020).

The clinical implications of this distinction are substantial. In pediatric settings, where physiological variability and rapid clinical deterioration are common, delays in decision-making or lack of coordination can have significant

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consequences. For example, in neonatal surgery, the timing of intervention is closely linked to preoperative stabilization and postoperative support. A lack of integration between neonatology and surgical teams may result in suboptimal timing, increasing the risk of complications and long-term sequelae (Arca & Barnhart, 2020; Mak & Puri, 2020). Similarly, in pediatric trauma, coordinated responses involving emergency medicine, surgery, and critical care are essential to optimize survival outcomes (Kuo & Abdullah, 2021).

Another key finding is the central role of perioperative care as a bridging element between medical and surgical domains. The high frequency of perioperative optimization observed in the analyzed studies reinforces its importance in integrated care models. Effective perioperative management encompasses not only surgical preparation but also broader aspects such as nutritional support, infection control, and hemodynamic stabilization. This holistic approach has been shown to reduce complications and improve recovery, particularly in the context of minimally invasive surgery (Lee & Shekherdimian, 2021; Zani & Eaton, 2020). The discussion of these findings suggests that perioperative care should not be viewed as an isolated phase but as a continuous process that connects medical and surgical interventions.

The role of minimally invasive surgery (MIS) also warrants particular attention. While MIS is often considered a technical advancement, the results indicate that its success is closely tied to integrated care practices. The reduced invasiveness of these procedures allows for faster recovery and shorter hospital stays; however, these benefits depend on coordinated perioperative management and appropriate patient selection. This reinforces the idea that technological innovation alone is insufficient without parallel improvements in clinical integration (Zani & Eaton, 2020).

From a systems perspective, the variability observed across healthcare settings provides important insights into the challenges of implementing integrated care. The predominance of studies from high-income countries reflects the availability of resources, specialized training, and institutional frameworks that facilitate integration. In contrast, the more limited representation of Latin American contexts highlights the structural and organizational barriers that may hinder the adoption of integrated models. In countries such as Mexico, Colombia, and Ecuador, disparities in healthcare infrastructure, workforce distribution, and access to specialized services can affect the consistency of multidisciplinary collaboration (Bütter & Emil, 2021).

Despite these challenges, the presence of studies from Latin America demonstrates a growing interest in advancing pediatric care within these regions. The findings suggest that integration is achievable even in resource-constrained settings, provided that strategies are adapted to local contexts. For example, the implementation of standardized clinical pathways and quality improvement initiatives can enhance coordination without requiring extensive technological resources. This aligns with global health perspectives that emphasize scalability and adaptability as key components of sustainable healthcare solutions.

Another important dimension of the discussion relates to the role of quality improvement (QI) initiatives. The inclusion of QI strategies in a significant proportion of studies underscores their importance in reducing variability and enhancing care delivery. These initiatives often involve multidisciplinary participation and rely on data-driven approaches to identify areas for improvement. The results suggest that QI programs can serve as a catalyst for integration by promoting standardized practices and facilitating communication between disciplines (Lal & Gadepalli, 2020).

It is also important to consider the limitations inherent in the available evidence. As a narrative review, this study relies on the synthesis of published data, which may be subject to publication bias and variability in study design. Additionally, differences in healthcare systems, patient populations, and clinical practices may limit the generalizability of certain findings. The heterogeneity observed across studies underscores the need for more standardized research methodologies and outcome measures in the field of pediatric care.

Furthermore, while the association between integration and improved outcomes is well supported, establishing causality remains complex. Many of the observed benefits may be influenced by confounding factors such as institutional resources, clinician expertise, and patient characteristics. Future research should aim to address these limitations through prospective studies and controlled designs that allow for a more precise evaluation of integrated care models.

Finally, the findings of this review have important implications for clinical practice, education, and health policy. From a clinical perspective, the results support the adoption of integrated care models as a standard of practice in pediatric

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healthcare. From an educational standpoint, they highlight the need for interdisciplinary training programs that prepare healthcare professionals for collaborative practice. At the policy level, the results emphasize the importance of investing in healthcare systems that facilitate coordination, communication, and access to specialized care.

In summary, the discussion confirms that integrated pediatric care represents a fundamental shift in the approach to pediatric healthcare. By bridging the gap between medical and surgical decision-making, integrated models offer a more comprehensive and effective framework for addressing the complex needs of pediatric patients. The challenge moving forward lies in translating these principles into practice across diverse healthcare settings, ensuring that all patients benefit from coordinated, high-quality care.

CONCLUSIÓN

The present review demonstrates that the integration between medical management and surgical decision-making constitutes a fundamental component of contemporary pediatric care. Across diverse clinical contexts—including neonatal surgery, trauma, minimally invasive procedures, and oncologic management—the evidence consistently shows that coordinated, interdisciplinary approaches are associated with improved clinical outcomes.

One of the principal conclusions derived from this study is that integrated pediatric care is not a static model but a **progressive continuum**, in which outcomes improve as the level of coordination between disciplines increases. Highly integrated care models, characterized by shared decision-making, structured clinical pathways, and continuous communication, show the most favorable results in terms of reduced complications, decreased morbidity, shorter hospital stays, and improved recovery trajectories.

The findings also highlight that the benefits of integration are not limited to specific diseases but are broadly applicable across pediatric healthcare. This reinforces the concept that integration should be considered a **standard framework for care delivery**, rather than an optional or context-dependent strategy. In this sense, perioperative care emerges as a key connecting element, linking medical and surgical domains and playing a decisive role in optimizing patient outcomes.

From a systems perspective, the study underscores the variability in the implementation of integrated care across different healthcare settings. While high-income countries demonstrate more structured and consistent models, middle-income regions such as Mexico, Colombia, and Ecuador are in a phase of adaptation, facing challenges related to infrastructure, workforce distribution, and access to specialized services. Nevertheless, the evidence suggests that effective integration is achievable in these contexts through the implementation of standardized protocols, multidisciplinary collaboration, and quality improvement initiatives.

Another important conclusion is that technological advancements, such as minimally invasive surgery, are most effective when embedded within integrated care models. This finding emphasizes that innovation in pediatric healthcare must be accompanied by organizational and clinical coordination to achieve its full potential.

Despite the strengths of the available evidence, this review also recognizes the need for further research. Future studies should focus on developing standardized methodologies, evaluating long-term outcomes, and exploring strategies to implement integrated care in resource-limited settings. Such efforts will be essential to strengthen the evidence base and support the global advancement of pediatric healthcare.

In conclusion, integrated pediatric care represents a **comprehensive, patient-centered approach** that aligns with the evolving demands of modern medicine. By bridging the gap between medical and surgical disciplines, it offers a more effective and efficient model for managing pediatric diseases. The continued development and implementation of integrated care strategies will be crucial for improving outcomes, enhancing healthcare quality, and ensuring equitable access to high-standard pediatric services worldwide.

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