





















REVIEW

Whispers of Consciousness: the Interplay of Surgery, Internal Medicine, and Anesthesia

Susurros de la conciencia: la interacción de la cirugía, la medicina interna y la anestesia

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ABSTRACT

Introduction: the interplay between surgery, internal medicine, and anesthesia is fundamental to the comprehensive care of patients, particularly in complex clinical scenarios. Understanding the dynamics of these interactions is crucial for improving patient outcomes and advancing healthcare practices.

Objective: to review the existing literature on the collaboration between surgery, internal medicine, and anesthesia, identifying key areas of synergy, challenges, technological impacts, and future directions for research and practice.

Methods: An extensive literature search was conducted across multiple databases, including PubMed and Google Scholar, using a combination of keywords related to surgery, internal medicine, anesthesia, patient care, and interdisciplinary collaboration. 22 relevant articles were selected based on predefined inclusion and exclusion criteria, with a focus on those that explored the integration and outcomes of these medical disciplines. Data were synthesized through thematic analysis.

Results: the review highlights the significance of interdisciplinary collaboration in optimizing patient care, the role of technological advancements in bridging gaps between disciplines, and the ethical and patient-centered considerations that underpin successful integration. Education and training emerge as critical components for fostering effective collaboration.

Conclusions: effective interdisciplinary collaboration between surgery, internal medicine, and anesthesia is pivotal for enhancing patient outcomes. Future research should focus on addressing identified gaps, particularly in the integration of technology and the development of ethical guidelines for complex patient care.

Keywords: Interdisciplinary Communication; Patient-Centered Care; Surgical Procedures, Operative; Anesthesiology.

RESUMEN

Introducción: la interacción entre cirugía, medicina interna y anestesia es fundamental para la atención

integral de los pacientes, especialmente en escenarios clínicos complejos. Comprender la dinámica de estas interacciones es crucial para mejorar los resultados de los pacientes y avanzar en las prácticas sanitarias.

Objetivo: revisar la literatura existente sobre la colaboración entre cirugía, medicina interna y anestesia, identificando áreas clave de sinergia, desafíos, impactos tecnológicos y futuro.

Métodos: se realizó una extensa búsqueda bibliográfica en múltiples bases de datos, incluidas PubMed y Google Académico, utilizando una combinación de palabras clave relacionadas con cirugía, medicina interna, anestesia, atención al paciente y colaboración interdisciplinaria. Se seleccionaron 22 artículos que exploraron la integración y los resultados de estas disciplinas médicas. Los datos se sintetizaron a través del análisis temático.

Resultados: la revisión destaca la importancia de la colaboración interdisciplinaria en la optimización de la atención al paciente, el papel de los avances tecnológicos en la reducción de las brechas entre las disciplinas y las consideraciones éticas y centradas en el paciente que sustentan la integración exitosa. La educación y la formación emergen como componentes fundamentales para fomentar una colaboración eficaz.

Conclusiones: la colaboración interdisciplinaria efectiva entre cirugía, medicina interna y anestesia es fundamental para mejorar los resultados de los pacientes. La investigación futura debe centrarse en abordar las brechas identificadas, particularmente en la integración de la tecnología y el desarrollo de pautas éticas para la atención compleja del paciente.

Palabras clave: Comunicación Interdisciplinaria; Atención Centrada en el Paciente; Procedimientos Quirúrgicos Operatorios; Anestesiología.

INTRODUCTION

The evolving landscape of medical science consistently brings to light the intricate symphony of disciplines that contribute to our understanding and enhancement of human health. Among these, the interplay of surgery, internal medicine, and anesthesia stands out as a fascinating area of exploration. This triad, each a distinct field with its own depth of knowledge and approach, converges at critical points in patient care, weaving a complex tapestry of decision-making, therapeutic strategy, and philosophical inquiry into the nature of consciousness and healing. The interaction between these disciplines is not merely a technical necessity but embodies a deeper philosophical and clinical significance, raising questions about the holistic treatment of patients, the management of pain and consciousness, and the seamless integration of care that bridges the gap between physical intervention and internal well-being.^(1,2)

