

**INTEGRAL TRAINING THROUGH TRANSDISCIPLINARITY FOR
HUMANIZED HEALTH CARE: THE COLOMBIAN CONTEXT
LA FORMACIÓN INTEGRAL DESDE LA TRANSDISCIPLINARIEDAD PARA UNA
ATENCIÓN EN SALUD HUMANIZADA. CONTEXTO COLOMBIANO**

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ABSTRACT

Keywords:

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In the Colombian context, marked by social inequalities and health challenges, the training of healthcare personnel demands a profound transformation. Transdisciplinarity emerges as a key approach to integrating disciplinary and community knowledge, facilitating the understanding of the social determinants of health and promoting ethical, collaborative, and critical competencies in professionals working in vulnerable settings. Therefore, this study adopted a qualitative approach with a descriptive scope and a case study design to analyze how transdisciplinarity is experienced in two healthcare institutions located in Bucaramanga and Armenia, Colombia. Sixteen healthcare professionals participated through semi-structured interviews and document review. Data analysis was conducted using triangulation in an Excel matrix. The findings reveal that both institutions function as training centers with a commitment that goes beyond patient care. Transdisciplinarity is reflected in the way patients are treated and in the continuous professional development of staff, demonstrating a vocation for social responsibility, teaching, and research. These practices contribute to transforming healthcare delivery and to the professional growth of the human team. In the discussion, the results are contrasted with previous research, highlighting similarities, differences, or novel contributions. It is concluded that transdisciplinarity is part of everyday practice and is reflected in the collaborative work among professionals, allowing for a comprehensive view of the patient beyond the disease. Furthermore, mechanisms exist for the integration and ongoing training of staff, positioning the healthcare professional as an educational agent serving the community through clinical practice and research.

RESUMEN

Palabras clave:

transdisciplinariedad, formación, profesional, salud, paciente.

En el contexto colombiano, marcado por desigualdades sociales y desafíos sanitarios, la formación del personal en salud exige una transformación profunda. La transdisciplinariedad emerge como un enfoque clave para integrar saberes disciplinares y comunitarios, facilitando la comprensión de los determinantes sociales de la salud y promoviendo competencias éticas, colaborativas y críticas en profesionales que actúan en entornos vulnerables. Por tanto, este estudio adoptó un enfoque cualitativo, con alcance descriptivo y diseño de estudio de caso, para analizar cómo se vive la transdisciplinariedad en dos instituciones de salud ubicadas en Bucaramanga y Armenia, Colombia. Participaron 16 profesionales de la salud a quienes se les aplicaron la entrevista semiestructurada y la revisión documental. El análisis se realizó mediante triangulación de datos en una matriz de Excel. Los hallazgos revelan que ambas instituciones funcionan como centros de formación con un compromiso que trasciende la atención al usuario. La transdisciplinariedad se manifiesta en la forma de atender al paciente y en la formación continua del personal evidenciando una vocación de responsabilidad social, docencia e investigación. Estas prácticas contribuyen a transformar la atención en salud y al desarrollo profesional del equipo humano. En la discusión se contrastan los resultados con investigaciones señalando coincidencias, diferencias o aportes novedosos. Se concluye que la transdisciplinariedad es parte del quehacer cotidiano y se refleja en el trabajo colaborativo entre profesionales, lo que permite una visión integral del usuario más allá de la enfermedad. Además, existen mecanismos para la integración y formación continua del personal posicionando al profesional de salud como agente educativo al servicio de la comunidad desde la práctica clínica y la investigación.

Introduction

This research addresses the emerging needs of a complex and dynamic social context that calls for innovative and collaborative solutions (Morin, 2020). In the field of health, phenomena such as climate change, pandemics, the rise in chronic diseases, widening disparities in access to care, and increasing disciplinary specialization constitute both community and public health emergencies. The contemporary world is characterized by the interconnection and interdependence of social, economic, cultural, and environmental processes; thus, the fragmentation of knowledge and sector-specific training pose barriers to effectively addressing the multifaceted problems faced by health institutions.

This challenge is particularly relevant in Colombia, where the quality of health care has been governed by various national and international standards. For example, Decree 1011 of 2006, Decree 780 of 2016, Statutory Law 1751 of 2015, and Law 2294 of 2023 aim to ensure efficient and safe services through measures such as updating mental health policy and incorporating territorial and environmental approaches; at the same time, international standards such as ISO 9001 and ISO 7101:2023 provide management frameworks for efficiency, patient satisfaction, and the sustainability of health care systems, promoting qualified professional teams and continuous quality improvements (Vélez and González, 2021). In this context, it is urgent to adopt a transdisciplinary and comprehensive approach in order to overcome the fragmentation of knowledge and move toward a holistic approach, in line with the World Health Organization's definition: "a state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity" (WHO, para. 1). From this perspective, applying a transdisciplinary and integrative approach in health contexts is based on the urgent need to adopt a holistic approach within the health system, as outlined by the World Health Organization (WHO), which defines health as "a state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity" (para. 1).

To overcome the limitations of fragmented knowledge, transdisciplinarity and holistic education are presented as key approaches. Transdisciplinarity is understood as an approach that transcends disciplines and promotes the integration of diverse bodies of knowledge; it represents a unique opportunity to overcome these limitations (Santaella and Simón, 2023). "It seeks to analyze a problem or situation from the perspective of different disciplines that are interconnected, that transcend one another, and that are not limited by the current compartmentalization of knowledge" (Nicolescu, 1996). It is not the same as interdisciplinarity, since the latter consists of integrating concepts, methods, and perspectives from two or more disciplines to address a specific question or problem while maintaining disciplinary boundaries and thus establishing a synthesis among established fields (Bell et al., 2022).

In the health sector, the primary goal of a transdisciplinary approach is to train professionals responsible for patient care, fostering intersectoral collaboration that enables the integration of medical, psychological, social, and cultural dimensions. It focuses on improving the quality of care and ensuring that patients' biopsychosocial needs are addressed in a comprehensive manner. Therefore, the true impact of regulations in the field of health depends on their integration with transdisciplinary approaches that bring together knowledge from education, health, and the social sciences. A transdisciplinary approach makes it possible to overcome the fragmentation of knowledge and address the complexity of health issues from a holistic perspective;

meanwhile, comprehensive education ensures the balanced development of the cognitive, emotional, and social dimensions of professionals and citizens, thereby strengthening the quality of health care not only through regulations but also through the development of human capacities that promote well-being and sustainability.

