

Design, implementation and evaluation of a community health training program in an integrated problem-based medical curriculum: a fifteen-year experience at the University of Geneva Faculty of Medicine

Philippe Chastonay^{1,2}, Nu Viet Vu¹, Jean-Paul Humair³, Emmanuel Kabengele Mpinga^{2*} and Laurent Bernheim^{4,5}

¹Unit of Development and Research in Medical Education, University of Geneva Faculty of Medicine and Geneva University Hospital, Geneva, Switzerland; ²Institute of Social and Preventive Medicine, University of Geneva Faculty of Medicine and Geneva University Hospital, Geneva, Switzerland; ³Department of Community and Primary Care Medicine, University of Geneva Faculty of Medicine and Geneva University Hospital, Geneva, Switzerland; ⁴Department of Neurosciences, University of Geneva Faculty of Medicine and Geneva University Hospital, Geneva, Switzerland; ⁵Vice-dean's Office for Medical Education, University of Geneva Faculty of Medicine and Geneva University Hospital, Geneva, Switzerland

Background: In the literature the need for relevance in medical education and training has been stressed. In the last 40 years medical schools have been challenged to train doctors competent to respond to community health needs. In the mid-90s the University of Geneva Faculty of Medicine introduced an integrated medical curriculum. In this initiative a particular emphasis was put in introducing a 6-year longitudinal and multidisciplinary Community Health Program (CHP).

Objectives: The aims of the present article are to describe the conception, elaboration and implementation of the CHP as well as its evolution over 15 years and the evaluation of its outcomes.

Methods: The CHP was at its origin elaborated by a small group of highly motivated teachers and later on developed by a multi-disciplinary group of primary care physicians, epidemiologists, public health and bioethics specialists, occupational health professionals, lawyers and historians. Evaluation of the program outcomes included educational innovations, new developments of the curriculum and interactions between students and the community.

Results: The CHP learning objectives and teaching modalities were defined by the multi-disciplinary group in consensus meetings which triggered a collaborative spirit among teachers and facilitated further developments. The evaluation procedures allowed the monitoring of students' satisfaction which remained high over the years, students' active participation which decreased over time and success at certifying exams which was globally as good as in basic life sciences. The evaluation also assessed outcomes such as educational innovations, new developments of the curriculum and interactions between students and the community.

Conclusion: As suggested in the literature, our experience shows that the students' direct exposure and practice in the community health environment is an effective training approach to broaden students' education by offering them a community perspective of health and disease.

Keywords: *curriculum reform; problem-based learning; community-based learning; community health; medical curriculum*

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The need for relevance in medical education and training has been stressed in the literature. Relevance requires that a medical curriculum will train doctors to be able to respond to health needs of the community (1). In the context of Switzerland several public health challenges for the coming years have been identified, i.e., aging of the population, increase of chronic diseases, social inequalities, evolution of health care consumption, multiethnic and multicultural evolution of the society, lack of governance of the health system and explosion of health care costs (2).

Indeed, there has been an increasing emphasis on preparing and exposing medical students to the communities' health needs (3–5). It comes from the observation that individual health problems might require public health responses (6). With today's health care environment and cost constraints, physicians need to integrate the care of individual patients and populations (7). Furthermore, to ensure a quality individual and population-based medical care, future physicians are expected to provide preventive care and play a growing role as community health leaders (8). Moreover, the social responsibility of medical schools has recently been encouraged and reinforced by both the scientific and teaching communities (9).

To address the population-based approach to health care, some medical schools have incorporated various community-based programs into their curriculum. Reviews of these programs indicate that in general (10–13) they provide students with opportunities to learn from situations close to those they will encounter in their professional lives; equip students with competencies that they would never learn otherwise, such as skills to communicate with other health professionals and to interact with the community; broaden the education of students by giving them a population and community perspective of health and disease and by binding them to the society in both a moral and a political sense.

When in the mid-90s the University of Geneva Medical School developed a new integrated medical curriculum centered on problem-based learning and clinical reasoning (second to fifth year, the first year being a selection year) (14), the challenge was to adapt the program to the health needs of the community. Specific attention was given to foster coherence between pre-graduate training and the professional practice of a medical doctor as it has also been stressed by the newly adopted Swiss Law on Medical Professions (15). Thus, particular emphasis was put on introducing early in the program, an integrated

problem-based learning emphasizing not only students' knowledge, but also their clinical skills. Furthermore, it appeared as an opportunity to develop a curriculum introducing students to primary health care, public and community health as well as to related issues such as epidemiology, health economics, medical ethics and medical humanities (16–19).

