Medical Education in Japan

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Abstract

There are 79 medical schools in Japan—42 national, 8 prefectural (i.e., founded by a local government), and 29 private—representing approximately one school for every 1.6 million people. Undergraduate medical education is six years long, typically consisting of four years of preclinical education and then two years of clinical education. High school graduates are eligible to enter medical school. In 36 schools, college graduates are offered admission, but they account for fewer than 10% of the available positions. There were 46,800 medical students in 2006; 32.8% were women.

Since 1990, Japanese medical education has undergone significant changes, with some medical schools implementing integrated curricula, problem-based learning tutorials, and clinical clerkships. A model core curriculum was proposed by the government in 2001 that outlined a core structure for undergraduate medical education, with 1,218 specific behavioral objectives. A nationwide common achievement test was instituted in 2005; students must pass this test to qualify for preclinical medical education. It is similar to the United States Medical Licensing Examination step 1, although the Japanese test is not a licensing examination.

The National Examination for Physicians is a 500-item examination that is administered once a year. In 2006, 8,602 applicants took the examination, and 7,742 of them (90.0%) passed. A new law requires postgraduate training for two years after graduation. Residents are paid reasonably, and the work hours are limited to 40 hours a week. In 2004, a matching system was started; the match rate was 95.6% (46.2% for the university hospitals and 49.4% for other teaching hospitals).

Sustained and meaningful change in Japanese medical education is continuing.

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Japanese medical education has undergone significant changes since the start of the final decade of the 20th century.[1,2] This report presents an overview of the steps of the Japanese medical education process, highlights the factors that influenced the recent changes, provides an overview of the current state of Japanese medical education, and concludes with some perspectives on its future.

Medical Schools

There are currently 79 Japanese medical schools, representing approximately one school for every 1.6 million people. There are 42 national, 8 prefectural (founded by a local government), and 29 private medical schools. There is an additional medical school, the National Defense Medical College of the Japan Defense Agency, which is sometimes included as one of the national medical schools, bringing the total to 80 schools. The regulating body over all of the medical schools is the Ministry of Education, Culture, Sports, Science, and Technology (MEXT). Two of the private medical schools have unique missions: the Jichi Medical School educates all physicians for community care, and the University of Occupational Environmental Health educates physicians for industry, such as occupational physicians (employed by companies with more than 50 employees to care for them and foster a safe work environment), physicians for 34 hospitals of occupational diseases, medical officers of the organizations related to laborers' health, and researchers of occupational and environmental health.

A few years ago, the Japanese government decided to convert the national universities to nongovernmental institutions, in an effort to reduce the number of government employees and save money. In 2003, the National University Corporation Law[3] was legislated, and on April 1, 2004, all of the national universities, including 42 national medical schools, became "national university corporations."[4] This change required the universities to take responsibility for their own finances and financial management. To cope with this change, by 2006, 7 of the 12 stand-alone national medical schools had merged with their neighboring national universities.

Undergraduate Medical Education

Programs for high school graduates

The standard Japanese undergraduate medical education program is six years long. Typically, there are four years of preclinical education and then two years of clinical education. High school graduates are eligible to enter medical school. The initial phase of undergraduate medical education contains, to varying degrees, general education in subjects such as biology, chemistry, physics, and mathematics, as well as a wide range of liberal arts subjects. The academic year starts on April 1 and ends on March 31. Japanese is the official language for medical education.

Programs for college graduates

Programs for college graduates were implemented for the first time at Osaka University in 1975, and by 2006, they had

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been adopted by 36 (46%) of the 79 medical schools,[5] but they account for fewer than 10% of the available positions. The graduate-entry programs were implemented in a structure parallel to that of the typical entry programs for high school graduates. The graduate-entry programs are four years long in 21 schools and five years long in 11 schools. For the remaining four schools, MD–PhD programs are provided as a part of their graduate-entry programs; the number of seats for the MD–PhD program is limited to five or fewer at each of these schools.

Student selection

Approaches to student selection vary,[6] but all include some combination of paper-based achievement tests, interviews, reports of high school grade-point averages, recommendations from students' high school principals, and writing essays. In 2005, all 43 of the national and 8 of the prefectural medical schools used a national test administered by the National Center for University Entrance Examinations, which was established in 1988.[7] The required subjects are Japanese language, English, mathematics, two natural sciences (biology, physics, chemistry, geoscience, etc.), and two social studies subjects (Japanese history, world history, human geography, etc.). Private schools require English, mathematics, and two of three natural sciences (biology, chemistry, and physics). The test items are created primarily by the individual schools. There are admission offices in 7 of the 79 schools.

