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Artículo de reflexión

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Knowledge management in the schools of medicine. Control strategy for noncommunicable diseases (NCDs)

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Summary

Today the world is experiencing changes permanent, deep and fast. Technology is advancing at an unthinkable pace before, providing tools for transfer and the globalization of information of the new knowledge.

However, is poor the management of that knowledge in areas of higher education. Universities are only transmitters of knowledge, focusing on explicit knowledge and ignoring the tacit knowledge to transform it.

The changes that are occurring in the process of aging of the population, the environmental impacts, the uncritical growth of large cities, the sedentary lifestyle (often associated with lack of health and insecurity), are changing the map of diseases, favoring the emergence and persistence of degenerative diseases.

These noncommunicable diseases such as cardiovascular disease, diabetes and renal failure have been established at epidemics levels without the necessary change in teaching of medicine in line with the new requirements.

In medical schools is essential generate innovative projects involving curriculum and paradigms shifts, highlighting the concepts of holistic health rather than the disease and its treatments.

This project presents an integrated model for the knowledge management in the intramural and extramural areas of the University, with the aim of generate knowledge societies and strengthen the coordination of activities between teachers and students, the University and the community, with the aim of creating graduates who can meet the actual demands of the society.

Key words: Knowledge Management. Higher education. Chronic diseases. Primary care.

Gestión del conocimiento en las facultades de medicina. Estrategia de control de las enfermedades crónicas no transmisibles

Resumen

El mundo actual, está sometido a cambios permanentes, profundos y rápidos. La tecnología avanza a un ritmo antes impensado, proveyendo herramientas de transferencia y globalización de la información y poniendo a disposición del público en general el conocimiento producido.

Sin embargo, no existe una adecuada gestión de ese conocimiento en la mayoría de los espacios de educación superior, siendo las universidades meras transmisoras de conocimiento, enfocándose en el explícito y sin darle un lugar de importancia al conocimiento tácito, para gestionarlo y transformarlo.

Los cambios que se están dando en el proceso de envejecimiento, los impactos del medio ambiente, el crecimiento acrítico de las grandes ciudades, el sedentarismo (muchas veces asociado a la falta de espacios

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saludables y a la inseguridad), están modificando el mapa de las enfermedades, potenciando la aparición y persistencia de enfermedades degenerativas.

Estas enfermedades crónicas no transmisibles, tales como las cardiovasculares, diabetes y la insuficiencia renal, se han establecido en niveles de epidemia, sin que la enseñanza de la medicina se haya modificado en consonancia con las nuevas necesidades.

En las facultades de medicina es imprescindible generar proyectos innovadores, que impliquen cambios paradigmáticos curriculares, enfatizando los conceptos de salud como un todo, más que el de la enfermedad y sus tratamientos.

Este proyecto, presenta un modelo integrado para implementar la Gestión del Conocimiento en los espacios intra y extramurales de la universidad, con el objetivo de potenciar sociedades de conocimiento, articulando acciones entre docentes y alumnos, universidad y comunidad, con el objetivo de generar graduados que puedan satisfacer las demandas reales de la sociedad.

Palabras clave: Gestión del conocimiento, educación superior, enfermedades crónicas, atención primaria.

Introduction

Currently, the world and its organizations are living in a situation of permanent change. The speed and accessibility of communications and the new information technologies have impacted on the creation and duplication of knowledge, often without too many ¨filters¨ that ensure their quality.

This aspect is of enormous importance, because knowledge, itself, generates a competitive value for those who possess it and it is also a vehicle for learning, in the process of unlearning to learn.

Knowledge is not the same as learning or information. It is an intangible asset whose possession generates a competitive advantage for its owner.

Nonaka and Takeuchi (1995) defined knowledge as "a human and dynamic process of justifying the personal beliefs in search of the truth". It is suggested that knowledge is context-dependent.[1]

Knowledge Management became a fundamental tool for the achievement of results, whether in organizational, business, research and teaching environments.

It had its origins in the business environment during the decade of the 1990s in the boom of globalization of knowledge and economy worldwide, with its subsequent incorporation into the universities.

It has been mentioned[2] that the extension of this new organizational culture to diverse spheres has to do with the unfolding of the "knowledge society", announced by Peter Drucker in "The New Realities".[3]

There are companies that are involved in projects of research and technological innovation, being producers, administrators and transferors of knowledge. An example of this, are the pharmaceutical companies, whose impact on the processes of research of new technologies has led to a substantial improvement in the quality of life of the individuals.

The companies manage human and material resources in an intelligent manner, while the universities are developed on the basis of "knowledge models", with their own curriculum and the profile of their teaching staff, by their form of government and their relationship with the society.

