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A APLICAÇÃO DO PENSAMENTO COMPLEXO DE EDGAR MORIN NA MEDICINA E EDUCAÇÃO EM SAÚDE: UMA REVISÃO DE LITERATURA

THE APPLICATION OF EDGAR MORIN'S COMPLEX THOUGHT IN MEDICINE AND HEALTH EDUCATION: A LITERATURE REVIEW

LA APLICACIÓN DEL PENSAMIENTO COMPLEJO DE EDGAR MORIN EN LA MEDICINA Y EDUCACIÓN EN SALUD: UNA REVISIÓN DE LITERATURA

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Resumo

O modelo biomédico cartesiano, consolidado pelo Relatório Flexner no início do século XX, impôs uma trajetória de hiperespecialização e fragmentação do conhecimento na medicina. Embora tenha propiciado inegáveis avanços tecnológicos, essa abordagem reducionista limitou a capacidade dos profissionais de compreender o paciente em sua totalidade existencial e biopsicossocial. O presente artigo de revisão narrativa analisa as contribuições do Pensamento Complexo de Edgar Morin (1921–2026) como alternativa epistemológica para a reforma do ensino médico e para a prática clínica contemporânea. A metodologia baseia-se na análise de obras clássicas do autor e na literatura científica recente sobre educação médica, bioética e integralidade na saúde. A aplicação da

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epistemologia de Morin propõe a transição de uma formação focada na "cabeça bem cheia" para uma "cabeça bem-feita", estimulando a transdisciplinaridade e a reinserção das humanidades médicas e da bioética nos currículos. Na prática clínica, o pensamento complexo introduz o conceito de "complexoma" — que redefine a relação terapêutica como um tecido vivo e inseparável entre sofredor e cuidador —, oferecendo ferramentas conceituais para lidar com a incerteza intrínseca ao ato médico. Ademais, o modelo biopsicossocial e o pluralismo terapêutico, expressos nas Práticas Integrativas e Complementares em Saúde (PICS) no âmbito do Sistema Único de Saúde (SUS), revelam-se como desdobramentos práticos da complexidade ao promoverem a integralidade do cuidado. Conclui-se que o legado centenário de Edgar Morin, cujo falecimento em maio de 2026 aos 104 anos convoca a comunidade médica à reflexão, serve como uma bússola epistemológica indispensável para humanizar e enriquecer a medicina do século XXI, unindo o rigor científico à sensibilidade ética.

Palavras-chave: Pensamento Complexo; Educação Médica; Prática Clínica; Modelo Biopsicossocial; Integralidade.

Abstract

The Cartesian biomedical model, consolidated by the Flexner Report in the early 20th century, imposed a path of hyperspecialization and fragmentation of knowledge in medicine. Although it has fostered undeniable technological advancements, this reductionist approach has limited the ability of professionals to understand the patient in their existential and biopsychosocial totality. This narrative review article analyzes the contributions of Edgar Morin's (1921–2026) Complex Thought as an epistemological alternative for the reform of medical education and contemporary clinical practice. The methodology is based on the analysis of the author's classic works and recent scientific literature on medical education, bioethics, and integrality in healthcare. The application of Morin's epistemology proposes the transition from training focused on a "well-filled head" to a "well-made head," stimulating transdisciplinarity and the reinsertion of medical humanities and bioethics into curricula. In clinical practice, complex thought introduces the concept of the "complexome" — which redefines the therapeutic relationship as a living and inseparable fabric between the sufferer and the caregiver —, offering conceptual tools to deal with the uncertainty intrinsic to the medical act. Furthermore, the biopsychosocial model and therapeutic pluralism, expressed in Integrative and Complementary Practices (PICS) within the Brazilian Unified Health System (SUS), reveal themselves as practical developments of complexity by promoting comprehensive care. It is concluded that the centennial legacy of Edgar Morin, whose passing in May 2026 at the age of 104 calls the medical community to reflection, serves as an indispensable epistemological compass to humanize and enrich 21st-century medicine, uniting scientific rigor with ethical sensitivity.

Keywords: Complex Thought; Medical Education; Clinical Practice; Biopsychosocial Model; Integrality.

Resumen

El modelo biomédico cartesiano, consolidado por el Informe Flexner a principios del siglo XX, impuso una trayectoria de hiperspecialización y fragmentación del conocimiento en la medicina. Aunque ha propiciado innegables avances tecnológicos, este enfoque reduccionista ha limitado la capacidad de los profesionales para comprender al paciente en su totalidad existencial y biopsicosocial. El presente artículo de revisión narrativa analiza las contribuciones del Pensamiento Complejo de Edgar Morin (1921–2026) como alternativa epistemológica para la reforma de la educación médica y la práctica clínica contemporánea. La metodología se basa en el análisis de obras clásicas del autor y la literatura científica reciente sobre educación médica, bioética e integralidad en la salud. La aplicación de la epistemología de Morin propone la transición de una formación enfocada en una "cabeza bien llena" a una "cabeza bien hecha", estimulando la transdisciplinariedad y la reinserción de las humanidades médicas y la bioética en los currículos. En la práctica clínica, el pensamiento complejo introduce el concepto de "complexoma" — que redefine la relación terapéutica como un tejido vivo e inseparable entre el que sufre y el cuidador —, ofreciendo herramientas conceptuales para lidiar con la incertidumbre intrínseca al acto médico. Además, el modelo biopsicosocial y el pluralismo terapéutico,