In this regard, a study in Mexico finds that “pseudo-interdisciplinarity” persists in Latin American higher education due to compartmentalized structures of knowledge (Portugal, 2021); Meanwhile, in Colombia, interdisciplinarity is framed as an ethical responsibility of universities, and a study in Valledupar demonstrates the potential of integrated teams to promote healthy lifestyles and empower communities (Sánchez et al., 2015). On the other hand, Garrafa (2022) points out the mismatch between biomedical ethics and transdisciplinarity in the social sciences and humanities, calling for frameworks that are sensitive to their specific characteristics, especially in Brazil. Therefore, a universal and holistic ethical framework—aligned with UNESCO’s Universal Declaration on Bioethics and Human Rights—is proposed as a guide for truly comprehensive and responsible research (Téllez and Aragón, 2022). Overall, the evidence points to the need to adopt transdisciplinary approaches and transform university structures into models of research and education capable of integrating different fields of knowledge and addressing complex problems.

The results of previous studies reveal a persistent gap between interdisciplinary rhetoric and institutional practice. Structures and incentives that perpetuate fragmentation remain in place, while interdisciplinary teams demonstrate transformative potential in community settings but require rigorous assessments of sustainability and scalability. Ethical models designed for biomedicine are inappropriate for social and participatory research, hindering the co-production of knowledge; therefore, it is necessary to adopt a more holistic ethical approach and adapted regulatory frameworks. Overall, the evidence calls for a shift from isolated projects and policy statements to institutional transformations that promote academic incentives, transdisciplinary reviews, and participatory mechanisms that enable the implementation, maintenance, and evaluation of integrative practices in health care delivery.

In this context, this study focuses on transdisciplinarity as a means of strengthening the comprehensive training of health care personnel, since the literature indicates that the topic has been addressed only to a limited extent. Therefore, the novelty of this study lies in the integration of knowledge, practices, and worldviews into the training of professionals responsible for patient care, fostering intersectoral collaboration that enables the integration of medical, psychological, social, and cultural dimensions to address complex problems in the health care system. However, it is recognized that hierarchical care structures, excessive workloads, fragmented models, cultural and educational barriers, and legal and patient safety considerations can hinder its implementation.

It is therefore recognized that human well-being is the result of multiple factors, such as nutrition, safe environments, social relationships, and many other factors that influence and enable a person’s healthy development. Therefore, it is crucial to train health professionals with a broader, more critical, and more collaborative perspective, emphasizing the importance of adopting transdisciplinary approaches that integrate knowledge from various fields. Thus, there is a need to restructure traditional educational models by promoting interdisciplinary interaction, the co-construction of knowledge, and the integration of theory and practice, which will help strengthen patient-centered care and take into account the patient’s social, cultural, and family context. These considerations lead us to the research question: How is holistic education based on a

transdisciplinary approach manifested in the context of selected Colombian healthcare institutions?

Conceptual Framework

Transdisciplinarity in Health

Transdisciplinarity is a methodological and epistemological approach aimed at addressing complex problems through the integration of diverse bodies of knowledge and disciplines. According to Nicolescu (1996), it is based on three principles: the integration of multiple levels of reality, the logic of the included third, and transdisciplinary collaboration. The multidimensional nature of reality is recognized, which allows for interdisciplinary collaboration to foster dialogue among different fields of knowledge and cooperation among researchers, professionals, and communities in order to generate shared knowledge and innovative solutions (Pérez *et al.*, 2013). Therefore, according to Morin (2001), transdisciplinary education promotes intrapersonal, interpersonal, and cognitive skills that are essential for solving complex problems through the collaborative work of multiple disciplines.

In the field of health, transdisciplinarity has established itself as a strategy that goes beyond collaboration among disciplines, involving the transcending of disciplinary boundaries to integrate knowledge, skills, and collective decision-making that includes patients, families, and communities (Van, 2017). Health interventions based on a transdisciplinary approach aim to address contextual complexity, incorporate diverse forms of knowledge, and build inclusive conceptual frameworks, thereby enabling the design of solutions that are sensitive to local realities (UNESCO, 2020). This approach seeks to solve real-world problems through a holistic and participatory lens, which is essential in a world where health issues are becoming increasingly complex and interdependent.

In recent years, it has been noted that transdisciplinarity is key to addressing global challenges such as climate change, pandemics, and social inequality, requiring the development of collective solutions drawn from different fields (Fagundo-Rivera and Gómez-Salgado, 2025). In public health, efforts have been made to integrate disciplines such as the social, environmental, and human sciences into our understanding of the life-disease process (Tirado, 2020). This approach emphasizes that health initiatives must go beyond the clinical realm, integrating different perspectives to achieve sustainable solutions. Thus, transdisciplinarity seeks to break down disciplinary boundaries and build bridges of dialogue and cooperation that foster a deep and holistic understanding of complex contemporary problems, thereby contributing to inclusive and equitable solutions.

Comprehensive Health

Holistic health has evolved into a vision that goes beyond the biomedical approach, incorporating various dimensions. Integrative approaches promote well-being as a multidimensional state that goes beyond the mere absence of disease (Valenzuela, 2016). This perspective emphasizes that physical, emotional, cognitive, and community aspects are intertwined and mutually reinforcing, arguing that care must respond to the complexity of the daily lives of individuals and communities.

Recent studies in Latin America highlight the importance of educational and community policies that integrate comprehensive health with sustainable development

(ECLAC, 2021; Montero, 2021). Promoting healthy lifestyles and shared responsibility for health fosters a sustainable and participatory approach to healthcare from an early age and in diverse contexts such as Colombia's. In this regard, the WHO (2018) states that health systems must ensure a comprehensive approach that incorporates the promotion of healthy environments, community participation, and attention to social determinants.

