

Using Computer and Internet-based Resources to Teach Health Care Planning and Administration in an Undergraduate Medical Program

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Summary

Objective: We describe the teaching methods, involving computer and Internet-based resources, used in the "Administration and Planning in Health Care" course of the undergraduate medical program at the Federal University of Rio Grande do Sul.

Method: Description on how the curriculum guidelines for the undergraduate medical education in Brazil have been implemented at this university. The guidelines specify that graduates should be skilled and knowledgeable in health care administration and management, understand the market dynamics of health care services, and be prepared to contribute to the development of health policy.

Results: A required 60-hour course provides students with an opportunity to learn about the structure, planning and administration of the Brazilian and of other health care systems, and their roles, as health care professionals, within those systems. The course is also intended to allow students to develop the minimal skill set required for manipulation of health care data available from national and international databases, and to use the Internet as a source of information in health care. The curriculum includes: Module 1 – basic computer skills, an introduction to networks as an infrastructure for management, the use of spreadsheets and databases for data processing and system modelling, retrieval of Internet-based health data and on-line bibliographic searches; Module 2 – health system financing and service quality management, using a university hospital as a case study; and Module 3 – a comparison of the Brazilian public health care system (SUS) with other national health systems resulting in a term paper formatted for journal submission and presented at a simulated conference at the end of the course.

Conclusion: Progressive shift in emphasis from theory to practice in this course has resulted in better development of the skill set required for the students.

Keywords

Health care administration, health care planning, undergraduate medical education, computer-based education

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Introduction

Teaching of health care planning, administration and management in Latin American undergraduate medical programs can be traced back to the "Seminário de Viña del Mar". This event, hosted by the Pan-American Health Organization (PAHO) and held in Chile in 1955, focused on teaching preventive and social medicine. The seminar concluded with the proposal that material about the structure and function of public health care systems should be included in undergraduate medical curricula [1]. In Brazil, the study of "public health services administration and the organization of health care" has been a required part of undergraduate medical education since the 1960s.

The Edinburgh Declaration of 1988 caused a change in the structure and content of medical education in the world to reflect, and thereby better attend to, the needs defined by society in each country [2]. In Latin American societies, the changes were most profound in the area of health crisis management and the impact of macro-economic changes on the health of populations [3]. The changes are an acknowledgement that the major issues facing health care today are fuelled by socio-economic factors such as poverty, migration, lifestyle and substance abuse. These are factors which must be understood and confronted by health care professionals if they are to develop and maintain a system that effectively responds to the changing health care needs of a population.

Increasingly, health care is being held accountable for the quality of its services, not only at the level of clinical outcomes but also in terms of the appropriateness of the

services, effectiveness of programs and institutions, and the efficiency of service delivery. Societies are demanding that health care be constantly moving toward Donabedian's simple goal of the best health care to the most people at the lowest cost [4]. In Brazil, health care's response has been similar to that in other parts of the world: a tendency toward community participation in health care planning and administration and the decentralization of health care service delivery. The idea is to build smaller, more agile service delivery systems that attend to local health care needs and are capable of responding quickly to changes in those needs. Health care professionals will play a critical role in the development and implementation of these emerging organizations [5], roles they will find difficult to fill without some knowledge and skill in the areas of health care financing, quality management and control, resource management, etc., a foundation in health care planning, administration and management acquired during their medical education [6]. Curriculum guidelines for undergraduate medical programs, approved by the National Council on Education in Brazil in 2001, clearly state that health care professionals must be trained in the areas of administration and management to be capable of dealing critically with market dynamics and health care policy [7].

The sheer breadth, depth and volume of historical and current health care data and information, and its geometric rate of growth, make it almost impossible for health care professionals, using conventional means of communication, to embrace and stay current on existing and emerging trends in health care needs and the technologies and methods used to address them. Increasingly, new health care data and in-

formation is being disseminated via the Internet to expedite its communication and reduce the time to its application. Further, computer-based applications have become essential tools for the analysis of large and constantly changing bodies of health care data. Essential, because of the demands being placed on health care professionals to respond quickly, effectively and efficiently to changing health care needs and the resources available to respond to those needs. Combining training in basic computer and network skills, and Internet-based data and information retrieval with training in health care planning and administration is a natural alliance. It provides not only the theory and concepts required but also the tools with which to apply them effectively.

Medical Education and the Health Care System

The structure and content of the course “Administration and Planning in Health Care” and the results of our experiences with its application in the medical program is presented in the next section. However, to understand why, where and how the course fits into the overall program it is necessary to describe a) the structure of medical programs in Brazil and, specifically, at the Federal University of Rio Grande do Sul (UFRGS) at Porto Alegre, and b) the structure of the Brazilian national health care system (SUS).

