

which is expensive and requires static histology laboratories, VM is relatively inexpensive and does not require dedicated laboratory space or equipment.³

Intervention: The VM system was obtained in June 2011 through a collaboration with the University of Alabama at Birmingham, and supported by the Medical Education Partnership Initiative (MEPI). Through MEPI, the authors obtained a 4-gigabyte portable hard drive containing more than 4,000 electronic images of histology and histopathology slides arranged by systems. Also through MEPI, the school procured 15 laptop computers and transferred the VM program and the slide content onto them. While VM has been widely used in medical schools in the United States and in Europe, its use in Africa is much less common.³

Outcomes: During the past three years, 112 medical and dental students have used VM as their sole means to study histology. More than three-quarters of staff and students reported in a self-administered questionnaire that VM was an effective and efficient easy way to study histology. The authors have found VM to be well suited to a new medical school that has limited laboratory space because sessions could be set up easily in a lecture hall or tutorial room.

Comment: VM has not gained wide use in African medical schools, but it has the potential to compliment teaching in histology, histopathology, and microbiology. The authors found VM to be easy to set up, cost-effective, and with high acceptability among students and staff. The glass slides normally used in optical microscopy are expensive, need continual replacement, and require adequate storage space and dedicated facilities. VM, on the other hand, has none of these disadvantages yet provides similar learning opportunities to students.^{3,4}

Correspondence should be addressed to Dr. Bowa, PO Box 39520 Lusaka, Zambia; e-mail: kbowa@yahoo.com.

Author affiliations: K. Bowa, Copperbelt University School of Medicine; P.G. Anderson, University of Alabama at Birmingham

Acknowledgments: The authors acknowledge the assistance of Zohray M. Talib, MD, George Washington University; James L. Fishback, MD, University of Kansas School of Medicine; Mary Ann Sens, MD, PhD, University of North Dakota School of Medicine; and Richard M. Conran,

MD, PhD, Uniformed Services University of the Health Sciences. They also acknowledge Laura F. Cotlin, Matthew C. Anderson, and M. Lumamba, who helped in this work.

Funding/Support: Support was provided by the Office of the U.S. Global AIDS Coordinator and the National Institutes of Health through the Medical Education Partnership Initiative programmatic award no. 1R24TW008873.

Other disclosures: None reported.

Ethical approval: Reported as not applicable.

Disclaimers: The content is solely the responsibility of the authors and does not represent the official views of the Office of the U.S. Global AIDS Coordinator or of the National Institutes of Health.

References

- 1 World Health Organization. Working Together for Health: The World Health Report 2006. Geneva, Switzerland: World Health Organization; 2012. http://whqlibdoc.who.int/publications/2006/9241563176_eng.pdf. Accessed April 17, 2014.
- 2 The World Bank. Population (Total). <http://data.worldbank.org/indicator/SP.POP.TOTL>. Accessed April 17, 2014.
- 3 Weinstein RS, Graham AR, Richter LC, et al. Overview of telepathology, virtual microscopy, and whole slide imaging: Prospects for the future. *Hum Pathol*. 2009;40:1057–1069.
- 4 Chen C, Buch E, Wassermann T, et al. A survey of Sub-Saharan African medical schools. *Hum Resour Health*. 2012;10:4.

Challenges and Opportunities for New Medical Schools in Africa: The Consortium of New Southern African Medical Schools (CONSAMS)

Quentin Eichbaum, MD, PhD, MPH, MFA, MMHC, BA (Hons), BSc (Med) (Hons), Kasonde Bowa, MB ChB, MSc, MMed, DPH, Paolo Pires, MD, Olli Vanio, MD, PhD, and Peter Nyarango, PhD

Background: Africa bears 24% of the world's disease burden yet has available only 3% of global health care workers.¹ The Medical Education Partnership Initiative (MEPI) has aimed to alleviate this health worker shortage by increasing training and infrastructure capacities at Sub-Saharan African medical schools. Financial awards totaling \$130 million were made to 13 medical schools, most of which were established and with track records in graduating health workers. Very few newly opened medical schools—

institutions that tend to suffer from limited funding, acute shortages of faculty, and insufficient facilities—were included in the MEPI initiative.