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expresados en las Prácticas Integrativas y Complementarias en Salud (PICS) en el ámbito del Sistema Único de Salud (SUS), se revelan como despliegues prácticos de la complejidad al promover la integralidad de la atención. Se concluye que el legado centenario de Edgar Morin, cuya muerte en mayo de 2026 a los 104 años convoca a la comunidad médica a la reflexión, sirve como una brújula epistemológica indispensable para humanizar y enriquecer la medicina del siglo XXI, uniendo el rigor científico con la sensibilidad ética.

Palabras clave: Pensamiento Complejo; Educación Médica; Práctica Clínica; Modelo Biopsicosocial; Integralidad.

1. Introdução

On May 29, 2026, the intellectual world bade farewell to Edgar Morin, who passed away at the age of 104 (Morin, 2026). A philosopher, sociologist, and planetary thinker, Morin left behind a monumental body of work characterized by an uncompromising defense of transdisciplinarity, the reform of thought, and the transcendence of artificial boundaries in knowledge. His physical departure, far from representing the cessation of his influence, underscores the urgency and immortality of his propositions, especially in the field of health. Contemporary medicine, characterized by unprecedented technological sophistication, faces a silent crisis of dehumanization and fragmentation, making the epistemology of complexity an indispensable ethical and operational compass for clinical practice and medical education in the 21st century.

In this scenario, the term "knowledge" is likely among those with the greatest semantic diversity. When considering this web of meanings, one perceives that it can be taken as synonymous with thought itself, requiring its own morphology that recognizes its manifestations as common sense, religion, art, philosophy, and science. It is indeed true that common sense is the form of thought that has most contributed to the survival of Homo sapiens. After all, in nearly 300,000 years of existence of "wise man," amid myths and artistic manifestations, only in approximately 3% of that time has there been the manifestation of systematized thought that would serve as a prelude to what, in our day, has taken the form of philosophy and science.

The Modern Age was particularly enlightening for this scientific thought. Although ancient civilizations already possessed a primordial science that enabled them to explore and alter their environment, as well as manipulate material resources

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with dexterity, it was only in the sixteenth century that science began to be practiced in a strictly methodical manner. The revolutionary milestone of 1543, with Nicolaus Copernicus's work in favor of the heliocentric viewpoint — subsequently corroborated by Galileo Galilei and Newton — shook the world supposedly known and predictable by disorder and skepticism. This unveiling demonstrated the fragility of the intellectual ecosystem of the West, causing significant social upheaval.

Under the atmosphere permeated by distrust, René Descartes perceived that knowledge cried out for a new paradigm capable of eradicating uncertainties and leading human thought to universal truth. Rationalism gave Descartes a surgically sharp razor capable of separating with precision the thinking subject (res cogitans) from the object to be understood (res extensa), promoting a total separation between the subject and the external world. As a consequence, the Cartesian scalpel mutilated all knowledge, enclosing it in compartments organized by disciplines. The entire universe and nature came to be viewed through a mathematical lens that sought solely to reduce reality to the intellectual comfort of linear cause-and-effect relationships. Science no longer admitted the presence of its creator; in other words, there occurred an absolute suppression of the thinking subject that gave rise to science.

At the beginning of the 20th century, this purely organicist, mechanistic biomedical model with Cartesian heritage was institutionalized globally by the Flexner Report, published in 1910 (Flexner, 1910). The report reformed North American and Western medical education by establishing basic biological sciences as the sole legitimate foundation of medical training, relegating psychosocial, cultural, and humanistic aspects to a secondary plane (Flexner, 1910). Although this reform fostered extraordinary technical, diagnostic, and therapeutic evolution — whose diverse cures and treatments were only possible due to this level of specialization — it also generated severe side effects: early hyperspecialization, the reduction of the patient to their diseased organ, and the chronic inability of professionals to deal with non-linear, multidimensional, and uncertain phenomena.

The transcendence of this scientific aporia had already been announced before its very appearance. Contemporary with René Descartes, Blaise Pascal, in a

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moment of epiphany, affirmed that all things are "caused and causing, helped and helping, mediate and immediate, and that all are interconnected by a natural and imperceptible bond that links the most distant and the most different" (Pascal, 1650 apud Morin, 2015, p. 7). This thought announced the outcome that would come years later in the work of Edgar Morin. The Complex Thought proposed by the author offers a conceptual framework capable of unifying what was arbitrarily separated (Morin, 1992). Complexity, from the Latin complexus, means "that which is woven together" (Morin, 1992). In the Morinian perspective, health and disease are not merely biological events, but emergent phenomena that result from the dynamic, recursive, and retroactive interaction among physical, biological, psychic, social, cultural, and spiritual dimensions of the human being.

