



REVIEW ARTICLE

Epidemiology as a Tool for Social Communication as a Fulfillment of the Millennium Goals: An Updated Look at the Causes in Parasitosis. Havana 2019

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Abstract

The epidemiology aims to describe and explain the dynamics of population health, identify the elements that compose it and understand the forces that govern it, in addition to promoting health, preventing and controlling diseases through the knowledge of their causes, in order to intervene in the course of their natural development to modify them [1,2]. The nascent development of capitalism gave new impetus to the development of epidemiology and a renewed nuance to the causal conception of morbid states. The millennium change served as a pretext to discuss the future of this scientific discipline and its role in improving the health of the population. The debate provoked several visions about it and served to outline a new time in epidemiological research, in which the preponderance of the method and the identification of disease risk factors is limited, and gives way to an epidemiological investigation that aims to locate the etiological theories at the center of the discipline and at the origin of the research. The population perspective of epidemiology is resumed and the relevance of the social, cultural and environmental contexts, in which the research and practice of epidemiology is developed, is emphasized.

Keywords

Epidemiology, Public health, Causality, Infectious diseases, Parasitism

Background

At the start of the Tercer millennium I epidemiology has been subject to various interpretations as to the scope of its subject, functions, who the running and rightful role as the basic science of Public Health. The health problems of human populations have evolved

over time; Currently, any situation that affects or that can affect the health of the populations is conceived as a health problem. Health problems are not only diseases, but any damage or risk that constitutes a present or future danger to the health of any population. These problems can be caused by factors of physical, mechanical, chemical or biological origin and, even, psychological or social, or the joint action of some or all of them [1-5]. The fundamental purpose of Epidemiology as a science, is, has been and will be, to identify and study the main causes. that cause, allow or facilitate the occurrence of these problems, with the aim of offering solutions to avoid them, reduce them, eliminate them or eradicate them, depending on the nature of the problem and the possibilities of acting on them. In the historical evolution, it has been recognized that microbiology, medical clinic and mathematics, represented by the added information obtained from its treatment and analysis, are pillars in the axis of epidemiological training. From the second half of the twentieth century, the contribution of social sciences to this specialty is incorporated, mainly Psychology, Anthropology and Sociology, both in training and performance, and provide new tools for the research of Health problems in human populations [6,7]. One of the great challenges of Epidemiology is causality studies, controversial, debated and controversial [7]. The detractors of the Epidemiology maintain the inability of this science to respond to such a challenge and argue that the studies carried



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out in the analytical epidemiological investigations have not been sufficiently enlightening and that the practical application of its results has not reached the expected impact on the morbidity of the diseases under study.

Could it be possible that the inaccuracies attributed to Epidemiology, with respect to causation studies, are related in some measure to the research model used, based on the assumption that health problems are simple and linear? Currently, Epidemiology must face several epistemological problems; of them, perhaps the most important is that of causality, an aspect on which there is still no consensus among experts. The bitter struggle of the early nineteenth century, between contagionists and followers of miasmatic theory, still persists in the twentieth and twenty-first, although with different nuances. The diversity of positions extends from those who propose to generalize the use of causality postulates, be they those of *Henle-Koch*, those of *Bradford Hill* or those of *Evans*, to those who consider that epidemiology should abandon the concept of cause and just give non-deterministic explanations of the events you are investigating. The matter has not yet been resolved, so it remains at the center of the controversy. The advance of medical and related sciences, globalization and the expansion of man in the face of the immediacy of technology have allowed human beings to redefine the concept of epidemiology; knowing the dynamics of diseases at the collective level, it has met its biggest challenge: The paradigm shift, due to the progressive increase of the world population, as well as life expectancy, population aging and chronic diseases that they are more frequent, which allows the formation of an epidemiological universe. The history of hygiene and epidemiology has developed in the context of the struggle between materialism and idealism, in their conceptions of the causes, factors and conditions involved in the health-disease process, both from the point of individual view as social [8].

