Assessing information and communication technology in surgical training, Sudan as example

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Introduction

The Internet has enabled increasing numbers of healthcare professionals to access flexible, convenient and interactive forms of continuing medical education. The advantages of these computer-based technology tools are clear but they are expensive, may not be available and there is a lack of Information Technology (IT) skills. The objectives of this study were to:

a. assess the knowledge and use of different educational modalities in surgical training among surgeons and trainees

b. compare the classical methods of training against modern technology-assisted ones

c. evaluate computer-IT literacy and competency

d. identify obstacles to IT use in surgical education.

The rapid development of IT has dramatically influenced medical training and practice. These advances have had an enormous impact on the ways in which diseases are diagnosed and managed. Computer assisted training (CAT) has been introduced to medical education. It offers various interactive teaching programmes that facilitate the learning process(1,2).

Surgical training is built upon a strong foundation of didactic learning, reading, observation and performance under guidance and repetition. Surgical skills are not only required tasks for specialist surgeons but also for a wide range of health care practitioners. For example, students who need to learn the basic skills of taking blood samples, setting up I.V lines and closing wounds. General practitioners carry out many surgical procedures such as removing skin lesions and lipomas, circumcisions and herniorrhaphies. Nurses provide a range of hospital and community based surgical services (3).

Surgical skills cannot be achieved simply by observation. Practice, where the learner understands the aim of the skill, is needed (4). The challenge in training surgical skills is to provide conditions for effective learning without putting patients at risk. Furthermore, ethical and medico-legal considerations mean that gaining surgical experience on real patients is unacceptable during the early stages of training. Other drawbacks are duty hour restriction, operating room time and cost.

Hence a radical transformation from the apprenticeship model to another training technique is needed (2,5,6). Consequently laboratories dedicated to teaching surgical skills have emerged. These laboratories were introduced with simple suturing models in the 1960's (7). Recently, advanced models that allow operative practice and simulate intra-operative complications have been introduced (8). In addition, a variety of other educational practices have evolved, such as case-conferences, grand rounds, bedside teaching and problem based learning (2, 9). Despite progress in surgical training, a number of economic and time factors have hindered the traditional training process by decreasing the amount of time and funding available for formal surgical teaching in hospitals (5). Recognizing these problems, the adoption of simulation and computer based training was suggested as a next step in surgical education.

Simulation refers to the act of mimicking a real object, event or process by assuming its appearance or outward qualities. Simulators are designed to reproduce some aspect of the working environment. This varies from replicating an aspect of a task (e.g. venous cannulation) through increasing levels of complexity to the recreation of an entire working environment such as the operating theatre. Also, simulators provide a safe and non-clinical environment designed to meet the educational needs of a learner. They encourage acquisition of skills through experience, as practicing can be repeated as often as necessary and learners have permission to fail so they can learn from their mistakes. Simulators can take many forms such as part task trainers (which are simulators used for only one purpose such as breast examination or canulation), computer based systems, simulated patients and environments and integrated simulators.

Computer-based training (CBT) is different from textbooks or other delivery vehicles that incorporate

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multimedia content because it allows interaction with the user. The idea of Computer Assisted Instruction (CAI) became popular in the mid 1960's. It was found more effective in educational programmes compared to traditional techniques and later developed into an 'intelligent tutoring system' in the 1980's. Further advances in the 1990's created a powerful tool that allowed the design and use of complex multimedia programmes in medical and surgical education.

The first category consists of multimedia products that merely duplicate text-book information. These non-interactive systems add little value to the educational process. Other categories of more dynamic software include virtual patients, virtual reality, computer based simulation, self-study and online discussion groups. A virtual patient is defined as an interactive computer simulation of real-life clinical scenarios for the purpose of health care and medical training, education and assessment.

Virtual reality allows students to interact with three dimensional computerized data bases in real time using their natural senses and skills. These virtual reality simulators have been applied widely to minimal access surgical techniques using laparoscopy and microsurgery simulators. Web-Based Learning (WBL) covers all educational interventions that use the Internet or local Intranet. It is also called 'online learning', 'distributed learning' or 'Internet –based learning'. WBL uses an approach that is flexible, engaging and learner-centered. It also encourages collaboration and communication (staff-staff, staff-student and student-student). The three broad configurations in WBL are:

- tutorials
- online discussion groups and
- virtual patients.