The academic work is organized around materials whose nature is singularly intellectual[4] and even though the classical authors had already written about the value of people in the organizations, Knowledge Management implies a paradigm shift, by which they prioritize the education of their members, tending towards creativity, innovation and systemic thinking.[5]

Based on how that knowledge is managed, from its creation, its distribution, its teaching and its practical application, extraordinary results can be achieved or, conversely, the proposed objectives could not be accomplished.

Managing knowledge implies to add value to it, starting from prior knowledge, the experience accumulated by its use, establishing an ascending spiral of

generation of new knowledge that enables the achievement of supportable and sustainable strategic advantages in the processes or programs developed. It should take the general and lead it, in its management process, to the particular and to the empowerment of each person of an organization so it can become an apprehended knowledge.

The role of the universities in this novel process of Knowledge Management is essential in the formation of qualified professionals, in their teachers, their researchers and in the university extension programs, with the aim of responding to the needs of the society with which they interact, propitiating true knowledge societies.

It is useless to havestrong research areas that generate knowledge, if they are not transferred to the academic body of the university and, hence, to the students. It is the difference between having individual intellectual capital and consolidating the collective intellectual capital.

It is essential to strive to achieve accredited research areas, whose accomplishments must culminate in innovation processes and new ways of seeing the world in whichever competencies in which the professional develops, after his stay at the university.

In recent years, it has been established the need to give the university a different role around the production and transmission of knowledge, without letting be overwhelmed by the rigidities of the professional schools and the academic bureaucracy.[6]

According to Pérez Lindo,[7] the concept of Knowledge Management, applied into the university involves at least these dimensions: a) a theory of knowledge; b) a theory of action; c) an institutional theory; d) a knowledge policy; e) a methodology for transmitting and applying knowledge. Knowledge Management is part of the process by which we try to value the scientific and technical potential to improve our living conditions.

Managing knowledge implies to recognize that human beings are linked with the world and with knowledge, based on their own interpretation, generating different perceptions and possibilities for action.[8] Each person is, at the same time, receiver, producer, shaper and interpreter of knowledge, expressed through language and instruments of social communication.[9]

That interpretative nature of the phenomena of the world and of knowledge, characteristic of each individual, generates a space for diversity that, if well exploited, would favor, respecting the other as a legitimate other and, therefore, with effective listening,[10] creativity and the generation of new knowledge and innovation.

Knowledge has been classified in different ways, according to the authors. It has been called: scientific and practical, objective and coming from experience, procedural, incorporated, migratory, encrusted and encoded, etc. On the other hand, the tacit knowledge must be differentiated from the explicit.[11]

Tacit knowledge is the one that is acquired from experience. It is a knowledge that is acquired in an insensitive way, when joining a different organization or culture. Explicit knowledge is the one that is transmitted through a formal and systematic language (Table 1).

Gopal and Gagnon (1995),[13] define Knowledge Management as an administration model of three stages: 1.- knowledge, 2.- information and 3.- learning (Figure 1).

In its development, there is a transformation of the individual or tacit knowledge, biased by the individual characteristics of the mental models of people,[5] into an explicit, formal and systematic knowledge, which can be communicated and shared.

Nonaka (1991, 1993, 1994)[14-16] and Nonaka & Takeuchi (1995)[12] define 4 modes of knowledge conversion: socialization, externalization, combination and internalization.They use a word: “ba”, which is a Kanji ideogram that was originated in the works of the Japanese philosopher Kitaro Nishida (1870-1945)[17]and was incorporated in the processes of knowledge management by Nonaka & Konno (1998).[18] Each conversion mode is expressed with a “ba”. The originated “ba” linked to the creation of knowledge, the dialoguing “ba” stimulates reflection, dialogue, brainstorming, and propitiates the teamwork. The “cyber-ba” is linked to technology and the empirical “ba” uses simulations by scenarios to help in the internalization of knowledge (Figure 2).

Table 1

Types of knowledge	
Tacit knowledge (subjective)	Explicit knowledge (objective)
Knowledge through experience (body)	Knowledge through rationality (mind)
Simultaneous knowledge	Sequential knowledge (in the act)
Analogical knowledge (practice)	Digital knowledge (theory)
Source: Nonaka[12]	