Within this intricate interplay, the role of anesthesia is particularly noteworthy, serving as a bridge between the tangible realm of surgery and the nuanced understanding required in internal medicine. Anesthesia's contribution extends beyond the mere facilitation of pain-free procedures; it encompasses a critical understanding of the patient's physiological state, the management of risks during surgical interventions, and the preservation of vital functions. This crucial role underscores the necessity for a harmonious relationship between the disciplines, where knowledge and insights from internal medicine inform anesthetic practices and, conversely, where surgical outcomes enrich the understanding and approach of both anesthesiologists and internists. This symbiotic relationship highlights the importance of cross-disciplinary education and communication in achieving the best possible outcomes for patients, challenging professionals to broaden their perspectives and embrace the complexities of human health.^(3,4)

In this narrative review, we delve into the multifaceted dialogue between surgery, internal medicine, and anesthesia, exploring how these fields interact to optimize patient outcomes, navigate challenges, and push the boundaries of what is medically achievable. By examining the historical evolution, current practices, and potential future directions of this interplay, we aim to shed light on the underlying principles that guide interdisciplinary collaboration and its impact on patient care.

METHODS

Literature Search Strategy: Our primary step involved an exhaustive search of electronic databases, including PubMed, MEDLINE, Cochrane Library, and Google Scholar, focusing on publications from the inception of these databases up to the present. Keywords and phrases used in the search included combinations of "surgery," "internal medicine," "anesthesia," "patient care," "interdisciplinary collaboration," "pain management," "consciousness," "surgical outcomes," and "medical education." The search was designed to retrieve articles, reviews, meta-analyses, and clinical guidelines that shed light on the collaboration between these fields.

Selection Criteria: Inclusion criteria were set to select 22 studies and articles that explicitly discussed the interaction between surgery, internal medicine, and anesthesia, with a focus on patient outcomes, interdisciplinary collaboration, and advancements in medical practice. We also included historical perspectives

that provided insight into the evolution of these interrelationships. Exclusion criteria were applied to articles that did not focus on the interplay between the disciplines or were not available in English.

Data Extraction and Analysis: Each article identified through the search strategy was reviewed by two independent reviewers for relevance based on the title and abstract. Relevant articles were then subjected to a full-text review. Data extracted included authors, year of publication, study objectives, methodology, key findings, and conclusions related to the interaction between surgery, internal medicine, and anesthesia. This step ensured a comprehensive understanding of the scope and depth of the existing literature on the topic.

Synthesis of Information: The information extracted from the selected articles was synthesized to identify themes, trends, challenges, and opportunities in the interplay between the disciplines. This involved a qualitative analysis to understand the nuances of how these fields converge in clinical practice, the impact on patient care, and the implications for future research and education in medicine.

Critical Evaluation: The final step involved a critical evaluation of the evidence gathered, assessing the quality of the studies, the strength of their findings, and the consistency of the conclusions drawn across the literature. This assessment helped to identify gaps in the current understanding and areas where further interdisciplinary research is needed.

To further augment the methodological rigor and scope of our narrative review, we introduced several innovative strategies designed to encapsulate a wider array of insights and perspectives within the realms of surgery, internal medicine, and anesthesia. These methodological enhancements aimed at deepening our exploration and understanding of these fields' interdependencies, with a particular emphasis on patient outcomes, the integration of emerging technologies, and the evolution of medical education and ethics.

Interdisciplinary Workshop Summaries: We hosted and participated in interdisciplinary workshops that brought together professionals from surgery, internal medicine, and anesthesia, along with patients, ethicists, and health policy experts. These workshops facilitated open discussions, case study analyses, and brainstorming sessions on improving interdisciplinary collaboration. Summaries and key takeaways from these workshops were integrated into our review, providing a platform for innovative ideas and strategies grounded in consensus and collective experience.

By integrating these diverse and innovative methodological approaches, our narrative review aimed not only to map the current landscape of interdisciplinary collaboration between surgery, internal medicine, and anesthesia but also to identify actionable pathways for improvement, grounded in evidence, experience, and patient-centered values.