For its part, the concept of *integrative health* describes a state of physical, mental, and spiritual well-being that encompasses the individual, the community, and the population. This approach is influenced by individual, environmental, and social factors, as well as public policies designed to promote the participation of both the individual and the healthcare team in preventive and therapeutic strategies aimed at holistic well-being (Engineer et al., 2021). Consequently, it is argued that fragmented systems are insufficient to address the complexity of the experience of illness, which reinforces the need for integrative approaches (Sasagawa et al., 2017).

Health and Education

The training of health professionals has adopted a transdisciplinary approach by integrating academic, ethical, and social content. Recent research highlights that healthcare education must incorporate not only technical competencies but also social-emotional and leadership skills to respond to changing contexts (Saleh, 2025). These contributions underscore the need for a curriculum that promotes adaptability, social responsibility, and interdisciplinary collaboration as essential components of health education.

Consequently, several transdisciplinary educational models in health have emerged that emphasize the development of technical, ethical, social, and collaborative competencies, training professionals capable of acting with cultural sensitivity and a holistic perspective in diverse contexts (UNESCO, 2020). One of these is the transdisciplinary pedagogical model for public health research, which aims to transfer skills across different disciplines and contexts (Betancourt, 2013). This model encourages learning that goes beyond technical knowledge and promotes a broad view of the role of healthcare professionals in society.

Another model is that of sustainable health, in which interprofessional education must address cross-cutting environmental threats, which requires collaboration across disciplines and an education focused on global responsibility (Hoyos and Velásquez, 2021). In this way, future professionals acquire the skills needed to tackle the complex challenges of the environment from a holistic perspective. According to Suero and Ferriol (2019), promoting healthy communities involves training health professionals to become agents who reinforce the values of providing selfless and courteous service.

Method

This study takes a qualitative approach in which data are collected from multiple sources that provide information about the case under study, as well as the subject's memories and experiences and the phenomenon under study, with the aim of interpreting it. In this particular case, the study explores how healthcare professionals understand and experience aspects of transdisciplinarity that enable comprehensive training for improved patient education and care, as well as disease treatment. In addition, the study takes a descriptive approach because it grounds transdisciplinarity in the practices, concepts, and factors that shape it within the healthcare setting. Finally, the design adopted is that of a collective case study, as it allows for the analysis of various case

studies on transdisciplinarity and the holistic training of healthcare personnel in their real-world context, interpreting meanings, practices, and relationships. This makes it possible to analyze several cases together to identify common patterns.

The study was limited to two cities in the country: Armenia and Bucaramanga. In the city of Armenia, there is one hospital—a recognized tertiary-level institution that provides supervised academic training in accordance with Law 2333 of 2023. In Bucaramanga, a tertiary-care healthcare facility was established, with a focus on healthcare personnel. Given these circumstances, the sample of participants was selected using non-probabilistic, purposive, or convenience sampling based on selection criteria such as: availability, having a current employment contract, and at least one year of professional experience in the health field. In addition, institutional documents such as protocols, contingency plans, resolutions, research policies, and the institutional mission and vision were reviewed. At Institution 1 (Armenia), the sample consisted of 5 bacteriologists and 3 laboratory assistants from the clinical laboratory subprocess, and at Institution 2 (Bucaramanga), it consisted of 8 healthcare professionals: 6 doctors and 2 nursing assistants. In total, the sample consisted of 16 participants from the health sector, representing both the public and private sectors (see Table 1).

Table 1

Sample from the study

Institutions health	Documents Considered	Participants		Total
Institution 1 (Armenia)	Protocols	Bacteriologists	5	8
	Contingency Plans	Laboratory assistants	3	
Institution 2 (Bucaramanga)	Institutional Resolutions and Policies	Doctors	6	8
	Mission and Vision institutional	Nursing Assistants	2	
Total number of participants:				16

Two qualitative methods were used to collect data: semi-structured interviews and a literature review. Each technique was selected based on its suitability for the study's specific objectives, with the aim of triangulating the information from various sources and perspectives. The document matrix made it possible to collect and analyze the documents that regulate and govern health care institutions. The semi-structured interview made it possible to gather healthcare staff members' accounts of the processes, experiences, and perceptions related to transdisciplinarity and comprehensive training. The interview consisted of 8 questions that had been previously evaluated by experts to ensure their reliability. The experts, who have experience in complex thinking, took into account factors such as writing style, content, consistency, relevance, clarity, and accuracy. Their evaluation highlighted the clear design of the instruments and suggested that some items and terminology be reworded. As a result, the original design of the literature review matrix is retained, and the interview is expanded from 6 to 8 questions (see Tables 2 and 3).

Table 2
Semi-structured interview

No.	Item
1.	Tell us about an experience in which you interacted with other fields of knowledge and professionals from other disciplines while providing care to a client.
2.	Based on your experience, describe how staff training is conducted at the institution.
3.	What institutional practices promote biopsychosocial training for staff at the institution?
4.	Describe the cross-functional projects the institution carries out to serve its users
5.	Describe the cross-functional projects the institution carries out in staff training
6.	Do you believe that the education you received (from the institution) promotes a holistic view of the human being? Why?
7.	In your role at the institution, how do you help make a difference in patients' lives?
8.	Has your work at the institution contributed to your personal and professional development?

Table 3
Literature Review

Institutional Document	CATEGORIES						
	Unity of knowledge, not fragmentation	Problem-Solving from Multiple Perspectives	Impact	What about transdisciplinarity?	Biological Development	Psychological Development	Social Development
Mission							What about a well-rounded education?
Vision							
Protocols							
Programs							
Manuals							
Internal Regulations							
Quality Report							
Clinical Practice Guidelines							
Regulatory Documents							
Training Programs							
Others							

Specifically, this research project, identified by code N02024-01-126, was approved by the Ethics Committee of the PICS Science and Social Innovation Park at the Minuto de Dios University Corporation (UNIMINUTO), which confirms its compliance with ethical, bioethical, and scientific integrity standards and its alignment with the objectives, methodology, and outcomes associated with the research proposal. In addition, two letters of intent were collected from the healthcare institutions and 16 informed consent forms from the participants, in which the project and its objectives were explained, ensuring complete anonymity and voluntary participation in the project.