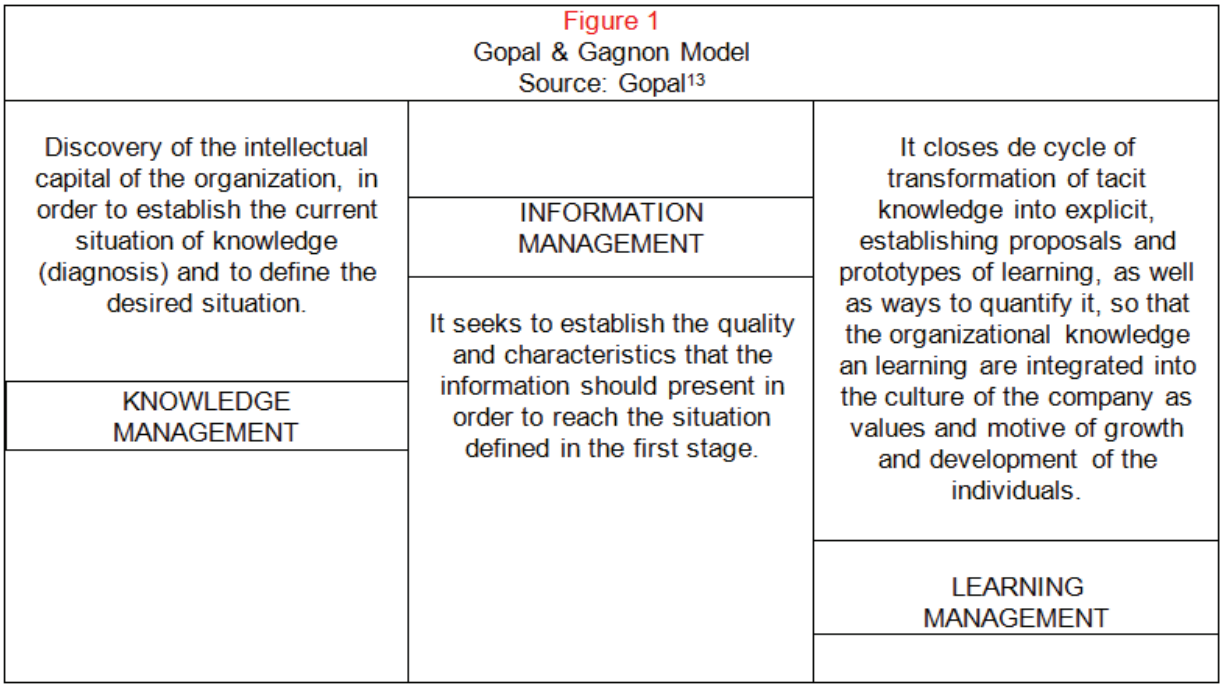


Figure 1
Gopal & Gagnon Model
Source: Gopal[13]

Expressed in a concept map, it can be synthetized as shown in Figure 3.

The "cycle" constitutes a permanent process, which is represented with a spiral (Figure 4).

The ascending spiral of knowledge creation includes 5 phases: 1.- share tacit knowledge, 2.- create concepts, 3.- justify the created concepts, 4.- build archetypes and 5.- transfer the new concept to all organizational levels. This model has been a pioneer of great part of the concepts which are currently managed and a reference for numerous subsequent works and models.

As defined by Pérez Lindo,[2] in the universities Knowledge Management has its field of application in academic administration, in the design of curricula, in their restructuring processes, in their own research projects or in international cooperation programs. It is important to achieve an adequate complementation between university and society, to avoid the paradox manifested by the author when he says that there are too many architects and there is a housing shortage, too many doctors and the health-care system fails, there is an excess of lawyers and the judicial system is highly deficient.

Figure 2

The four modes of knowledge conversion
Source: Nonaka[12,14-16,18,19]