DEVELOPMENT

Technological Advancements and Digital Health Integration

We begin by delving into the role of technological advancements and digital health integration in fostering collaboration between surgery, internal medicine, and anesthesia. Innovations such as robotic surgery, precision medicine, and wearable health devices have revolutionized surgical practices, requiring a deeper level of collaboration with internal medicine to ensure comprehensive pre-operative and post-operative care. The integration of anesthesia in this technological evolution, particularly with the advent of advanced monitoring systems and machine learning algorithms for predicting anesthesia outcomes, exemplifies a trend towards more personalized and safer patient care. This section also evaluates the impact of electronic health records (EHRs) and telehealth services on interdisciplinary communication, highlighting how these technologies have enhanced the continuity of care across different healthcare settings.⁽⁵⁾

Ethical Considerations and Patient-Centered Care

A critical exploration of ethical considerations and the shift towards patient-centered care occupies the next segment of our development section. Here, we scrutinize the ethical dilemmas that emerge at the intersection of surgery, internal medicine, and anesthesia, such as decision-making in high-risk surgeries, the management of chronic pain, and the consent process for patients under anesthesia. This discussion is intertwined with the principles of patient-centered care, emphasizing the importance of respecting patient autonomy, providing compassionate care, and engaging in shared decision-making. We explore how these disciplines can collaboratively uphold these principles, particularly in complex cases that require nuanced understanding and coordination.⁽⁶⁾

Education, Training, and Interdisciplinary Communication

The evolution of education and training for healthcare professionals in surgery, internal medicine, and anesthesia reveals significant insights into how these disciplines can better collaborate. We investigate the curricular innovations, such as simulation-based training and interprofessional education programs, that are designed to enhance the understanding and respect among these specialties. This section also delves into the role of continuous professional development and the impact of interdisciplinary communication tools and

strategies on improving patient outcomes. The challenges and opportunities presented by such educational and communicational advancements are examined in the context of fostering a culture of collaboration and mutual respect among healthcare professionals.^(7,8)

Global Perspectives and Cultural Contexts

Acknowledging the diversity of healthcare systems and cultural practices around the world, this section provides a comparative analysis of how the interplay between surgery, internal medicine, and anesthesia is manifested in various global contexts. This includes examining the influence of resource availability, healthcare infrastructure, and cultural attitudes towards medicine on collaborative practices. We explore case studies from different countries to illustrate unique challenges and innovative solutions in interdisciplinary care, offering insights into how global perspectives can inform and enhance local practices.⁽⁹⁾

Chronic Disease Management and Surgical Interventions

This segment explores the critical role of internal medicine in the pre-operative and post-operative management of patients with chronic diseases undergoing surgery. The focus is on how anesthesiologists and surgeons collaborate with internists to optimize patient outcomes, particularly in managing comorbid conditions such as diabetes, hypertension, and cardiovascular disease. We discuss the importance of a multidisciplinary approach in developing individualized care plans, adjusting medication regimens, and monitoring post-operative recovery, emphasizing the potential for reducing surgical risks and enhancing patient recovery.⁽¹⁰⁾

Table 1. Summary of Key Findings in the Interplay Between Surgery, Internal Medicine, and Anesthesia

Theme	Key Findings	Implications for Practice	Future Directions
Technological Advancements	Robotic surgery and precision medicine enhance surgical precision and reduce recovery times.	Need for continuous training in new technologies for all disciplines.	Further research into AI's role in predictive analytics for patient care.
Ethical Considerations	Complex ethical dilemmas arise, especially in high-risk surgeries and end-of-life care.	Development of interdisciplinary ethics committees.	Enhanced guidelines for ethical decision-making in patient care.
Education and Training	Interprofessional education programs improve understanding and collaboration among disciplines.	Incorporation of simulation-based training across disciplines.	Development of standardized interprofessional curricula.
Global Perspectives	Diverse healthcare systems influence the collaboration effectiveness among disciplines.	Adaptation of best practices to local contexts.	Comparative studies on interdisciplinary practices in different settings.
Pain Management and Palliative Care	Multimodal analgesia and interdisciplinary palliative care approaches improve patient quality of life.	Broader adoption of holistic pain management strategies.	Research on non-pharmacological interventions for pain and symptom management.
AI and Machine Learning	AI and ML offer predictive insights for surgery, anesthesia, and chronic disease management.	Ethical integration of AI into patient care decisions.	Exploration of AI in post-operative care and long-term health monitoring.
Interdisciplinary Research	Collaborative research leads to innovations in treatment and diagnostics.	Support for interdisciplinary research initiatives and funding.	Expansion of research into minimally invasive and patient-specific treatments.
Patient Education and Engagement	Informed and engaged patients demonstrate better outcomes and higher satisfaction with care.	Implementation of comprehensive patient education programs.	Studies on the impact of patient engagement on treatment efficacy.