The development of hygiene and epidemiology has been related, of course, to the advancement of medicine in all its aspects. Both sciences can be considered as very old practices and, at the same time, as relatively young sciences. His conception, in the broadest sense, that "something" is the cause and that "something" can be done to prevent disease, is as old as you are. In the historical evolution of the ideas that led to the current concept of hygiene and epidemiology, five fundamental stages or periods can be identified: Primitive, individualistic clinical, of the great epidemics, etiological-unicist and ecological-multicausal or current. The concept of causality, in epidemiology, has historically been related to the predominant philosophical thinking in each era, the advances made by science in general and health sciences in particular, and with the problems that have affected and predominated in each era in the health

of human populations [5-10]. Proposals for the study of causality during the last century were based primarily on the epidemiological models of single causes/single effects (monocausal) or multiple causes/multiple effects (multicausal), so that evolution History of causality in Epidemiology the following causal theories and models are recognized [6,7-12].

Causality due to miasmas

Before the emergence of Epidemiology as a science, there was a belief that diseases were caused by emanations, "putrid" air or other "humors" (miasmas). This way of thinking prevailed until the discovery of the Bacteria by Louis Pasteur, in 1860. In its final stage, the belief in miasma theory rivaled the nascent contagion theory.

Unique causes-unique effects

It extends from the discovery of bacteria by Louis Pasteur, until the first half of the 20th century. In the early twentieth century, it was believed that only the presence of the infectious agent was enough for the disease it caused to manifest itself. Soon the researchers realized that, for this to happen, the presence of other elements was necessary. The concepts of necessary cause and sufficient cause introduced in this model were rescued from Galileo's philosophical thinking. The explanatory model of single causes and monocausal cutting subsequently gave rise to the so-called "ecological model", according to which health problems were explained by the agent-host relationship in a given environment. During this stage, intensive work was carried out in the study and control of infectious diseases that hit humanity during previous centuries, antibiotics were discovered, large sanitary works were carried out, multiple vaccines were discovered and large global campaigns were carried out in favor of control of infectious diseases. The use of descriptive exploratory research and descriptive and health statistics in epidemiological studies is initiated.

Cause multiple-unique effects

By decreasing infectious diseases and increasing chronic ones, there is a transition of epidemiological profiles in some countries; Some authors visualize a transit stage that is recognized as the "multiple cause - single effect" model. It began to be used in some countries with the transition in epidemiological profiles.

Multiple causes - Multiple effects

It begins at the moment that infectious diseases begin to decline in developed countries and noncommunicable diseases increase. It has a transit stage with the previous model, when several biological agents capable of producing the same disease are identified. After the first studies by Richard Dolls and

Bradford Hill, the relationship of various factors with the occurrence of noncommunicable diseases is recognized. Mac Mahon proposes, in 1960, the concept of "risk factors" to identify possible causal elements, participants in the occurrence of these diseases, and calls the risk of acquiring the disease "risk". The studies of the risk factors allowed to apply the theory of probability in the Epidemiology and to begin the use of the inferential Statistics; With this, analytical and experimental research expanded, epidemiology focuses its interest in the study of risk factors, and moves away from the general population scenario. Subsequently, Mervyn Susser and Ezra Susser, with a systemic, albeit hierarchical, vision proposed a new model that they called "Ecoepidemiological" or Chinese boxes [7,18], and that we consider to overcome the conceptual limitations of Mac's risk factor model Mahon; However, Jaime Breilh considers that this proposal "establishes a mechanical dichotomy between social and individual elements relegated to different systems, denies the dialectical relationship between social and individual phenomena, disdains the individual as a personification of fundamental social facts, their representative character of interests and class relations, and makes it a functional unit influenced from outside by the social class that acts as something outside".

