

A Framework for Revising Preservice Curriculum for Nonphysician Clinicians: The Mozambique Experience

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ABSTRACT

Mozambique, with approximately 0.4 physicians and 4.1 nurses per 10,000 people, has one of the lowest ratios of health care providers to population in the world. To rapidly scale up health care coverage, the Mozambique Ministry of Health has pushed for greater investment in training nonphysician clinicians, *Técnicos de Medicina* (TM). Based on identified gaps in TM clinical performance, the Ministry of Health requested technical assistance from the International Training and Education Center for Health (I-TECH) to revise the two-and-a-half-year preservice curriculum. A six-step process was used to revise the curriculum: (i) Conducting a task analysis, (ii) defining a new curriculum approach and selecting an integrated model of subject and competency-based education, (iii) revising and restructuring the 30-month course schedule to emphasize clinical skills, (iv) developing a detailed syllabus for each course, (v) developing content for each lesson, and (vi) evaluating implementation and integrating feedback for ongoing improvement. In May 2010, the Mozambique Minister of Health approved the revised curriculum, which is currently being implemented in 10 training institutions around the country. Key lessons learned: (i) Detailed assessment of training institutions' strengths and weaknesses should inform curriculum revision. (ii) Establishing a Technical Working Group with respected and motivated clinicians is key to promoting local buy-in and ownership. (iii) Providing ready-to-use didactic material helps to address some challenges commonly found in resource-limited settings. (iv) Comprehensive curriculum revision is an important first step toward improving the quality of training provided to health care providers in developing countries. Other aspects of implementation at training institutions and health care facilities must also be addressed to ensure that providers are adequately trained and equipped to provide quality health care services. This approach to curriculum revision and implementation teaches several key lessons, which may be applicable to preservice training programs in other less developed countries.

Keywords: HIV/AIDS, health workforce, Mozambique, nonphysician clinicians, preservice training

Background

Mozambique, with approximately 0.4 physicians and 4.1

nurses per 10,000 people,^[1] has one of the lowest ratios of health care providers to population in the world. To increase health access, Mozambique began training nonphysician clinicians, *Técnicos de Medicina* (TM). TM candidates are required to have an education level equivalent to 10th grade to enter the 30-month preservice program,^[2] which provides the competence needed to perform a new job requiring specific training.^[3] After graduation, TMs are expected to provide preventive, acute, and chronic care services and are commonly posted in rural areas where the shortage of physicians is most severe.^[4] TM training requires less than half the time and about

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one-tenth the cost of training physicians,^[5] and with salaries much lower than physicians,^[6] they represent significant savings to the system.

Mozambique has experienced success in the provision of quality care by nonphysician clinicians, especially in the area of surgery.^[7,8] TMs have also been successful in expanding human immunodeficiency virus (HIV) services in the country. A 2007 study found TM care statistically equivalent or better than physicians at two large urban HIV clinics for several quality measures.^[9] However, a subsequent evaluation identified significant gaps in TM clinical performance and training.^[10] The Ministry of Health responded with a revised scope of practice for HIV care and treatment (see Task Analysis), a revised program of inservice training, and a call to action for the integration of HIV care and treatment skills into the TM preservice curriculum.

In 2007, the Ministry of Health requested technical assistance from the International Training and Education Center for Health (I-TECH), a center at the University of Washington, to revise the TM preservice curriculum. I-TECH has been providing technical assistance to the Ministry of Health in Mozambique since 2005, supporting the development of a skilled health work force and well-organized national health delivery systems. I-TECH and the Japan International Cooperation Agency (JICA) assisted the Ministry of Health Training Department in conducting assessments of its 13 health training institutions that offer 8 different health training courses, and TM training, offered in 10 of these institutions. Assessments of TM preservice training identified: (i) lack of coordination between classroom and clinical training, (ii) variation of content taught within and across institutions, (iii) difficulty hiring and maintaining clinical instructors, and (iv) lack of access to current teaching materials.^[11,12] Only 30% of the 221 full-time faculty in 2007 had pedagogic training,^[13] and the annual full-time faculty turnover rate was as high as 32%.^[12] The content of the TM curriculum did not reflect the most prevalent conditions in Mozambique; with too little attention to malaria, malnutrition, HIV/AIDS, tuberculosis and management of chronic diseases.^[11,12]

As a result of the findings and recommendations from the training institution assessments^[11-13] and TM performance study,^[10] the Ministry of Health Training Department convened a Technical Working Group composed of practicing Mozambican clinicians to identify gaps in TMs' clinical performance and guide the curriculum revision process. The goal of the curriculum revision was to integrate HIV/AIDS content, strengthen overall clinical skills and improve graduates' clinical decision-making. It also aimed to develop a comprehensive curriculum and training materials to standardize TM training, provide updated materials and

improve teaching quality in all 10 public training institutions responsible for TM training around the country.