Source: review analysis. This table summarizes the interdisciplinary interactions and outcomes identified in the narrative review, highlighting the crucial areas of collaboration between surgery, internal medicine, and anesthesia.

Pain Management and Palliative Care

The interplay between anesthesia, surgery, and internal medicine is crucial in the context of pain management and palliative care. This section examines the collaborative efforts to provide holistic pain management strategies that extend beyond surgical interventions, including the use of multimodal analgesia, nerve blocks, and non-pharmacological therapies. The discussion also covers the integration of palliative care principles into

the surgical and medical management of patients with life-limiting illnesses, focusing on improving quality of life, managing symptoms, and supporting patients and their families through complex medical decisions.⁽¹¹⁾

The Role of Artificial Intelligence and Machine Learning

An in-depth analysis of the role of artificial intelligence (AI) and machine learning (ML) in enhancing the collaboration between surgery, internal medicine, and anesthesia forms a significant part of this section. We explore how AI and ML are being used to predict surgical outcomes, individualize anesthesia protocols, and identify potential complications before they occur. The potential of these technologies to facilitate real-time decision-making, improve the accuracy of diagnostics, and tailor treatment plans to the unique needs of each patient is highlighted, along with the ethical and practical considerations of integrating AI into clinical practice.^(12,13)

Interdisciplinary Research and Innovation

This segment focuses on the impact of interdisciplinary research teams that include surgeons, internists, anesthesiologists, and other healthcare professionals in driving innovations in patient care. We examine case studies of successful collaborative research projects that have led to breakthroughs in minimally invasive surgical techniques, advanced anesthetic agents, and novel diagnostic tools.⁽¹⁴⁾

The discussion also encompasses the challenges of conducting interdisciplinary research, such as funding, coordination, and the integration of diverse expertise, and strategies to overcome these barriers.

Table 2. Challenges and Opportunities in Interdisciplinary Collaboration

Challenge	Description	Opportunity	Potential Solutions
Communication Barriers	Differences in terminology and priorities among disciplines can lead to misunderstandings.	Enhanced interprofessional communication.	Implementation of standardized communication protocols and training.
Educational Silos	Discipline-specific training programs may lack interdisciplinary components.	Development of integrated education and training programs.	Interprofessional education workshops and shared learning resources.
Technological Integration	Variability in the adoption and utilization of new technologies across disciplines.	Harmonized adoption of digital health solutions.	Cross-disciplinary technology committees to guide implementation.
Ethical Decision-Making	Navigating complex ethical dilemmas involving multiple disciplines can be challenging.	Collaborative ethics consultation services.	Establishment of interdisciplinary ethics boards.
Resource Allocation and Accessibility	Disparities in resource availability can affect interdisciplinary care, especially globally.	Equitable resource distribution strategies.	International collaborations and policy advocacy for resource sharing.
Pain Management and Palliative Care	Varying approaches to pain and symptom management across disciplines.	Unified protocols for pain and palliative care.	Multidisciplinary pain management teams.
Research and Innovation	Limited funding and support for interdisciplinary research projects.	Increased funding and institutional support for innovation.	Development of interdisciplinary research grants and collaboration platforms.
Patient Education and Engagement	Differing levels of patient engagement and education by each discipline.	Coordinated patient education efforts.	Unified patient education materials and interdisciplinary consultation sessions.

Source: review analysis. This table delineates the key challenges in the collaboration among surgery, internal medicine, and anesthesia, alongside the corresponding opportunities for growth and improvement. It underscores the necessity of fostering strong interdisciplinary communication, integrated educational frameworks, and equitable technology adoption.

Future Directions and Innovations

The concluding segment of our development section is dedicated to envisioning the future of collaboration among surgery, internal medicine, and anesthesia. This includes speculative analysis on the potential impact of emerging technologies like artificial intelligence, 3D printing, and nanomedicine on these disciplines. We

also consider the evolving landscape of medical ethics in the face of technological advancements and the ongoing shift towards holistic and integrative approaches to patient care. Potential barriers to interdisciplinary collaboration, such as institutional silos and the need for cultural change within healthcare organizations, are discussed, alongside strategies to overcome these challenges.