Thus, Mac Mahon's multiple causality model does not overcome the limitations of the classical or linear causal model, based on an analytical causality, fragmented into isolated parts, which does not harmonically articulate the individual with the population. On the other hand, Susser's "Ecoepidemiological" model faces conceptual pitfalls, as it fails to overcome the problem of the dichotomy between the individual and the social, nor the hierarchy between levels [11].

Geoffrey Rose had expressed, by the middle of the 80s, that the factors that have to do with the occurrence of disease cases in a given population are different from those that would explain the differences in the occurrence of diseases between different populations. So, the concept of causality, centered on patients and diseases, extends to the health-disease process at the population level. The concept of causality at the individual level becomes insufficient to understand the participation of a causality that encompasses, not only the individual or the groups of individuals, but wants to face population health problems [5-13].

There is no model known causal capable of linking the causal relationships that occur between the micro (at the individual level) and the macro (at the social level); Causality, thus understood, seems to be impossible to be apprehended with the knowledge, tools and tools provided by statistics and the calculation of probabilities. The social sciences begin to fill the social understanding space.

Classical Epidemiology, focused on the study of the population from the individual and based on the principles of linear causality, managed to study health problems considering the individual as part of a population whole. Because of the development achieved, it dismembered the population in its parts (individuals), and adopted the statistical concept of population as the sum of the parts (individuals), and from this perspective, the causal theory of risk factors assumed the social as One more risk factor. The changes in the social and economic structure that have occurred in the world during the last 100 years have had a fundamental effect on the prevailing attitudes in epidemiology. The position is such that it is necessary to examine again the fields of interest that should be included in this science, as well as a new assessment of its role in the practice of preventive medicine and in public health. Ecoepidemiology or multilevel epidemiology opens one of the chapters of contemporary social epidemiology, which also includes social epidemiology and the political economy of health. The ecosocial system and other recent multi-level epidemiological systems seek to integrate social and biological reasoning and a dynamic, historical and ecological perspective, to generate new ideas on the determinants of population distribution of the disease and social inequalities in the field of health. For the ecosocial theory, the fundamental question is what or who is responsible for the population trends of health, disease and well-being, manifested in the present and past social inequalities of health and their changes. Therefore, adequate epidemiological explanations should take into account the tempospatial distributions of the disease, both persistent and changing, including social inequalities in health. In this way, the ecosocial theory invites us to consider how the population's health is generated from social conditions, necessarily geared to biological processes at all scales, from the subcellular to the world or from the nanosecond to the millennium. The development of the sciences of modernity had allowed scientific knowledge to become the most important of all knowledge, so that the "measurement" and "accuracy" that characterized it became highly appreciated virtues. However, the scientific discoveries made during the nineteenth and twentieth centuries came to opposite conclusions: "uncertainty", "blur", "emergency", "chaos" appear as expressions of a new scientific way of thinking that breaks the ideal of "certainty" and "accuracy" reigning after five centuries of unquestionable successes of the classical sciences [1-3]. They are part of this revolution of knowledge, epistemological questions from science, the sociology of science and knowledge. Also, new type scientific theories, which are built on the basis of the demolition of the ideals of classical rationality: Catastrophe theory, chaos theory, nonlinear dynamics: Complexity.

We May Ask Ourselves: Is Complex Causality a New Causal Paradigm in Epidemiology?

The concept of complex causality does not deny the existence of linear causality, it only allows studying a system that is complex in nature, from the perspective of complexity and not from the perspective of simplicity, while non-complex systems can be followed studying from the perspective of simplicity [1-3].