This paper aims to share the approaches and experiences of the revision of the preservice curriculum for nonphysician clinicians in Mozambique, which we feel are applicable to strengthening other training programs in less developed countries.

The curriculum development process

Revision of the TM curriculum followed a six-step approach [Figure 1] developed by I-TECH's project staff in Mozambique and Seattle that has proven effective in revising competency-based curricula in other countries.^[14] A concept paper was presented to the Ministry of Health Training Department and approved. To ensure the curriculum was consistent with the Ministry of Health vision and guidelines, the Technical Working Group reviewed and approved each stage of development through an iterative process.

Because of timeline and human resource constraints, most of the work was conducted by a core curriculum development team and external consultants. Taking faculty away from their teaching responsibilities for an extended period of time could have distressed already under resourced training institutions. The core team was composed of technical advisors from I-TECH (in Mozambique and the United States), Ministry of Health, and Duke University and the University of Washington in the US. External consultants were clinician educators, who were either general practitioners or specialists from Mozambique, or Western expatriates with experience educating nonphysician clinicians or working within Mozambique's national health system.

Conduct task analysis

The Ministry of Health convened two workshops to assess the TM practice environment and identify the tasks TMs performed

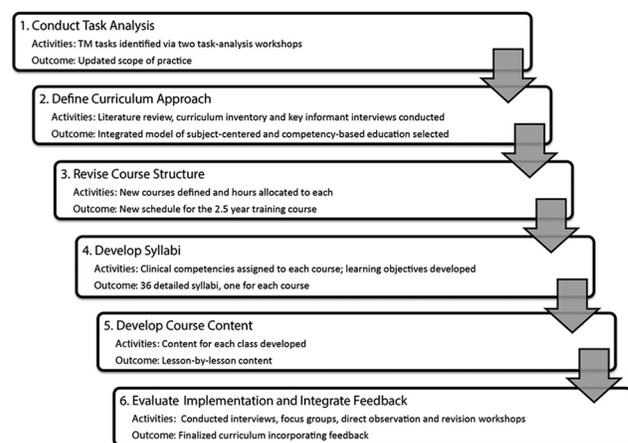


Figure 1: Six-step approach to revising a competency-based preservice curriculum

most frequently. The first workshop focused on HIV/AIDS and the second covered common conditions in Mozambique. Each of Mozambique's 11 provincial health departments selected two TMs to participate in each workshop. Participants had a minimum of 2 years of practice experience and came from both rural and urban facilities. Participants reported activities they performed regularly, the number of patients they saw per week, and the types of services provided. They also reported the most common medical conditions encountered, and access to relevant diagnostic tools, which would indicate their ability to diagnose certain diseases.

Seventy-five percent of participants reported that they spent most of their time in clinical activities, attending an average of 62 patients a day. Their second most common activity was management, which included supervising clinic staff. Task analysis showed the Ministry of Health's existing TM scope of practice was not aligned with the tasks they actually performed in the field. As a result, the TM scope of practice was updated based on the data collected during the workshops.

Define curriculum approach

The core team conducted a literature review, a curriculum inventory, key informant interviews, and reviewed the experiences of analogous training programs. The literature review identified the advantages, disadvantages, and lessons learned in developed and developing countries for four types of curriculum: Subject-based, problem-based, competency-based, and integrated. The established subject-based approach is criticized for being too didactic, overly focused on acquisition of knowledge,^[15] and lacking integration between content learning and application.^[16] A problem-based curriculum is effective but resource intensive.^[17] Competency-based curricula focus on what graduates do in practice; outcomes drive selection of instructional content, instructional strategies, assessment, and curriculum evaluation.^[18] Competency-based education may focus on technical knowledge and skills at the expense of humanistic aspects of professional development.^[19]

The team performed a curriculum inventory to identify successful curricula from similar training programs in neighboring countries. Building on Mullan and Frehywot's analysis of nonphysician clinicians in sub-Saharan Africa,^[20] we obtained sample curricula from several African training programs and interviewed faculty from programs in South Africa and Tanzania. There were no similar training programs in other Portuguese-speaking countries.

The core team decided on a model integrating subject-based and competency-based approaches. Previous needs assessments^[10-12] had shown that clinical skills were lacking among students and graduates, so the team focused on "on-the-job" skills that are specific and measurable.