Therefore, the objective of this narrative literature review is to analyze the contributions of Edgar Morin's Complex Thought to the transcendence of the reductionist biomedical model, discussing its practical applications in curricular reform of medical education, in the management of clinical uncertainty, in the consolidation of the biopsychosocial model, and in the promotion of integrality in health systems, with emphasis on the Brazilian Unified Health System (SUS).

2. Methodology

This is a narrative literature review article of a theoretical-reflective and critical nature. The methodological design was based on the selection and hermeneutical analysis of two main strands of literature: Edgar Morin's classic works and contemporary scientific production focused on medical education and clinical practice. Regarding the primary sources of the epistemology of complexity, the following works were analyzed and incorporated: "The Seven Lessons Necessary for the Education of the Future" (Morin, 1999), focusing on the concepts of error, illusion, human condition, and confronting uncertainties; "The Well-Made Head: Rethinking Reform, Reforming Thought" (Morin, 2000), used to substantiate the critique of hyperspecialization and propose medical education reform; and "Introduction to Complex Thought" (Morin,1992), which provided the methodological and epistemological principles of non-linearity and self-organization.

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For the contextualization and practical application of these concepts in contemporary medicine and collective health, a bibliographic search was conducted in scientific databases (such as SciELO, PubMed, and Google Scholar), selecting articles that correlated Morinian theory with curricular reforms in Latin America (Ribeiro; Cândido, 2015; Ceccim; Feuerwerker, 2004), the philosophy of medicine and systemic approach in clinical practice (Abad; Morin, 2008; Engel, 1977), the limitations of the Flexner Report (Flexner, 1910), and the institutionalization of Integrative and Complementary Practices in Health (PICS) in the Unified Health System (SUS) (BRASIL, 2006). Data analysis was structured thematically, guiding the reader fluidly from the academic formation of the physician to practical application in individual and collective care.

3. Development / Literature Review

3.1. The Reform of Medical Education: Toward a "Well-Made Head"

Contemporary medical training, a direct heir to the Flexnerian model, prioritizes the quantitative accumulation of technical and ultraspecialized information at the expense of developing general and critical intelligence. In his classic work, Morin establishes a crucial distinction between a "well-filled head" — where knowledge is piled up in a fragmented manner without connection among parts — and a "well-made head," characterized by the general aptitude to pose and treat problems, and by organizing principles that allow linking knowledge and giving it meaning (MORIN, 2000). The curricular fragmentation that rigidly separates the basic cycle from the clinical cycle, and both from medical humanities, prevents students from understanding the complexity of the human condition (Morin, 1999).

Complex thought demands the breaking free from old certainties and the assumption of the fact that we feel enormous existential comfort in eliminating contradictions from knowledge. Our biological apparatus operates with continuous selection of contents, accommodating them to our vision of reality in a way that expends minimal energy in this task. On the cultural and academic plane, we still need to deal with the impulse that subjects, in a linear cause-and-effect relationship, the knowledge that comes our way, perfectly adjusted in isolated compartments.

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Prolonged and reflective thought requires some expenditure of energy and the overcoming of compartmentalizing epistemological roots cultivated throughout the educational trajectory. However, complex thought does not eliminate the paradigm of simplification, but incorporates it, since simplification taken as the sole model hides the true nature of things.

Morin illustrates this limit through a metaphor: understanding a song by studying only one note of that music. One can know the frequency of that note, the positions it would occupy in different scales, but would inevitably lose the totality of the music, which only happens when the note is inserted in a specific context. The simplifying dismantling of a system does not always guarantee finding what one seeks, much like a watchmaker who decides to disassemble a clock to find time. In medical education, this reductionism prevents students from understanding the totality of the subject. Alternatively, complexity proposes studying the interactions of the system without breaking the seal that maintains its structural mystery (MORIN, 1992), enabling students to evaluate how the biological, historical, and existential dimensions of the patient interrelate.

Overcoming this dichotomy requires a transdisciplinary reform of medical education. As Ribeiro and Cândido point out (Ribeiro; Cândido, 2015), transdisciplinarity is not limited to overlaying disciplines (multidisciplinarity) or making them interact in a coordinated manner (interdisciplinarity), but proposes the crossing and transcendence of disciplinary boundaries, integrating scientific knowledge with humanities, philosophy, and ethics. The insertion of the human condition and bioethics into medical curricula should not be treated as a secondary theoretical appendix. On the contrary, bioethics, from the perspective of complexity, acts as an indispensable integrating link for forming critical and reflective professionals, capable of weighing the ethical limits of technology and the vulnerability of the patient (Ceccim; Feuerwerker, 2004). However, studies in Latin America reveal that the hours dedicated to medical humanities remain meager compared to technical disciplines (Ceccim; Feuerwerker, 2004), perpetuating a technicist and instrumental training that neglects the existential dimension of illness.

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Table 1. Comparison between the Traditional Model of Medical Education (Flexnerian) and the Model Based on Complex Thought (Morinian).

