Research on the Logical Structure of Medical Knowledge as Related to Medical Teaching

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(Abstract)

The volume of medical knowledge and the level of expertise necessary for effective solving of medical problems have been growing dramatically in recent years, and it is evident that this trend will not only continue but even accelerate in the future. The effectiveness of teaching decreases and in order to maintain it (avoiding at the same time excessive specialization), reorganisation of the components of the undergraduate curriculum and postgraduate studies, introduction of new disciplines, and taking into account more and more details does not suffice; these measures may even make the situation worse. The solution should be sought in perfecting the methods of teaching and learning, and - probably most important - in providing (whenever it is possible) the student with a strong background of general knowledge and versatile thinking. The goal of the development and perfecting of the process of medical education should consist in teaching and assisting learning of broad concepts, general laws, basic structures and processes, correct procedures of reasoning and effective methods of practical problem solving; the detailed knowledge and its practical application should follow as a natural extension and broadening of a general basis or basic domains, the number of which may be restricted. Despite the fact that the realisation of the above postulates does not necessitate any essential restructuring of the curriculum but rather the shifting of emphasis from details to generalities, the present state of advancement of medical knowledge could allow it only partially. The growth of empirical aspects of almost every medical discipline should be accompanied by a parallel progress in general methodology and understanding which is a necessary condition for the above-stipulated change of perspective in teaching.

This paper presents the results of a study of basic logical problems of medicine which are especially relevant from the educational point of view, as well as suggestions concerning their use in teaching. The research in this field is conducted in our Center and is partly related to the use of computers as tools assisting medical teaching and decision making. It is centred on the following problems: a) medical concepts: their denotation and connotation, and structure of laws and fragments of knowledge; b) main procedures of reasoning: inference, verification of hypotheses, explanation, proving; c) description of the basic physiological and pathological processes (e.g. regulation, disease): its logical structure; d) general aspects of the basic medical actions (e.g. diagnosis, therapy); e) logical principles of medical decision making. The implications of the above studies for the contents and organisation of medical textbooks, lectures, seminars, self-learning, etc. as well as for the use of teaching-aiding devices (e.g. computers) are briefly indicated. The use in education of the results of the logical analysis of medical knowledge and action is discussed also from the point of view of the relation of this approach to the main types of medical curricula, e.g. discipline-based and problem-oriented ones. The relevance for medical education of logical versus heuristic approaches is considered.