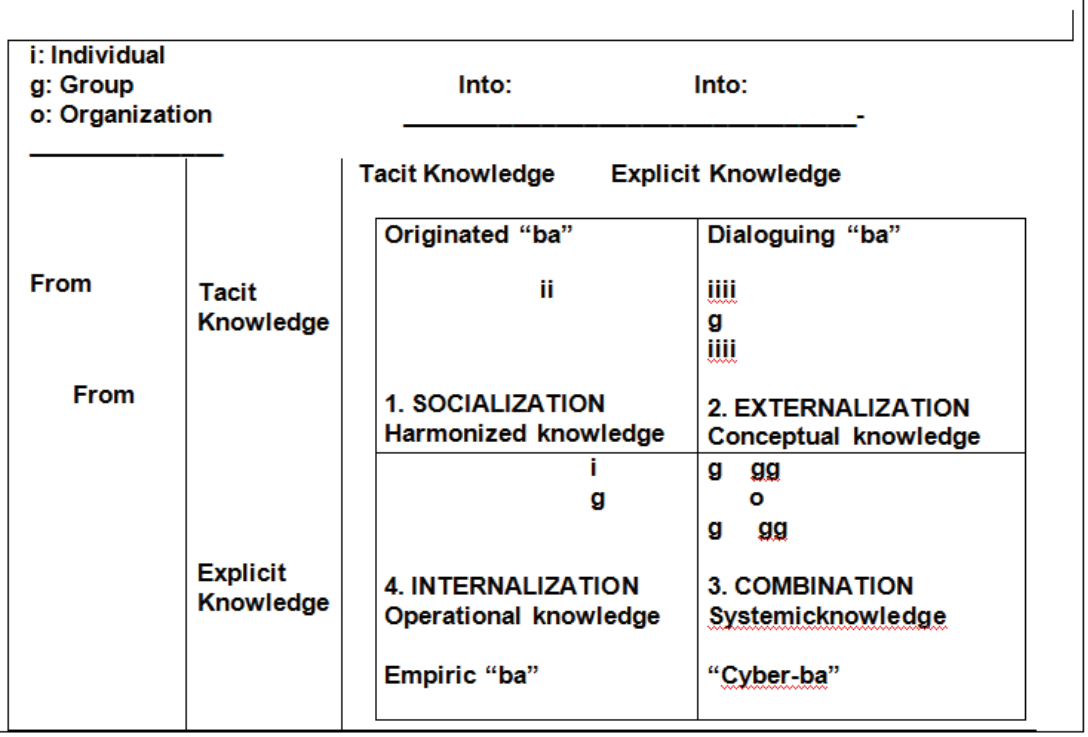


Figure 3

Cycle of Knowledge Management
Source: Bueno[20]

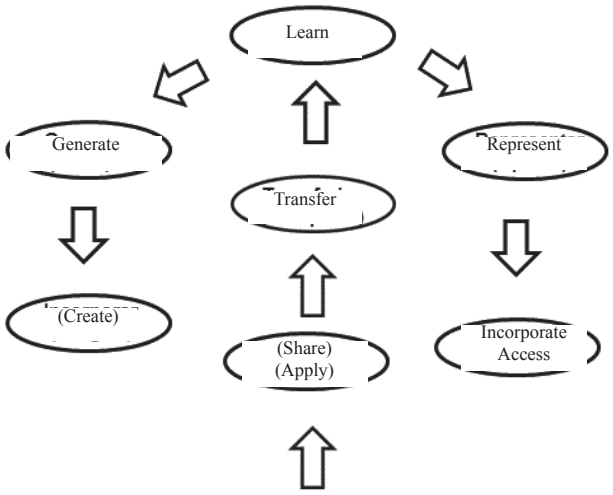
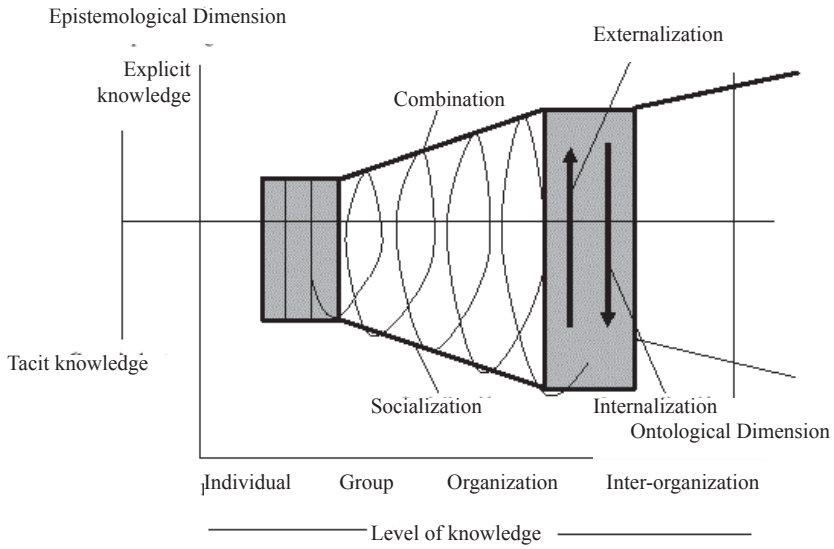


Figure 4
Spiral of organizational knowledge conversion
Source: Nonaka[12]



It is essential to make emphasis on the processes of change and improvement, which are:

- Give a new direction to scientific activity, favoring interdisciplinary work, the resolution of the problems of society, as well as its cultural enrichment, inside and outside the university spaces, in mural and extramural areas.

- Develop an intelligent organization, avoiding the fragmentation in careers, orienting it towardsDepartments, with articulation among them,[21] strengthening the informatization of the university, to facilitate the connection among all areas, taking the library to the action of teaching, and research to knowledge transfer. Establish a publications policy, articulate the exchanges of the body of professors and students towards the interior and the exterior and generate knowledge networks, establishing nodes with effective participation of teachers and researchers. Give importance to programs as a permanent tool and an instance that surpasses the individual efforts.

- Be open to the process reengineering to get adapted to the changing times, the scientific advances and the new social needs.

- Establish a dynamics of the curriculum in an intelligent manner, upgradeable during the formative stage so that the graduate possesses the updated knowledge to practice his profession.

- Preparethe future graduates in generic skills, approaching the formative space of emotional intelligence.[22]

- Develop a "Total Library", providing the students with the greatest amount of information available, using all technological possibilities.