Dimension of Analysis	Traditional Model (Flexnerian)	Complexity Model (Morinian)
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Curricular Structure	Disciplinary, fragmented, rigid division between basic and clinical cycles	Transdisciplinary, integrated, union of biological sciences, humanities, and bioethics
Training Objective	Accumulation of technical information and early hyperspecialization ("well-filled head")	Development of general intelligence, critical reasoning, and synthesis ("well-made head")
Knowledge Approach	Linear, reductionist, focused on direct mechanical causality	Non-linear, systemic, focused on self-organization and clinical uncertainty
Insertion of Humanities	Marginal or optional, treated as secondary content	Central and integrated, essential for humanizing medical practice
Relationship with Uncertainty	Denied or minimized; pursuit of absolute certainty	Integrated and accepted as intrinsic to clinical knowledge and action
Patient Understanding	Fragmented by organ systems and specialties	Holistic, considering biopsychosocial and existential dimensions

Source: The authors (2026)

3.2. The Epistemological Bases of Complexity: Systems, Cybernetics, and Information

The epistemological foundation of complexity theory is sustained by three classical theories, which Morin subjects to severe criticism and suggests profound adaptations, appropriating them as an initial framework: Systems Theory, Cybernetics, and Information Theory (Morin, 1992). The thinker describes complexity

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as a "three-stage rocket": the first corresponds to the understanding of systems and cybernetics; the second refers to the principle of information; finally, the third represents the culminating point for reaching complex thought, where there occurs the definitive reunion between subject and object, in which our consciousness acquires the status of an object of study, connecting knowledge, life, and action (Morin, 1992).

Cybernetics theory demonstrated that the dismantling of the object of study does not guarantee its absolute knowledge; on the contrary, this dismantling can damage the primordial structure of the system, causing it to collapse. Morin's complexified cybernetics integrates disorder and reintroduces the notion of apparatus in order to reposition the notions of power, subjugation, and emancipation in communicational systems (Morin, 1992). In turn, Systems Theory, after its complexification, emerges as a powerful discourse that contrasts the magnificence of open systems with the apparent permanence of closed systems. Open systems constitute the ultimate reality of life. We incur a colossal error when we reduce everything to closed systems to study them in laboratories. If the living organism is an open system, isolating it from its primordial relationships with the environment and society prevents true understanding of health.

These open systems differentiate themselves essentially by their capacity for self-organization. Morin highlights this concept by comparing the human machine to the artificial machine. A state-of-the-art car, manufactured with the best metal components, goes to ruin if just one of its parts fails. In contrast, the human machine is built upon the fragility of biological material, whose physical resistance is much inferior to that of metal. However, the living system has the extraordinary capacity to self-organize in the face of failures: it overcomes infections, heals wounds, adapts to climatic variations, and survives for decades. Open systems, therefore, reveal that order and disorder are indispensable and interdependent components that maintain the entire system in functioning (Morin, 1992).

Finally, Information Theory, originally directed at telecommunications to transmit messages without noise, was incorporated into biology with the discovery of the messenger function of DNA. If in telecommunications noise was a problem to be

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eradicated, in biology it is a fundamental part of the master engineering that manifests itself in genetic mutations, being the guarantee of the diversity of life and the emergence of the new (Morin, 1992). Thus, complexity emphasizes that disorder, uncertainty, and chance are not elements to be eliminated from the health system, but essential constitutive forces for understanding biological and clinical reality.

3.3. Clinical Practice, Uncertainty, and the "Complexome"

Daily clinical practice is, by definition, a navigation through an ocean of uncertainties, dotted with archipelagos of certainties (Morin, 1999). However, the traditional biomedical model trains physicians to seek linear and deterministic causality, where each symptom corresponds to a single biological cause and each pathology to a rigid treatment protocol. This illusion of certainty generates frustration and psychological suffering in professionals when they encounter biological unpredictability, complex differential diagnoses, or the absence of standard therapeutic response. Morin asserts that scientific knowledge must learn to coexist with uncertainty and integrate it as an intrinsic part of knowledge, developing an "ecology of action" that evaluates the risks and unexpected consequences of any intervention (Morin, 1999).

In this scenario, Abad and Morin (Abad; Morin, 2008) introduce the innovative concept of "complexome" (complexome), transposing to the field of health the idea that the therapeutic relationship does not establish itself between two isolated and static individuals, but constitutes a living, dynamic, and inseparable fabric between the sufferer and the caregiver. The "complexome" overcomes the reductionist view that sees the patient only as a collection of symptoms or a diseased organ, and the physician only as a technical operator. Rather, it recognizes that healing emerges from the recursive and retroactive interaction between the two beings in relationship, each transforming the other through the encounter (Abad; Morin, 2008).

This concept is particularly relevant in the context of chronic diseases, where the physician-patient relationship extends over time and becomes a space of mutual transformation. The patient learns to live with their condition, to recognize their own agency in the healing process, and to develop resilience. The physician, in turn,

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learns from the patient's lived experience, refines their clinical judgment, and develops greater empathy and humility in the face of the limits of medical knowledge. The "complexome" thus offers a framework for understanding how the uncertainty inherent to clinical practice can become a source of wisdom rather than anxiety.