Brazilian post-secondary education is delivered by a combination of private and publicly-funded, state and federal universities. The Brazilian federal university system is administered directly by the (Federal) Ministry of Education. There are over 40 federal universities, nation-wide, of which UFRGS is the third oldest. UFRGS admits 130 students annually to its 6-year, 12-semester, 8800-hour undergraduate medical program. Admission to all university programs is based on the results of a rigorous entrance examination. Participation in programs at publicly funded universities is free of charge. Students can, and do enter medical school directly from high school; there is no “pre-med” requirement. However, the

first two years of the program are spent taking basic science courses equivalent to the content of “pre-med” programs found in other countries. Clinical courses begin in the third year or fifth semester of the program and internships begin in fifth year or ninth semester.

The faculty of medicine’s clinical teaching resources include the “Hospital de Clínicas de Porto Alegre” (HCPA), a 600-bed tertiary care facility, subsuming all major medical specialties, that is the primary referral center for the state of Rio Grande do Sul. The HCPA is recognized internationally for its electronic patient record and nationally for its quality control procedures. Practical medical education is further enhanced by the HCPA’s extensive ambulatory (secondary care) facility that handles over 2000 outpatient encounters per day.

Hospital and ambulatory clinical internships are complimented by community care (primary care) internships at one of the many outpatient health centers serving local communities (bairros) in Porto Alegre. Recent programs initiated by the Brazilian Ministry of Health and the Pan American Health Organization have resulted in an increased emphasis on primary care internships in an effort to make the health care system more reactive to local health care needs and more proactive in the areas of health promotion and disease prevention. As a direct consequence, community-based health care provided by SUS now has a greater influence on the structure and content of the medical curriculum at UFRGS. The result should be that graduates of the medical program should be better prepared to assume responsibilities within SUS, including those involving planning and administration.

SUS embraces the concept of universal-ity; the system’s services are accessible to all citizens without cost. However, the system does not have the resources to be comprehensive and even for the services it is mandated to provide, notably surgeries, there are frequently long wait times. Also, the less than ideal distribution of SUS resources means that, in practice, not all citizens have equal access to the system [8].

Direct health care services are responsible for 75% of the nation’s health care expenditures. The private health care sector provides many of the same services provided by SUS as well as services not available through public systems, to clients able to pay for services and to private health plan subscribers. SUS purchases services from the private sector in those specialties where demand exceeds capacity. Besides providing services not covered by SUS the major advantage of the private system is much shorter wait times for procedures.

The health system in Brazil can be viewed as a combination of a solid publicly funded and administered health care system, like Canada’s, an extensive private sector fuelled by insurance programs, like the United States’, and a system of publicly funded private services, like the United Kingdom’s. A system of this complexity requires some consideration in terms of planning and administration in medical education.

Administration and Planning in Health Care

The course “Administration and Planning in Health Care” is a 60-hour required course in the eighth semester of the undergraduate medical program and is administered by the Department of Social Medicine. The course pre-requisites are “Health and Society” and “Basic Epidemiology”, both of which are offered in the seventh semester by the Department of Social Medicine. The course was introduced ten years ago and currently has the broad objectives of providing students with opportunities:

- i) to understand their roles, as health care professionals, in activities related to the planning, administration and management of health care services;
- ii) to develop the conceptual framework and knowledge base required for them to participate in activities related to the planning, administration and management of health care services;
- iii) to develop capacity in analysis and critical thinking related to the planning, administration and management of health care services; and

Table 1 Summary of the undergraduate medical curriculum at Federal University of Rio Grande do Sul, Brazil, 2004

Year 1	Semester 01 Cellular Biophysics Biochemistry I Neuroanatomy Human Histology I Human Anatomy I Health Promotion and Protection of Women	Semester 02 Biochemistry II Physiology I Human Histology II Human Anatomy II Child and Adolescent Health Promotion and Protection Child and Adolescent Development
Year 2	Semester 03 Medical Genetics Biochemistry III Physiology Adult Health Promotion and Protection General Methods in Community Health Adult Development and Ageing	Semester 04 Microbiology Medical Immunology Clinical Medicine General Pathology Patient-Physician Relations
Year 3	Semester 05 Parasitology Pharmacology I Clinical Medicine Applied Pathology I	Semester 06 Pharmacology II Clinical Medicine II Applied Pathology II General Epidemiology
Year 4	Semester 07 Pharmacology III Emergency Medicine I Health and Society Ophthalmology Otorhinolaryngology Psychiatry	Semester 08 Emergency Medicine II Paediatric Medicine Occupational Health Administration and Planning in Health Gynecology and Obstetrics Legal Issues and Ethics
Year 5	Semester 09 Surgery Applied Pathology III	Semester 10 Paediatric Internship Gynecology and Obstetrics Internship Elective Internship
Year 6	Semester 11 Internal Medicine Internship Psychiatric Internship	Semester 12 Surgical Internship Social Medicine Internship
	Electives Introductory Administration Applied Molecular Biology Evolution of Scientific Thought Brazilian Culture Introductory Computer Science Algorithms and Programming	Basic German Basic Spanish Basic French Basic English Introductory Health Informatics Introduction to Databases in Health Care Basic Organic Chemistry