Data analysis was conducted using a triangulation process that combined two data collection techniques: semi-structured interviews and a literature review. For the semi-structured interview, the epistemological approach that guided the interpretation of the data was the phenomenological one. This allowed us to understand how health professionals experience and interpret transdisciplinarity in their daily practice, beyond what institutional norms or models dictate. For its part, the literature review included a

hermeneutic analysis, which made it possible to interpret the documents governing health centers within their context. Consequently, the purpose of its policies and institutional guidelines was discussed. To achieve this, the following phases were implemented:

1) Finger placement: The semi-structured interviews were transcribed from audio to text using the AI Vocal tool. By reviewing the documents, the noteworthy excerpts from the institutional documents were selected and inserted into a Word document.

2) Selection of relevant data: The sections that define, explain, discuss, and illustrate the phenomenon under study were selected for both instruments. Similarly, anecdotes that contribute to the participants' shared meanings are drawn from the data. All the excerpts were arranged one after another in a Word document.

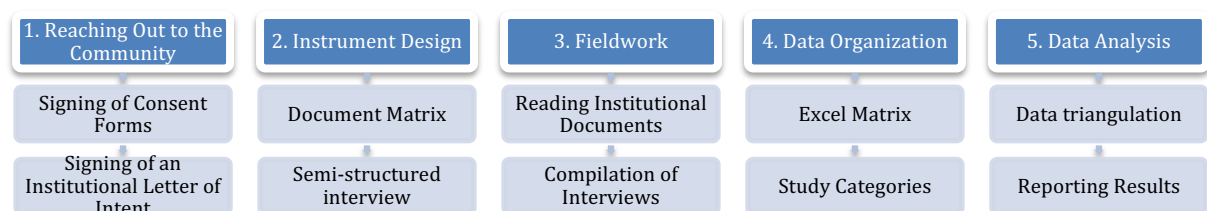
3) Establishment of categories for analysis: A) Transdisciplinarity: Unifying knowledge, not fragmentation; problem-solving from multiple perspectives; impact. B) Holistic Development: biological development, psychological development, social development.

4) Analysis matrix: The study's data and categories were organized in an Excel spreadsheet. The left-hand column contains the selected excerpts from the literature review, and the right-hand columns contain the study's categories and subcategories. Each instrument went through this process on a separate sheet of paper.

5) Triangulation: Once the data has been organized and the categories against which it will be compared have been established, the systematic analysis begins. The process begins by comparing each response with each category, noting their relationship and common themes. Once this step is complete, the information obtained from the two instruments is combined.

6) Interpretation: Through a phenomenological and hermeneutic interpretive approach, the results for each category were documented, highlighting their convergence, divergence, and complementarity—an aspect that enabled a holistic understanding of the phenomenon under study in relation to transdisciplinarity and holistic education (see Figure 1).

Figure 1
Investigation Procedure



Results

Unity of Knowledge, Not Fragmentation

At Institution 1, the laboratory bacteriologists demonstrate the integration of knowledge by playing a key role in comprehensive patient care, validating laboratory results through clinical correlation, interdisciplinary collaboration, and continuous verification to ensure reliable diagnoses. Their work takes place in an institutional

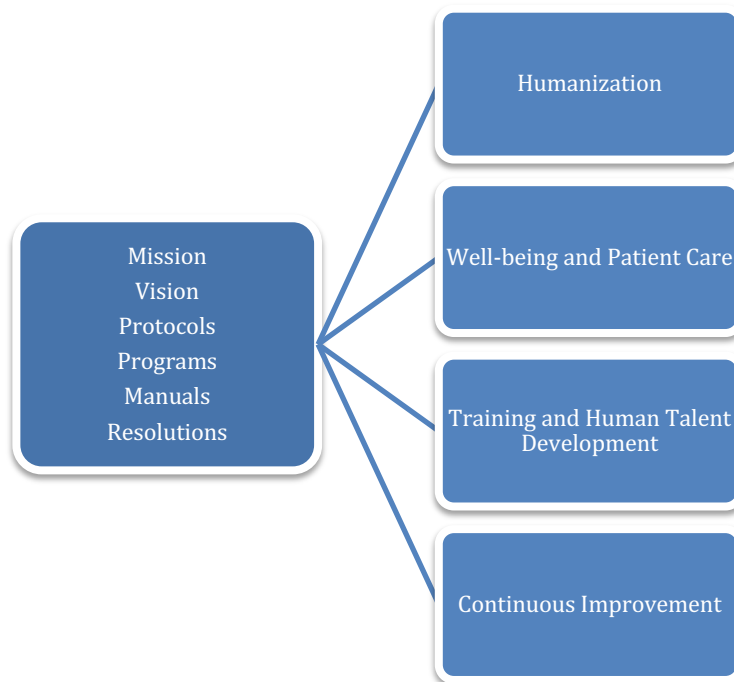
environment that promotes ongoing training, a patient-centered approach to care, technical development, and staff well-being. Through training programs, participation in committees, emotional support, and teamwork, both technical knowledge and interpersonal skills are strengthened. The institution has established itself as an educational and healthcare setting where ethics, empathy, and professional commitment are combined with advanced technologies and patient-centered management; the bacteriologist's experience in this context highlights the value of the clinical laboratory in the diagnostic process as part of coordinated, ethical, and educational care. Thus, the presence of elements such as humanization, patient well-being and care, training and development of human talent, and continuous improvement is evident in all the documents reviewed, whether mentioned directly or explicitly.

There is a comprehensive integration of technical, clinical, administrative, and human expertise, resulting in seamless, patient-centered care. Constant coordination with various hospital departments, ongoing training, collaborative work, psychosocial support, and participation in educational and feedback processes all strengthen an interdisciplinary approach. This initiative strengthens the comprehensive training of healthcare professionals, promoting patient-centered care and an education grounded in the realities of the hospital setting. It is recognized that this practice promotes diagnostic efficiency, quality of service, and the well-being of both patients and staff, establishing the institution as a place for learning, professional development, and empathetic care, as Bacteriologist 3 notes: *"We promote emotional well-being activities and workshops on empathy and communication with patients—that's very important. We need to keep in mind that we're basically putting ourselves in the patient's shoes, because they're the ones suffering from the pain or illness," "It has greatly strengthened my empathy and my commitment to healthcare."*

Meanwhile, at Institution 2, documents such as Annex D of the Patient Safety Protocol and the Manual Development Template demonstrate an explicit intention to integrate various dimensions of knowledge (clinical, pedagogical, legal, ethical, and administrative), thereby creating a platform that transcends the traditional fragmented approach. This organizational practice echoes the statement made by Doctor 3, who noted that *"Training must be comprehensive—not only to heal, but also to care for, understand, and support patients."* Thus, it is clear that the organization views health care as a space where each discipline contributes specific value and where knowledge flows in an interdependent manner.