For all this, it is essential to think the evolution of the universities in epistemological terms. Strengthen the reflection on the creation, legitimation and application of knowledge in society. [23] In order to

propitiate academic programs, the most advanced scientific trends must be aligned with the demands of society, giving rise to a wide space of action of university social responsibility, making possible the symbiosis of the social with the scientific.

Therefore, a successful knowledge management in the spheres of university and higher education, in general, requires:

1. Institutional coherence. Purposes, missions, functions and objectives shared by all actors.

2. Formulation of scientific and academic programs based on knowledge policies, which include epistemological, pedagogical, organizational and social aspects.

3. Support the articulation of the institutional compartments, avoiding academic isolation by areas.

4. Advance towards an adequate information network accessible to all actors.

5. Establish concrete guidelines for articulation with the society, the economic actors, the Market and the State.

Pérez Lindo, emphasizes that the paradigm of "Knowledge Management" proposes to strengthen the abilities to participate in the creation and diffusion of knowledge in order to solve the problems of the society, to train specialists with moral responsibility and to expand the frontiers of science.

Statement of the problem

The traditional teaching in the medical schoolsfocuses on diseases rather than on the overall concept of health and quality of life.

Today is not enough to have completed the first cycle at the university. It is necessary to maintain a lifelong learning, especially in the postgraduate careers, as away to maintain knowledge up to date and accompany the vertiginous changes presented by social demands.

In medical careers this aspect is crucial, given the period between the graduation and the end of the medical activity, which goes beyond the formal retirement, as can be seen in Figure 5.

Until now, the medical schools have behaved in the following manner:

- Conceding little value to tacit knowledge.

- Prioritizing knowledge storage over knowledge flow.

- Documentation centers, databases, journals and Websites, without approaching the work teams of the Healthcare System.

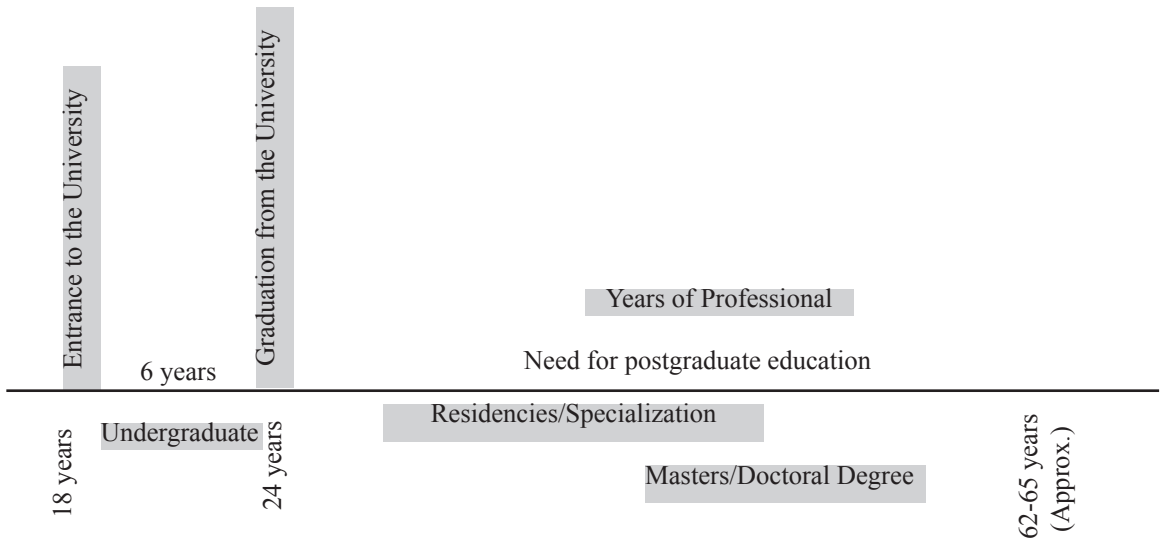
- Having little intervention in the standards/guidelines of care and administration of services and not participating in health care networks, even in those of the university hospitals.

In some Latin American Countries, the accreditation of physicians every 5 years (voluntary) has been installed. But these assessments are not sufficient if the curricular aspects of Medicine teaching in the undergraduate program are not modified.

It is necessary to propitiate a more holistic teaching of health, not only for the diseases, and especially to articulate the different specialized views in order to avoid the fragmentation of medical care.

It is proposed to strengthen the concepts and contents of the Primary Health Carein the curriculum, given the changing situation of the populations' health, the age composition of the society and the increase in the "hostilities" of the environment on the human being. The importance of population aging as a factor that explains the increase in the prevalence of chronic diseases cannot be disregarded. As an example, the population sequence of Colombia, expressed in the pyramid was as it appears in Figure 6.