At the faculty level the decision was taken to implement a longitudinal and multidisciplinary Community Health Program (CHP), detailed in an earlier publication (20).

The CHP was developed in a very pragmatic way including three major steps:

- (1) initial work was done by a small group of highly motivated teachers (definition of possible objectives, contents and possible educational approaches);
- (2) later development was conducted by a multi-disciplinary group including primary care physicians, epidemiologists, specialists in public health, in bio-ethics and in occupational health, lawyers and historians;
- (3) this multi-disciplinary group currently co-ordinates the CHP.

A crucial question was how to put in place a monitoring of the change as well as designing appropriate evaluation strategies in order to insure quality on the long run.

The present article aims to describe the development and characteristics of the CHP as well as some evaluation data collected over the past 15 years.

Methods

Time frame

Data reported corresponds to 15 years of observation from October 1996 to September 2011.

Population

On a yearly basis an average of 460 students were involved in the program over the 15-year span (successive cohorts of second to sixth year students; first year students excluded since the first year is a selection year with around 70% of failure; due to government recommendations the number has been on the increase over the past 5 years; over the 15 years the total number amounts to 1380). Between 55 and 97 teachers were involved in the various community health activities on a yearly basis (variations are due to the development of new courses such as the electives with a community dimension).

Study designs

There were several methodological approaches.

First, the way learning objectives and teaching contents were defined was investigated through a retrospective study analyzing minutes of the program committee meetings over the years and a prospective observation study focused on consensus meetings.

Second, several evaluation procedures were implemented and data was systematically collected over the 15-year span. An ongoing evaluation of the CHP was planned from the beginning with the support of medical educators, members of the Unit of Development and Research in Medical Education of the Faculty. Evaluation methods included: students' satisfaction with the quality of program (6–12 items) and competences of the teachers (9 items) was measured using a 5-point Likert scale systematically at the end of each teaching unit; students' participation rates (at various courses and seminars) were periodically monitored by tutors; students' performance at local exams was collected using the documents of the Evaluation Committee in charge of the implementation and monitoring of the exams; students' performance at the national final multiple choice exams in social and preventive medicine (including questions in epidemiology, ethics, health economics, health service organization, health promotion and prevention, health policies, occupational health) was collected and data were analyzed by the Institute in charge of the national exams (IAWF); students' and teachers' perceived achievement of CHP objectives were measured on a 5-point Likert scale and yearly collected by self-administered questionnaires sent to all students and to a sample of the CHP teaching staff and analyzed with the open source EpiInfo software and calculated significance values on percentages with χ^2 ; data concerning 'homework' done by students (community investigation reports, lectures to peers and posters presenting community health networks) was collected by the co-ordinating group of the CHP.

Third, various outcomes related to the different training modules were monitored, i.e., educational innovations that were initiated over the years, curriculum adaptations that were done due to various evaluation procedures, as well as internal and external ones (accreditation process), and interactions that took place with the community actors. The monitoring was done through the analysis of the minutes of the program committee meetings (educational innovations), through satisfaction questionnaires of students and discussions with teaching staff as well as consideration of Bologna guidelines (curriculum adaptation) and through annual data-collection on interactions between students and the community.

Results

Definition of the objectives and content of the Community Health Program: a consensus approach

The objectives and content of the CHP were defined by the following procedures:

In the initial phase community health training activities of the traditional program were identified, and a time frame was established for possible community health activities in the new program; this was done by the Unit of Development and Research in Medical Education created in order to plan, implement, monitor and evaluate the new program (21).

In a second phase monthly consensus meetings were organized over a 2-year span with the participation of heads of departments and educational staff in charge of teaching community health and clinical skills. The meetings aimed to define main objectives in community health relevant to clinical practice.

In a third phase a multi-disciplinary group including the actual teaching staff in community health (and related topics) received the faculty mandate to develop specific training objectives in community health and the appropriate educational activities; this committee 'The Co-ordination Group of the Community Health Program' met on a bi-monthly basis; it includes one general practitioner, 2 community geriatricians, 2 experts in bio-ethics, 1 occupational health specialist, 2 epidemiologists, 2 historians, 2 university hospital-based community health physicians and 2 public health specialist.

The developed program was submitted to both pre-clinical and clinical Program Committees (including clinicians, basic scientists, community health specialists, students and medical education specialists) in charge of the global co-ordination and the evaluation of the curriculum. After an 18-month process of consensus meetings and discussions at different faculty levels, the various committees agreed on the need to introduce the CHP early in the undergraduate curriculum from the second to the fifth year (Table 1).

The various committees also agreed on specific teaching activities, disciplines to address and general objectives.