The core team then shaped a curriculum based on body systems and the clinical presentation of the most common health problems in Mozambique, with appropriate emphasis on the management of chronic conditions. It designed an educational experience to equip students with the knowledge, skills, and attitudes to accomplish professional tasks in real-life situations. This integrated approach required fewer changes in faculty roles and skills than a problem-based curriculum, and could be implemented more easily. The revised curriculum focused on improving TMs' capacity to provide care and treat the most common conditions, while being alert to diagnostic outliers.

The revised curriculum drew heavily on the experience of physician assistant educators in the United States. In the mid-1960s, physician education in the United States aimed at imparting knowledge during 5–7 years of highly specialized training. When physician assistant programs were started in the 1960s, programs matriculated students without college degrees, taught the essence of what students needed to perform in 2 years, and awarded a certificate of completion. In the United States, physician assistants practice medicine with physician supervision, and are trained in what are now 2-year master's degree programs. Physician assistant training in the United States is based on competency, assuring individuals can apply knowledge, skills, and attitudes required in specific clinical situations.^[21] Physician assistant educators from Duke University and the University of Washington served as technical advisors throughout the Mozambique curriculum revision process, contributing their experience with implementing a competency-based approach.

Revise course structure

The 30-month TM course was transformed into an integrated model of subject-based and competency-based education. Beginning with anatomy and physiology, nursing, and physical examination skills, foundational courses are followed by competency-based courses structured around body systems. This model integrates basic and clinical sciences using a single body system as a focal point to explain normality and malfunctions, signs, symptoms, and corresponding diseases.^[22]

TM faculty reflected that TM students entering the course sometimes lack basic Portuguese language and math skills. To level the playing field and assure all TM students are ready to learn and succeed, the new curriculum includes a preparatory seminar to review basic math and writing concepts, study skills, computer use, and how to conduct a literature review.

The new curriculum dedicates more time to practice clinical skills with peers and with anatomical models in the skills laboratory, and includes discussion seminars to address gaps between classroom learning and practicum experiences [Figure 2].

Semester I		Semester II		Semester III	
Preparatory Seminar	70h	Dermatology	54h	Management I	47h
Anatomy and Physiology	98h	Sexual and Reproductive Health I: Female	54h	Ear, Nose, Throat, and Ophthalmic System	35h
Diagnostic Aids	42h	Sexual and Reproductive Health II: Obstetrics	54h	Musculoskeletal System and Soft Tissues	35h
Medical Sciences	70h	Sexual and Reproductive Health III: Male	27h	Hematology and Oncology	31h
Clinical History Taking	54h	Gastrointestinal System	81h	Dentistry	31h
Physical Examination	107h	Cardiovascular System	54h	Neurology	35h
Ethics I	28h	Respiratory System	54h	Mental Health	62h
Community Health	56h	Clinical Procedures	84h	Infectious Disease	62h
Nursing and First Aid	70h	Ethics II	28h	Endocrinology	24h
				HIV and Associated Conditions	93h
Practicum Discussion Seminar	40h	Practicum Discussion Seminar	70h	Practicum Discussion Seminar	80h
Practicum	100h	Practicum	175h	Practicum	200h

Semester IV		Semester V	
Urinary System	62h	Management III	35h
Geriatrics	35h	Autopsy	35h
Pediatrics	310h	Teaching	35h
Management II	48h	Emergencies and Traumas	140h
		Practicum Discussion Seminar	40h
		Practicum	100h
Practicum Discussion Seminar	70h	Rural Site Practicum	280h
Practicum	200h	Discussion Seminar Post Rural Site Practicum	35h

Figure 2: Revised TM course schedule and time allocation (h = hours)

Develop syllabi

The team developed a detailed syllabus for each course, first mapping the competencies from the revised scope of practice to each syllabus, then defining learning objectives and guidance for scheduling, evaluation and clinical practica.^[14,23] The mapping process assigned each clinical competency to one or more courses. Content not directly associated with core competencies was eliminated. Competencies were mapped to learning objectives that defined the knowledge, skills, and attitudes that students should achieve by the end of the course. Each syllabus included a proposed number of contact hours and type of learning environment (classroom vs. skills laboratory vs. practicum) for each topic. Emphasis was placed on students' acquiring skills in laboratories using anatomical models, practicing noninvasive techniques with peers to recognize normal conditions before they were exposed to abnormalities.

The core team performed the mapping of the competencies and designed the syllabi outlines; individual syllabi were developed by a diverse group including Ministry of Health Training Department staff, I-TECH staff, local and international consultants. A document including course structure, requirements for implementation, syllabi and student evaluation strategies was approved for implementation by the Minister of Health, spring 2010.