iv) to develop the basic set of computer skills required to exploit Internet-based, national and international health databases to produce information useful for decision making in the planning, administration and management of health care services.

The basic course outline and major topics covered in the course are:

- 1) Health Care Administration and Planning: Basic Concepts
- 2) Spreadsheets – Computer-based Health Data Processing
- 3) Telecommunications, Networks and the Internet
- 4) National and International Health Data Bases
- 5) The Brazilian Health Care System: History of SUS
- 6) The Brazilian Health Care System: Financing
- 7) Health Care Quality Management: Basic Concepts
- 8) Health Care Quality Management: Indicators
- 9) Health Care Quality Management: HCPA (case study)

- 10) Health Care Planning: Basic Concepts
- 11) Health Care Planning: Estimating Demand
- 12) Health Care Planning: Resource Distribution
- 13) Health Care Institutions
- 14) The Problems of Health Care in Small Communities (case study)
- 15) Health Care Systems in other Countries (student presentations)

The course is divided into three modules of which the first is “using computers and Internet-based resources for administration and planning in health care”. The use of computer-based processing and Internet-based data and information retrieval was introduced into the course plan five years ago. Since its introduction this module has matured and now occupies the first 15 of the 60 course hours. This module’s content is delivered in a networked, 24-workstation computer laboratory connected to the Internet via the university’s high-speed backbone. This module is divided into two activities: The first is information retrieval using Internet search engines, principally Google and Lycos, and the bibliographic searches using Internet-based portals such as Bireme, MedLine and Lilacs using MeSH. Students learn to compose their queries and are often surprised at how fine and specific they can make their searches.

The second activity is data retrieval from Brazil’s health data repository, Datasus, and from the World Health Organization’s health data repository. Using the Datasus repository, the students are required to find data regarding the number of hospital beds in the system, the number of admissions and the average length of stay per health region in the state of Rio Grande do Sul. The students then download these data, transform the files to spreadsheet format, merge the data into a single spreadsheet file and calculate hospital bed utilization rates per region. The students are generally shocked at how low the utilization rates are given the public complaints about lack of resources in the system. The ensuing discussion about planning and resource allocation provides a good starting point for the subsequent modules.

The second module, again, comprising approximately 15 hours, deals with health

care financing and service quality. This module also involves two activities. In the first activity, students access the current values of HCPA's quality indicators via the hospital's intranet and compare these values with those for other institutions published on the Internet by the Ministry of Health. The comparison forms the basis for discussions about indicators, what they are, how they are calculated and how they are used to manage service quality in an institutional setting.

In the second activity groups of two to four students are given access, via the HCPA's intranet, to an actual patient case. They do a detailed analysis of the services received by that patient and the actual costs of those services to the hospital. They then go to the Ministry of Health payment schedules, published on the Internet, to determine what the HCPA actually received for the services provided and what hospitals in other municipalities and states would have received for a similar case.

Students present the results of the analysis for each case in class. The discrepancies between actual costs and payments for services and the differences in payment schedules for different states provide a very good base for discussions on health service financing strategies in Brazil.

The third module deals with the comparative of health care systems and takes up the second half of the course. This module was introduced five years ago as a means of exploring the structure and function of the Brazilian system with those of other countries. The health care systems of the United States, Canada and the United Kingdom are used as models of the principal types of health care system implementation. Students are presented with the differences and similarities between those systems and the Brazilian system in terms of governance, structure, financing, planning, administration, management, resource allocation, universality, comprehensiveness, access and quality.

Finally, groups of no more than four students are asked to select a country and to research and prepare a presentation on the structure and function of the public health care system in that country. The assignment and presentation guidelines include:

- i) a demographic and socio-economic description of their country: population by sex and age, GDP, average income, literacy, etc.
- ii) an epidemiological profile of their country: general and infant mortality and morbidity statistics, predominant diseases, life expectancy, fertility, etc.
- iii) the structure of the health care system of their country: public/private ratio, service network (primary, ambulatory and hospital care), complexity, access, etc.
- iv) the financing of the health care system of their country: insurance or social security model; per capita spending, proportion of GDP, etc.
- v) the human resources of the health care system of their country: population per physician, professional training programs, forms and level of remuneration, etc.
- vi) other characteristics of the health care system of their country: special programs (HIV/AIDS, aboriginal people, ageing populations, etc.), offshore financing, etc.

