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Integration of Community Health Teaching in the Undergraduate Medicine Curriculum at the University of Toronto

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Background: In 1999, Determinants of Community Health was introduced at the Faculty of Medicine, University of Toronto. The course spanned all 4 years of the undergraduate curriculum and focused on addressing individual patient and community needs, prevention and population health, and diverse learning contexts.

Purpose: To demonstrate the value of an integrated, longitudinal approach to the efficiency of delivering a public health curriculum.

Design: Time-series comparing the curricular change over two periods of time.

Setting/participants: Undergraduate medical students from 1993 to 2009.

Intervention: Using a spiral curriculum, the educational materials are integrated across all 4 years, based on the concept of medical decision making in a community context.

Main outcome measures: This study compares measures of student satisfaction and national rankings of the University of Toronto with the other 16 Canadian medical schools for the "Population Health, Ethical, Legal, and Organizational aspects of the practice of medicine" component of the Medical Council of Canada Qualifying Examination Part 1.

Results: The University of Toronto has been ranked either first or second place nationally, in comparison to lower rankings in previous years ($p < 0.02$ on the Kruskal–Wallis test). Student ratings indicated the course was comparable to others in the curriculum.

Conclusions: For the same amount of curricular time, an integrated spiral curriculum for teaching public health appears to be more effective than traditional approaches.

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Introduction

Attention to teaching medical students about public health has increased in the past few years in both Canada and the U.S. Examples include the recent changes to the Liaison Committee on Medical Education (LCME) accreditation standards¹ which have included the requirement to teach and provide placements relevant to the sciences of public health. Major outbreaks such as severe acute

respiratory syndrome (SARS)² and H1N1³ have focused attention on the need for a stronger understanding of public health while other documents, such as those produced by the IOM⁴ and the Association of Faculties of Medicine of Canada, have described the need to increase the emphasis of effective teaching in public health and preventive medicine.⁵

While there is a strong call for greater teaching, there is a relative dearth of articles that include evaluation of different methods of teaching. At the University of Toronto (U of T), the Determinants of Community Health (DOCH) course incorporated public health education across all 4 years of the medical curriculum. This paper describes the first 10 years of experience and evaluation of this course. The purpose is to demonstrate the value of an integrated, longitudinal approach to the efficiency of delivering a public health curriculum.

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Table 1. Organizational framework for mapping educational concepts across the 4 years of the curriculum

Topic/year	Health and determinants	Science of population health	Working as a team in the communities	Application
Fourth year	Health of special populations	More on quality improvement, occupational health	Physician payment models	In ambulatory clinical rotations
Third year	Alternative and complementary medicine	Evidence-based medicine and quality improvement	Public health, discharge planning	In clerkship rotations
Second year	Health and social issue for project	Community health research methods	Working with sponsoring agency	Applied research project
First year	Definitions of health and its determinants	Epidemiology, health promotion, health protection	Professional roles, learning about community agencies	Field visits with home care, school visits, and health promotion agencies

Background

At the U of T in the 1980s, public health was traditionally taught in a didactic manner during the second year of the medical curriculum. During the curricular renewal of 1992, three new courses, two courses called “Health, Illness, and the Community” and one called “Determinants of Health” were created. Health, Illness, and the Community, taught during the first 2 years of medical school, had a strong focus on experiential learning and required students to attend community-based education sessions.^{6,7} In contrast, the Determinants of Health course continued with the didactic approach to education, adding tutorial groups in which students worked on problem sets. Both courses had been operational for approximately 6 years when a decision was made to integrate the three courses (two from Health, Illness and the Community and one from Determinants of Health) into DOCH, which would span all 4 years of the medical curriculum. In 1999, the first class of medical students started DOCH.

There were multiple reasons for the creation of this new course,⁸ but the creation of a longitudinal integrated curriculum was one of the primary motivations. The format of the new course broke down the preclerkship–clerkship barrier as it was designed as one longitudinal experience, not a combination of two 2-year experiences. Another reason was the dissatisfaction reported by many students. Part of this was due to the experiential part of the teaching (in the first and second year of Health, Illness and the Community) occurring before the academic, theoretical curriculum of the third-year Determinants of Health.

Methods

Intervention

The time allocation given to the 4-year DOCH course was substantial: 1/2 day per week in the first year; 1/2 day per week in the second year; 15 half-days in the third year (just before the students start on

the wards); and 1 week in the fourth year (done on a rotational basis with one fifth of the class being taught approximately every 6 weeks).

Course Description

The DOCH course was based on a spiral curriculum as developed by Bruner.⁹ In this model, educational concepts are revisited at increasing levels of complexity across the length of the curriculum. The topics were mapped across the curriculum using the headings of “health and its determinants,” “science of population health,” “working as a team in the community,” and “practical application.” This framework is shown in Table 1.