Table 3. Gaps and Opportunities for Future Research in the Interdisciplinary Field of Surgery, Internal Medicine, and Anesthesia

Research Area	Identified Gaps	Opportunities for Future Research
Technological Integration	Limited research on the long-term impacts of robotic surgery on patient health.	Studies focusing on the long-term outcomes and patient satisfaction rates.
Patient-Centered Care	Sparse data on patient preferences and outcomes in interdisciplinary care.	Research on patient engagement strategies and their impact on health outcomes.
Interdisciplinary Education	Lack of standardized curricula for interdisciplinary medical education.	Development and evaluation of integrated educational programs across disciplines.
Global Health Perspectives	Inadequate comparative studies on interdisciplinary practices globally.	Cross-cultural studies to understand diverse healthcare practices and adaptability.
Chronic Disease Management	Gaps in understanding the optimal integration of specialties in managing complex chronic conditions.	Longitudinal studies on interdisciplinary approaches to chronic disease management.
Pain Management	Limited research on non-pharmacological interventions within surgery settings.	Innovative studies on integrating holistic pain management techniques in perioperative care.
Ethical Considerations	Insufficient guidelines on ethical dilemmas specific to interdisciplinary care.	Development of comprehensive ethical frameworks for decision-making in complex care settings.
AI in Patient Care	Uncertainty about the ethical implications and patient trust in AI-based decisions.	Ethical studies and trust-building measures for AI integration in patient care.
Palliative Care Integration	Lack of research on palliative care integration with surgical and medical treatment plans.	Studies on the effects of early palliative care involvement in surgical and medical care plans.
Interdisciplinary Communication	Inefficient communication strategies among different medical disciplines.	Research on effective communication models and tools for interdisciplinary teams.

Source: review analysis. This table presents a summary of the current gaps and future research opportunities in the interdisciplinary interactions among surgery, internal medicine, and anesthesia as identified through the narrative review.

DISCUSSION

Interdisciplinary Collaboration: A Keystone of Modern Healthcare

Our review underscores the pivotal role of interdisciplinary collaboration in enhancing patient care and outcomes. The integration of surgery, internal medicine, and anesthesia is shown to be not just beneficial but essential in managing complex patient cases, particularly those involving chronic diseases and multi-faceted treatment plans. Articles within the review consistently highlight the positive impact of collaborative approaches on surgical success rates, patient satisfaction, and recovery times. These findings echo the growing consensus within the medical community that holistic, team-based care approaches are paramount in addressing the multifaceted needs of patients in a comprehensive manner.^(15,16)

Technological Advancements: Bridging Gaps and Creating New Frontiers

The exploration of technological advancements reveals a dual-edged sword. On one hand, innovations such as robotic surgery, precision medicine, and AI-driven diagnostics have revolutionized aspects of patient care, offering new possibilities for treatment and management. On the other hand, the rapid pace of technological evolution presents ongoing challenges for integration into clinical practice, requiring continuous adaptation and learning among medical professionals. Furthermore, the discussion within the articles reviewed points to an urgent need for research focusing on the long-term effects of these technologies on patient health and healthcare systems.⁽¹⁷⁾

Ethical and Patient-Centered Care Considerations

The narrative review brings to light the complex ethical considerations inherent in the convergence of

surgery, internal medicine, and anesthesia. The emphasis on patient-centered care across the articles reviewed aligns with the ethical imperative to respect patient autonomy, dignity, and preferences. However, the articles also illuminate the challenges in balancing technological possibilities, clinical judgments, and patient values—especially in contexts involving end-of-life decisions, chronic pain management, and high-risk surgical interventions.

Education and Training: Foundations for Future Success

A recurring theme in the articles reviewed is the critical importance of education and training in fostering effective interdisciplinary collaboration. The gap in standardized curricula and the need for innovative educational approaches are identified as significant barriers. The discussion highlights opportunities for the development of integrated training programs that reflect the realities of modern healthcare, emphasizing the need for skills in communication, ethical decision-making, and collaborative patient care.⁽¹⁸⁾

Moving Forward: Research Gaps and Future Directions

The discussion concludes by addressing the identified gaps in current research and outlining future directions. It calls for a concerted effort to undertake longitudinal studies that can provide deeper insights into the long-term impacts of interdisciplinary care on patient outcomes. Additionally, there is a clear need for further exploration into the ethical, social, and practical implications of integrating emerging technologies into clinical practice. The articles reviewed collectively advocate for an increased focus on global health perspectives, aiming to adapt and apply lessons learned from diverse healthcare systems to improve interdisciplinary collaboration worldwide.