Emphasis is placed on the active retrieval of information from indexed scientific journals, such as the "International Journal of Public Health" and "The Bulletin of the World Health Organization", and textbooks (this tends to be more difficult due to availability and language problems). They are asked to take advantage of direct contact with their country's embassy and consulates in Brazil, with professionals who have worked or are working in their country, and with emigrants from those countries. In addition to topic specific and bibliographic searches, students make intensive use of data and information available on the Internet at their country's Ministry of Health web site, the World Health Organization's web site and database, and the Pan American Health Organization's web site and database.

The completed projects from previous years are provided as models for the current students' projects. Students working on a country for which there exists a previous project are asked to build on and expand the previous project and presentation, and to re-

search changes that have occurred in that country's health care since the previous project was completed. This means that the course has a body of continually evolving data and information that can be used as a teaching and learning resource.

Discussion

In undergraduate medical programs, the principal concern of students is usually the development of understanding and skills in the clinical and surgical areas, those areas traditionally associated with medical practice. This image is consistent with the expectations and values of the society these students will eventually serve and, as a consequence, the technical and scientific aspects of medicine are well-established foci in the curricula of the nation's medical schools. Unfortunately, this focus frequently occurs at the expense of the students' need to develop an understanding of, and the skill to work within, their own health care system. Consequently, and despite being trained in public institutions, graduating medical professionals' understanding of public health care systems, in general, and SUS, in particular, is deficient, verging on absent.

During the medical curriculum reform that happened at UFRGS at the end of the 1980s, the faculty of medicine identified, as a training objective, the development of an understating of the basic principals of planning, organization and management of health care services. As a result the course described herein was introduced to the curriculum, as a requirement in 1994. The observations made, are the result of our experience in that course and the challenges that we face as teachers in the area of administration and planning in health care.

Many students still follow the "search, find, cut, paste, format and hand in" procedure for assignment completion. Little consideration is given to the validity of the data and information, its context or the veracity of the conclusions drawn from it. In short, there is a paucity of the critical thinking, a very important process in an area of health care where truth is elusive, and

poorly defined when encountered. We continually tell students to critically evaluate all of the data and information they encounter, despite its source; to consider the context in which the data and information is produced and used; and to draw their own conclusions. This will continue to challenge teachers at schools in which professors are considered oracles in the area of medicine, a myth that many professors are not quick to dispel.

Generally students underestimate the amount of work and time required to complete the final assignment. Further, some consider work on this course to be of less importance than the work in their clinical courses. Despite their apparent experience with computers and the Internet, most need to spend time learning how to properly compose bibliographic queries [9], web searches and on-line health statistic database searches [10]. In the process of researching their chosen country, the majority of students are surprised at the volume and the complexity of data available. While most have some experience researching clinical subjects this is the first opportunity for most to perform health systems analysis based on on-line data and information.

Learning in medical programs is a series of successive steps through which the student transforms himself or herself into a physician. This transformation manifests itself not only in terms of the acquisition of knowledge and development of skills but also in their professional attitudes, capacity for critical thinking and their ability to synthesize. How well the student achieves this transformation depends not only on the content they are taught but also the attitude of their professors, the intellectual challenges with which they are presented, and the

quality of the environment created for the learning process.

In the delivery of the course described above we strive to transfer knowledge about, and develop the skills required to be active in, administration and planning in health care [10]. As an unstated objective, the course is structured to raise awareness regarding the social, political and cultural issues that influence medical practice and their lives as health care providers.

Conclusion

The teaching strategies currently used in the course "Administration and Planning in Health Care" are evidence of a progressive shift from didactic delivery of theory-based content to analysis in small groups of case-based content [11]. Further, the course content emphasizes the development of computer skills for data collection and analysis, and the use of the Internet-based health data and information. Staying current in these areas is as much a challenge to faculty as it is to students.

These experiences also contribute to UFRGS' capacity to do distance education via the Internet, the demand for which grows daily. Medical practice changes as new information is created. The rate at which new information is introduced exceeds our capacity to deal with it by traditional means. Medical schools around the world are preparing to take a more proactive role in continuing medical education by means of Internet-based learning. Professionals lacking the necessary information technology skills will not be able to stay current.

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