The focus in the first year is on definitions of health, the determinants of health, description of the healthcare system, role of community agencies, health promotion, and health protection. In the second year, students complete an independent research project. In the third year, the main concepts are evidence-based medicine, quality improvement, patient safety, outbreak management, and legal aspects of medicine. The fourth year is the capstone week that brings all these concepts together after the students have had a year of clinical ward experiences. Table 2 shows more details on the individual courses taught in each year of study.

Epidemiology provides an example of the application of the spiral curriculum: descriptive epidemiology is taught in the first year, analytic epidemiology in the second year, and clinical epidemiology in the third and fourth years. Similarly, for being able to work effectively in the healthcare system, the basic structure of the healthcare system is taught in the first year; students work on a project in the second year that may involve some discussion of the organization of community-based services; quality improvement and patient safety are taught in the third year; and physician supply and payment systems are taught in the fourth year. For this latter concept, the discussion in the fourth year looks at the evidence of how physician payment systems may affect the quality of patient care.¹⁰

Main Outcome Measures

The evaluation of the course focused on two major areas. Since student dissatisfaction was one of the reasons for creating DOCH, student satisfaction scores were used as one of the main outcome measures. The standard student rating system was used for assess-

Table 2. Distribution of curriculum time and content by year

Year	Time	Content
First	0.5 days per week	Definition of health, determinants of health, healthcare system, population health and epidemiology, health promotion, health protection, occupational and environmental medicine
		Field visits: home visiting with healthcare worker, school visits, visits to community agencies
Second	0.5 days per week	Research methods, biostatistics, critical appraisal, self-directed learning, library searching skills, project management
		Field visits: individual research project done with an agency
Third	15 half days	Evidence-based medicine, quality improvement, patient safety, legal aspects of medicine, public health and outbreaks, complementary and alternative medicine
		Field visits: none since students start ward rotations immediately afterwards
Fourth	1 week	Capstone—brings together all the previous components after clinical experiences; for example, worker's compensation and return to work are covered in this week

ing lectures, seminars, tutorial sessions, and field visits. This system is a Likert-type scale, with a score of 1 indicating that the session was “not at all helpful”; a score of 3 is neutral; and a score of 5 indicates that the session was “extremely helpful.” While these scores are ordinal in nature, average scores are provided as a means of giving one summary measure for each education session.

For more objective outcome measures of knowledge, a time-series analysis was done, using the average scores and school rankings from the Population Health, Ethics, Legal, and Organizational (PHELO) aspects of medicine component of the Medical Council of Canada Qualifying Examination Part 1 (MCCQE1)¹¹ from 1993–2009. The Medical Council of Canada administers national licensing exams, similar to the National Board of Medical Examiners in the U.S. The MCCQE1 is normally taken at the end of the fourth year of medical school and has six major components, one of which is the PHELO component. Prior to 2001, the PHELO component was known as Population Health (PH; in 2000) and as Preventive Medicine and Community Health (PMCH) before 2000. In order to compare the different curricular methods (didactic portion in the second year; Health, Illness, and the Community/Determinants of Health; and DOCH), the changes in ranking of the U of T (relative to the other 16 medical schools) in the PHELO/Public Health/Preventive Medicine and Community Health scores were compared over time. In this approach, a lower ranking is better. In order to compare the trend over time, Mann–Whitney/Wilcoxon 2 Sample Rank Sum (Kruskal–Wallis) test¹² was analyzed in Epiinfo.¹³ This method compared the time periods of 1996–2002 and 2003–2009.

Results

The DOCH course has been successfully run since 1999, with the first class graduating in 2003. In terms of subjective student satisfaction, the evaluation of lectures and tutorials are equivalent to those of other courses taught in the medical school. Clinically related sessions, such as visits with nonmedical health professionals to people re-

ceiving care in their home, are very popular. On the other hand, similar sessions on public health where students visit a school and assess the health of a population of school children are slightly lower (Table 3). Overall, lectures delivered by patients or members of the community (e.g., a drug addict presenting on the heroin replacement program) had the highest ratings, followed by community visits. The sessions with the lowest rankings are those in the second year when students are expected to do a fair amount of individual work. In terms of the rankings of all courses, the first and fourth years were the most popular, followed by the third year and then the second year.

In terms of the objective data from the PHELO/PH/PMCH scores on the MCCQE1 exam, Figure 1 gives the ranking of the U of T compared to the average of the other medical schools in Canada. In the 1993–1995 period (didactic teaching in the second year of the medical school) the U of T had a relatively poor ranking. At this time, the average scores for U of T graduates were lower than the overall average of graduates from Canadian medical schools. With the advent in 1996 of Health, Illness, and the Community, and Determinants of Health (4 years after the course started in 1992), the ranking of U of T relative to the other schools improved to 2nd place. However, the ranking slowly fell over time and approached the Canadian average.