Structural coherence between the healthcare team's discourse and institutional tools promotes the integration of knowledge in education and practice, facilitating a complex and transdisciplinary understanding of care. This category is reinforced by the recognition that both professional protocols and testimonials emphasize the need to integrate different fields of knowledge to improve care and training. The integration of knowledge thus becomes a guiding principle that prevents fragmentation and promotes a holistic approach to care (See Figure 2).

Figure 2
Key Elements in Institutional Documentation



Problem-Solving from Multiple Perspectives

At Institution 1, problem-solving demonstrates a comprehensive, collaborative approach to health care, in which the bacteriologist's work in the clinical laboratory is closely coordinated with physicians, nursing supervisors, and other professionals; this includes the validation of critical results, correlation with the patient's clinical status, and active participation in interdisciplinary committees, as noted by Bacteriologist 04, who states: "I actively participate in the Infection Control Committee and the Epidemiological Surveillance Committee, where many issues that cut across all hospital departments are addressed." This reflects a process focused on accurate diagnosis and timely treatment; This model promotes continuing education, patient-centered care, the well-being of staff and patients, and the ethical use of technology, thereby strengthening a healthcare system based on trust, empathy, and continuous improvement.

Laboratory assistants note that the handling and management of samples at the institution reflect a collaborative and comprehensive approach, in which coordination among assistants, bacteriologists, physicians, and administrative staff allows problems to be addressed from multiple perspectives—technical, organizational, ethical, and human. Ongoing training and EPM meetings, as highlighted by Laboratory Assistant 03, who states that: "*Almost every month, at the end of the month, we hold what we call the EPM, which is a meeting with the entire lab staff to see how things are going, to foster camaraderie and teamwork, and to ensure a very good work environment,*" and the inclusion of students strengthens collective learning, while coordination among clinical, social, and psychological departments ensures patient-centered care. This model fosters more informed and sensitive decision-making by integrating diverse knowledge and promoting an environment of continuous improvement and shared care.

At Institution 2, institutional protocols—such as the fall prevention protocol and the Immediate Action Guide—provide multifaceted solutions to critical incidents, which are developed with the participation of professionals from various fields (psychology,

physical therapy, medicine, nursing, safety, and nutrition). Accordingly, Doctor 4 emphasizes that *“when we all contribute from our respective roles, the solutions are more comprehensive.”* This account illustrates how the collaborative development of knowledge in practice makes it possible to generate more effective responses that are tailored to and contextualized for patients' needs.

This finding shows that problem-solving from multiple perspectives is an established practice at the institution, not merely a theoretical ideal. We develop integrated solutions that enhance patient safety, the quality of care, and the continuous learning of healthcare professionals. This approach also fosters an environment in which teamwork is established as a core value, enabling the team to handle critical situations more effectively and reducing the margin for clinical error.

Impact

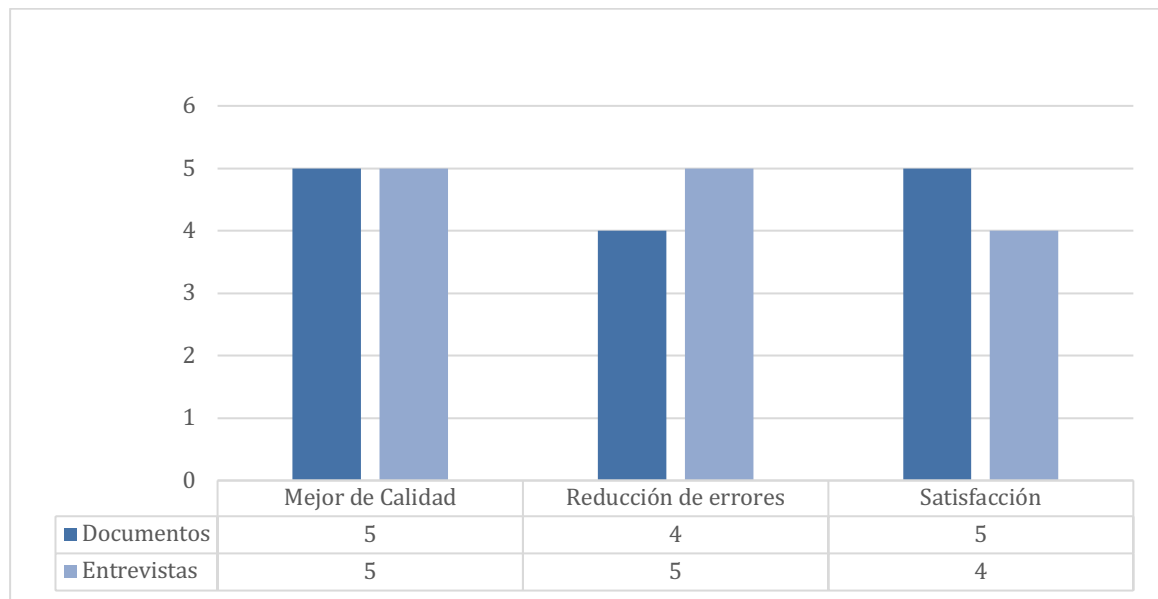
At Institution 1, the laboratory bacteriologists demonstrate the impact of quality on hospital care through the integration of technical knowledge, interdisciplinary work, and a patient-centered approach. The clinical laboratory—and especially the role of the bacteriologist—is key to timely and accurate diagnosis, which guides medical treatment. Effective communication across departments, ongoing training, employee well-being, and an organizational culture centered on empathy and collaboration strengthen both professional development and the patient experience. This comprehensive approach improves the safety, efficiency, and patient-centered nature of the service, reinforcing a patient-centered approach and a commitment to continuous improvement.

