

Advanced Trauma Operative Management course introduced to surgeons in West Africa



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Following his induction as an honorary member of the West African College of Surgeons (WACS), Claude H. Organ, Jr., MD, FACS, Past-President of the American College of Surgeons, proposed an educational exchange between the two organizations. A dialogue regarding an appropriate course developed between Edward D. Yeboah, MD, president of the WACS, and several authors of this article: E. Cornwell III, MD, FACS, president of the Society of Black Academic Surgeons, Lenworth M. Jacobs, MD, MPH, FACS, past-president of the National Medical Association Surgical Section, and Samuel A. Adebajo, MD, FACS, past-secretary general of the WACS.

Various educational programs were discussed with a view toward providing practical hands-on experience to West African surgeons, who would be expected to implement and sustain the programs in West Africa. The purposes of this endeavor were to: (1) improve care for severely injured trauma patients in West Africa; (2) develop a professional exchange between trauma surgeons in the U.S. and members of the WACS; and (3) introduce trauma surgeons in West Africa to the techniques of Advanced Trauma Operative Management.

West Africa

West Africa comprises 16 countries with 260 million people. Ghana is located in the southwestern portion of the region. It is about the size of the U.K. and slightly smaller than the state of Oregon. Its population is 18.4 million people. The government is a parliamentary democracy with an elected president. Its capital city, Accra, is located on the coast and has a population of 1.5 million people.

Trauma is a significant health care problem in Ghana and one of the leading causes of death in West Africa. In the urban areas, the trauma mortality rate is 69 per 100,000 persons annually, with 75 percent of the deaths secondary to motor vehicle injuries. In the rural areas the incidence of

unintentional, nonfatal, penetrating wounds represents 43 per 1,000 persons annually.¹ Therefore, the training of surgeons in the management of trauma was identified as a major need, and the concept of providing training for surgeons in the operative repair of penetrating injuries became an important objective. Such training would assist surgeons in the management of penetrating injuries and, consequently, improve their capacity to care for injured patients. These benefits would be realized immediately. The goal then became to develop an educational experience that could be implemented in West Africa and performed by the surgeons at the same standard as any site in the world.

A plan

The WACS selected the Republic of Ghana and its capital city, Accra, as the test site for the implementation of the educational program. The Korle-Bu Hospital is the teaching hospital of the University of Ghana and has a long tradition of educating surgeons. The academic faculty has excellent technical and educational skills and is geographically well located with easy access for surgeons from throughout West Africa. Furthermore, Dr. Yeboah is from Ghana.

The plan was to establish a surgical skills center that would initially train surgeons in the operative management of severe penetrating trauma and proceed to conduct regular training programs in other surgical procedures and for other disciplines. Specialties that would be included are anesthesia, surgical operating room technology, surgical operating room nursing, ophthalmology, and veterinary medicine.

A series of meetings occurred in 2003 to solidify the goals of the program and to develop an operational implementation plan. It was then necessary to seek partners to aid in the procurement of equipment and provide financial support for this trans-continental educational endeavor.

ATOM

The Advanced Trauma Operative Management (ATOM) course was a logical choice, fulfilling all the educational prerequisites and technological objectives deemed necessary.^{2,3} One of the prin-

Opposite: Surgeons performing operations in the ATOM course. Background design is a traditional West African kente cloth (digital image courtesy of Darrell Holloway, <http://www.geocities.com/Athens/Oracle/7943/graphics.htm>).

principles of the ATOM course is that it adheres to a structured educational methodology, ensuring that all students receive the same training. The course significantly enhances surgeons' confidence in their operative skills and increases cognitive knowledge of management of patients with penetrating trauma. ATOM was developed at Hartford (CT) Hospital and the University of Connecticut in association with expert trauma surgeons from the College's Committee on Trauma.

Ten sites in the U.S. and Canada have implemented the ATOM course and over 250 surgeons have been trained and certified. The sites are Hartford Hospital-University of Connecticut, Massachusetts General Hospital-Harvard University, St. Michael's Hospital-University of Toronto, Hospital of the University of Pennsylvania, Johns Hopkins University, Maryland Institute of Emergency Medical Services Shock Trauma-University of Maryland, Vanderbilt University, Loyola University, the University of Miami, and the U.S. Army Trauma Training Center in Miami.

The course is designed to be standardized and completely reproducible. The standardization of the course along with its relational database ensures that all surgeons completing the course have demonstrated to the instructors a similar level of surgical operative competence. Instructors are required to have successfully completed the student ATOM course as well as an instructor course. Each instructor is taught to create the injuries in a standardized manner so each student has a similar surgical challenge.