The main purpose of the CHP is to expose students to priority health problems of individuals, of the community or of the whole population. It also aims to expose students to real primary health care services and to the community health network.

The program includes community-oriented and community-based training activities. Community-oriented training includes seminars and workshops on various aspects of health systems, health economics, social and preventive medicine, epidemiology, occupational

Table 1. *Community Health Program* in the under-graduate medical curriculum of the University of Geneva

Medical curriculum	Basic medical sciences	Clinical skills program	Community Health Program
Year 1	Basic sciences: physics, chemistry, organic chemistry. Life sciences: cellular and molecular biology, anatomy, physiology, histology, biochemistry	One-month hospital-based basic care clerkship (dropped in 2009)	Since 2005 introductory course on psychosocial and community health issues: psychological development of the individual, biostatistics, ethics, health system organization, occupational health, complexity of disease, multidisciplinary care approach
Year 2	Basic life sciences: PBL* system approach: growth & aging, nutrition & digestion, reproduction, homeostasis & excretion, respiration, circulation, synthesis	System-oriented bi-weekly basic clinical practice (colleagues, standardized patients, in-hospital patients)	Epidemiology, occupational medicine, medical history, initiation to family medicine at a general practitioner's office, electives in community health-related matters (since 2007)
Year 3	Basic life sciences: PBL system approach: locomotion, perception, emotion and behaviours, immune response, infectious disease	System oriented bi-weekly basic clinical practice (colleagues, standardized patients, in hospital patients)	Ethics and law, health economics and health systems, medical history and medical humanities, community health experience, electives in community health related matters (since 2007)
Years 4 and 5	Clinical sciences: PBL & CRL# approach: 2-month clinical rotations in pediatrics surgery, internal medicine – geriatrics, 1-month clinical rotations in obstetrics, gynecology, neurology, ophthalmology, dermatology	Roughly half-time integrated in clinical activities of the hosting department (taking patient histories, performing physical examination of patients, etc.)	Ethics and law, epidemiology, issues in international health, clinical clerkship in community and primary care medicine, elective clerkships in family practice, public health and tropical medicine, health care in the field of drug addiction and exclusion (abolished when second to third year electives were introduced)
Year 6	Elective clerkship year	Broad range of clinical clerkships mainly hospital based	Clerkship opportunities at general practitioners' office, at public health institutions, in primary care settings in third world countries

*PBL: problem-based learning, #CRL: clinical reasoning learning.

medicine, ethical and legal issues of medical practice and medical history.

Community-based teaching includes clinical activities at a general practitioner's office, experiences in a community program, a health network project report as well as a clinical clerkship in primary health care. Objectives and characteristics of the different courses of the CHP are outlined below.

Community-oriented training (Table 2 and Table 3)

Epidemiology

This course addresses the use of basic tools and concepts in epidemiology and biostatistics, in order to help students to integrate population health issues and evidence-based medicine into medical practice.

The course includes nine 2-hour interactive seminars where students learn, through directed article readings, the application of specific epidemiology tools.

The evaluation assesses students' use of basic tools in epidemiology and biostatistics and their capacity to interpret population health data.

Occupational medicine

The course addresses the basic topics of occupational health and disease, in order to raise the students' awareness of integrating these dimensions into their professional practice.

The course includes four 2-hour seminars where, in medium-size group discussions (n : 20–25) based on selected readings and frontal lectures by occupational medicine teachers.

The evaluation focuses on cognitive elements in occupational medicine relevant to medical practice.

Health systems and health economics

This course addresses the structure and the functioning of the health systems and the characteristics of the regional health network. More specifically, students learn the importance of quality assessment, program evaluation and multidisciplinary collaboration in the health sector in order to promote delivery of efficient health care and prevention.

The course includes eight 2-hour seminars with small group discussions and exercises where students analyze

