

# Ecological analysis in general medicine

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## Abstract

Disease is an unstable process that moves in one or more directions, and where quality differences are much more important than quantity differences. Living systems maintain their identity by changing to adapt to their environment. Diseases can be understood, in the same way as certain symptoms, as attempts by the organism to adapt to a new environment or situation. This complex living system can only be approached from a generalist solution with an ecological analysis, to reduce fragmentation and promote integration. The ecological analysis allows to understand the objective causes and the subjective meanings of health, illness, treatment, cure, or disability, and can be used to understand, among others clinical situations, the doctor-patient relationship, the interactions between the biological, psychological and social aspects of the symptoms and diseases, the patterns of disease accumulation, the prevention or treatment of the multitude of complex chronic diseases (such as hypertension, diabetes, allergies, autoimmune diseases, chronic fatigue syndrome, chronic kidney disease, chronic pain, depression, etc.), the co-infection patterns among viruses, bacteria, and parasites, the early clinical presentation in Alzheimer's and cardiovascular diseases, the community health action, health promotion, well-being of the community, resilience, and empowerment.

The ecology (of the Greek words οἶκος, "house" and λογία "study of") is the science of "house", since it studies the environments in which we live. There are three main ways of thinking about ecology: 1) ecology as the study of interactions (between humans and the environment, between humans and living beings, between all living beings, etc.); 2) ecology as the statistical study of interactions; 3) ecology as a science that requires a metaphysical vision. The goal of Ecology is to study, through a scientific methodology, the entire natural world, answering very different questions that arise from different fields (Economics, Biology, Sociology, Philosophy, etc.) [1,2].

Therefore, human ecology is a global concept that encompasses various social, physical and cultural elements that exist in the external environment of the individual. Its theoretical perspective designates a complex and multidimensional system that includes individuals and their reciprocal interactions with their global environments and the subsequent impact of these interactions on their health. The preconditions of human ecology include individuals, their environments and their transactions. Nature is not understood as static and balanced, but with a vision of complex, constantly changing and unpredictable ecosystems. The attributes of the ecology concept encompass the characteristics of an open system (for example, interdependence and reciprocity) [3].

The ecological model recognizes complex multi-level functional hierarchies that interact starting at the cellular level and ending with the individual experience of the environment. Although foci of disease and injury are found within the body and mind, the physical and social environment contains elements that can cause or aggravate diseases, and also barriers that interact in ways that cause injury and disability. The ecological model allows understanding the objective causes and the subjective meanings of health, illness, treatment, cure, or disability. In addition, these environments contain the elements from which treatment agents, facilitators and social supports should be designed [4,5].

The structure of complex biological systems reflects not only their function but also the environments in which they evolved and adapted.

Ecological analysis of complex biological networks can be used to understand the doctor-patient relationship, the interactions between the biological, psychological and social aspects of symptoms and diseases, to predict patterns of disease accumulation in people, the grouping that give rise to co-morbidity and in the multi-morbidity, the temporal evolution of the natural history of the diseases, the understanding and prevention or treatment of the multitude of complex chronic conditions we are facing the recent years (such as, hypertension, diabetes, allergies, autoimmune diseases, chronic fatigue syndrome, chronic kidney disease, chronic pain, depression, etc.), co-infection patterns among viruses, bacteria, and parasites, the evolution of the natural habitats of poorly characterized microbial species, their interactions with other species and the patterns that govern the adaptation of organisms to their environments, the dynamic interaction of individuals with their environment through time and space, the deregulation of networks that allow biopathology to evolve, resulting in a clinical presentation early, for example in Alzheimer's and cardiovascular diseases, the action in community health, the promotion of the health and well-being of the community, the resilience, and empowerment, among others clinical situations [6-15].

The multitude of different interactions with the environment and the complexity of genetic disposition, means that each patient needs to be assessed thoroughly as a unique individual, making ecological analysis the form most comprehensive of patient centered medical approach.

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But, although the science of ecology is an important tool for reflecting on the interaction between organisms and the environment, it can not be applied directly to human systems, since human interaction is very complex and often based on symbolic meanings. The ecological analysis must be integrated into a vision of the unity of reality, which includes subjective and objective experiences, and where human values are as important as the facts. The ecological analysis challenges medicine to adopt a multidimensional vision of man and to considering life in general, as a self-organized system [16] or disorganized [17].