Medical students

In 2006, out of 103,384 applicants, 7,282 matriculated in the 79 schools.[8] In that year, there were fewer than 5% of graduate-entry students per school in 26 schools, 10% in 7 schools, 15% in one school, 20% in another school, and 40% in one other school.[5] The total number of medical students in Japan was 46,800[8] in 2006, of whom 15,331 (32.8%) were women.

The model core curriculum

In 2001, the Report of the Coordinating Council on the Reform of Medical and Dental Education[9] of the MEXT advocated guidelines for innovative changes to Japanese medical education. The report proposed an exemplary model of an integrated medical education curriculum, a "model core curriculum," which was developed by the Subcommittee for Research and Development of Medical Education Programs. The model curriculum outlined essential core components of the undergraduate medical education program; these were presented as educational content guidelines with 1,218 specific behavioral objectives. All Japanese medical schools were expected to implement the core curriculum using 70% of the existing contact hours, leaving 30% of contact time to achieve their school-specific curriculum goals. The coordinating council report also contained guidelines for implementing the clinical clerkship[10] and guidelines for evaluating the educational activities of faculty.[11] The guidelines were a product of cooperative work involving representatives of all 79 Japanese medical schools. The guidelines include the essential knowledge and skills of medical education as well as noncognitive elements and topics, such as principles of medical practice, communication and the team approach, problem solving and logical ways of thinking, safety, and risk management.

In response to this report, a series of remarkable changes have occurred in Japanese medical education.

Responses to a survey[12] conducted by the Association of Japanese Medical Colleges in 2005 revealed that the components of the core curriculum had already been implemented in 66 medical schools (83%), were under way in three schools (4%), were being planned by four schools (5%), and had not yet being planned by three schools (4%). Three schools (4%) did not reply to the question.

Curriculum structure

Integrated curriculum. In 2005, 32 schools (41%) had implemented an integrated curriculum in various ways.[12] In another 38 schools (48%), the curriculum was only partially integrated. Of these 70 schools, integration was throughout all four years in 16 schools, in years 2 to 4 at 19 schools, in year 3 in 15 schools, and in year 4 or later in 11 schools. Precise information was not obtained from nine schools. The remaining nine schools (11%) of Japan's 79 schools maintained a discipline-oriented curriculum.

Problem-based learning. Problem-based learning (PBL, or tutorial education) was systematically incorporated into an integrated organ- and system-based curriculum for the first time at Tokyo Women's Medical University in 1990.[13] In October 2004, a survey indicated that PBL was the prevalent educational method at 63 of the 79 Japanese medical schools (80%),[14] and PBL was planned in an additional 13 schools (16%). Two schools (3%) expressed no intention of adopting PBL at the time of the survey, and one school (1%) did not reply to the questionnaire.

The implementation of PBL in Japanese medical education has accelerated since it was first introduced in 1990. By 1994, three schools (4% of 79 schools) had introduced PBL; from 1995 to 1999, 11 more schools (14%) had done so; and between 2000 and 2004, PBL became the teaching method in 49 schools (62%).[13,14] PBL was implemented beginning in the first year at 16 schools, at the beginning of the second year in 13 schools, in year 3 in 18 schools, and in year 4 in 16 schools. All of the PBL programs are the so-called "hybrid" type (a mixture of Barrowsian PBL and lectures).

Student assessment

The Common Achievement Test. The Common Achievement Test (CAT) is a new quality-assurance measure of students' mastery of the preclinical core curriculum at their medical school. The Common Achievement Tests Organization[15] (CATO) was established in March 2005 as a consortium of all the Japanese medical and dental schools and is responsible for the administration of the CAT.[16] After several nationwide yearly trials since 2002, the CAT was officially implemented in December 2005. Students must take and pass the CAT before starting their clinical education. The content of the CAT and the expected level of achievement have been developed in accordance with the model core curriculum of 2001. The CAT is composed of two phases: a computer-based testing (CBT) phase and an objective structured clinical examination (OSCE).

The CBT phase can be administered at the individual member schools at their convenience; an examinee can access the test from his or her desktop computer. The CBT is composed of 300 items, and

the testing time is six hours. The blueprint for the CBT portion of the test was developed with national input from medical school faculty. Subject areas, and the proportion of each for the CBT, are

- principles of medicine, 5%;
- general principles of biomedical sciences, 20%;
- organ-based normal structure, function, pathophysiology, diagnosis, and treatment, 40%;
- systemic physiological/pathological changes, 10%;
- introduction to clinical medicine, 15%; and
- health promotion/patient care/society, 10%.