Table 2. Population-centered community-oriented training activities

Field	Objectives: students are familiar with:	Instructional methods	Student evaluation methods	Program evaluation methods
Epidemiology	<ul style="list-style-type: none"> ● investigating an epidemic ● defining of health risk factors ● key issues of collecting data ● various types of studies designs ● screening methods and related concepts ● decision analysis 	<ul style="list-style-type: none"> ● small group tutorials based on exercises related to epidemiological (health statistics or scientific articles) 	<ul style="list-style-type: none"> ● multiple choice questions ● short open answer questions 	<ul style="list-style-type: none"> ● a six-item students' satisfaction questionnaire with a Likert scale (1–5) ● performance at local and national examinations ● class attendance
Occupational medicine	<ul style="list-style-type: none"> ● prevention strategies in occupational medicine ● clinical and therapeutic and social aspects of occupational diseases ● occupational patient history and specific laboratory exams ● specific insurance procedures related to occupational disease 	<ul style="list-style-type: none"> ● medium size group discussions based on prior readings ● specific lectures 	<ul style="list-style-type: none"> ● multiple choice questions ● short open answer questions 	<ul style="list-style-type: none"> ● a six-item students' satisfaction questionnaire with a Likert scale (1–5) ● performance at local and national examinations ● class attendance
Health economics and health systems	<ul style="list-style-type: none"> ● the impact on health of various health insurance systems ● assessing quality of care and therapeutic efficacy ● evaluating medical interventions ● understanding economic issues relevant to the health sector 	<ul style="list-style-type: none"> ● medium size group discussions based on prior readings and small group tutorials based on media documents and specific health economics data 	<ul style="list-style-type: none"> ● multiple choice questions ● short open answer questions 	<ul style="list-style-type: none"> ● a six-item students' satisfaction questionnaire with a Likert scale (1–5) ● performance at local and national examinations ● class attendance
Social and preventive medicine	<ul style="list-style-type: none"> ● see community health experience 			

Table 3 Individual and population-centered community-oriented training activities

Field	Objectives: students are familiar with:	Instructional methods	Student evaluation methods	Program evaluation methods
Medical ethics and law	<ul style="list-style-type: none"> ● the basic principles of ethics (e.g., autonomy, beneficence, justice) ● the concept of ethical pluralism: implication for medical practice ● the ethic challenges related to research on humans ● the specific legal roles of medical doctors (e.g., legal obligations of a medical doctor cited as an expert by a court) ● key issues in forensic medicine (e.g., death certificate, paternity DNA exam, etc.) 	<ul style="list-style-type: none"> ● small group tutorials based on the analysis of clinical complex situations with an ethical component (sometimes with role play) ● medium size group lectures and discussions related forensic medicine topics 	<ul style="list-style-type: none"> ● multiple choice questions ● short open answer questions ● short essays based on clinical situations 	<ul style="list-style-type: none"> ● a six-item students' satisfaction questionnaire with a Likert scale (1–5) ● performance at local and national examinations ● class attendance
Medical history	<ul style="list-style-type: none"> ● relativism (e.g., paradigmatic change as a component of medical practice) ● critical appraisal of medical practice (e.g., corporate attitudes of defence) ● multiplicity of medical practice (e.g., subjective perception of disease, therapeutic approach, etc.) ● complexity of medical practice (e.g., socio-cultural context) 	<ul style="list-style-type: none"> ● medium size group lectures 	<ul style="list-style-type: none"> ● short open answer questions 	<ul style="list-style-type: none"> ● a six-item students' satisfaction questionnaire with a Likert scale (1–5)

health data and critically comment on papers about the health system and its organization.

The evaluation of these seminars focuses on cognitive elements important to enhance the collaboration among community health services to assess the efficacy and efficiency of medical interventions and to ensure a better social security system.

Social and preventive medicine (later on integrated into the community immersion program – see below)

This course introduces to students the socio-cultural and environmental aspects of medicine and health, thus helping students to understand the complexity of health, disease and illness as well as their intricacies. More specifically, students learn about the importance of prevention and health promotion, health policy priorities and health advocacy, thus increasing their awareness of the importance of prevention and community involvement for their future practice.

The course initially included eight 2-hour seminars where, in small group discussions, the students work on various public and community health topics as well as on individual counseling. It was progressively integrated into the Community Experience Program. The evaluation assesses the efficacy and relevance of prevention and health promotion in medical practice.

Medical history

This course aims to strengthen the humanistic attitude of medical students.

It includes four 2-hour seminars focusing on four components of social sciences in the light of historic texts in order to familiarize the students with key concepts of critical thinking. Students learn to understand present medicine and patients from the lessons of history on the patient–doctor relationship through ages.

The evaluation procedure focuses on critical analysis of historical situations related to health and disease.

Medical ethics and legal issues in medicine

This course aims to familiarize the students with ethical issues related to various medical activities (clinical or socio-cultural) and to the complexity of the ethic and legal dimensions of the patient–doctor relationship.

The program includes four 2-hour seminars focusing on the exploration of basic bio-ethical concepts and four 2-hour centered on legal issues in forensic medicine. Furthermore the program includes five 2-hour periods addressing ethical and legal issues in clinical situations, which are integrated into various clinical clerkships.

Various topics related to medical ethics (euthanasia, therapeutic refusal, palliative care versus aggressive therapeutic approach) are discussed based on clinical situations by students with ethicists, lawyers and clinicians as tutors.

