ABSTRACT

In the last decade, advances in medicine, telemedicine, computer technologies, information systems, Web applications, robotics and telecommunications have enabled creation of new solutions for training and continued education in various medical disciplines. This chapter presents most recent developments and future trends in distance learning for surgeons, focusing on the following goals: a) Building a comprehensive, world-wide, virtual knowledge base for various disciplines of surgery and telesurgery, including text documents, videos, case studies, expert surgeons’ opinions, and relevant references; b) Building a virtual knowledge base for rare medical cases, conditions and recommended procedures; c) Interactive multimedia simulators for hands-on training in all surgical disciplines; d) Building a worldwide surgical community, which will accelerate the accumulation and sharing of the latest surgical breakthroughs and technological advances throughout the world. Above all these goals, the most important goal is to improve patient health and convenience, and reduce risks of mortality and complications.

INTRODUCTION

According to the U.S. Bureau of Labor and Statistics (http://stats.bls.gov/oco/ocos074.htm), employment of physicians and surgeons will increase annually 10% - 20% through the year 2012 because of the expansion of the health care industry. The growing and aging population will drive overall growth in the demand for medical services. Therefore, the demand for surgeons is
expected to be favorable, although highly sensitive to changes in consumer preferences, healthcare reimbursement policies, and legislation. Reports of shortages in some surgical disciplines or geographic areas should attract new entrants (surgeons), encouraging schools to expand their programs and hospitals to expand available residency slots. On the other side, new entrants may be discouraged by demand for the long-term commitment and high expenses of surgical education and training. To become a surgeon, it takes 4 years of undergraduate school, 4 years of medical school, and 3 to 8 years of internship and residency.

Surgical training requires close supervision and evaluation. Technical competence of surgical learners is evaluated by the mentor and has always been subjective (Otta, 2005). Typically, qualitative rather than quantitative evaluations are performed in traditional surgical training.

Based on the most recent trends in surgery, distance learning represents a very attractive medium for training of new as well as continuing medical education (CME) for seasoned surgeons in:

- **Traditional Surgical Procedures**: Traditional surgery typically involves 20 to 80 cm long incisions into a patient’s body in order to examine or treat a certain organ or tissue (Otta, 2005).

- **Laparoscopy Procedures**: Laparoscopy (minimal invasive surgery) is a relatively new surgical technique that enables major abdominal procedures with only four to five 1 cm long incisions into the patient’s abdomen. The surgeon passes the video imaging scopes and surgical instruments into the abdominal cavity and completes the procedure while monitoring the operation on a display. The advantages of laparoscopy include: a) less postoperative pain, b) earlier patient’s recovery and hospital discharge, c) reduced costs, d) earlier return to work or normal activity, and e) fewer complications (Otta, 2005).

- **Robotic Telesurgery**: In 2001, the first telesurgical operation (called the “Lindbergh Operation”) was performed at a distance of 4,000 miles by a surgeon in New York, USA on a patient in Strasbourg, France. Using a satellite link to control remotely a surgical robot, the surgeon successfully removed the patient’s gallbladder. This first telesurgery operation has demonstrated an enormous potential to expand the availability of surgical expertise to patients worldwide. On the other side, it has also clearly indicated that telesurgical technology needed to be improved with respect to tactile feedback, instrumentation, telecommunication speed and availability (Eadie, L. H., Seifalian, A.M., Davidson, B.R, 2003). In addition, new challenges in telesurgery have been discovered in the domains of education, liability, legislation, health insurance, and costs.

Laparoscopy and robotic telesurgery require skills that are very different from the skills required in traditional surgical procedures. Surgeons accustomed to using the sense of touch have to learn to perform surgery using a video monitor instead of direct vision, how to compensate for reduced depth perception, and how to distinguish nearly identical-looking objects.

**INFORMATION TECHNOLOGY IN SURGICAL EDUCATION**

Information technology has become a critical component of initial and continuing medical education (CME) as well as daily surgeons’ practice. According to a survey done by American College of Physicians (2004), approximately 20% of physicians use computers for education. 41% of them prefer electronic formats (primarily, the Internet), 32% non-electronic, and 27% rated...
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