Understanding and improving integrative care

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Integrated care is a concept that has been gaining popularity in recent years. Although the term is often used, a deep understanding of exactly what it means is not always present. Integrated care goes beyond traditional, conventional medicine to include complementary and alternative treatments. But what is it really about and does the user properly understand what it means.

Hippocrates has a point that the patient is central and not the disease, but this does not imply that a mishmash of conventional, complementary and alternative therapies is going to set their darts on the patient. This would open the door to uncontrolled and expensive medicine, and this cannot be the intention. Surprising are the topics in a journal such as Integrative medicine. The journal is full of studies of all possible alternative approaches, but talks little about "integration," which is what it should really be about. Integration is more than giving access to alternative or complementary treatments, it is the science of cleansing, transforming and combining data from different sources into a working tool, usable to better understand the total patient and better assess treatment outcome. The latter is invaluable in the introduction of "value-based" care, where not the treatment but the added value provided is reimbursed. Added to this is the importance of defining an end point in treatment or at least an intermedium status.

In integrative care, the approach should at least be holistic, but how do we define the end point, the path to it and what about the added value. Simply, the end point could be "being healthy," but is that measurable from a quantitative angle? The idea of defining "being healthy" as "a state of equilibrium" is an old one and was common in many cultures. In the early twentieth century, this culminated in numerous homeostasis theories, with the "homeostatic maintenance of design" theory of Dussault and Gagné-Julien, published in 2015 in my judgment still appearing scientifically relevant when they write: *"An organism is healthy if and only if it is intrinsically disposed to homeostatically maintain or restore its intrinsic disposition to perform its designed functions in relevant situations." (1)*

This aligns closely with an attractor in systems theory, in which case "being healthy" is a structure that forms in phase space, where the trajectory of the system, though never repeating itself, is confined to a specific area, constantly spiraling in unpredictable but bounded paths. This creates a delicate balance between chaos and order, where infinite complexity unfolds within a finite space. This concept implies that "being healthy" is a dynamic physiological process in search of an equilibrium point, rather than a static, fixed state that is the same for everyone and at every moment. Thus, people often experience recurring health problems or symptom cycles, with their perception of "being healthy" fluctuating over time. Therefore, it is necessary to give operational and measurable meaning to this equilibrium point (being healthy), whose robustness is determined by a dynamic multi-field linkage.



Chaos theory can perhaps help us further in our integrated thinking about "being healthy", after all, how can different perspectives and disciplines bring us to value-added creation, when, as already mentioned, we do not conceptualize the endpoint intelligibly. A chaotic behavior is the property of most biological processes and means that small, induced changes can make the endpoint stable or unstable. For

example, small symptoms can cause anxiety, leading to stress, worsening symptoms and reinforcing the perception of poor health. Health anxiety follows a similar cycle, where reassurance temporarily eliminates anxiety, but doubt resurfaces over time. Robustness in this case refers to the inherent strength and stability of a system, allowing it to function effectively under various conditions without significant degradation, and is consequently the main criteria in the “being healthy” approach and gives mathematical content to the endpoint.

Important in integrated care is that the caregiver employs only those therapies or combinations of therapies that contribute to the robustness of “being healthy”. Two principles play an important role here, patient resilience and antifragility. Robustness and resilience in “being healthy” reflect in the patient the strength to resist and adapt to various challenges. It is not just about recovering but learning and growing from these experiences. In the context of “being healthy”, resilience can refer to the ability to maintain oneself during health-threatening conditions. Antifragility goes beyond resilience and suggests that certain systems actually improve and thrive when exposed to volatility, randomness and disorder. In the context of being healthy, both robustness and antifragility are essential to creating a set of therapies that can navigate the complexities and uncertainties of the integrated care offered, ensuring better patient outcomes and overall health stability. “Being healthy” never settles into a simple, predictable state, but neither does it fly apart completely. Instead, it evolves within a set of constraints that allow for both fluctuation and coherence. Even the most chaotic systems are governed by rules that shape them, even if that shape is highly sensitive to initial conditions and constantly changing. Digital twins, virtual representations of physical systems, use this principle to simulate and monitor real-time health data. By applying mathematical models of chaotic dynamics, digital twins can predict and analyze irregular health patterns and provide valuable insights into the underlying stability of these patterns.

This understanding helps identify critical points where “being health” patterns may shift from stability to instability, allowing for more precise interventions. Thus, using digital twins not only provides greater insight into the nature of health as a chaotic system, but is also a critical tool in advancing integrative health care, where the goal is to holistically understand and manage the complex, dynamic processes that determine human health. In doing so, Metaverse represents a new frontier for studying and improving integrative care. A collective virtual shared space created by the convergence of virtually enhanced physical reality and physically persistent virtual reality provides a revolutionary approach to creating realistic models of human physiology and disease, enabling more efficient and accurate testing of integrative treatments and interventions. Simulated trials can significantly reduce time and costs.



The future is at our feet. If we are to truly implement integrative care, it involves not randomly applying multiple therapies to the patient, but carefully choosing which combinations contribute to the patient's robustness and “being healthy”. The goal is to gain a deep understanding of the patient as a whole. Essential here is defining endpoints and correctly simulating and assessing the added value of treatments, if not the health system derails.

(1) Dussault, A.C. and Gagne-Julien, A.-M. (2015) Health, Homeostasis, and the Situation-Specificity of Normality. Theoretical Medicine and Bioethics, 36, 61-81.