Innovation: The Consortium of New Southern African Medical Schools (CONSAMS) was created in 2012 by five new medical schools in southern Africa that sought to support each other through the sharing of ideas, programs, faculty, and facilities: University of Namibia School of Medicine, Windhoek, Namibia; Copperbelt University School of Medicine, Ndola, Zambia; Lurio University School of Medicine, Nampula, Mozambique; University of Botswana School of Medicine, Botswana; and National University of Lesotho, Lesotho. Also included in the consortium were two established “Northern” medical schools—Vanderbilt University in the United States and Oulu University in Finland—which serve a guiding and facilitating role and have submitted grants to fund specific projects. MEPI provided a small grant to help support CONSAMS. The mission and major goal of CONSAMS was to promote a productive “interdependence” among new medical schools in Africa through the creation of “networks, alliances and consortia” as advocated in the landmark 2010 *Lancet* report.¹

Outcomes: In just over two years, CONSAMS has created a highly supportive interdependent network with active working groups dealing with undergraduate medical education, postgraduate training, and research. Specific outcomes include the adoption by partner schools of Universidad Lurio's One-Student-One-Family community health program, which pairs medical students with families living in rural communities to serve as their health advocates. There is also ongoing development of accreditation standards that includes curriculum reviews and a system of external examiners between partner schools; implementation of pedagogical methods appropriate to the contexts of each school (driven from Oulu University); development of interprofessional training programs, specifically at the medical schools of Namibia and Universidad Lurio; and ongoing discussions on the structure of postgraduate training programs and recruitment of clinical faculty for these

programs. The two northern partners have assisted in recruiting faculty, providing seed funding, and applying for grants.

Comment: New medical schools have the capacity to be more agile and adaptive to change than their established counterparts.¹ But new medical schools in southern Africa also face daunting challenges primarily due to resource constraints. Working together through networks, alliances, and consortia such as CONSAMS is an approach that can strengthen medical education capabilities in resource-constrained areas.

Correspondence should be addressed Dr. Eichbaum, Vanderbilt University School of Medicine, 4511-C TVC, Nashville, TN 37232; e-mail: quentin.eichbaum@vanderbilt.edu.

Author affiliations: Q. Eichbaum, Vanderbilt University; K. Bowa, Copperbelt University, Ndola, Zambia; P. Pires, Universidad Lurio, Nampula, Mozambique; O. Vanio, Oulu University, Oulu, Finland; P. Nyarango, University of Namibia, Windhoek, Namibia

Acknowledgments: The authors gratefully acknowledge the participation in general meetings and discussions of other CONSAMS partners at the University of Botswana and the National University of Lesotho.

Funding/Support: Funding was provided by the U.S. President's Emergency Plan for AIDS Relief's Medical Education Partnership Initiative through the Health Resources and Services Administration grant number T84HA21125. Higher Education Institutions Institutional Cooperation Instrument grants were provided by the Ministry of Foreign Affairs in Finland to the University of Namibia School of Medicine, Windhoek, Namibia; and to the Lurio University School of Medicine, Nampula, Mozambique. A North-South-South Instrument grant was provided by the Ministry of Foreign Affairs in Finland to the University of Namibia School of Medicine, Windhoek, Namibia; Lurio University School of Medicine, Nampula, Mozambique; and Copperbelt University School of Medicine, Ndola, Zambia. Funding was also provided by Global Health through Education, Training, and Service.

Other disclosures: None reported.

Ethical approval: Reported as not applicable.

Disclaimers: The content is solely the responsibility of the authors and does not necessarily represent the official views of any agency or organization.