Moreover, the management of clinical uncertainty through the lens of complex thought involves recognizing that multiple therapeutic pathways may be equally valid for a given patient, depending on their unique biopsychosocial context. This pluralism does not represent a relativism that abandons scientific rigor, but rather an acknowledgment that the application of scientific knowledge to individual cases requires judgment, adaptability, and ethical sensitivity. The physician becomes a navigator of possibilities rather than an executor of predetermined protocols, always maintaining the scientific foundation of their decisions while remaining open to the complexity of human existence.

3.4. The Biopsychosocial Model and Integrative Practices in the SUS

The biopsychosocial model, conceptualized by George Engel in 1977, represents a paradigmatic shift from the purely biological understanding of disease toward a more comprehensive perspective that integrates psychological and social dimensions (Engel, 1977). However, when viewed through the lens of Morinian complexity, the biopsychosocial model acquires a deeper epistemological foundation. It is no longer merely an additive model that juxtaposes biological, psychological, and social factors, but rather a systemic understanding of health as an emergent property of the dynamic interaction among these dimensions.

In the Brazilian context, the institutionalization of Integrative and Complementary Practices in Health (PICS) within the Unified Health System (SUS) represents a practical manifestation of this complexity-based approach (BRASIL, 2006). PICS encompasses a diverse range of therapeutic modalities — from acupuncture and herbal medicine to meditation and therapeutic massage — that have been historically marginalized by the biomedical establishment but are increasingly recognized for their therapeutic value and their capacity to address the existential and spiritual dimensions of health and illness.

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The integration of PICS into the SUS is not merely a matter of expanding therapeutic options, but represents a fundamental acknowledgment that healing involves dimensions beyond the purely biological. It recognizes that the patient's beliefs, cultural context, and spiritual orientation profoundly influence their health outcomes. Furthermore, PICS often embodies a different epistemology — one that emphasizes prevention, health promotion, and the patient's active participation in their own healing — rather than the reactive, disease-focused approach that characterizes much of conventional biomedicine.

However, the integration of PICS into the SUS faces significant challenges, including the need for rigorous scientific evaluation, the training of practitioners, and the overcoming of epistemological prejudices within the medical establishment. Morin's complex thought provides a framework for addressing these challenges by proposing that scientific rigor and openness to alternative healing modalities are not mutually exclusive. Rather, a complex epistemology can accommodate multiple ways of knowing and healing, provided they are subjected to critical examination and evaluated in terms of their effectiveness and safety.

3.5. The Humanization of Medicine and the Role of Medical Humanities

The humanization of medicine has become an increasingly prominent theme in medical education and practice, particularly in response to the growing recognition that the biomedical model, despite its technological achievements, has contributed to a crisis of meaning and purpose in medical practice. Physicians report high rates of burnout, moral distress, and a sense of disconnection from the humanistic values that initially drew them to medicine. Patients, in turn, often feel reduced to their diagnoses, treated as passive recipients of medical interventions rather than as active agents in their own healing.

The medical humanities — encompassing literature, philosophy, history, and the arts — offer a pathway toward the re-humanization of medicine by cultivating the capacities for empathy, moral reflection, and existential understanding that are essential to compassionate and effective clinical care. When integrated into medical curricula from the earliest stages of training, the humanities help students develop

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what Morin calls the "aptitude for complexity," the capacity to hold multiple perspectives simultaneously, to recognize the limits of their knowledge, and to approach each patient as a unique and irreducible human being.

Literature, in particular, offers a powerful medium for developing this capacity. Through engagement with literary works that explore themes of illness, suffering, mortality, and resilience, medical students can develop a more nuanced understanding of the patient's experience and can cultivate the imaginative empathy necessary for compassionate care. Philosophy, likewise, provides tools for ethical reflection and for grappling with the fundamental questions that arise in medical practice: What is health? What is the physician's responsibility to the patient? How should we approach the end of life? How do we balance individual autonomy with collective welfare?

The integration of the medical humanities into medical education is not a luxury or an optional addition, but a necessity if medicine is to fulfill its fundamental purpose of healing and alleviating suffering. As Morin emphasizes, the reform of medical education must involve not merely the addition of more content or skills, but a fundamental transformation of how we think about knowledge, about the physician's role, and about the nature of health and disease.

3. Development / Literature Review

3.1. The Reform of Medical Education: Toward a "Well-Made Head"

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Complex thought demands the breaking free from old certainties and the assumption of the fact that we feel enormous existential comfort in eliminating contradictions from knowledge. Our biological apparatus operates with continuous selection of contents, accommodating them to our vision of reality in a way that expends minimal energy in this task. On the cultural and academic plane, we still need to deal with the impulse that subjects, in a linear cause-and-effect relationship, the knowledge that comes our way, perfectly adjusted in isolated compartments. Prolonged and reflective thought requires some expenditure of energy and the overcoming of compartmentalizing epistemological roots cultivated throughout the educational trajectory. However, complex thought does not eliminate the paradigm of simplification, but incorporates it, since simplification taken as the sole model hides the true nature of things.