Learning methods

ATOM was designed to teach surgeons to diagnose and operatively manage penetrating injuries to numerous organs in the abdomen and



The surgical faculty and other participants in the ATOM course in Accra. Left to right: William Dyckman, Research Technology, Hartford Hospital; Myles Fish, president/CEO, International Aid; Dr. Ekeh; Dr. Jacobs; Dr. Cornwell; Dr. Adebajo; and Dr. Luk.



The new Surgical Skills Centre, Korle-Bu Teaching Hospital, Accra.

chest, including the bowel, bladder, kidney, ureter, pancreas, duodenum, stomach, diaphragm, liver, inferior vena cava, spleen, and heart.

The injuries are produced in live 50 kg swine, which are fully anesthetized and monitored with

arterial pressure transducers and EKG monitors. The student objectives are to accurately identify the injuries, develop a clinically safe and acceptable management plan, and then to successfully repair the injuries. The animal must be adequately managed so as to be hemodynamically stable at the end of all the procedures.

To document students' learning and to ensure a sound educational experience, the students are given pretests online to assess their level of knowledge and confidence regarding the management of patients with penetrating trauma. They are then provided with a CD/video with the correct surgical repairs of the injuries as well as a textbook containing the knowledge content for managing the injuries two weeks before the course.

On the day of the course, the students attend six standardized 30-minute lectures outlining the diagnosis and management of injuries to the organs in the chest and abdomen.

The students then proceed to the surgical skills laboratory. Each student learns from an individual certified ATOM instructor. The instructor gives the student a clinical scenario outlining the injuries to a specific area of the abdomen or chest.

The student is then asked to leave the operating room. The instructor creates injuries using a standardized method that ensures that each student has a similar surgical challenge. The student is invited back into the operating room and is asked to: (1) identify the injuries; (2) provide a plan to operatively manage the injuries; and (3) perform the necessary



Operating rooms in the Surgical Skills Centre in Accra.



Samples of instruments used to support the ATOM course; they were donated to the Surgical Skills Centre.

surgical repairs. After successfully repairing all the injuries, the student then takes the posttests online.

The importance of completing all the registration and pre- and posttest requirements online is that these data are entered immediately into a relational computer database. This allows for comparison in the educational performance of surgeons at different levels of training, in different areas of the country and the world, and allows for careful evaluation of the areas of cognitive competence in the management of injuries of the various organs. The course can then be modified to accommodate to areas of weaknesses because they are specifically identified.

Implementation in West Africa

It was immediately apparent at the inception of the planning process that it would require the complete involvement of the leadership of the West African College of Surgeons, the Korle-Bu Teaching Hospital of the University of Ghana, the Ministry of Health of Ghana, and the senior surgeons and anesthesiologists at the teaching hospital.

To achieve a successful outcome, Dr. Yeboah and Rudolph Darko, MD, chief of surgery and head of research at the Korle-Bu Teaching Hospital at the University of Ghana, along with Dr. John Quartey, the previous president of the WACS; Dr. Adebajo, the past-secretary general of the WACS; and Dr. N.A. Adu-Aryee, a senior surgeon, came to Hartford Hospital and the University of Connecticut to audit and participate in an ATOM course. Dr. Darko was certified as an instructor of the ATOM course. He will serve as the principal investigator of future ATOM courses in Accra, where they are to be conducted under the appropriate academic and clinical auspices in West Africa.

To maximize the exposure of

West African surgeons to the ATOM course, they were given an opportunity to audit the six lectures on penetrating trauma. Fifty surgeons, along with five previous presidents of the WACS, attended the course. A number of these surgeons also inspected the skills center and observed their colleagues performing the operations.

Course support

It was a major logistic and financial challenge to conduct a surgical skills course with live animals using full anesthesia and Institutional Animal Care and Use Committee support in a remote location. Johnson & Johnson and their subsidiary companies, Codman Surgical Instruments, Ethicon Sutures, and Ethicon Endo-Surgical, provided financial and equipment support for two operating rooms, each with two operating tables for a total of four. Around each of the four tables, the necessary surgical instruments, anesthesia machines, sterilizers, and support equipment were provided. These resources were donated to the Korle-Bu Teaching



Opening Ceremony for the Surgical Skills Laboratory in the ATOM course. Front row, left to right: Mr. Person; Dr. Nwariaku; Dr. Jacobs; Prof. Giwa-Osagie, MD, past-president of WACS; Dr. Yeboah; Moses Dani-Baah, then-Deputy Minister of Health; Christine Rada, representative, U.S. Embassy; Prof. C.N. Tagoe, provost; and Dr. Cornwell.

