World J Surg (2008) 32:2134–2137
DOI 10.1007/s00268-008-9638-1

World Journal of Surgery

Surgical Education and Postgraduate Training in Japan

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Published online: 19 June 2008

Abstract Japanese students must pass very competitive entrance examinations to enter medical school after graduating from high school at the relatively young age of 18. There are currently 80 medical schools in Japan, with approximately 7700 students graduating annually. Since 2004, after passing the National Medical Board Examination, all medical graduates are required to complete a 2-year period of clinical training to become medical practitioners. Surgical residency starts only at the third postgraduate year. The Japan Surgical Society initiated a new surgical board certification system in 2002, defining minimum requirements to qualify for the specialty. Four subspecialties are recognized along with general surgery: gastroenterological surgery, cardiovascular surgery, thoracic surgery, and pediatric surgery. General surgery board certification is a prerequisite for subspecialty board certification. Notwithstanding these revisions, the number of surgery candidates is steadily declining because work conditions in the surgical profession are viewed as unfavorable. To regain some level of the previous attractiveness and glory of this specialty, surgeons need to receive significant incentives that counteract some of the downsides of the life of a surgeon.

Historical background of surgical education in Japan

The Tokugawa Shogunate maintained an isolationist policy for nearly 200 years, from the 16th to the 18th century, for the stability of the nation. However, the shoguns maintained an open window to the world on the small artificial island of Dejima in the Bay of Nagasaki, where trade with Holland were exclusively allowed. Numerous Dutch surgeons landed at Nagasaki as factory doctors for the Dutch East India Company. Japanese official translators had contact with these surgeons, translating surgical textbooks and learning surgical techniques. Philipp Franz von Siebold, a factory surgeon and outstanding scholar, brought in surgical instruments and was allowed a medical practice outside of Dejima [1]. He founded a private medical school at his home in Nagasaki and issued medical licenses to students who had completed the course [2].

After the Meiji Restoration in 1868, when the feudal system collapsed, the Japanese government adopted German medicine as a model for the emerging medical system. However, following defeat in World War II, Japan received greater influence from the United States. The rotating internship was introduced as part of an American-style postgraduate education. At this stage, interns were unpaid because they did not yet have a medical license. Medical student frustration and anger peaked in 1968, after which the Japanese government abolished the internship system.

During the four decades that followed, Japanese physicians were not trained in primary care medicine but instead concentrated on their specialties. This system initially created a shortage of pediatricians, and nonpediatricians (even internists) hesitated to treat children. The increasing number of lawsuits for malpractice by nonspecialists exacerbated this problem and brought about a medical crisis in pediatric emergency care. Following this painful lesson, a 2-year compulsory clinical training system was restored in 2004, this time with the financial support of the government. At present, there are 80 medical schools in Japan with approximately 7700 students graduating annually.

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Surgical education at medical school

After graduating high school at 18 years old and passing extremely competitive entrance examinations, students in Japan can enter medical school, which is not a graduate school as in the United States. The curricula of medical schools formerly consisted of a 2-year premedical course (liberal arts) and a 4-year medical course. However, this framework were abolished in 1991 in accordance with increasing amounts of medical information. Medical schools have become free to create their own 6-year curricula. As a result, curricula have become different depending on the specific school.

The curriculum of the Kyorin University School of Medicine, for example, consists of liberal arts in the first year, basic medicine in the second and third years, clinical medicine in the third and fourth years, and clinical training, including clinical clerkship, in the fifth and sixth years. Surgery is taught in an integrated curriculum that includes the digestive, circulatory, respiratory, and nervous systems, tumors, emergency medicine, and critical care and childhood, along with internal medicine, pediatrics, obstetrics and gynecology, radiology, pathology, and so on. Students must pass a computer-based test (CBT) and objective structured clinical examination (OSCE) before starting clinical training. During clinical training in the fifth year, students study by seeing patients under the supervision of instructors [3]. Students rotate through 4 weeks in general surgery, 1 week in pediatric surgery, and 1.5 weeks each in cardiovascular surgery and neurosurgery. In the clinical clerkship of the sixth year, students can choose two departments for 4 weeks each at hospitals at which they want to be trained. A student who wishes to be trained as a surgeon can undergo a clinical clerkship in surgery at two different hospitals inside or outside Japan. As mentioned above, the curriculum differs more or less according to each medical school.

A medical student is granted the diploma of Medical Bachelor on graduation and obtains a National Medical License by passing the National Medical Board Examination.

Postgraduate surgical education

In 2004, a new regulation regarding the postgraduate training system for physicians came into effect. All medical graduates, after passing the National Medical Board Examination, are now required to complete a 2 years of clinical training to become medical practitioners (Fig. 1). According to the new training program designed by the Ministry of Health, Labour and Welfare, clinical trainees rotate through the services of internal medicine, surgery, emergency medicine, pediatrics, obstetrics and gynecology, psychiatry, and local healthcare for 1–3 months each as compulsory, with other services as electives. Training hospitals are decided by a computer matching program as with residencies in the United States. The trainee is paid a stipend of approximately 200,000–300,000 yen (1,700–2,600 dollars) a month, and working additional jobs or hours ("moonlighting") is prohibited. This new clinical training system is not yet on the right track, however, as the matching program can cause an uneven distribution of doctors.