In synthesizing the results and discussions from the articles related to our narrative review, it becomes evident that the interplay between surgery, internal medicine, and anesthesia is a dynamic and evolving field. The challenges highlighted necessitate ongoing dialogue, research, and innovation to harness the full potential of interdisciplinary collaboration in advancing patient care.⁽¹⁹⁾

Enhancing Patient Outcomes through Interdisciplinary Collaboration

The review revealed a consensus on the importance of interdisciplinary collaboration in improving patient outcomes. Several studies highlighted how coordinated care plans, involving surgeons, internists, and anesthesiologists, led to shorter hospital stays, reduced complication rates, and improved patient satisfaction. This aligns with the broader literature, which emphasizes that collaborative approaches, especially in the management of chronic conditions and complex surgeries, result in a more holistic understanding of patient needs, thereby enhancing care.⁽²⁰⁾

The Impact of Technological Advancements on Clinical Practice

The exploration of technological advancements in our review resonates with findings from the literature that underscore the transformative potential of these innovations in healthcare. Articles have discussed the implementation of robotic surgery and AI in diagnostics and treatment planning, pointing out both the enhanced precision and efficiency they offer and the challenges they pose in terms of integration into clinical workflows and ensuring equitable access. This dual perspective emphasizes the need for ongoing training and ethical considerations in the deployment of new technologies.⁽⁵⁾

Navigating Ethical Complexities in Patient-Centered Care

The narrative review's emphasis on ethical and patient-centered care considerations finds strong support in the literature. Articles have elaborated on the ethical dilemmas faced by healthcare professionals when managing patients with complex needs, especially in the context of advanced directives and end-of-life care. The literature suggests a growing recognition of the need for frameworks and guidelines that support shared decision-making and respect for patient autonomy, reinforcing the importance of empathy and communication skills in clinical practice.⁽²¹⁾

The Crucial Role of Education and Training

The review's focus on the pivotal role of education and training in promoting effective interdisciplinary collaboration is echoed in numerous studies. These articles have called for integrated educational programs that reflect the collaborative nature of modern healthcare, highlighting the benefits of simulation-based learning and interprofessional education initiatives. The consensus suggests that preparing healthcare professionals for a future of collaborative practice starts with a foundation of mutual understanding and respect, developed through shared learning experiences.⁽²²⁾

Research Gaps and Future Directions

Finally, the discussion of research gaps and future directions in our review aligns with the broader academic discourse, which calls for more in-depth studies on the long-term impacts of interdisciplinary care, the integration of technological innovations, and the ethical dimensions of modern medical practice. Articles have emphasized the need for longitudinal research to better understand how these dynamics play out over time and across different healthcare settings, pointing to a fertile ground for future investigations.

By weaving together these strands of discussion from the articles reviewed, we highlight the rich tapestry of challenges and opportunities that define the intersection of surgery, internal medicine, and anesthesia. The consensus points towards an optimistic future, where continued research, innovation, and collaboration can lead to even greater advancements in patient care. However, it also underscores the importance of vigilance in addressing the ethical, educational, and technological challenges that accompany these advancements.

CONCLUSIONS

The narrative review on the interplay between surgery, internal medicine, and anesthesia elucidates the critical importance of interdisciplinary collaboration in enhancing patient care and outcomes. Through a comprehensive analysis of the literature, we have identified the pivotal roles of technological advancements, ethical considerations, patient-centered care, and education in facilitating effective communication and cooperation among these disciplines. The review highlights not only the current successes and challenges but also points towards significant opportunities for future research, particularly in the realms of technology integration, ethical frameworks, and global health perspectives. In conclusion, the evolving landscape of healthcare demands a continued emphasis on interdisciplinary approaches, underpinned by robust education and training, ethical diligence, and a steadfast commitment to patient-centered care, to navigate the complexities of modern medical practice and achieve the best possible outcomes for patients.

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