In reality, the problems are dynamic: The same phenomenon over time can vary from a state of equilibrium to one of non-equilibrium; Simplicity and complexity can sometimes be alternated. In theory, simple or non-complex systems are recognized as such by the stable trajectory or dynamics they generate in their movement; they are closed systems that remain in a state of equilibrium or very close to it; The magnitude of the causes that cause them correspond to similar intensity effects, and time is an external factor inherent in the process or phenomenon being studied. However, complex systems are open, sensitive to small variations of their initial conditions, of their internal, external or both fluctuations, which destabilize them; this bankruptcy of the old balance does not end many times in chaos or destruction, but in the creation of a totally new structure on a higher level. This new structure can be more differentiated, internally interactive and complex than the old one, and needs more energy and matter (and, perhaps, information and other resources) to sustain itself. Referring primarily to physical and chemical reactions, but occasionally calling attention to analogous social phenomena, *Prigogine* calls these new and more complex systems "dissipative structures [12-16]". The causality approach, based on complexity, proposes a different analysis model, where the causes are neither single nor multiple, but complex. The theoretical models for the analysis of causality, under the assumption of complexity, are not completely elaborated, we would say that they are being built at the moment, so there is no extensive documentation regarding their practical application at all times. branches of knowledge; This means that we are talking about a theory under construction. Complex causality seems to break through as a new causal paradigm in Epidemiology, which this time has as its starting point the transformation in the integration of contemporary knowledge, the dialogic relationship between the principles of order and disorder, both concurrent and antagonistic, the recursive process in which products and effects are, at the same time, causes and producers of what produces them (idea that breaks with linear causality) and the presence of the hologrammatic principle (which, similar to physics, is the lowest point of the hologram image that contains almost all the information of the object represented). In the light of these new theories, it will be

necessary to distinguish when we face a complex or a linear problem, or to recognize when one is transformed into the other; It will also be necessary to recognize the laws, principles and categories that govern causality in complexity in Epidemiology, as well as incorporate and build mathematical modeling for the study of the network of networks in complex systems, develop methodological guidelines for inquiry or scientific research and, above all, achieve the transdisciplinary development of this science for the sake of its future development [16-19]. Internationally and nationally, universally and singularly, theoretically and practically, Epidemiology must reconsider much of its current assumptions, which have so far functioned as absolute truths, as categories Universal, related to all branches of scientific knowledge, such as determinism and indeterminism, causality and chance, are being reformulated in light of the theory of complexity [20].

The classical principle of causality prevalent in modernity is not useful to explain the circular causal interactions that are established in open complex systems, which are the most frequent forms of movement that predominate in nature and society. New theories, such as chaos, catastrophes, fractals, networks, can contribute to provide the theoretical and practical foundations to initiate an explanatory path to phenomena that interact differently with the environment and, therefore, they can be useful to undertake the study of these new causal relationships. The implication of epidemiology, in clinical and preventive research, should be increased and give a more global vision to health problems, evaluating and proposing effective technologies in environments with low levels of development. From stable vaccines at high temperature, to diagnostic procedures of simple application, epidemiology can favor projects guided by public health priorities from a global perspective [20-25].

Final Considerations

The change in the paradigms has led epidemiology to consider, at the same time, the molecular, human, social and environmental levels, which allowed for the establishment of multilevel models, which allow the health-disease process to be more widely known. Within the paradigm changes, the concept of social epidemiology stands out, whose main objective is the diagnosis and search for health inequalities. Given the emergence of multiple chronic diseases and new paradigms, such as complex adaptive systems, a good design of variables is necessary, in order to study the multiple determinants in health and take advantage of the great development in current technology that allows obtaining analytical results advanced closer to reality, so that the areas in charge take effective measures. It is a priority to raise awareness among the epidemiological community of the importance of

breaking schemes and change the current paradigms, which are not allowing the results of their studies to be useful to impact the health of the community. Analyzing the above.

One might ask; will epidemiologists adapt to express themselves in a predominantly qualitative language? Will they be able to express population-related health-disease problems without the predominance of statistics; Or is it that the general tendency will be to develop a new form of quantitative epidemiology from theories and not from the thought of complexity?

The new times impose new challenges; Let us not forget that it is an area of knowledge that has historically had an eminently practical nature.

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