



Traditional and/or clinical epidemiology. One pillar of modern medicine

Epidemiología tradicional o clínica. Un pilar de la medicina moderna

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ABSTRACT

Traditional epidemiology has been neglected by some clinicians, as bothersome and of little use in daily medical practice. However, as two fundamental pillars of science applied to medicine are biostatistics and epidemiology, their study is essential for clinicians to make informed decisions when reading medical papers or attending lectures and be able to decide about the quality of the evidence for the best patient's evaluation and treatment. Many medical schools around the world, as is the case in Mexico, do not include the scientific method in their curriculum, and the mathematical preparation that students acquire in previous years is usually deficient. To stimulate doctors to learn the importance of epidemiology and statistics, they must be immersed in these fields well before entering medical school or, at the very least, during residency and specialty training.

RESUMEN

La epidemiología tradicional ha sido despreciada por algunos médicos, que la consideran molesta y de poca utilidad en la práctica médica diaria. Pero, ya que dos pilares fundamentales de la ciencia aplicada a la medicina son la bioestadística y la epidemiología, su estudio es fundamental al leer artículos médicos o atender a las conferencias y así poder evaluar adecuadamente la calidad de los datos para la toma de decisiones informadas, y lograr un mejor estudio y tratamiento de los enfermos. Muchas escuelas de medicina alrededor del mundo y es el caso de México, no incluyen el método científico en su currículum y la preparación en matemáticas adquirida en los años previos también es usualmente deficiente. Para estimular a los médicos a aprender la importancia de la epidemiología y la estadística, deben ser inmersos en estas disciplinas antes de entrar a la escuela de medicina o al menos, durante los años de residencia y especialidad.

The world as we have created it is a process of our thinking. It cannot be changed without changing our thinking.

Albert Einstein

It has been mentioned that there are 15 types of thinkingⁱ but for today's dissertation, some definitions are relevant to the scientific method.

1. Everyday thinking is the act driven by both the brain and the individual's personal needs to interact with the environment.
2. Scientific thinking is the act of seeking systematic and controllable explanations regarding a question. It refers to both thinking about the content of science and the set of reasoning processes that permeate the field of science.
3. Philosophical thought is the impulsive act that human beings possess in the search to differentiate themselves. This thinking seeks to provide explanations for events that science cannot. Anyhow, science is considered a derivation of philosophy, so that the differentiation can be complex.

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ⁱ 15 Types of thinking and their characteristics (<https://exploringyourmind.com/types-of-thinking/>).

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The point of comparison among the three thoughts is the desire to meet a need: the everyday focuses on basic needs, the scientific on the factual, and the philosophical on the transcendental.

Although at its inception epidemiology was the earliest form of preventive medicine, it is currently an important component of the science of medicine. The history of epidemiology dates back to ancient Greece, where Hippocrates observed patterns of disease in human populations. Over the centuries, epidemiology has evolved, and in the nineteenth century, it was established as a formal scientific discipline.

In 1854, there was the most violent outbreak of cholera in London. John Snow, observing the distribution of cases and the proximity to different water sources, was able to determine which were contaminated and successfully applied preventive measures to the point of being considered the father of modern epidemiology.¹

Among contemporary clinical epidemiologists with pioneering contributions² are Sir Austin Bradford Hill («Causality Rules»), Archie Cochrane («Evidence relevant to the patient»), and David Sackett («Clinical epidemiology»). Sir Michael Marmot was consecrated for his epidemiological studies of the relationship between social status and health. My teacher, the late Jeremiah Stamler, disseminated knowledge of epidemiology, statistics, and prevention among health professionals in many countries, including Mexico.

Biostatistics, the scientific method, and clinical epidemiology should be the basis of medicine, instead of only using personal experience or following the clinical guidelines which have become, in the words of E. Meaney, «The Guidelines Disease»³ and have led to a «guidemanía». Instead of being published by accredited institutions, elaborated according to approved standards, and actualized frequently, in many cases, clinical guides lack scientific methodology. There is a need for their elaboration to follow the published «Criteria for trustworthy clinical practice guidelines».⁴ Meanwhile, medical professionals have to be instructed in the critical analysis of scientific

papers to decide if they are appropriate to be included in clinical settings.