The evaluation procedure focuses on critical analysis of ethical situations related to medical practice through short essays and oral presentations.

Community-based activities

The community-based activities include three programs.

Introduction to ambulatory and primary care

The aim is to introduce students early on in their medical training to various aspects of community and primary care medicine. More specifically students get acquainted with the professional tasks of a general practitioner and learn how to integrate the long-term follow-up of a patient into medical practice.

The program, conceived in partnership with general practitioners, internists and paediatricians in private practice, allows each student to attend a private practice following the same patient once a month over a 12-month period. Each consultation exposes the students to a higher level of responsibility and brings them closer to ambulatory and primary care practice.

Students address various topics in bilateral discussions with the general practitioner, such as to determine the role of the general practitioner and to establish the role of the social environment on health and disease.

Students also potentially experiment various activities of a general practitioner, such as handling the follow-up of an ambulatory patient and making home visits and interacting with family members of the patient.

Thus program gives the students a chance to experience emotional aspects the doctor–patient relationship, be confronted to decision making without absolute scientific evidence and integrate the importance of ‘time as a diagnostic tool’ in medical practice.

The students are evaluated on their attendance and on the analysis of situations they have been confronted with throughout their clerkship, i.e., critical description of the patient–doctor relationship, elaborating on their own perception of what happened throughout the clerkship, reflecting upon their emotions related to the situations they have gone through.

Community health immersion experience

The aim of the program is to familiarize the students with public health issues and an interdisciplinary and multi-sector approach to health and disease, thus giving them an opportunity to become competent community health professionals. Furthermore, the program aims to get students familiar with community health services and their personnel.

The program consists of a 4-week period where the students work up a particular health problem while making short-term visits in various community settings, eventually writing up a report on the selected health issues. Furthermore, the students are exposed through

meetings with community health workers to health topics specifically related to poverty, exclusion and human rights related to health.

The students learn how to plan an investigation in a community setting on a selected health problem in order to understand the problem in its bio-psycho-social complexity, to collect public health data and reflect upon it, to collaborate with a network of health services and professionals, to elaborate and write a synthetic report on the experience and the investigated health problem.

The final evaluation includes three items: the presentation of the collected health data to fellow students, the elaboration a poster on a community health institution and the writing of a 30- to 60-page report on the investigated health problem.

Clinical clerkship in community and primary care medicine

This clerkship aims to familiarize students with ambulatory medicine. More specifically the students learn how to approach a patient in his bio-psycho-social dimension, to take a patient history and perform a physical examination in an ambulatory setting, to elaborate diagnostic hypotheses and define a therapeutic approach for common clinical problems while keeping in mind the contextual dimension of the patient, to coordinate patient care with other medical specialists or health services of the community in order to deliver optimal care to a patient.

During this 4-week clerkship taking place at the university-based Department of Community Medicine, the program included 4 half-day sessions in primary care practice, 4 half-day sessions in an outpatient emergency room, 2 half-day sessions in community geriatrics delivering home care to frail elderly, 2 half-day sessions in an addiction clinic, 12 problem-based or clinical reasoning tutorials about common primary care problems: e.g., sore throat, low back pain, dyspepsia, case presentation and analysis to fellow students and a teacher.

The evaluation was initially formative and consisted in a clinical problem-solving exam in three steps: reading a clinical situation on paper with questions on diagnostic and therapeutic strategies, self-learning to find answers to questions and presenting the answers to two teachers.

A 15-year cumulative evaluation

Several evaluation procedures were implemented.

Students' satisfaction with the program and the teaching staff

Response rates to self-administered questionnaire vary between 60 and 85%, being higher at the beginning of the year and slowing down over the months and years despite a constant effort of the faculty. It dropped to less than 20% when the evaluation went on-line during year 13.

Students' satisfaction with the program and the teaching staff was globally high. Overall perception of the program appears in Table 4. Community-based activities, such as the Community Medicine Clerkship, the Community Health Immersion program, the introductory program to ambulatory and primary care have a high satisfaction rate, whereas community-oriented seminars are less appreciated with the exception of medical ethics seminars. Satisfaction with the teaching staff was acceptable, less than 5% of teaching staff getting ratings below 3 on the Likert scale of 5.

Students' participation at training activities

Participation rate of students at community-oriented and community-based training activities was higher than in years prior to the introduction of the PBL curriculum, moving from 20 to 30% of class attendance prior to the reform process to above 80%, though it declined over the years later on.