Figure 5
Evolution of medical formation
Source: Depine, S. Own elaboration



This "inversion" of the pyramid is much more evident in the more developed countries, which makes it even more necessary the reformulation of health policies, supported by a "novel" teaching of Medicine in the universities, paradoxically returning to a closer doctor-patient relationship. For example, the population pyramid in the United States of America shows a greater tendency towards population aging (Figure 7).

To a more aged population corresponds a higher burden of Non-Communicable Chronic Diseases (NCCDs), a greater demand for installed capacity and a higher budget.

This situation places the focus of action in university spaces in particular and in learning spaces in general, to transform university teaching, focused on the care of the disease, towards a new conceptualization of health, managing knowledge to train health care professionals with a more holistic vision, with insertion in the community work, supporting practices of improvement of the quality of life and promotion of healthy habits.

The faculties of Medicine should be an active part of the communities of knowledge and practices, fostering strategic alliances of Knowledge Management among the teaching staff, the health policy makers, the service providers, the society intermediary organizations, acting in the citizenship spaces, the researchers and the patients themselves, being such action a priority in the NCCDs.

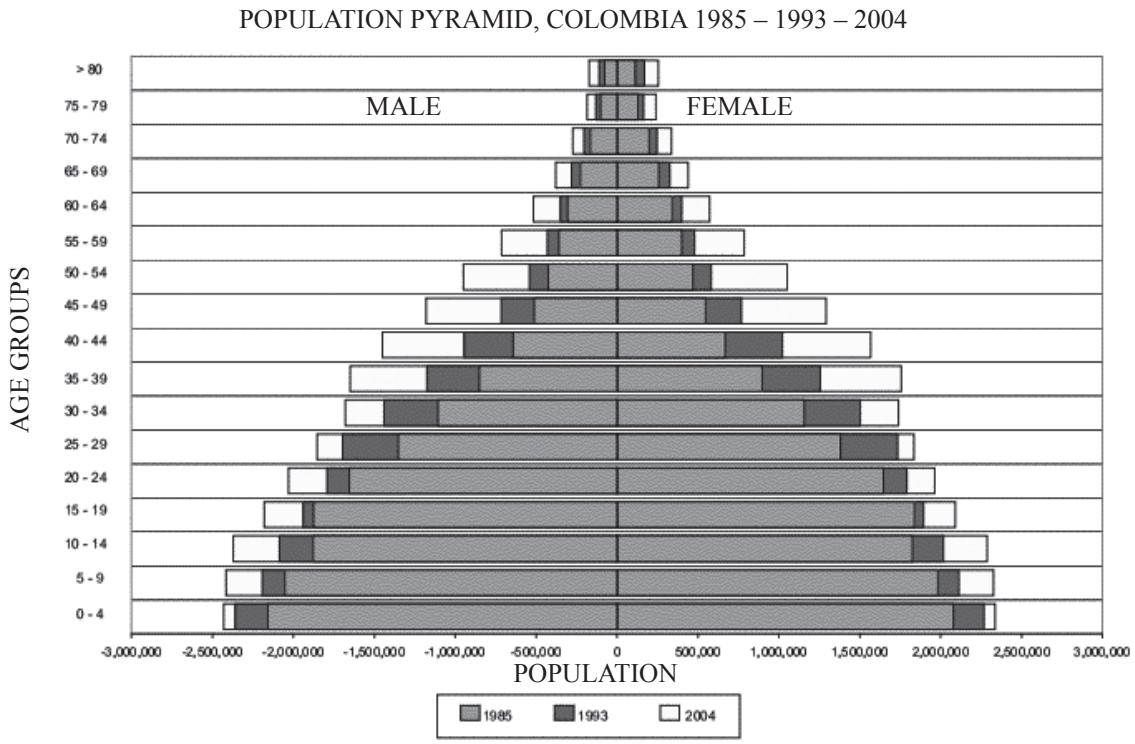
Objectives

The objective of this project is to promote a model of Knowledge Management in order to incorporate into the university curriculum of the medical schools a new bio-psycho-social-economicconception of the process health-disease-care-rehabilitation-health, strengthening mainly the components of promotion, prevention and control of the NCCDs, as a global challenge for the 21st Century.

