The Interdisciplinarity in the Romanian Medical Research

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Motto: „As the science and technology race ahead, the greatest mystery of the universe and the less controlled force of nature remains the human being and her actions, as well as the mankind experiences" (Kanfer & Scefft, 1998)

Abstract:

Generally, the educational training and research / development process describes the following levels of disciplines interpenetration: pluridisciplinarity, multidisciplinarity, interdisciplinarity and transdisciplinarity. The interdisciplinarity implies phenomena, general laws and concepts common to several disciplines, analyzed in contexts as varied as possible, to highlight the many facets and possibilities of their application in the area of various disciplines. Through interdisciplinarity, the horizontal transfer of knowledge from one discipline to another is being promoted. This article aims at defining the specificity of the interdisciplinarity in the Romanian medical education and research, the importance and benefits thereof in the context of the educational and research process.

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The term "interdisciplinarity" appeared fairly late in the current language, for which reason it was not included in the Romanian dictionary of modern language dating 1958. The term was to be found only in 1978 in the Dictionary of Neologism (F. Marcu and C. Maneca) defined as "the establishment of relations between several sciences or disciplines". In the dictionary "Le Petit Larousse en couleurs" (1995) we also find the synonymous terms "pluridisciplinary" and "multidisciplinary", defining the simultaneity of several disciplines.

The interdisciplinarity, although based on the unity of the science fields, initially emerged as an ambiguous concept. H. Hechhansen considers the interdisciplinarity as being heterogeneous, a complementary component, and even unifying pseudointerdisciplinarity. From M. Boisot's point of view, the interdisciplinarity may be linear, structured and restrictive. In 1983, G. Gozzer (quoted by A. Jula) points out that, at a certain period, the concept has been framed between a universal pedagogical panacea and a formula which was likely to encourage superficiality and spiritual disorder, the latter leading to the extinction or mixing of the disciplines, and thus, disputing the professor, by tradition possessing a monodisciplinary training. The disciplinary approach of a subject leads, in most situations, to the emasculation of the scientific creativity, reduced to a mere, chant technical research, strictly specialized in a limited field. Thus it tends to create barriers between the groups of specialists and dissociating them from the scientific communities. Generally speaking, there are several levels of disciplines interpenetration: pluridisciplinarity, multidisciplinarity, interdisciplinarity and transdisciplinarity.

Interdisciplinarity implies phenomena, laws and general concepts common to several disciplines examined in contexts as varied as possible, to emphasize the multiple facets and the means of implementation thereof in the area of various disciplines. Through interdisciplinarity, the horizontal transfer of knowledge from one discipline to another is being promoted. In "Exposé de quelque concepts fondamentaux ", UNESCO, 1985, G. Vaideanu shows that interdisciplinarity involves a certain degree of integration between different areas of knowledge and different approaches, and also the use of a common language, allowing "exchanges of a conceptual and methodological order". Gusdrof (quoted by A. Jula) argues that interdisciplinarity has always been an important factor in the development of knowledge in two ways: the accomplishment of an exhaustive map of knowledge and the need for cooperation with other disciplines. Consequently interdisciplinarity appears as a specialization process that generates new sub disciplines and opportunities.

According to Basarab Nicolescu, interdisciplinarity represents a transfer of methods from one discipline to another, describing three degrees of transfer: an applicative one (for example, the nuclear physics methods are being transferred to medicine, thus yielding new therapeutic solutions), an epistemological one (for instance, the transfer of direct analysis, of formalized logical analysis, historical and critical analysis and of experimental genetic analysis to medicine) and the transfer generating new disciplines (for example, the transfer of management methods to medicine led to the emergence of health management).

The projects initiated by UNESCO (at the beginning of the 7^{th} decade) in various countries, known as "integrated sciences" emphasized the principle of interdisciplinarity, imposed by research. Teams made of researchers from several science areas achieved remarkable results. The National Science Teachers Association (NSTA) in the U.S.A played an important role in promoting the interdisciplinarity, in 1964, drafting a list of basic concepts common to several sciences, in order to improve the curricula.