The number of medical school graduates who remain at university hospitals for postgraduate training has declined due to the matching program, resulting in a shortage of physicians at university hospitals. University hospitals have thus recalled doctors from affiliated hospitals to supplement the reduced labor force. As a consequence, many hospitals, particularly those in rural districts, have been forced to close major departments such as pediatrics, obstetrics, and anesthesiology because their doctors have been recalled to university hospitals and young physicians

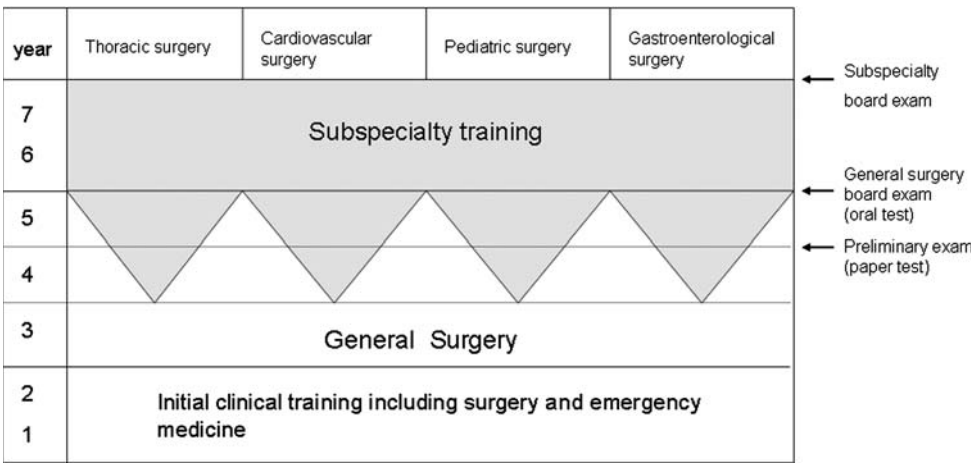

Fig. 1 Postgraduate training program and board examinations

did not apply to those "inconvenient" hospitals in the matching program. We need to wait until the movement of doctors reaches an equilibrium, then the distribution of doctors should return to an even level.

According to these changes in the initial clinical training system, surgical residency is delayed until the third postgraduate year. Surgical residency programs also differ according to the specific hospital, but the Japan Surgical Society (JSS) defines minimum requirements of surgical experience for application for the title "board-certified surgeon." Thus, residency programs of every registered hospital are largely standardized to meet these requirements. The program includes pathophysiology, diagnostic planning, perioperative care, and basic therapeutic skills in general surgery, emergency medicine, and subspecialties.

Requirements for general surgery board certification

In 2002, the Ministry of Health, Labour and Welfare eased the restriction rule for physicians to advertise their specialties in public. The new rule states that a specialist needs to be certified by a corporate body after a minimum of 5 years of training. This announcement impacted the surgical board certification system, as the former program for a board-registered surgeon required only 4 years of training. The JSS had to initiate a new certification system for a 5-year training program in 2002 to meet this law (Fig. 1). Thus, 2007 was the first year for the new board certification of general surgery.

Physicians who want to be board-certified surgeons must first register with the JSS before starting the surgical residency program. They are required to perform precisely defined numbers and types of operations and to gain experience in presenting or publishing a paper, in addition to taking board examinations. Board examinations are conducted in two steps: a preliminary writing test after a minimum of 4 years of training and an oral test by interview after 5 years or more. The initial 2 years of clinical training can be taken into account as clinical experience. This means 3 years of training as a surgical resident is the minimum requirement for qualification. Knowledge of general surgical principles is evaluated in a written test, and the ability to solve clinical problems and knowledge of appropriate ethical behavior are assessed by an interview with two examiners.

A resident is required to partake in at least 350 operative procedures either as an operator or as an assistant in all fields of general surgery, including minimum numbers of digestive (50 cases), breast (10 cases), thoracic (10 cases), cardiovascular (10 cases), head, neck and endocrine (10 cases), pediatric (10 cases), trauma (10 cases), and laparoscopic surgeries (10 cases). In addition, the resident is required to be an operator in at least 120 surgeries.

The certificate is valid for 5 years and is renewed by credits of attendance at major surgical meetings over the past 5 years.

Interactions in training between general surgery and surgical subspecialties

Four subspecialties are recognized along with general surgery: gastroenterological, cardiovascular, thoracic, and pediatric (Fig. 1). General surgery board certification is a prerequisite for subspecialty board certification. Surgeons must exceed the minimum requirements of operative experience and pass the certifying examination conducted by each society. Two more years of training, for a total of 7 years after graduation, are necessary to take a board examination for subspecialties.