Hospital and will be available for future educational programs. Conrad Person, director of international program and product giving for Johnson & Johnson, provided strong leadership, as did Dennis Robson, general manager of Johnson & Johnson in Edinburgh, Scotland, and René Kiamba, corporate contributions manager for Africa.

International Aid—a nongovernmental, not-for-profit organization that establishes hospitals and clinics throughout the world—met the challenge of retooling the equipment for the appropriate electrical specifications and constructing and preparing the operating center. The implementation of the ATOM course in a timely manner was a significant challenge for International Aid, as they were simultaneously providing massive amounts of aid to support relief work in the countries affected by the tsunami of 2004.

The West African College of Surgeons selected senior surgeons from eight hospitals. Four were from Nigeria: Ahmadu Bello University Teaching Hospital, Lagos University Hospital, Shell Petroleum Development Corporation Hospital, and the

University of Nigeria Teaching Hospitals; and four from Ghana: Korle-Bu Teaching Hospital, the 37th Military Hospital, Komfo Anokye Teaching Hospital, and the Police Hospital. These surgeons completed the pretest, attended the lectures, and successfully completed all the trauma procedures in the skills laboratory.

The ATOM instructors included: Dr. Jacobs, Stephen S. Luk, MD, FACS, assistant professor of surgery, University of Connecticut, and medical director of the ATOM course, Hartford Hospital and University of Connecticut; Dr. Cornwell, professor of surgery and chief of trauma, Johns Hopkins Hospital, Baltimore, MD; Peter Ekeh, MD, MPH, FACS, assistant professor of surgery, Wright State University School of Medicine, Dayton, Ohio; and Fiemu Nwariaku, MD, FACS, FWACS, associate professor of surgery, University of Texas Southwestern Medical Center, Houston. William Dyckman, research technologist, Hartford Hospital, provided anesthesia and veterinary support services in collaboration with the anesthesia department at the University of Ghana. The local faculty was Dr.

Darko and Dr. Adu-Aryee. Eight other senior surgeons assisted during the operative procedures and audited the course.

Discussion

The involvement of international and local faculty had the advantage of exposing a significant number of local surgeons and anesthesiologists to the concept of advanced surgical skill acquisition and the ATOM process. A sense of ownership was fostered at the Korle-Bu Teaching Hospital and the University of Ghana Medical School that created confidence and pride in successfully implementing the course with the same standards used in North America.

The ATOM course in West Africa has also allowed for in-



The surgical delegation (left to right: Dr. Darko, Dr. Jacobs, Dr. Giwa-Osagie, and Dr. Yeboah) being received by President Kufuor.

ternational comparisons. Surgeons in different parts of the world are educated in different educational systems (British, French, American, and so on) but are expected to successfully repair injuries in any patient anywhere in the world. One of the important outcomes of the ATOM course and its relational database is that there is the potential to identify successful operative procedures in any international geographic location and incorporate them into the educational content of the course.


A challenge of the ATOM course in West Africa that was successfully overcome was the implementation of a paperless electronic evaluation process. The students took the pretests in their country of origin via the Internet and successfully completed their posttests via the Internet in Ghana. All scores were accessible on line in Accra. Immediate certification of successful completion of the course and continuing medical education credits were provided.

Conclusion

The successful completion of the course generated considerable enthusiasm. A courtesy call to the president of the Republic of Ghana, John Agyekum Kufuor, was arranged. The Honorable Minister of Health, Major Courage Quashigah; the director general of the Ghana Health Service, Prof. Agyeman Badu Akosa; and Dr. Yeboah led a delegation of the ATOM course leadership to meet with the President, His Excellency Mr. John Agyekum Kufuor. The ATOM leadership attending this meeting included: Dr. Jacobs, founder of the ATOM course; Dr. Darko, chief of surgery and the principal investigator of the ATOM course in Ghana; Rev. Myles Fish, chief executive officer of International Aid; and Mr. Person of Johnson & Johnson International. President Kufuor endorsed the concept of the ATOM course and pledged the country's support for the ongoing implementation of a structured educational program for surgery, as he believes this will be a significant benefit to the citizens of Ghana and the entire region of West Africa.

Within one week of the completion of the course, one of the major objectives was fulfilled. Immediate benefit to a severely injured patient was realized when Dr. Darko managed a patient with a se-

vere gunshot wound to the liver and was able to use one of the techniques taught in the ATOM course with a successful outcome. The patient has done well.

An additional benefit of the educational program was the opportunity to develop social and professional friendships. The kind and generous hospitality that the West Africans offered to the visiting group was exceptional. The concept of surgeons interacting with their colleagues and learning from each other was never more evident than in Accra, Ghana. 

References

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