Develop course content

I-TECH clinical staff and external consultants developed content for each lesson in an iterative cycle of review and revision. A teaching package was developed for each course, which included lesson-by-lesson content, checklists for procedures, clinical rotation guidelines, and suggested course and rotation schedules. After instructional design feedback was incorporated, a second clinician familiar with

the Mozambique context performed a "do-no-harm" review to ensure clinical accuracy. This time-consuming process required a large team of clinicians and instructional designers.

Course packages were developed by I-TECH clinical staff (in Mozambique and US), as well as external consultants. Teaching faculty were provided paper and electronic copies of lesson plans and content for each course in its entirety. Students were provided with hard copies of the content. These materials serve as a resource for teachers and students and standardize course content across training institutions. The material provides a blueprint for faculty on content to be addressed with learners and was not designed to replace the need for faculty to plan lessons in advance. Faculty define teaching methods and develop activities to achieve learning goals.

Evaluate implementation and integrate feedback for ongoing improvement

Evaluation of curriculum implementation was accomplished through key informant interviews, focus groups, questionnaires and direct observations. Two faculty workshops were organized by I-TECH and the Ministry of Health to collect feedback on the content and teaching materials and begin the revision process. Revisions were completed by I-TECH clinical and instructional design staff with assistance from external consultants.

Adoption and response to new curriculum

In May 2010, the Minister of Health approved the new scope of practice, the syllabi, and the schedule for courses. Implementation of the curriculum began in July 2010 in three training institutions and expanded to seven other sites in the following 2 years. I-TECH provided support to the Ministry of Health for implementation of the curriculum by orienting faculty and clinical preceptors to the new course syllabi, course structure, and content. The Ministry of Health and I-TECH monitored curriculum implementation of the first and second semesters at the three initial training institutions in Pemba, Beira and Chimoio. The new curriculum and instructional materials were well received by faculty and students; in one institution 80% of the faculty reported using the new materials. Faculty reported less time was needed for class preparation and students' participation in the classroom increased. Institute directors reported the new curriculum and materials allowed for easier substitution of faculty, resulting in fewer canceled classes.

Although the new curriculum and training materials filled gaps in the TM preservice curriculum, there were obstacles to full implementation. While students spent more hours in the skills laboratories, not all students were able to access skills laboratories due to capacity limitations. Even though clinical and laboratory teaching supplies were provided to training institutes, some skills laboratories still lack sufficient equipment and faculty development regarding use. Students

and faculty also reported there was not enough class time to cover all the content.

Interviews with practicum supervisors, preceptors and training institution directors indicated practicum tools were useful in guiding preceptors and students, but an analysis found that the tools were not filled out consistently and that, in some cases, preceptors used tools from other curricula. Lack of coordination between training institutions and the health facilities where practica occur, insufficient numbers of preceptors, conflicting demands on preceptors' time, lack of trained preceptors, and overload of students in the clinics were other problems observed.

A public health evaluation is underway to measure the impact of the new curriculum on the performance of TMs in Mozambique.

Lessons learned

This collaborative project taught team members several key lessons that may be applicable to preservice training programs in other resource-limited countries.

Initial assessments of the strengths and weaknesses of training institutions should inform curriculum revision. Addressing structural strengths and weaknesses at training institutions are important to the successful implementation of any revised curriculum. It is also important to consider the availability of human resources to develop clinical content in countries that face severe health worker shortages, and the impact of taking clinicians and faculty away from their work to develop new curriculum.

Establishing a technical working group with respected and motivated clinicians was key to local buy-in and ownership of the project. The Ministry of Health did not have the human resources available to provide extensive clinical support during project development and implementation, but designated clinical experts to provide support during final approval.

Developing detailed syllabi and content allowed for standardization across a large and diverse faculty, and across students and institutions in varying locations. Standardized material ensured content was up-to-date, correct, covered only tasks within TM scope of practice, and ensured continuity of classes despite high faculty turnover and absences.

The model still relies on the expertise and teaching skills of faculty, who define teaching methods and develop activities. This model would ideally be accompanied by a robust faculty development program.

A comprehensive curriculum revision is a first step toward improving the quality of training provided to health care

workers in less developed countries, as it is in developed countries. Other implementation aspects at the training institutes and health care facilities must be addressed in order to ensure health workers are adequately trained to provide quality health care. A long-term commitment from donors, the Ministry of Health, and technical assistance agencies is critical to sustainability.

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