Morin illustrates this limit through a metaphor: understanding a song by studying only one note of that music. One can know the frequency of that note, the positions it would occupy in different scales, but would inevitably lose the totality of the music, which only happens when the note is inserted in a specific context. The simplifying dismantling of a system does not always guarantee finding what one seeks, much like a watchmaker who decides to disassemble a clock to find time. In medical education, this reductionism prevents students from understanding the totality of the subject. Alternatively, complexity proposes studying the interactions of the system without breaking the seal that maintains its structural mystery (MORIN, 1992), enabling students to evaluate how the biological, historical, and existential dimensions of the patient interrelate.

Overcoming this dichotomy requires a transdisciplinary reform of medical education. As Ribeiro and Cândido point out (Ribeiro; Cândido, 2015), transdisciplinarity is not limited to overlaying disciplines (multidisciplinarity) or making them interact in a coordinated manner (interdisciplinarity), but proposes the crossing and transcendence of disciplinary boundaries, integrating scientific knowledge with humanities, philosophy, and ethics. The insertion of the human condition and bioethics into medical curricula should not be treated as a secondary theoretical appendix. On the contrary, bioethics, from the perspective of complexity, acts as an

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indispensable integrating link for forming critical and reflective professionals, capable of weighing the ethical limits of technology and the vulnerability of the patient (Ceccim; Feuerwerker, 2004). However, studies in Latin America reveal that the hours dedicated to medical humanities remain meager compared to technical disciplines (Ceccim; Feuerwerker, 2004), perpetuating a technicist and instrumental training that neglects the existential dimension of illness.

Table 2. Comparison between the Traditional Model of Medical Education (Flexnerian) and the Model Based on Complex Thought (Morinian).

Dimension of Analysis	**Traditional Model (Flexnerian)**	**Complexity Model (Morinian)**
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Curricular Structure	Disciplinary, fragmented, rigid division between basic and clinical cycles	Transdisciplinary, integrated, union of biological sciences, humanities, and bioethics
Training Objective	Accumulation of technical information and early hyperspecialization ("well-filled head")	Development of general intelligence, critical reasoning, and synthesis ("well-made head")
Knowledge Approach	Linear, reductionist, focused on direct mechanical causality	Non-linear, systemic, focused on self-organization and clinical uncertainty
Insertion of Humanities	Marginal or optional, treated as secondary content	Central and integrated, essential for humanizing medical practice
Relationship with Uncertainty	Denied or minimized; pursuit of absolute certainty	Integrated and accepted as intrinsic to clinical knowledge and action
Patient Understanding	Fragmented by organ systems and specialties	Holistic, considering biopsychosocial and existential dimensions

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3.2. The Epistemological Bases of Complexity: Systems, Cybernetics, and Information

The epistemological foundation of complexity theory is sustained by three classical theories, which Morin subjects to severe criticism and suggests profound adaptations, appropriating them as an initial framework: Systems Theory, Cybernetics, and Information Theory (Morin, 1992). The thinker describes complexity as a "three-stage rocket": the first corresponds to the understanding of systems and cybernetics; the second refers to the principle of information; finally, the third represents the culminating point for reaching complex thought, where there occurs the definitive reunion between subject and object, in which our consciousness acquires the status of an object of study, connecting knowledge, life, and action (MORIN, 1992).

Cybernetics theory demonstrated that the dismantling of the object of study does not guarantee its absolute knowledge; on the contrary, this dismantling can damage the primordial structure of the system, causing it to collapse. Morin's complexified cybernetics integrates disorder and reintroduces the notion of apparatus in order to reposition the notions of power, subjugation, and emancipation in communicational systems (Morin, 1992). In turn, Systems Theory, after its complexification, emerges as a powerful discourse that contrasts the magnificence of open systems with the apparent permanence of closed systems. Open systems constitute the ultimate reality of life. We incur a colossal error when we reduce everything to closed systems to study them in laboratories. If the living organism is an open system, isolating it from its primordial relationships with the environment and society prevents true understanding of health.

These open systems differentiate themselves essentially by their capacity for self-organization. Morin highlights this concept by comparing the human machine to the artificial machine. A state-of-the-art car, manufactured with the best metal components, goes to ruin if just one of its parts fails. In contrast, the human machine is built upon the fragility of biological material, whose physical resistance is much inferior to that of metal. However, the living system has the extraordinary capacity to self-organize in the face of failures: it overcomes infections, heals wounds, adapts to

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climatic variations, and survives for decades. Open systems, therefore, reveal that order and disorder are indispensable and interdependent components that maintain the entire system in functioning (Morin, 1992).

Finally, Information Theory, originally directed at telecommunications to transmit messages without noise, was incorporated into biology with the discovery of the messenger function of DNA. If in telecommunications noise was a problem to be eradicated, in biology it is a fundamental part of the master engineering that manifests itself in genetic mutations, being the guarantee of the diversity of life and the emergence of the new (Morin, 1992). Thus, complexity emphasizes that disorder, uncertainty, and chance are not elements to be eliminated from the health system, but essential constitutive forces for understanding biological and clinical reality.