During the «dark ages», there was scientific and medical progress in Asia, where, additionally, were exiled scientific personalities from Europe. One example was Maimonides/Ramban. (1135 Córdoba-1204 Egypt), who arrived in 1148 at the University of al-Qarawiyyin, Fez, Morocco. While he was physician to the vizier Alfidhil and Sultan Saladin, he applied the foundations of preventive medicine that would reach Europe until the Renaissance. Clinical Epidemiology can be defined as the application of epidemiological principles and methods to the problems encountered in clinical medicine, in order to provide better care, conduct research, and critically understand the medical literature.⁵ Many ideas and many epidemiologists have contributed to the basis of this concept. John R. Paul, in 1938, used the term «Clinical Epidemiology» for the first time when he gave the lecture «A new philosophy for old diseases» at the American Society for Clinical Investigation in order to propose the use of Epidemiology in the clinical area. Dr. Peter P.H. De Bruyn, a physician and professor at the University of Chicago, taught a course to students of Public Health and Medicine that they called «Principles of Epidemiology» or commonly called «Clinical Epidemiology».⁶

When Dr. John R. Paul published the first known book on Clinical Epidemiology in 1958, he recognized that he owed the idea of it to Dr. Peter P.H. De Bruyn, a physician and professor at the University of Chicago, and that part of the text is based on an instructional course that a dozen years earlier, was offered to students of Public Health and Medicine as an elective course at Yale University.

Clinical epidemiology is ideologically linked to evidence-based medicine (EBM), whose origins some authors place in France in the mid-nineteenth century. In 1834, a movement called «*Médecine d'observation*» contributed to the eradication of useless treatments, such as bloodletting. For the first time, the observation, quantification, and careful measurement of phenomena related to health and disease were opposed to the deductive and intuitive method prevailing until then, to generate valid knowledge. «Observational medicine» has

become the first basis of all medical science; it gives the diagnosis, the prognosis, and the prediction of what will happen according to the knowledge of the evolutionary law of diseases. Nevertheless, pure observational medicine has never been able to suffice either. As a treatment is considered in clinical decisions, in the 1980's, the studies looked at the effects and determinants of those clinical decisions. The term 'Evidence-Based Medicine' (EBM) was first used in 1991, in an article by Gordon Guyatt published in the ACP Journal Club.⁷ Accordingly to Alvan Feinstein, one of the pillars of modern epidemiology, John R. Paul's approach led to the development of the methods of analytical epidemiology and their extension to the field of non-communicable diseases. In 1992, the first working group on EBM was created in Canada.⁸ In the words of Sackett et al., EBM is «... the integration of the best research evidence with the clinical expertise and values of the patient...».⁹

For many medical professionals, epidemiology has been considered «the ugly duckling» among the subjects taught in medical school. If we add the usual disgust for mathematics, we will see why statistics is another component of the lack of interest in the scientific method. To see the other side of a coin toss where one side is «the arid epidemiology and mathematics», the other one should be the description of science by Max Born –Nobel laureate in physics– «Science is one of the great adventures of the human race, as fantastic and demanding as the tales of heroes and gods, nations and states, writers and poets. That is my conviction, and I think that science can and should be taught in such a way as to transmit a suspicion of that spirit to the mind of the student».

Overall, critical appraisal plays a pivotal role in ensuring that healthcare professionals can make well-informed decisions based on high-quality, reliable, and relevant research evidence. By mastering critical appraisal skills, medical professionals can effectively navigate the extensive landscape of medical literature and apply the best available evidence to patient care.

Clinical guidelines cannot be used as if they were the absolute truth and should

not be followed without taking into account the particular conditions of each case and information from other sources. There are currently so many guidelines developed by multiple medical groups in different parts of the world and of very different quality and applicability, that their revision requires the use of the recommendations for critical analysis of the medical literature.¹⁰

The evolution to evidence-based medicine, especially through the contribution of David Sackett, has allowed blending traditional epidemiology with clinical medicine.¹¹ Clinical epidemiology and Evidence-Based Medicine (EBM) can be our allies to take advantage of research studies and incorporate them into the practice of medicine, taking into account the importance of the doctor's experience and the individuality and preferences of each patient.¹²

It has been mentioned that evidence-based medicine has some weaknesses, but we will review some of them. One is the misuse of statistical values, which are improperly used instead of clinical significance, frequently trying to hide the lack of utility of some procedure or drug. Another problem is the definition of evidence, which can have many levels and is not always properly stated in the publications. The other is that EBM is not a substitute for the physician's experience but has to be seen as a complement.

Modern treatises on clinical epidemiology agree that there are two major applications: clinical practice and clinical research. According to Jeniseck,¹³ in both, the user will devote themselves to:

1. Defining the concept of normality or abnormality.
2. Choose or evaluate diagnostic tests.
3. Control etiological factors.
4. Predict the evolution of the disease.
5. Carry out therapeutic tests.
6. Select the necessary information.
7. Evaluate the quality of medical care.

As an example of the usefulness of evidence-based medicine, in a study where two treatment strategies are compared, when we are told that a result is significant, we will understand that:

1. The data reflect with high probability that the differences found in the study represent the data of the universe where the sample comes from ($p < 0.05$).
2. That the size of the sample and its characteristics make it efficient and representative.
3. The results are important for the patient, and the recommendations can be incorporated into clinical practice.¹⁴

If any other method that you use to practice medicine has all these items, it is clinical epidemiology and evidence-based medicine by any other name!

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