Centre International de Recherche et d'Etudes Transdisciplinaires (CIRET), in collaboration with UNESCO, developed "The Transdisciplinary Evolution of the University", a project debated at the International Congress "Which University for Tomorrow?" (Monte Verita, Locarno, Switzerland, 1997), on which occasion certain suggestions contained in the Statement of Lucarno had been made. Some of these relate to the need to devote a percentage of the teaching time corresponding to every discipline to the inter- and transdisciplinarity and to create inter- and transdisciplinary research workshops, inter- and transdisciplinary guidance centres, PhD theses on inter- and transdisciplinarity and development of responsibility, etc.

Today, interdisciplinarity is one of the most important and complex theoretical and practical problems for the development of science, for a new pedagogy of the unity. The history of science recorded attempts of cooperation and interconnections as well as endeavours to develop them. Philip Hughes concludes that "the argument that pleads for interdisciplinarity is not the fact that disciplines would represent an erroneous theory of knowledge, but that they never give us a full picture of things taken separately; inter-connecting to one another, integrating therein, they fulfil their role in an effective manner". The interconnection of the disciplines and coordination of interdisciplinary research can be completed by adopting the same set of fundamental concepts or general methodological elements, which means a new area of knowledge or another discipline (for example genetics engineering, medical engineering, bioengineering, management of health system).

Interdisciplinarity can be analyzed and assessed from different points of view. Thus, we talk about the interdisciplinarity of related areas (in which are being applied the methods and concepts of other disciplines), interdisciplinarity of the issues (issues that exceed the boundary of disciplines and require the collaboration of several disciplines), the methods' interdisciplinarity (applying methods of one discipline in other disciplines (for example mathematical and statistical disciplines) and concepts' interdisciplinarity (the concepts of a discipline are applied in research in another discipline).

Generally speaking, the study of interdisciplinarity focuses on global environmental issues, health issues, impact of science and technology issues, etc. The relations between technical production processes, economic processes, cultural and spiritual life processes are very strong and any change occurred within such a process produces changes in all the others. In the medical field, for example, a new medicine involves, among other things, a new technology, experimentation and promotion conditions, application conditions, etc.

Medical culture has a display of its own, consisting of patterns of action, institutions, knowledge, beliefs and habits, skills and it responds to universality needs, because the health problems that people are facing and their fundamental needs bear a similar character everywhere. Pain, illness or deaths are, in any society, serious threats to the survival of individuals and communities. Therefore one main aspect of human's domination over nature was the creation of opportunities for establishing control mechanisms on health, as a natural resource, constantly threatened by disease. Health, defined by OMS (1946) as the complete state of physical, mental and social welfare, which is not reduced to the absence of the disease and infirmity, is also one of the fundamental human rights. In this context, it is also being understood as both individual and collective state, as a necessity and a right, as an individual goal and an achievable political objective of the system, health being an indispensable ability of any society development.

Health and illness can only be defined by reporting them to the human being regarded as a whole, as a bio-psycho-social creature in the same time. The concepts of health and illness are evaluative concepts, being defined by the development of biomedical knowledge, the cultural guidelines and values, the values' system of any society. Health and illness are strongly influenced by beliefs, attitudes and practices specific to various societies, communities, social groups, and they are rated as per their own normative standards. Physicians are those who legitimize the health problems of the individuals, define the disease and create it as social role.

From the very beginning, medicine has aimed at improving the individuals' health and maintaining their survival capacity in a particular environment and space. Any need responds to some subjective and objective requirements, and its accomplishment takes place within a system of institutions, practices and knowledge. Health need is one of the most vital human needs, because its alteration or deterioration is a danger which threatens not only the welfare of its members, but even the own functioning and development of the society. Therefore health behaves in the social environment as a fundamental value, the promotion and socialization thereof among individuals being one of the most important goals of any society. Wherever we talk about value with regard to the human being, something is considered valuable only when contributes to the preservation and perpetuation of life. Medical practice, organized in an environment of relational system, institutions, attitudes, behaviours and resources, carries out the promotion of health in the community, protecting individuals against risks caused by disease. Most of the medical

activity is also devoted to the social aspects, related to prevention, which involves the doctors' responsibility for the collective welfare.