Nursing assistants have a direct and positive impact on the quality of diagnosis and patient care; interdisciplinary collaboration, ongoing staff training, and the implementation of organizational strategies—such as EPM meetings, technical training, and psychosocial support—strengthen both professional performance and the work environment. This comprehensive, empathy-centered approach, as Laboratory Assistant 02 points out: *“We must show warmth and empathy toward others”*—in addition to efficiency and teamwork—promotes more humane, safe, and timely care, establishing the hospital as a place of learning, collaboration, and commitment to patient well-being.

At Institution 2, institutional documents acknowledge the positive impact of transdisciplinary training and coordinated protocols on the quality of care, patient safety, and the strengthening of the organizational climate. This statement is corroborated by Doctor 1, who stated: *“Since we’ve been working together, everything has been running more smoothly and there have been fewer mistakes.”* This demonstrates that disciplinary coordination not only affects processes but also has a direct impact on reducing risks and strengthening trust.

The impact of transdisciplinary processes is not limited solely to clinical indicators; it is also reflected in institutional trust, the consolidation of a culture of care, and the creation of a reflective and participatory learning environment. This impact manifests itself in two key areas: for patients, who receive safer, more humane, and more personalized care; and for staff, who find opportunities for professional and personal growth in these practices (see Figure 2).

Figure 2
Impact of Transdisciplinary Processes



Transdisciplinarity

Transdisciplinarity in healthcare institutions is a key factor in providing comprehensive patient care. In this context, collaboration among bacteriologists, physicians, nursing assistants, and patient care staff enables a more effective response to diagnostic challenges—especially when faced with abnormal or inconsistent test results—and fosters a culture of continuous and collective learning. This synergy is enhanced through institutional programs designed for continuing education—such as courses, specialized training, and collaborative discussions—which broaden professional perspectives and enrich clinical decision-making. Thus, the bacteriologist’s technical expertise—validated by rigorous quality controls—becomes indispensable for guiding medical practice, even though their work remains largely unseen. Furthermore, the transdisciplinary model emphasizes the human dimension of care, incorporating empathy and the emotional well-being of both patients and healthcare personnel. This comprehensive perspective redefines healthcare as a collaborative practice, in which each discipline contributes, based on its specific expertise, to the common goal of providing more precise, humanized, and effective care (see Figure 3).

Figure 3
Humanized and Collaborative Healthcare Cycle



In this regard, transdisciplinarity is not an abstract ideal, but rather a concrete and necessary institutional practice that is reflected in policy documents and in the day-to-day experiences of health professionals. Manuals, protocols, and plans—such as the IAAS Action Plan, the Patient Safety Manual, and the Immediate Action Guide—require effective cooperation across multiple disciplines, breaking down barriers between traditional roles and fostering the collective creation of knowledge. In this regard, the institutional framework is geared toward establishing processes that do not rely on rigid hierarchies, but rather promote a horizontal approach to work in which each role is recognized for its unique characteristics and for the value it brings to patient care. This creates an environment in which open communication, collaborative decision-making, and participation become standard practices that enhance the quality of care and build team trust.

Transdisciplinarity, therefore, cuts across all the other subcategories identified in the analysis, as it brings knowledge together, enables problem-solving from multiple perspectives, and has a positive impact on the patient's biopsychosocial development. It is not merely a methodological tool for improving care, but rather an epistemological and ethical stance that redefines both the role of the professional and that of the patient in the care process. Transdisciplinary practice thus becomes the cornerstone of comprehensive training and quality care, offering a broader vision of health in which biological, psychological, and social factors are intertwined. This approach paves the way for a profound transformation of care models, placing the patient at the center and viewing knowledge as a collective asset that must be shared and coordinated to achieve more effective and humane outcomes.

Biological Development

At Institution 1, the laboratory bacteriologists demonstrate that the close relationship between the clinical laboratory and patient care—based on constant communication among bacteriologists, physicians, and healthcare staff—is essential to

ensuring accurate diagnoses and timely treatments. Ongoing training and scientific updates for staff, along with the use of advanced technologies—which are of great importance for the diagnosis mentioned by Bacteriologist 02, who states: *“When it comes to technologies in the lab, they vary; some are more complex, so you develop the ability to gain a basic understanding of all these technologies and know how to use them in your day-to-day lab work.”*

The proper collection, handling, and processing of biological samples is crucial to ensuring the validity of clinical analyses and diagnostic accuracy, which directly impacts the patient's physical health. This process requires a thorough understanding of physiological and technical principles, as well as effective coordination among hospital staff. Continuing education and training are essential for keeping this knowledge and these skills up to date, while also promoting the physical and emotional well-being of staff through a healthy work environment.

Meanwhile, at Institution 2, initiatives such as IAAS 2025 and the Fall Prevention Protocol directly address patient safety through infection control, fall prevention, and the safe performance of invasive procedures. From a practical standpoint, Doctor 6 emphasizes that “Biological treatment is essential, but it is not enough unless it is accompanied by comprehensive support.” This testimony shows that the biological dimension, while a priority, cannot be addressed in isolation but must be complemented by other perspectives.

Biological development is promoted at the institution not only through medical intervention but also through coordination with departments such as physical therapy, nutrition, and nursing. This comprehensive approach prevents the fragmentation of care and promotes patient recovery through a broad view of health. In this way, the biological dimension becomes the starting point for a form of care that is expanded and enriched by other forms of knowledge.

Psychological Development

At Institution 1, laboratory bacteriologists describe how psychological development is assessed by integrating it with the medical history and through interdisciplinary dialogue among bacteriologists, physicians, and nursing staff, as highlighted by Bacteriologist 01: *“We have colleagues here with various specialties, so we rely on them quite a bit, and they’re always willing to help us as well—which is truly rewarding,”* which allows for a comprehensive understanding of the patient and better therapeutic decision-making. The institution fosters a collaborative environment that emphasizes not only technical training but also the personal, ethical, and emotional development of its staff, recognizing the importance of empathy, communication, and psychological support for both patients and professionals.