Generally speaking, a physician who completes the 2 years of clinical training becomes a resident of a subspecialty department at a university hospital or teaching hospital qualified by both the JSS and the specific society of the subspecialty. Educational policy differs according to individual departments, which offer a 5-year program, including general surgery, to become a board-certified specialist as well as a board-certified surgeon. The 7-year program of subspecialties and 5-year program for general surgery partly overlap. The common subjects of the two programs are counted as experience for both.

The kinds and numbers of operations required to apply for status as a board-certified surgeon have long been a matter of contention. In training programs for cardiovascular surgery, for instance, there is little overlap in programs because general surgery is almost synonymous with digestive and abdominal surgery. Cardiovascular surgeons want to begin training in cardiovascular surgery as early as possible after a short period of training in basic surgery [4].

Research at graduate schools

In the past, every resident at a university hospital was given a clinical or basic research theme from professors to obtain a PhD degree (Doctorate of Philosophy). This system supported the advancement of surgical science at university. Since the introduction of board certification, very few residents wish to undertake research. Many seem to think that board certification is sufficient for their future career and do not want to sacrifice their time for research. For those wishing to obtain academic positions, however, a PhD in Medical Science is essential. Such students are encouraged to attend graduate school and engage in research for 4 years. These students are then exempted

from clinical duties but must pay tuition to the graduate school.

Crisis in surgical education

Currently, surgery does not seem particularly attractive to medical students. The number of medical students who want to become surgeons is declining every year. Labor conditions for surgeons are expressed by the three Japanese "Ks": "kitsui" (hard or tough); "kitanai" (dirty); and "kiken" (risky). Students were more willing to face these challenges in the past, but that spirit seems to be disappearing among both students and existing surgeons.

In 2005, police arrested an obstetrician at a general hospital in Fukushima Prefecture because of a cesarean section he performed that resulted in the death of the woman from bleeding. The woman had placenta accreta, firm attachment of the placenta to the uterine wall. The doctor, the only obstetrician of the hospital, was arrested on suspicion of professional negligence resulting in death and for violating the Medical Practitioners Law by failing to report the death to the police. Japanese Medical Practitioners Law states that surgeons must report to the police within 24 h the unexpected death of a patient caused by an operation. This news that they might become subject to criminal prosecution was a big shock to all doctors working in surgical fields. The SCC and other surgical societies appealed against the arrest of this obstetrician. Given the massive growth in the demand for surgeons, similar troubles with patients or families are not rare these days. As a result, surgeons tend to hesitate in accepting risky patients or attempting risky operations. Surgeons are quitting from teaching hospitals and tend to practice simple surgeries or primary care only at their own clinics. This tendency in Japan is known among surgeons as "quitting sabotage." This issue is deeply related to fundamental problems in the Japanese healthcare system. All Japanese people are equally covered by a national insurance system and can choose any hospital they wish to visit. The patient then needs to pay 0–30% of the medical fees, mainly according to age and income.

Japan's expenditure for healthcare as a share of its gross domestic product (GDP), based on OECD Health Data in 2004, was ranked 22 (8%) of 30 countries and the lowest among the G7 nations (mean = 10.2%) [5] (Fig. 2). Medical costs are incurred mainly for drugs, surgical supplies, and disposable instruments. Although surgical fees

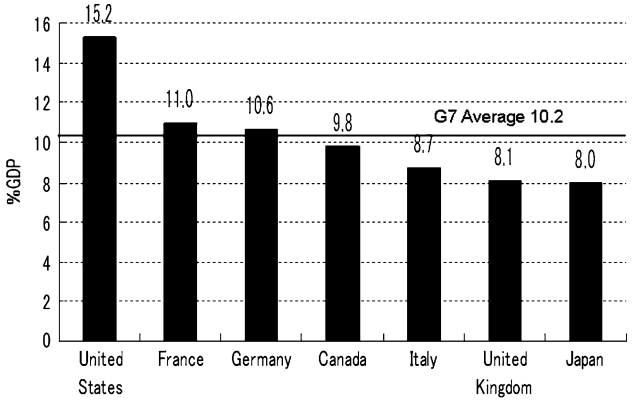

Fig. 2 Total health expenditures of G7 countries as a share of GDP in 2004 (OECD Health Data 2007 http://www.oecd.org/health/healthdata)

are determined by the required length of the operation, required numbers of personnel, and level of difficulty, they are kept very low. Also, there is no concept of a doctor's fee in the healthcare system. Doctors are employed by hospitals and paid monthly salaries that are in many cases lower than those of employees of major companies. Salaries are basically the same for doctors in every department who are the same age and same position. In other words, the efficient Japanese healthcare system is maintained at the expense of cheap labor by doctors, at the same time that surgeons are experiencing burnout. Many surgeons consider that any social prestige and income of their position does not counterbalance the hard, dirty, and risky work they perform. Unless this situation is improved, surgery in Japan will decline and the healthcare system itself will start to break down. Significant incentives that can counteract some of the downsides in the life of a surgeon are important factors for medical students and young surgeons to return to the specialty of surgery.

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