Health system is neither the only responsible nor the most significant determinant of health's state of the population, these considerations showing that the interdisciplinary approach of health should be regarded (maybe more than in other areas) as a necessity; it is about the physical environment, social environment, educational environment, and economic environment - the main sources of the health determinants. On the other hand, both the public and other interest groups may have different perceptions, expectations and interests on various issues, needs and priorities of medical-social sphere, not always based on real information, studies or evidence.

Given the major contribution of life and environmental factors, of other sectors of activity as well as of the interaction and interdependence of these direct and indirect determinants in producing and maintaining the health state, medicine and implicitly the medical research that cannot be separated in particular, are strongly characterized by interdisciplinarity. Considering the influence, the developing and the changing of the attitudes and behaviours, in terms of promoting the health and safety, the medicine and the medical research pursue the achievement of their specific aims and objectives, by increasing the intake of both medical personnel as other professional categories involved in education, information-communication, social work, etc. In fact, research in medical field represents the science and art to prevent the disease, to prolong life and promote physical and mental health through a complex collective action, aiming at environmental improvement, the fight against diseases, training the entire population on rules of personal hygiene, the organization of health services for early diagnosis and preventive treatment of diseases, by making use of the social measures capable to provide to each individual a standard of living properly to maintaining health. Starting from these specifications, health research should be imposed as a national priority which fully corresponds to the priorities of the European space.

The Romanian medical research evolved and keeps evolving fewer than two main inseparable aspects: the fundamental research and applied clinical research. It is very difficult to specify which of the two above mentioned facets of the medical research is the most important. Certainly there must be achieved a balance between the two components, because there cannot exist applied clinical research without fundamental research, respectively without research that produces knowledge in order to increase the capacity of research-development and innovation system, to gain knowledge, results and first rank experience in high scientific and technological fields, to release and transfer them to the economical and internal social environment in order to increase their competitiveness. If fundamental research can develop mainly in higher education institutions and is being financed from budgetary resources, applied research should develop in national research institutes and hospitals and bring private investment funds in compliance with the practices from the countries with powerful economies from all over the world and it is being forecasted to develop in the European policy of scientific research as well.

In this context it is still necessary to set some priority directions of research which have chances to develop at European level in the context of "health globalization" and of a still fairly low budget allotted to research in our country. These research directions should be established through the strategic plan of every higher education and/or research institution; at the University of Medicine and Pharmacy "Carol Davila", such an approach is being put into practice.

Another aspect of the medical field, which requires special attention and institutional responsibility, is the relationship between higher education and research activity in the universities, given the benefits deriving from this interaction, benefits acknowledged and cultivated in all countries with developed economy. The interdisciplinary nature of the medicine and of medical research is supported both in the training plan as well as in the research and development of medical applications; based on the already acquired experience, related areas are being approached namely: medical electronics, modelling and stimulation of physiological systems, nanomaterials and nanotechnologies, management etc.

The need for interdisciplinary medical research and training is imposed by the dynamics of research in this field, the evolution on the international market of labour and the desire of the University of Medicine and Pharmacy "Carol Davila" to provide, within a unitary structure, research and training conditions in the interdisciplinary fields to the future specialists, to provide the opportunity of approaching much larger areas (by concentrating equipment and specialists in sectors that contribute to the achievement of some major and current objectives), to have an accelerated rate of endowment, which enables it to access high-level and complex research and training programs.

The coordinates of medical interdisciplinary research at the University of Medicine and Pharmacy "Carol Davila" are materialized in:

- development of the material base of the university to provide conditions for the training and development of the research activity for the PhD students in health field and related areas: medical engineering, nanosciences and nanotechnologies, electromagnetic compatibility, information and communications technology;
- increasing the capacity of scientific research for PhD students of the University of Medicine and Pharmacy "Carol Davila" by providing an effective material base and an interdisciplinary organizational framework;
- providing human resources - PhD students, researchers, teachers - for national and international interdisciplinary research programs;
- creating a competitive structure - human and material resources - on the European market of research and technological development;
- increasing the visibility and attracting partners from other sectors.

In the performance of the educational-training and research/development process, the interdisciplinarity aims at:

- increasing the University of Medicine and Pharmacy "Carol Davila" capacity of integration into the educational European area and the initial and continuous training;
- complying the higher education system with the demands of the society based on knowledge;
- providing the conditions for training and development of the research activity for PhD attendants, university students and residents who perform activities in this area;
- carrying out research activities in mixed teams: university professors, PhD attendants, researchers, students in the legal, economic field etc., within complex national or international programs.