Figure 6

Modification of the population pyramid in Colombia over the years

Source: National Administrative Department of Statistics (DANE, for its acronym in Spanish)



Population pyramid. Colombia 2012

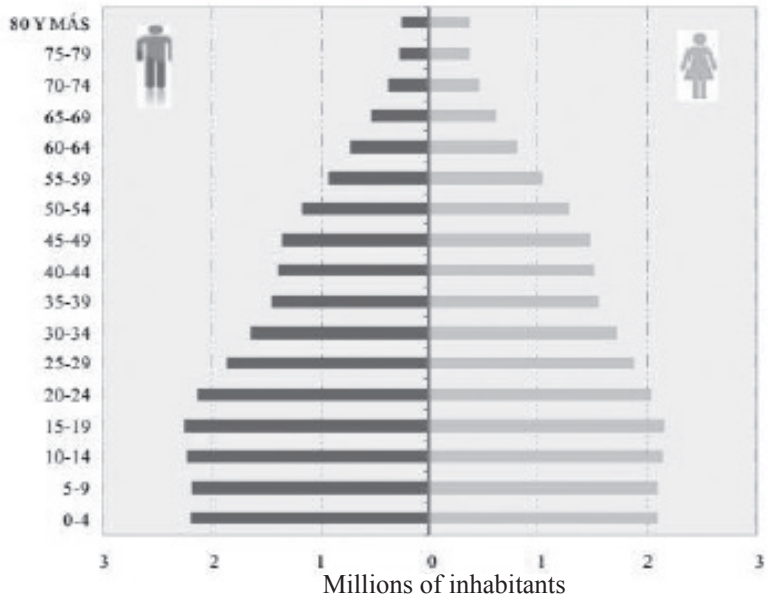
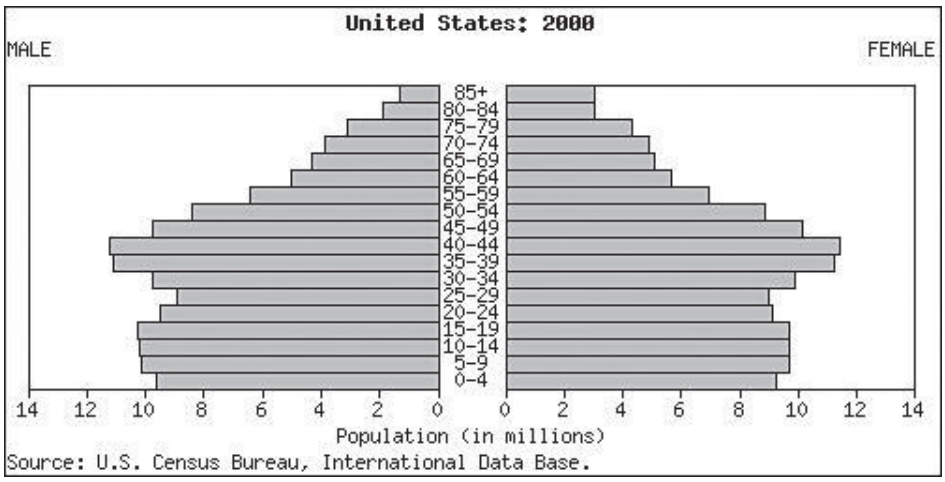


Figure 7

Population pyramid in the United States of America

Source: U.S. Census Bureau



Justification

Currently, the NCCDs generate a growing demand for permanent treatments of high technological impact and for resources to implement them.

There is a general consensus to give them a preferential place among the serious public health problems to be solved in the short term.

Some countries made emphasis on healthy public policies and on the control of chronic diseases, in an isolated and independent manner.[24-26] However, in the university spaces there has not been a systematization of Knowledge Management in those subjects, with a few exceptions.[27]

As a consequence of this impact, in September 2011 was held the World Summit on Non-Communicable Diseases, which was attended by the Heads of State in order to discuss a global plan of action for the control of these diseases. This plan of action was reflected in the Political Declaration of the High-Level Meeting of the General Assembly on the Prevention and Control of Non-Communicable Diseases (United Nations, 2011), which recognizes that these pathologies pose a challenge of "epidemic proportions" with a serious impact on the socio-economic development of the countries and requests, urgently, a global action of the governments and the society, paying special attention to the strategies for health promotion and prevention.[28]

Its text recognizes the need for a paradigm shift for learning and the approach of the current challenges posed in global health, given that the high mortality from cardiovascular diseases persists, and also that kidney failure and diabetes mellitus,its main etiological cause, are in the range of epidemics.

The number of people who need treatment with dialysis or transplant is increasing, with high overall costs that have a negative impact on the economies of the countries, making them, in many cases, impossible to support.

There are a large number of asymptomatic individuals with hidden renal disease, who detected and treated early, can achieve remission, slow the progression of their renal disease and reduce cardiovascular events, with a much more efficient use of the necessary resources.

However, it is usual that due to the training deficits in the undergraduate programs and even in the specializations, the initial stages of the diseases are not

detected early, which in the case of renal disease, without a proper diagnosis and control, would evolve towards permanent failure of the kidney function, cardiovascular disease and premature death.

These patients generate enormous expenses to the providers and the financing systems, strongly deteriorating the family economies, generating expenses avoidable with a proper early epidemiological surveillance and control, product of a good medical training in health promotion and disease prevention.