Students' performance at local and national exams

In the local examinations addressing public health and community health issues (Multiple Choice Questions and Short Open Answer Questions exams) the students performed on the average as well as in clinical competencies exams and in basic life sciences tests. The students' performance in community health-related topics at national exams was stronger than expected and above average in local examinations, with an 8% increase at multiple choice exams while students from other Swiss faculties remained at constant levels; the improvement remained constant over the years but the absolute result stayed below the level of other faculties.

Table 4. Community Health Program: students overall program satisfaction with CHP. Mean score (on a 5-point Likert scale: 1 strongly disagree, 2 disagree, 4 agree, 5 strongly agree)

Overall satisfaction with the course	Years 1–15 of curriculum change
Epidemiology	3.9
Occupational medicine	3.8
Health economics – health systems	3.9
Medical History	3.6
Medical ethics and legal issues in medicine	4.3
Introduction to ambulatory medicine	4.0
Community health immersion experience	4.6
Clerkship in community and primary care medicine	4.2

Perceived achievement of CHP objectives by students and teaching staff

The perceptions of students and teachers of objectives achieved by students are presented in Table 5. Overall, for a majority of defined objectives, the above 75% of students feel they have achieved the learning objectives. The teachers' perception is globally similar even if the differences are statistically significant. Indeed, there are some differences observed: for example tutors rank higher than students the ability of students to 'identify collaborations among health institutions in a health promotion campaign'; they rank lower the students' capacity to 'establish ethical guidelines in regard to prevention programs' for example.

Achievement in producing reports, giving lectures, making poster presentations was collected

Producing reports, giving lectures, making poster presentations, presenting clinical situations or public health problems in their community dimension are hallmarks of the CHP program: so far around 80 Community health institutions have been presented in poster sessions, 135 priority health problems have been investigated in the community in their bio-psycho-social dimensions, around 200 forty- to fifty-page reports have been written and as many lectures by students and for students have been done.

Outcomes

Educational innovations

In an educational perspective the CHP acted as an innovative agent for the whole undergraduate curriculum. Indeed, the CHP program was innovative in including at various levels primary care physicians in the teaching

staff; in integrating community health institutions into training; in developing community-based training activities; *in* introducing new evaluation procedures, such as writing a report on the investigation of a health problem in a community setting, working up clinical situations, elaborating through introspection on emotional aspects of patient–doctor relationship, writing small essays for example on ethical issues, presenting to peers public health investigations done and clinical situations experienced, taking a modified triple-jump examination on a clinical problem.

Curriculum adaptations

Over the years the CHP was adapted several times after feedback from students, teachers and an external expert committee on accreditation and implementation of the Bologna recommendations. These adaptations were implemented with little opposition in part due to the dynamic of educational change that was introduced with the PBL reform and the close collaboration between members of the various program committees.

Let's mention some adaptations that were implemented over the years the development of a longitudinal 'medical humanities' program, done in collaboration between the medical historians, the ethicists, the general practitioners and the hospital clinicians; the strengthening of the clinical clerkship in community and primary care medicine expanded from 4 to 8 weeks which allowed a stronger and more varied exposure to ambulatory clinical practice in structures such as GPs' offices, emergency wards, geriatric ambulatory units and institutions, addiction clinics; the extension of the community immersion program, initially limited to local community health immersion, to community health settings in developing

Table 5. Students and teachers perceptions of community health objectives achieved by students (aggregated data year 1–15; *n* students evaluations: 455; *n* tutors evaluation: 187)

Examples of community health learning objectives	% of students having achieved the objectives (perception of students)	% of students having achieved the objectives (tutors evaluation)	<i>p</i> value
Identify priority health problems in a community	78	88	<0.001
Determine the impact of a prevention program on a health problem	67	72	<0.05
Evaluate health costs implications of new insurance measures	67	75	<0.05
Analyze the impact individual of vaccination refusal on immunization coverage of the population	100	85	<0.001
Identify epidemiological bias of screening tests	91	88	<0.05
Investigate an epidemic outbreak	92	90	ns
Describe a high-risk population prevention strategy versus a global population strategy	78	74	<0.05
Establish ethical guidelines in regard to a prevention program	100	85	<0.001
Establish objectives of a health education program	76	70	<0.001
Identify collaborations among health institutions in a health promotion campaign	77	95	<0.001

countries; in the introduction of a psychosocial and public health program in the first year of the curriculum, the 'Patient, Health, Society' Program (Program 'Patient, Santé, Société'); in the development of second and third year electives of which 25% represent community health topics/public health issues, such as 'health and human rights', 'humanitarian medicine', 'patient safety', 'health promotion', 'art and medicine', 'philosophy and medicine', etc.; in the implementation of shared teaching activities between various curricula in nursing, midwifery, physiotherapy and medicine.