Nursing assistants are constantly interacting with patients and other healthcare professionals, which requires them to adapt and manage stress in order to maintain a healthy work environment and provide compassionate care focused on holistic well-being. Continuing education and training strengthen these emotional and social skills, fostering staff confidence, motivation, and resilience. Institutional strategies such as psychological counseling, grief management courses, and integration activities contribute to a supportive environment and group cohesion. Organized, timely, and empathetic care reduces anxiety and stress in patients, improving their experience and emotional well-being.

At Institution 2, institutional documents include modules on self-care, empathetic communication, stress management, and emotional support. These elements were

acknowledged by Auxiliary 2, who stated: *“A patient who is afraid, alone, and without emotional support will not make a good recovery.”* This testimony highlights that the emotional aspect is crucial both for the patient's recovery and for the well-being of healthcare workers. Psychological care is viewed as an essential part of the care process, rather than as a secondary aspect.

The institution strengthens this aspect through programs aimed at humanizing care, training in emotional management, and activities that promote the team's resilience and mental health. In practice, this means that every interaction with a patient should take into account not only the clinical aspect, but also active listening, psychological support, and empathy, thereby fostering a more sensitive and compassionate approach to care.

Social Development

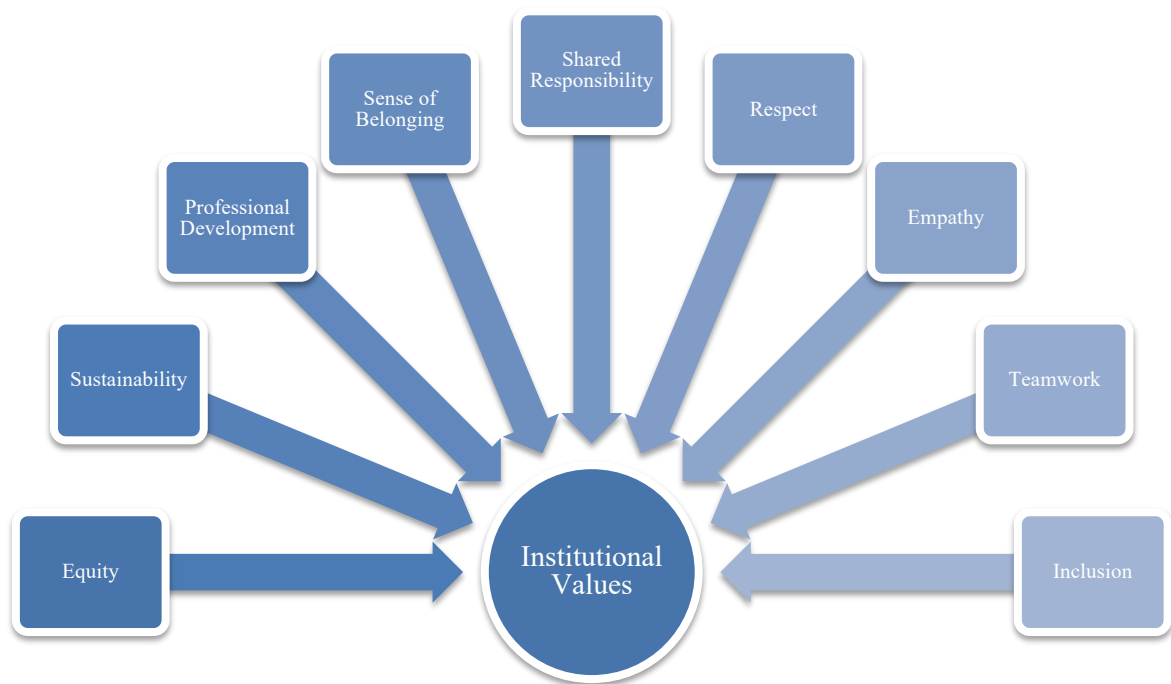
At Institution 1, the bacteriologists in the laboratory demonstrate social development through dialogue and interdisciplinary interaction among health professionals, promoting accurate diagnosis and timely treatment while comprehensively addressing the patient's needs. Teamwork, participation in committees and institutional processes, as well as ongoing training and support, strengthen communication, trust, and organizational cohesion. These dynamics foster a healthy work environment based on values such as respect, empathy, and teamwork, as noted by Bacteriologist 01: *“Teamwork—a colleague's help is always welcome,”* which positively impact both the quality of clinical care and the emotional well-being of patients and healthcare professionals.

Nursing assistants are strengthening the communication and cooperation networks that are essential for a cohesive work environment. Coordination and constant communication, along with training and educational opportunities, as Laboratory Assistant 01 points out: *“We have training and improvement meetings for us, the assistants. From time to time, the institution asks us to update our professional training,”* all of which fosters a sense of belonging, respect, and solidarity within the team; patient support programs and common areas contribute to social integration and collective well-being.

Meanwhile, at Institution 2, both the IAAS Plan and the Fall Prevention Protocol encourage the involvement of family members, caregivers, and the community in care, fostering a sense of shared responsibility. This is in line with the observation made by Doctor 1, who emphasizes: *“We must view the patient in context—within their family and their reality—not just in a hospital bed.”* This acknowledges that a patient's well-being depends not only on healthcare professionals, but also on the support they receive from those closest to them.

Social development is reflected in projects such as *“Tu corazón en tus manos,”* which involves patients after discharge, and in continuing education programs for family members and caregivers on risk prevention and home care. This approach recognizes that health is not an individual phenomenon, but rather a social and community one, which means that care must be coordinated with patients' support networks, family context, and social environment. (See Figure 4).

Figure 4
Internalization of Institutional Values



Comprehensive Training

In healthcare institutions, comprehensive training goes beyond the acquisition of technical knowledge, encompassing ethical, human, and collaborative dimensions that are essential to quality healthcare. This approach recognizes the importance of smooth and constant communication among the various healthcare professionals—doctors, bacteriologists, and nurses—integrating clinical findings as well as the emotional, social, and psychological factors that affect the patient's condition. In turn, the well-being of healthcare staff is positioned as an essential pillar, promoted through self-care, stress management, and continuing education, which reinforces an institutional culture based on respect, inclusion, and collaboration. The incorporation of advanced technologies and ongoing scientific updates strengthen technical skills and also foster a more reflective and critical approach to practice, in which teamwork and feedback promote professional and emotional growth. In this context, patient safety emerges as the cornerstone of practice, ensuring that every clinical decision is guided by ethical principles, interpersonal sensitivity, and an ongoing commitment to improving the quality of care.