Project viability

For all the above, the ideal conditions are ripe to give shape to a curricular project in the medical schools, based on primary health care strategies, with a focus on health promotion and prevention of chronic diseases, without disregarding the components of disease treatment, rehabilitation and the techniques for replacement of impaired functions.

Limitations of the project

It implies a paradigm shift, which is not usually simple. The modification of the curriculum of studies is also not easy to achieve.

Lines of action and project implementation

This project will focus on Knowledge Management in the medical schools, generating curricular mechanisms and activities which make possible to take advantage of tacit and explicit knowledge, in order to transform the latter into a tool available and accessible for students, both in undergraduate and postgraduate university programs.

Given the importance and the impact of the NCCDs, transform the existing tacit knowledge in explicit knowledge, enhancing at the same time the latter as a final product of the academic and scientificissues. All this in order to:

- Make it more accessible.
- Starting from it, transform it into capacity for action.
- Transfer it to the patients in order to encourage their self-care.

Regarding the importance given to tacit knowledge, article h of the United Nations Declarations states: “Recognize to a greater extent the potential and contribution of traditional and local knowledge and, in this regard, respect and preserve, according with the capacities, the priorities, the legislation and the national circumstances, knowledge and the safe and effective use of traditional medicine, its treatments and practices, based, as appropriate, on the circumstances prevailing in each country”.

To carry it out, it has been proposed to:

- Incorporate information and communication technologies (ICTs) into the knowledge building processes (teaching-learning) to develop the information analysis and knowledge capture.
- Give visibility and articulate the mechanisms so that the communities of knowledge and practices of the Health Sector, whether mediated by elaborate or popular knowledge, become true learning spaces, from the extramural settingof the strict academic sector, enhancing the university extension.
- Generate strategic alliances to develop the Knowledge Management, conducting curricular co-management of contents and platforms of ITCs, at the service of the formation of human resources for health.
- Strengthen the participation of students in community carespaces; preferably in the Primary Care Centers, early, to support teaching-assistance integration.
- Establish lines of academic research on the health systems and services enhancing the teaching-student linkage with social-sanitary problems.
- Incorporate the conceptualization of Knowledge Management (from tacit to explicit and vice

versa) to curricular designs, generating dynamic educational processes that include socialization of learning, teamwork, use and creation of information networks, establishing the use of portals of knowledge (e-learning).

- Adapt the information centers/libraries to the new proposals.

- Give active participation to the university in the organization of the information and generate knowledge basis that support medical practices according to the available scientific evidence. Take example from the universities that currently do it, for example the Centre for Evidence-Based Medicine, Department of Primary Health Care, of the University of Oxford (UK).

- Transform the document filesinto something dynamic generating knowledge maps.

- Reinforce the notion that the university manages knowledge and that the same turns out to be significantwhen the student becomes protagonist by self-managing knowledge.

- Foster in the teacher a facilitating and transformer role, providing added value to the knowledge self-management process.

- Develop in the university environment a structure specialized in Knowledge Management and Information Architecture that can select, evaluate, synthesize and eventually comment the publications that provide the best practical contents, through secondary information sources.

- Support the students in the design and interpretation of scientific works, meta-analyses, and the use of specialized search engines.

- Propitiate, between students and teachers, learning spaces as an expert system, and organization of the information in knowledge communities.

- Use and design instruments and contents of distance learning with ICTs.

- Accustom students and graduates to use the tools for knowledge dissemination, participation in virtual networks.

- Manage knowledge in such a way that it makes possible that the student and the graduate in the university extension programs, understand and participate in the management of the healthcare resources, in the understanding that the physician is the first resources manager in the healthcare system.

- Become an indispensable ally of the regulatory and generator of health policies agencies in each of the countries.

- Finally, carry out the dynamic process of updating the curricula implementing Knowledge Management, either in the clinical aspects or in the maintenance and strengthening of the intellectual capital necessary to achieve the objectives proposed in the Public Health Programs for control of NCCDs; actively participating in the design and generating extracurricular and extension training, to ensure the correct implementation of the essential function of public health in the programs with priorities in cardiovascular, renal and endocrine-metabolic health of the society.

Expected outcomes

A more comprehensive formation of medical graduates will allow:

- Lower global spending for the healthcare systemsin the short, medium and long terms.

- Lower global spending for the families and the community.
- Lower overall morbidity and mortality and better quality of life.
- Significant savings in healthcare costs, for the funding organizations, the providers and the families.
- Facilitation of the use and interpretation of epidemiological and statistical indicators and actuarial curves.
- Involvement of graduates in the establishment of corrective measures for the follow-up of patients, expenditure containment and proper budgetary forecasts for the future.

Conflict of interest

The author declareshe does not have any conflict of interest.

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