The interdisciplinary nature of the activity performed in the University of Medicine and Pharmacy "Carol Davila" is completed by other aspects, such as:

- training programs in the PhD School - which are mostly interdisciplinary. Thus, knowledge in the medical field connects with the medical engineering knowledge (signals processing, monitoring the activity of various human organs) of state of the art materials and technologies, sanitary management, etc.

- development of medical care equipments as well as the action of testing new drugs and materials - which is being achieved by means of involving a large number of disciplines (in the health area or other fields: biology, chemistry, mechanics, microelectronics, electrical, pneumatic and hydraulic equipments, etc.)
- nanoscience and nanotechnology - represent an area of fundamental and applicative research based on the synergy of the inter- and pluridisciplinary approach in medicine, physics, chemistry, biology and mathematics. The thorough study performed up to a deep nanometric level of the substance, analyzing the interaction between substance and field, enables the procurement of materials with exceptional properties and production of highly complex components. The revolution marked by this new stage of technological knowledge and development, extends over all the other fields, such as medicine, electronics, chemistry, metallurgy, mechanical engineering, the process being exclusively and particularly based on the biological approach.

All the research work achieved by the academic community members of the University of Medicine and Pharmacy "Carol Davila" targets to bring contribution to:

- the enrichment of the bio-humanist knowledge and universal cultural heritage;
- the active development of knowledge in the specializations field, in the educational processes and techniques in the medical field;
- the enlargement and development of the testimonial research activity in the above mentioned fields, compatible with the national and international scientific research;
- the promotion of the quality and excellence features in research, the creativity, competition, cooperation, effective management, ethical and deontological principles in all research activities and at all levels;
- the dissemination and capitalization of the results obtained from the scientific research, the promotion of the creativity activities;
- the stimulation of the extra budgetary funding of scientific research activities, design, expertise and advice, through contracts concluded with economic agents, other institutions and organizations;
- facilitating the acquirement of the skills necessary to students and PhD attendants in order to perform scientific research and their material and mental motivation;
- the development and modernization of the research assistance and micro production units, teaching and experimental bases.

In essence, scientific research in the University of Medicine and Pharmacy "Carol Davila" represents a basic component of the activity of the university teaching staff and it is being undertaken:

a) Under all forms:

- contract based-research with the National Authority for Scientific Research, Ministry of Education and Research, Ministry of Health, Ministry of Environment and other national or international institutions or bodies;
- individual research reported in the departments;
- research in the PhD School (essays, articles, TD projects)
- achieve certain services undertakings to materialize both the University material base, as well as the expertise of the teaching staff;
- publications (articles, monographs, treaties);

b) At all levels:

- fundamental/experimental research;
- applicative/clinical research;
- research for achieving technological medical-pharmaceutical development;

- research in the educational and human resources fields;
- design of products, production systems, technologies and procedures, medical, pharmaceutical and laboratory services;
- advisory activity, technical assistance and expertise in the medical-pharmaceutical and bio-humanist fields.

The development of the Romanian medical research and the promotion of the high level partnerships have required and still imply a competitive and critical mass of human resources describing complementary competences (Chemistry, Physics, Biology, Electronics, Economics, Law, etc.).

Given that future belongs to a technologized and computerized society, which requires a high qualification, but also to some major challenges in medicine (the emergence of new diseases, the population's aging phenomenon, health system globalization, labour migration, etc.), the interdisciplinary medical research, not only that it is justified, but it should also be imposed as a top priority, being performed as follows:

- optimally developing and capitalizing the scientific and technological high level potential existing in our country;
- supporting the training, development, integration and consolidation, in the covered/targeted areas/fields of research network whose activity reaches the level of excellence recognized by international standards;
- accelerating the technological compliance and integration of the economic agents according to the European Union requirements;
- increasing the capacity of the Romanian medical research to provide efficient partners for the programs which require scientific and technical cooperation and for the international research partnerships;
- integrating and consolidating the research-development institutions networks in the concerned areas.

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