These documents (Teaching and Service Relationship Manual and Institutional Training Plan 2025) identify it as an essential component for ensuring the quality and relevance of health workforce training. Through the effective integration of theory and clinical practice, and through strategies such as the progressive delegation of responsibilities based on the student's level of training, continuous and context-specific educational processes are established that enable the coherent development of competencies. This training encompasses technical knowledge, critical thinking skills, and ethical and collaborative skills—all of which are essential for patient-centered care adapted to the complexity of the hospital setting. Incorporating clinical, academic, and community perspectives into learning processes enriches analysis, strengthens interdisciplinary decision-making, and reinforces the link between academia and service.

In this way, holistic education becomes a driving force for institutional transformation by fostering professionals who are more aware, committed, and capable of responding ethically and effectively to the challenges of the health care system (see Table 2).

Table 2
Key Elements of Comprehensive Health Care

CATEGORY	SUBCATEGORY
Comprehensive, precise, and compassionate care	Empathy, patient well-being, and team well-being: the ultimate goal of the transdisciplinary model.
Better clinical decision-making	Decisions based on collaboration and technical expertise lead to safer and more efficient actions.
Technical Validation and Knowledge	Quality controls and technical input from the bacteriologist increase diagnostic reliability.
Continuing Education and Collective Reflection	Courses, training programs, specializations, and institutional opportunities enhance knowledge.
Interdisciplinary collaboration	Cooperation among physicians, bacteriologists, nurses, and nursing assistants to address patient care.

Discussion and Conclusions

In the findings, transdisciplinarity emerges as an epistemological stance and an institutional practice that goes beyond interprofessional collaboration to become a framework that integrates teaching, research, patient care, and the community around complex health issues. The findings show that this vision—in which bacteriologists, physicians, nursing assistants, and other healthcare personnel share knowledge and responsibilities—aligns with contemporary proposals that view transdisciplinarity as a response to systemic challenges. Not only does it break down disciplinary boundaries, but it also incorporates non-academic stakeholders and reflective practices to generate sustainable solutions (Sell *et al.*, 2022). Current literature broadens this perspective to include health systems science and the need for transdisciplinary frameworks to promote continuous learning and improvements in complex systems (Méndez, 2015). Overall, the results reinforce the idea that a transdisciplinary approach—when implemented through institutional policies, tools (manuals and protocols), and training opportunities—can transform training and care to comprehensively address the needs of the population.

With regard to the experience of holistic education, the findings of this study show that both institutions promote it through their healthcare workforce. This involves acquiring technical skills, putting values into practice, and engaging in continuing education, which leads to the adoption of a holistic approach that recognizes the inherent complexity of health care. Olivera (2013) emphasizes the importance of integrating knowledge through an interdisciplinary approach, highlighting its practical application in the students' learning process. Similarly, López and Fernández (2025) assert that the comprehensive training of professionals requires them to place themselves at the service of others and their realities; therefore, it entails ongoing preparation. However, it is important to note that the ethical and political tensions arising from the funding crisis facing the current healthcare model hinder its effective implementation.

In conclusion, it is established that transdisciplinarity and holistic education are not isolated dimensions, but rather complementary pillars that redefine health care in the institutions studied. Transdisciplinarity is becoming established as an everyday practice

that integrates technical, human, and community knowledge, fostering a comprehensive approach to patient care and promoting horizontal collaborative processes that enhance the quality of care. In turn, comprehensive training goes beyond technical training to incorporate human values, ensuring that professionals develop critical and collaborative skills focused on the well-being of both the patient and the healthcare team itself.

The study's objectives were achieved by determining that institutional documents reflect policies with a clear transdisciplinary focus, demonstrating an explicit intention to train health professionals capable of applying critical thinking in complex and constantly changing contexts. The report also described how healthcare personnel experience transdisciplinarity and comprehensive training based on their professional experiences, highlighting the importance of caring for patients beyond their illness. Among the most significant features are ongoing training and the involvement of various professionals in the management of the disease—practices that strengthen a patient-centered approach.

Therefore, a holistic education based on a transdisciplinary approach is manifested through continuing education, clinical practice, and transformative assessment. Continuing education is based on flexible, up-to-date modules that address key areas such as comprehensive care, bioethics, and teamwork, with an open, cross-sectoral curriculum that promotes meaningful learning. The clinical school emphasizes hands-on learning in real and simulated settings, incorporating activities such as interprofessional rounds, workshops, and case studies that strengthen collaborative skills and complex thinking. Finally, transformative evaluation focuses on formative, multidirectional processes, with constant feedback and measurement of the impact on service quality, promoting evidence-based plans for continuous improvement.

Among the limitations identified were various difficulties in coordinating efforts among the participating institutions, due to regional particularities, such as climatic factors. In addition, the implementation of transdisciplinary projects faces significant obstacles, such as a lack of time on the part of professionals, stemming from both their heavy workload and their rigid schedules. This situation made it difficult to plan jointly and create opportunities for coordination. As recommendations, we encourage the development of proposals that promote the integration of clinical, community, and humanistic knowledge through collaborative work among professionals from different disciplines. We will also provide comprehensive care for users that goes beyond their illness. However, it is necessary to anticipate and address potential challenges related to the coordination between clinical practice and institutional guidelines, the excessive workload of healthcare personnel, and the specific contextual conditions of each region in order to ensure comprehensive care as a social commitment.

In summary, these findings are considered relevant in the Colombian context, as they demonstrate that transdisciplinarity and holistic education are essential pillars for transforming health care and addressing health inequalities. Its applicability is reflected in clinical practice, as it promotes a comprehensive approach to patient care through collaboration among professionals and the incorporation of human dimensions into care. In the field of education, these findings point to the need to strengthen ongoing educational processes that integrate theory, practice, and critical reflection. In this regard, lines of research are being pursued to examine in greater depth the institutional mechanisms that facilitate interdisciplinary integration, assess their impact on the quality of care, and explore models of social responsibility and community engagement among healthcare personnel.

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