

Reflections on hard and soft technologies applied to health, and their association to the teaching, research, and university outreach activities

Technology, as a promoter of quality of life, and its incorporation in population's daily life are responsible for academic dilemmas? In the pharmaceutical sciences context, are the efforts to develop a high quality educational level linked to the research considering the whole picture? Who is responsible for providing answers to these key questions?

During the last decades, the health paradigm has been focusing on producing hard technologies to supply the market with innovative alternatives. The pharmaceutical technology has contributed with medicines based on synthetic drugs with several types of formulations, varying from oral solid immediate release drug products to complex platforms for drug delivery.

However, the interest of the pharmaceutical industries is changing. The development of biological drug products is arising as the best resource to manage complex chronic conditions with huge investments by the governments around the world. This could be explained by the advances on technology, but the difficulty of producing "biosimilar" products, comparable in quality, efficacy and safety with the innovative biological drug products, and acceptable for registration by regulatory authorities, is a strong argument considering that pharmaceutical technology is still a remarkable business.

Drug products (synthetic or biological) are still the most used resource in therapeutics, but the aging of population, and the reduction of available resources available for health financing by governments, have created new forces that converge and interact. New strategies had to be developed to face the increasing number of people who require different interventions in health care.

Advances in health care go far beyond the provision of high quality medicines and other associated technologies. The inappropriate use of drugs has contributed to raise health care costs. Of notice for every US\$ dollar spent on medicines there was a cost of US\$ 1.33 associated with treatment of problems related to the drug. This demands a careful evaluation of the use of drugs by a multidisciplinary team of health professionals.

At the same time, a new paradigm is emerging, where the focus of health strategies is shifting from a disease-oriented care to a patient-oriented one. This model causes a profound change in the relationship among physicians, pharmacists, other health professionals and patients. This change also requires a patient-

oriented research based on the identification of the best intervention for an individual patient, which reduces the distance between clinical research and clinical practice.

It is important to highlight that patient-oriented research is not against to evidence-based medicine, because it is not possible to practice patient-centered medicine that is not based on evidence. Furthermore, this approach is in accordance with the concepts of personalized medicine (tailored therapeutics), and the objectives of translational research. This concept is a great contrast to the “illness-oriented care” that aims “to treat the illness, not the patients with the illness” (Sacristán, 2013).

In this context, the necessity of adequate evaluations in health care is still arising, as well as the clinical skills of the pharmacist are gaining importance. The research on soft technologies is growing to improve the populations’ health, considering that the access to the best medicines is not sufficient. It is also important the measurement of “soft” outcomes (quality of life, for instance) that represents the perspective of the patients.

In this scenario, especially in Latin American countries, the reflection on the link among teaching, research, and university outreach activities acquires a very relevant meaning. Taking Brazil as an example, by knowing the origin of the funds that finance higher education and the research applied to health, a good question would be if the pharmaceutical education could be deprived from a direct relation with the research applied to the solution of these problems.

Those questions have an unquestionable value when the Brazilian Ministry of Education is in process of reviewing the National Guidelines for Pharmacy Courses. It is time to discuss conceptual aspects regarding how to integrate the concepts of hard and soft technologies in pharmaceutical education, and how to stimulate the association between teaching, research and university outreach activities as an effective contribution to the improvement of the research applied to solve health problems with social responsibility.

The construction of a curriculum matrix that also considers the experience of developed countries in pharmaceutical education is imperative. In those countries, the satisfaction of the pharmacists with their professional role is high, as well as the recognition of the population on the importance of the pharmacist to obtain a higher level in health has shown positive outcomes.

This is a fact, not a myth! Why not try?

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