Although clinical experience is the cornerstone of surgical education, the Internet and computer assisted technologies have provided an important tool for surgical education. All these educational modalities, ranging from simple simulators to complex computer assisted ones (such as virtual reality) are commonly used in developed countries. The Sudan, being a developing country with limited resources, does not have such technology available for medical training. Therefore the traditional methods of teaching are still used.

Surgical education depends mainly on lectures and seminars, while the training of surgical skills vary from one medical school to another, depending on the available teaching aids. Some schools have facilities known as 'skills laboratories' where simple simulators are available such as manikins for I.V punctures and blood pressure measurement. But more complex tasks may not be at hand. Furthermore students, surgical trainees and staff may rely on the Internet. Surgical training in hospitals still depends mainly on observing seniors and later imitation of the skill by the junior practitioner. Therefore ethical and medico-legal considerations maybe jeopardized.

In this study we are trying to address these issues among a selected study group in Sudan.

Methods

This was a prospective cross- sectional study at Soba University Hospital, one of Sudan's main training hospitals for surgeons and surgical trainees.

Ninety five doctors working in the Department of Surgery were selected by purposive sampling (where only doctors within different surgical teams were involved) using a self administered standard questionnaire which was developed through a literature search (e.g.Health Technology Assessment 2011; Vol. 15: No. 1) and focused discussion with the study group. The questionnaire was piloted in a sample of five participants.

Results

Most of the doctors enrolled in this study were aged below 40 years and more than 50% were aged under 30 years. They are considered the 'cyber generation' which is expected to be familiar with the use of computers and Internet.

The study group mainly used computer aided education for preparing lectures and seminars (55.8%) and for searching for surgical literature reviews (43.2%). However knowledge about popular surgical websites was limited, with only 18.9% knowing a popular surgical website such as websurg.com. Online discussions, videos explaining operations, Personal Digital Assistants (PDAs) as well as using IT for assessment of students were all uncommon. Online discussions were used by only 13.7%.

Most of the study group used the Internet (89.5%) but only 67% regularly used computers for surgical education. Only 17.9% said they used it frequently (i.e. more than 3 times a week) and 42% said they used it for less than five hours each week. Reasons for not using the computer regularly were:

- difficult access.
- lack of time due to tight schedules.
- limited knowledge of websites.

Higher medical ranks benefited from and used different educational technology modalities more than others (as they were using it to review their practices, update their knowledge, and participate with other community

practices around the globe as well as networking).

Discussion and Conclusion

Educational technologies have the advantage of providing a safe, controlled environment that eliminates risk to patients and provides documentation of the learner's performance and allows repetition and practice.

This study showed that the majority of surgeons claimed competence in using computers. However many had gained their computer skills through self learning (46.3%). Only 21% had combined self learning with formal courses. This may have contributed to the users' restricted knowledge of computers and the Internet.

When the group was asked about teaching methods:

- 69% thought conventional methods, such as chalk and blackboard, were of moderate benefit and 10% thought they gave the maximum benefit.
- 48% thought computer aided lectures and seminars were of moderate benefit and 42% thought they gave maximum benefit.

Most of the group (82%) thought simulation was beneficial. About 60% had practiced on simulating programmes during their training and these were mostly consultants and registrars. Simulation is not widely available in the Sudan.

Therefore we concluded that lectures and seminars are better appreciated when aided with computer facilities such as video clip diagrams and pictures which draw attention and are visually attractive.

The majority of the doctors (98.9%) enrolled in the study suggested that IT should be introduced to the medical curriculum. This will require more investment in technology and computer assisted programmes. Obstacles cited against using technology were mainly limited time (52%) and difficult access due to limited availability of computers (34%) for the doctors.

To ensure maximum benefit we should consider reducing and systemizing the working hours for doctors enrolled in rotation programmes so they have the time to update their knowledge. Moreover the provision of free courses in computer skills and other aspects of IT as well as easy access to the equipment would be greatly beneficial.

Last but not least, we recommend constructing a website for continuous professional development of surgeons in Sudan.

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