References

- 1 Frenk J, Chen L, Bhutta ZA, et al. Health professionals for a new century: Transforming education to strengthen health systems in an interdependent world. *Lancet*. 2010;376:1923–1958.

Strengthening Health Systems by Integrating Health Care, Medical Education, and Research: University of Nairobi Experience

James N. Kiarie, MMed, MPH, Carey Farquhar, MD, MPH, Robert Redfield, MD, Kefa Bosire, MPharm, Ruth W. Nduati, MMed, MPH, Walter Mwanda, MD, James M. M'Imunya, MMed, and Isaac Kibwage, MPharm, PhD

Background: Lack and inequitable distribution of human resources for health (HRH) is a major health systems challenge in Sub-Saharan Africa.^{1,2} The Partnership for Innovative Medical Education for Kenya (PRIME-Kenya) is an innovative approach that seeks to strengthen health systems by increasing linkages and collaborations in health care, health education, and health research. This approach was informed by concerns of inadequate clinical exposure with increasing undergraduate student enrollment at a tertiary hospital; increasing demand for locally relevant health research; and the desire to retain health workers at nontertiary facilities during and after training.

Intervention: We focused on three interventions as part of the PRIME-Kenya initiative: decentralized training of undergraduate students, building research capacity at 14 nontertiary health facilities, and a nurse training program based on an eLearning platform.

- **Decentralized Training.** We sought to improve medical education capacity at selected nontertiary health facilities by training facility staff that already had postgraduate clinical training by using e-resources (textbooks, guidelines, and online lectures). Staff that completed the training were appointed as adjunct faculty at the University of Nairobi (UoN).
- **Building Research Capacity.** We conducted two phases of implementation science research training. First, between December 2012 and August 2013, 354 staff (30–60 per facility) received three days of instruction at their facilities on how to develop research questions, write research proposals, and collect data. Second, in October and November 2013, 35 adjunct faculty (3–5 per facility) received two additional

days of training during which they developed research proposals based on research questions developed during the first phase. These adjunct faculty will be mentored by UoN faculty to help them submit their proposals for ethics review, collect and analyze data, and disseminate results.

- **eLearning.** In 2012, the School of Nursing Sciences introduced an eLearning Bachelor of Nursing (eBScN) upgrading course for diploma-level nurses. Training is conducted in accredited county hospitals where students are supervised by UoN adjunct faculty.

Outcomes: At 14 nontertiary health facilities, 182 adjunct faculty have been trained and 306 students have rotated. Adjunct faculty at 9 health facilities have developed draft research proposals covering various areas including the impact of national health financing policies, staff retention, and quality of services. At 28 county hospitals, 148 students are enrolled in the eBScN program, and initial exam results indicate that trainees are gaining expected knowledge and skills.

Comment: According to the interviews, the students felt they had more opportunities to practice clinical skills, closer mentoring, and closer interactions with patients at the nontertiary facilities than at the tertiary hospital. Health workers at the nontertiary hospitals also reported improved quality of patient care, increased job satisfaction, and greater interest in research. Those working in the nontertiary health facilities prioritized research that was highly relevant to local practice and policy. In the eBScN training program, county hospitals have retained employees, and the nurses are upgrading their skills without losing income. This innovative approach is successfully addressing some of the HRH challenges in medical education, health care, and research.

Correspondence should be addressed to Dr. Kiarie, PO Box 3085-00506, Nairobi, Kenya; e-mail: jkiarie@swiftkenya.com.

Author affiliations: J.N. Kiarie, K. Bosire, R. Nduati, W. Mwanda, J.M. M'Imunya, I. Kibwage, University of Nairobi; C. Farquhar, University of Washington; R. Redfield, University of Maryland

Acknowledgments: PRIME-Kenya Secretariat staff members included Collins Owek, Francis Njiri, Raphael Kinuthia, Samuel Runo, James Macharia,