3.3. Clinical Practice, Uncertainty, and the "Complexome"

Daily clinical practice is, by definition, a navigation through an ocean of uncertainties, dotted with archipelagos of certainties (Morin, 1999). However, the traditional biomedical model trains physicians to seek linear and deterministic causality, where each symptom corresponds to a single biological cause and each pathology to a rigid treatment protocol. This illusion of certainty generates frustration and psychological suffering in professionals when they encounter biological unpredictability, complex differential diagnoses, or the absence of standard therapeutic response. Morin asserts that scientific knowledge must learn to coexist with uncertainty and integrate it as an intrinsic part of knowledge, developing an "ecology of action" that evaluates the risks and unexpected consequences of any intervention (Morin, 1999).

In this scenario, Abad and Morin (Abad; Morin, 2008) introduce the innovative concept of "complexome" (complexome), transposing to the field of health the idea that the therapeutic relationship does not establish itself between two isolated and static individuals, but constitutes a living, dynamic, and inseparable fabric between the sufferer and the caregiver. The "complexome" overcomes the reductionist view that sees the patient only as a collection of symptoms or a diseased organ, and the physician only as a technical operator. Rather, it recognizes that healing emerges

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from the recursive and retroactive interaction between the two beings in relationship, each transforming the other through the encounter (Abad; Morin, 2008).

This concept is particularly relevant in the context of chronic diseases, where the physician-patient relationship extends over time and becomes a space of mutual transformation. The patient learns to live with their condition, to recognize their own agency in the healing process, and to develop resilience. The physician, in turn, learns from the patient's lived experience, refines their clinical judgment, and develops greater empathy and humility in the face of the limits of medical knowledge. The "complexome" thus offers a framework for understanding how the uncertainty inherent to clinical practice can become a source of wisdom rather than anxiety.

Moreover, the management of clinical uncertainty through the lens of complex thought involves recognizing that multiple therapeutic pathways may be equally valid for a given patient, depending on their unique biopsychosocial context. This pluralism does not represent a relativism that abandons scientific rigor, but rather an acknowledgment that the application of scientific knowledge to individual cases requires judgment, adaptability, and ethical sensitivity. The physician becomes a navigator of possibilities rather than an executor of predetermined protocols, always maintaining the scientific foundation of their decisions while remaining open to the complexity of human existence.

3.4. The Biopsychosocial Model and Integrative Practices in the SUS

The biopsychosocial model, conceptualized by George Engel in 1977, represents a paradigmatic shift from the purely biological understanding of disease toward a more comprehensive perspective that integrates psychological and social dimensions (Engel, 1977). However, when viewed through the lens of Morinian complexity, the biopsychosocial model acquires a deeper epistemological foundation. It is no longer merely an additive model that juxtaposes biological, psychological, and social factors, but rather a systemic understanding of health as an emergent property of the dynamic interaction among these dimensions.

In the Brazilian context, the institutionalization of Integrative and Complementary Practices in Health (PICS) within the Unified Health System (SUS)

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represents a practical manifestation of this complexity-based approach (BRASIL, 2006). PICS encompasses a diverse range of therapeutic modalities — from acupuncture and herbal medicine to meditation and therapeutic massage — that have been historically marginalized by the biomedical establishment but are increasingly recognized for their therapeutic value and their capacity to address the existential and spiritual dimensions of health and illness.

The integration of PICS into the SUS is not merely a matter of expanding therapeutic options, but represents a fundamental acknowledgment that healing involves dimensions beyond the purely biological. It recognizes that the patient's beliefs, cultural context, and spiritual orientation profoundly influence their health outcomes. Furthermore, PICS often embodies a different epistemology — one that emphasizes prevention, health promotion, and the patient's active participation in their own healing — rather than the reactive, disease-focused approach that characterizes much of conventional biomedicine.

However, the integration of PICS into the SUS faces significant challenges, including the need for rigorous scientific evaluation, the training of practitioners, and the overcoming of epistemological prejudices within the medical establishment. Morin's complex thought provides a framework for addressing these challenges by proposing that scientific rigor and openness to alternative healing modalities are not mutually exclusive. Rather, a complex epistemology can accommodate multiple ways of knowing and healing, provided they are subjected to critical examination and evaluated in terms of their effectiveness and safety.

3.5. The Humanization of Medicine and the Role of Medical Humanities

The humanization of medicine has become an increasingly prominent theme in medical education and practice, particularly in response to the growing recognition that the biomedical model, despite its technological achievements, has contributed to a crisis of meaning and purpose in medical practice. Physicians report high rates of burnout, moral distress, and a sense of disconnection from the humanistic values that initially drew them to medicine. Patients, in turn, often feel reduced to their diagnoses, treated as passive recipients of medical interventions rather than as active agents in

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their own healing.

The medical humanities — encompassing literature, philosophy, history, and the arts — offer a pathway toward the re-humanization of medicine by cultivating the capacities for empathy, moral reflection, and existential understanding that are essential to compassionate and effective clinical care. When integrated into medical curricula from the earliest stages of training, the humanities help students develop what Morin calls the "aptitude for complexity," the capacity to hold multiple perspectives simultaneously, to recognize the limits of their knowledge, and to approach each patient as a unique and irreducible human being.