After the change to DOCH, the students graduated in 2003 and the ranking of the U of T program improved to number 1, indicating that students were doing substantially better. Unlike the previous period, this better ranking was sustained over time from 2003 to 2009. Comparing the time periods of 1996–2002 with 2003–2009, the

Table 3. Evaluation scores for indicators of student satisfaction in Years 1 and 2

Sample of first-year and second-year student results as examples	Question	Mean score on 1–5 ranking scale ^a
Medical students on completion of the fall term of first-year DOCH in the 2005/2006 academic year	Perceived value of home visits with healthcare professionals	4.5
	Perceived value of visits to central city schools	4.1
	Perceived value of tutorial sessions	3.6
	Perceived value of epidemiology web module	4.2
	Range of perceived value of lectures	3.3 to 4.6 (median is about 3.8)
Medical students on completion of second-year DOCH in the 2009/2010 academic year	Perceived value of the quantitative lectures	3.3
	Perceived value of the qualitative lectures	3.3
	Perceived value of the Individual Learning Plan	3.9
	Perceived value of oral presentation	3.9
	Perception that the material learned in DOCH 2 will be useful in future practice	3.6

^a1 = not very helpful to my learning; 5 = very helpful to my learning
DOCH, Determinants of Community Health course

difference is significant with the Kruskal–Wallis H value at 9.6 ($p=0.002$).

Discussion

The results of these indicators should be considered in two ways. First, the improvement in the ranking and increase in the average score of U of T graduates relative to those of all Canadian graduates was accomplished with no change in the amount of curricular time. The total number of educational hours offered in the Health, Illness, and the Community/Determinants of Health curriculum was the same as that of the DOCH curriculum. The essential difference was the organization of the material into a longitudinal curriculum and a change in the timing of the course (moving 1 week from the third year to the fourth year of the curriculum). The other comparison is between U of T and the other medical schools. During this time, no other Canadian medical school used a longitudinal curriculum. Taken together, these results indicate the relative effectiveness of teaching public health in a longitudinal fashion.

The use of a longitudinal curriculum has helped to keep the course focused. There was one overall course planning committee and one course director who was responsible for the curriculum planning and delivery of all 4 years. The course planning committee had student representatives

from all 4 years. Since many curricular topics have a community health component, there has been a strong pressure to keep adding more and more topics to the DOCH course, particularly those that did not fit well with the other courses being offered. The spiral curriculum provided a framework

Figure 1. PHELO Rank for the Medical Council of Canada
Note: PHELO was the Preventive Medicine and Community Health course until 2000

DOCH, Determinants of Community Health course; DOH, Determinants of Health course; HIC, Health, Illness, and the Community course; PHELO, Population Health, Ethics, Legal, and Organizational course

for assessing these potential new components relative to the student learning objectives. In many instances, the new components were rejected or moved to another time due to this incompatibility. For example, the suggestion of teaching how to interview patients with disabilities living in the community was felt to fit with the clinical skills course. The inclusion of such material would have led to potential confusion among the students about the core content of public health.

The student satisfaction scores were used in planning class activities and to increase the student appeal of the course. The examples shown in Table 3 were chosen as they were typical of the student evaluations over the years. As can be seen, the first-year community field visits ranked extremely high. On the other hand, the values for the second year were lower. The latter were interpreted to be due to the fact that the lectures on research methodology were general in nature and the students had to apply material to their individual project. Based on these evaluation scores, more relevant speakers were identified and other educational resources were developed, such as web-based modules to help students with specific educational needs (e.g., many students conduct surveys, so a module on survey research was added). A second reason for the lower scores is that second-year students have to take an active role in engaging with the sponsoring agencies to complete their projects.

There are a number of major limitations to this study. First, the research design does not allow for the authors to control for other factors that could have occurred at this same time. Due to the nature of the medical school class, the entire class had to follow one curriculum so that no comparison group was temporally available.

Second, the PHELO component of the MCCQE1 exam does cover most of the areas being taught by the DOCH course. However, it does not cover everything. Topics such as immunization schedules and many aspects of clinical prevention are taught in other sessions, outside of the DOCH course, and thus they were not taught in the longitudinal curriculum.

Conclusion

The use of a spiral curriculum with integration of public health content across all 4 years appears to be more effective

than traditional teaching methods. The course was acceptable to the students and resulted in higher scores on objective assessments of clinical knowledge used in Canada.

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