Interactions 'student community'

Over the years, mainly related to the 'community immersion program', students had over 1400 direct interactions with community health professionals (social workers, public health nurses, local politicians, general practitioners) as well as with patient associations, family members of patients and patients themselves. Students not only visited over 550 different associations, community health services, but also research institutions, nursing homes, schools, international organizations, health committees of state and federal parliaments, etc. Over the years more than one hundred different health topics were investigated (Table 6). Moreover, students organized a dozen of health promotion campaigns in the community (e.g., melanoma, breast cancer, organ donation, blood donation, vaccination), seminars on specific public health topics open to patient associations for example (e.g., health of refugees, palliative care-euthanasia, health and prostitution) and mediation meetings between health authorities and patient associations.

In the context of community immersion in a developing country students also managed to support local community health centers (e.g., building a labor room in southern Mali, giving seminars to diabetics in urban Chile, supporting a vaccination program in rural Senegal, monitoring childbirth complications in a Casa Materna in Nicaragua, developing a website for a community health structure in Bolivia, teaching basic hygiene in an orphanage in Cambodia, etc.).

Discussion

Fifteen years of experience in a PBL Community Health Program shows robustness of learning objectives and activities, constant high satisfaction rates by students, sustained commitment by the teaching staff, a series of outcomes that consolidates the position of community health topics in the program and might even have strengthened ties between the Faculty of medicine and the community health actors as well as triggered 'a small amount of health' in the communities.

Program development

The consensus building process among faculty members at the beginning of (and through out) the process allowed the development of a program with which the teaching staff identifies. Indeed, this consensus approach seems to us as being a key-factor for the daily implementation of the program. The importance of such a consensus approach has been mentioned elsewhere in the literature (22). It also fostered public health relevance of the CHP, since the objectives were developed with critical appraisal of university- or community-based hospital physicians, general practitioners and public health specialists. There is a call for developing relevant medical curricula responding to population health needs (23). This means a medical curriculum with expanded ambulatory care activities. Such a curriculum should integrate general practitioners and foster inter-professional collaboration. This has been the aim of the Geneva CHP.

But bringing together teachers from different professional background and have them accept common objectives relevant considering the health of the population as recommended in the literature (24) was however a special challenge that required time and negotiating skills as reported by others (25). Furthermore, keeping up motivation of the teaching staff over the 15-year span was also a special challenge and certainly a crucial one in order to keep up the interest of students for topics that are not always perceived as priorities (26).

Evaluation process

The evaluation results show the high interest and satisfaction of the students for the CHP. The introductory clerkship at the general practitioners' offices, where the students can appreciate the day-to-day work of a family physician, is well ranked. The community immersion program where students investigate a priority health problem in the community, meeting community health workers, visiting community health institutions and so on gets an even higher approval rate.

Globally speaking, the quality of the students' work (written reports, oral presentations, etc.) and the good performance at local and national exams is another satisfying element.

Some built-in bias might exist in our study especially the students' self-reported perceptions of the program. Yet our observations might well suggest that a community-based learning experiences possibly does prepare medical students to future community health challenges, as has been mentioned in the literature (10, 12, 13).

Furthermore, the students' perceptions agreed in line with the tutors' opinions on to students' achievements of learning objectives though the tutors were more positive than the students, even though there were significant differences.

Table 6. Examples of investigated topics during the community immersion clerkship

Topics investigated locally (Geneva)	Topics investigated in a developing country
<ul style="list-style-type: none"> – Health in detention – Health and prostitution – Health of refugees – Health of clandestine workers 	<ul style="list-style-type: none"> – Diabetes in rural Benin – Malaria in Kenya – Vaccination campaign in Senegal – Access to health structures in a township in South Africa – Nosocomial infections in Bamako, Mali – AIDS prevention in Gabon
<ul style="list-style-type: none"> – Domestic violence – Burn-out – Autism 	<ul style="list-style-type: none"> – Epilepsy in Equator – Health in a favela in Brazil – Chaga's disease in Argentina – AIDS in Bolivia – Access to safe birth in Nicaragua – Children living with a handicap in Peru
<ul style="list-style-type: none"> – Measles – AIDS – Pro/contra vaccination 	<ul style="list-style-type: none"> – Access to water in rural India – Mother and child health in Calcutta, India – Violence against women – Health of street children in Mumbai, India
<ul style="list-style-type: none"> – Blindness – Deafness 	<ul style="list-style-type: none"> – Tuberculosis in Nepal – Health of street children in Mongolia
<ul style="list-style-type: none"> – Abortion – Infertility – Breast cancer – Melanoma 	<ul style="list-style-type: none"> – Children living with HIV in Thailand – Health of orphans in Cambodia – Access to health care in Manila, Philippines – Children living with a handicap in Vietnam
<ul style="list-style-type: none"> – Children living with a handicap – Childhood obesity – Pain in chronic childhood diseases – Senile dementia – Palliative care – Euthanasia 	<ul style="list-style-type: none"> – Health of refugees in Lebanon – Nosocomial infections in Armenia – Tuberculosis in Romania – Addiction in Sweden
<ul style="list-style-type: none"> – Alcohol consumption – Addiction to illegal substances – Smoking 	<ul style="list-style-type: none"> – Health of native populations in Australia
<ul style="list-style-type: none"> – Alternative medicines – Nosocomial infections – Emergency 	
<ul style="list-style-type: none"> – Rights of the psychiatric patient – Organ transplantation 	