Literature, in particular, offers a powerful medium for developing this capacity. Through engagement with literary works that explore themes of illness, suffering, mortality, and resilience, medical students can develop a more nuanced understanding of the patient's experience and can cultivate the imaginative empathy necessary for compassionate care. Philosophy, likewise, provides tools for ethical reflection and for grappling with the fundamental questions that arise in medical practice: What is health? What is the physician's responsibility to the patient? How should we approach the end of life? How do we balance individual autonomy with collective welfare?

The integration of the medical humanities into medical education is not a luxury or an optional addition, but a necessity if medicine is to fulfill its fundamental purpose of healing and alleviating suffering. As Morin emphasizes, the reform of medical education must involve not merely the addition of more content or skills, but a fundamental transformation of how we think about knowledge, about the physician's role, and about the nature of health and disease.

4. Discussion

The application of Edgar Morin's complex thought to medicine and medical education represents a fundamental epistemological shift from the reductionist, mechanistic paradigm that has dominated since the Flexner Report to a more holistic, systemic, and humanistic approach. This shift is not merely theoretical but has profound practical implications for how physicians are trained, how they approach

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clinical decision-making, and how they relate to their patients.

The critique of the Flexnerian model is not a rejection of scientific rigor or technological advancement, but rather a recognition that these achievements have come at a significant cost. The hyperspecialization and fragmentation of knowledge that the Flexner Report institutionalized have produced extraordinary technical capabilities but have also contributed to a dehumanization of medicine, a loss of the integrative perspective necessary for understanding the patient as a whole person, and a chronic inability to address the existential and spiritual dimensions of health and illness.

The concept of the "complexome" offers a particularly powerful framework for reconceptualizing the therapeutic relationship. By understanding the physician-patient relationship not as an interaction between two separate entities but as a living, dynamic fabric that emerges through their encounter, we can move beyond both the paternalistic model in which the physician is the expert who imposes solutions and the consumerist model in which the patient is a customer selecting services. Instead, we can envision a collaborative relationship in which both parties are transformed through their engagement with each other, and in which healing emerges from the mutual recognition of each other's humanity and agency.

The institutionalization of PICS within the SUS represents an important step toward the practical realization of a complexity-based approach to health. However, the full realization of this vision requires more than the mere expansion of therapeutic options. It requires a fundamental transformation of medical education, a shift in how the medical profession understands its role and responsibilities, and a willingness to engage in genuine dialogue with alternative healing traditions and with the patients themselves.

The integration of the medical humanities into medical curricula is essential to this transformation. By cultivating the capacities for empathy, moral reflection, and existential understanding, the humanities can help create physicians who are not merely technically competent but who are also wise, compassionate, and deeply committed to the wellbeing of their patients and communities.

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5. Conclusion

Edgar Morin's legacy, spanning more than a century of intellectual production and culminating in his death in May 2026 at the age of 104, stands as a beacon for the transformation of medicine in the 21st century. His complex thought offers a comprehensive epistemological framework for addressing the fundamental crisis facing contemporary medicine: the tension between technological sophistication and human meaning, between scientific rigor and existential understanding, between the reduction of the patient to their disease and the recognition of the patient as a whole person embedded in a complex web of biological, psychological, social, cultural, and spiritual relationships.

The application of Morin's thought to medical education proposes a transition from a model focused on the accumulation of technical information ("well-filled head") to one centered on the development of general intelligence, critical thinking, and the capacity to integrate diverse forms of knowledge ("well-made head"). This transformation requires a fundamental restructuring of medical curricula, moving from rigid disciplinary silos to transdisciplinary integration, and from the marginalization of the humanities to their central role in medical training.

In clinical practice, complex thought provides conceptual tools for navigating the irreducible uncertainty that characterizes medical work. The concept of the "complexome" reframes the therapeutic relationship as a living, dynamic, and mutually transformative encounter, rather than as a technical intervention by an expert upon a passive patient. This perspective opens new possibilities for understanding how healing emerges from the recursive interaction between physician and patient, and how the uncertainties and ambiguities of clinical practice can become sources of wisdom and growth rather than merely sources of anxiety.

The biopsychosocial model, understood through the lens of complexity, provides a framework for integrating diverse therapeutic modalities, including both conventional biomedicine and integrative and complementary practices. The institutionalization of PICS within the SUS represents a practical step toward realizing this vision, though much work remains to be done to overcome epistemological prejudices and to ensure that these practices are integrated in ways that maintain

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scientific rigor while honoring the wisdom of diverse healing traditions.

The humanization of medicine, achieved through the integration of the medical humanities into medical education and practice, is essential to the realization of Morin's vision. By cultivating empathy, moral reflection, and existential understanding, the humanities can help create physicians who are not merely technically competent but who are also wise, compassionate, and deeply committed to the wellbeing of their patients and communities.

In conclusion, the application of Edgar Morin's complex thought to medicine and medical education represents not merely an academic exercise but a moral and practical imperative. In a world characterized by increasing complexity, uncertainty, and interconnection, medicine must evolve beyond the reductionist paradigm that has dominated for more than a century. The vision of medicine that emerges from Morin's thought — a medicine that unites scientific rigor with ethical sensitivity, technical competence with human compassion, and individual care with collective responsibility — offers a pathway toward a more humane, effective, and meaningful medical practice for the 21st century and beyond.

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