Chronic disease is an unstable process that moves in one or more directions, in which only new changes can be calculated to a certain extent. Living systems are "living processes" where flows of information arise rather than physical cause-effect relationships, and where differences in quality are much more important than differences in quantity. A living system maintains its identity through change to adapt to its environment. It stays stable by constant change and modification. Diseases can be understood in the same way - certain symptoms can be understood as attempts by the organism to adapt to a new environment or situation. Physical symptoms are signs that the body needs to change. Our whole body is intelligent, the whole body thinks and feels (the skin can be sad and the liver depressed); This is not just a brain phenomenon. The suppression of symptoms could lead to situation of imbalance at a deeper level of the organism.

In this scenario, the problem of fragmentation could only be tackled from a generalist solution with an ecological approach to promote integration [18]. The Table 1 presents some differences between the usual model and the ecological model from general medicine.

The ecological analysis is the study of the functional relationships between organisms and the environment of their external world. The concept of ecological analysis in general medicine with respect to the individual patient leads us to comprehensively understand patients, and therefore to have a holistic view of diseases, which should include most of the following aspects [19-22]:

- Bio-psycho-social data
- Quantitative and qualitative data
- Experience of the disease by the patient and its context
- Various actors or protagonists: patient, family, specialists, relatives, community)

**Table 1.** Some differences between the habitual model and the ecological analysis from general medicine

Models of medical analysis	Concepts on the method of understanding and medical intervention	Results
<b>1.-Traditional model (usual)</b>	Quantitative paradigm, linear causality, static and balanced relationships, biomedical intervention more Information and motivation	It can achieve a patient with less illness and partially active
<b>2.-Ecological model</b>	Qualitative-quantitative paradigm, non-linear causality, complex ecosystems, constantly changing and unpredictable, bio-psycho-social intervention, with information, plus motivation, plus training, plus contextualization (actors, resources, context)	It can achieve an individual with more health and "operative" (people able to think for themselves in their contexts)

-History biographical: projects, expectations, etc.

-Relation doctor-patient-family-context.

-Evaluation of family aspects (genogram, list of problems, family life cycle, et.) and community (resources, strengths and weaknesses, relationships, etc.), in diagnosis and treatment.

Diagnosis etymologically means knowledge, but, global or partial knowledge? Traditionally, the diagnosis has focused on the physical complaint. The classic works of medicine describe meticulously, and sometimes disconnected, signs and symptoms of the patient. This model, which has hardly any evolutionary coherence in the natural history of the disease, can hardly promote the integration of the complaint in the patient's true history. The patient has been isolated from his symptoms; professional has put symptoms into a disease and usually returns them as impersonal information.

The course that adopts a disease and what it implies for the destiny of a man depends, not on the "disease", but, fundamentally on the patient, on his attitude towards life and his situation in it. Every sick person not only has his illness, but he himself and his destiny "make" his illness. Morbid history is always a biography.

Is there really a natural history of the disease independent of any cultural belief system? Every person belongs to a culture that to some degree determines their beliefs and expectations related to the disease. It is inconceivable that a certain disease has a natural history independent of cultural and social factors. The biomedical concept of the "natural history of the disease" (that is, the expected course of an untreated disease) that is widely used in medicine reflects a decontextualized view of the disease.

What then is the implication for the general practitioner of the ecological analysis? What is the real purpose of medical work? Is the body of the individual isolated? Understanding the diseased body in an ecological way changes:

- The focus of diagnostic and therapeutic procedures.
- The attitude with which the doctor will face the relationship with the people in his care.
- The doctor's attitude regarding their insertion in the social process.

The ecological analysis is like the process of opening doors and windows for the doctor and the patient, and seeing how the light illuminates the contexts and the bio-psycho-social relationships clarifying the understanding of a situation or problem. It is not about finding "rare cases" or "complex cases", but about understanding that all patients and all consultations are complex in general medicine, because they are integral people in relational contexts [23]. Our understanding of decision-making suggests that people (living with diseases, especially chronic ones, who "per se" are complex) need to receive care from general practitioners who recognize and address their multi-morbidity as a complete disease that is integrated constantly in the life of a whole person.

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