Our findings also indicate that the students' perception of their competencies was maintained over the following years, thus possibly keeping the students' continued interest in community-related matters when entering the clinical practice years. Similar observations have been reported in the literature, some emphasising the quality of work done by the students and the high satisfaction rates of the community-based training activities (27, 28, 9), some even showing that community exposure stimulates motivation for learning, enhances lifelong learning skills and orients future medical practice (11).

On the basis of our observations, one might speculate that the community-based approach adopted in Geneva seems to ensure basic community health competencies to students in the long run. This would be in accordance with the recent directives of the Association of American Medical Colleges that recommend 'that students have knowledge of the epidemiology of common maladies within a defined population, and the systematic approaches useful in reducing the incidence and prevalence of those maladies' (29). Our observations also give some hints on how to teach community and public health

efficiently, the importance of which has been stressed recently in a study on core values medical schools should enhance (30).

The main challenge over the years was to convince students of the importance of them participating at the program evaluation: it was crucial to show them that their comments were taken into consideration and triggered some change as it has been documented elsewhere (31). Furthermore, keeping up high spirits among the teaching staff, ever overbooked and often very research-oriented, was tough coordination worked; some help came from the vice-dean's for education who implemented a teaching data base that monitored teaching activities of faculty who were taken into account for faculty promotion. Eventually insuring logistics with a growing number of students has grown into a yearly challenge, which in the long run might prove the critical point.

Outcomes

Educational innovations

The CHP program was innovative in its educational approaches, thus enhancing some creativity and critical thinking to students, as recommended by the UNESCO World Declaration on higher Education (32). Many innovations done at Geneva Medical School aimed at strengthening early practical experience in community settings known to help students to develop appropriate attitudes toward their future practice (33). Such early practical experience associated with relevant evaluation procedures has a strong formative influence (34).

Curriculum adaptations

The curriculum adaptations implemented throughout the years were first aimed at improving the community skills of the students, i.e., their ability to interact in complex and ever changing cultural and societal settings. These adaptations were also aimed at best preparing students to new health challenges, for example providing a large array of preventive measures and health promotion activities as suggested by some authors (35). Furthermore these adaptations were in the line of the recommendations of the accreditation process put in place by the national authorities (36).

Interactions 'student-community'

The Geneva CHP allows students to interact at several levels and on multiple occasions throughout the curriculum with community health professionals as well as the community at large. This might help medical students to consider themselves as part of a team, thus better accepting a multidisciplinary and multi-professional approach to health and diseases, which has been stressed in many domains from specific types of care to health promotion (37, 38). In this regard the CHP might promote the population health perspective of the

students, strengthening their awareness of the need for health promotion, patient advocacy, community leadership, cultural specificities and multi-professional collaboration as suggested in the literature (39).

Challenges faced were few when considering outcomes: the critical one has been, adopting a permanent readiness to move forward with the students, who happened to be often more creative and more innovative than the teaching staff.

Conclusion

In our experience, as suggested in the literature (7), the students' direct exposure and practice in the community health environment realities seems to be an effective training approach to broaden students education by offering a community perspective of health and disease, and down the road strengthening their perception of the importance of community health issues for medical practice (13). In a Medical School perspective this approach might also enhance the social responsibility of the School, a matter that is of growing interest in an ever polarized world, where access to care, to medication or to insurance coverage for many sub-populations of our communities is getting more difficult (40).

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***Emmanuel Kabengele Mpinga**

Institute of Social and Preventive Medicine
 Centre Médical Universitaire
 Michel Servet 1
 1211 Geneva 4, Switzerland 4
 Email: emmanuel.kabengele@unige.ch