Every year since 2001, approximately 10,000 new items have been collected from all 79 medical schools, then reviewed by the education committee of CATO, edited, tested in trials, reevaluated, and pooled when regarded as appropriate. Item-writing workshops have been held throughout Japan. The nationwide trials have been repeated each year since 2002. The test items are randomized sets of questions from the item pool, which is housed in the central host computer at CATO. The order of the items is shuffled by the computer so that individual examinees will have different-looking examinations, although the contents are the same.

The second part of the CAT is the OSCE. The OSCE assesses clinical competencies in six stations: medical interviewing (10 minutes), head and neck (5 minutes), vital signs and chest (5 minutes), abdomen (5 minutes), neurological examinations (5 minutes), and basic minor surgical procedures and life support (5 minutes). Because of the constraints in facilities and budget, the number of stations was restricted to six in 2005. The evaluators in each station consist of one person from outside and one within the institution, for economic reasons. The evaluation sheets were developed and standardized through repeated trials between 2002 and 2005. Workshops for training standardized patients and OSCE evaluators have been conducted both locally and nationwide.

The CAT is similar in format to the Step 1 examination of the United States Medical Licensing Examination, although it is not actually a licensing examination. Each school establishes its own policy for use of the test results. Schools may choose to use the CAT to perform a formative evaluation or a summative one. Test results are given individually to the students and to the medical schools. The costs per school for the administration of the CAT are ¥1,514,000 ($13,000) each year, and ¥28,000 ($240) for each applicant.

Clinical skills laboratory. With the implementation of the CAT, many medical schools were under pressure to provide clinical skills laboratories for their students. By 2005, 50 schools (62.5%) had developed clinical skills laboratories,[17] and an additional 14 schools (17.5%) were preparing to develop them. A series of simulators are used in the laboratories. Responses to the 2005 survey by the Association of Japanese Medical Colleges indicated that the costs of the necessary equipment ranged between ¥5,770,000 ($50,000) and ¥70,000,000 ($600,000) (average is ¥31,500,000, or approximately $270,000).

Clinical clerkship

The Japanese Medical Practitioner Law (*Ishi-hou*) Article 17 prescribes that no one will be allowed to perform medical acts without a physician's license, and Article 37 determines that a person who violates Article 17 will be sentenced to no more than two year's penal servitude or be punished with a fine of no more than ¥20,000 ($170). For many years, this legislative control inhibited medical educators from developing and implementing clinical clerkships. Because of the restrictions, undergraduate clinical education had consisted either of observing what the instructors did in actual medical acts (bedside teaching) or of practicing simulations of history taking or physical examinations with the consent of patients (bedside learning).

In 1991, a study committee for clinical education of the Ministry of Health and Welfare issued a report[18] arguing that the purpose of Article 17 was to protect the life and safety of patients. Therefore, medical procedures performed by medical students would not be deemed unlawful when the purposes, contents, and processes were reasonable from an educational standpoint and when the procedures would be as safe as when performed by a certified medical doctor. The study committee also proposed four requirements to allow medical students to perform certain limited medical acts during their clinical training:

- The acts should not be highly invasive, which should be stipulated explicitly.
- The acts should be carried out under the meticulous guidance and watchful supervision of teaching faculty.
- The clinical competence of the students should be evaluated/qualified in advance.
- Informed consent of the patients/families should be obtained.

The committee developed the following classification of medical acts: level 1, low-invasive medical acts, to be performed by ordinary-level medical students; level 2, moderately invasive medical acts, to be performed only by selected students deemed capable; and level 3, highly invasive medical acts, which should not be performed by medical students. Every medical school takes responsibility for determining which medical acts are permitted at a given level. This committee report provided the incentive for the development of clinical clerkships in Japan. In 2005, clinical clerkships were implemented in 66 medical schools (84%), although their degree of emphasis within each school's entire clinical education program varied. Clinical clerkships were under consideration in an additional 13 schools (17%).[19]

The MD degree

At the end of the final academic year, there is a graduation examination designed by each medical school. It is usually a paper-based test, but it may also include an advanced OSCE (not the same as the CAT OSCE) in some medical schools. The successful examinee is awarded an MD degree in the graduation ceremony at the end of March.

National Examination for Physicians

The Japanese National Examination for Physicians is conducted once a year for three days in mid-February by the Ministry of Health, Welfare, and Labor[20] at 12 sites covering the Japanese archipelago. The applicant must submit a certificate of completion of formal

undergraduate medical education in Japan or in a foreign country. All students eligible to graduate on March 31 of the same year may sit for the examination. Those who pass this examination are granted a National License for Physicians and are eligible for residency training (discussed in the next section).

The examination is a paper-based test with 500 multiple-choice questions. There are 100 required items containing a number of essential questions designed to reveal possible contraindicated behaviors of a physician. The "blueprint" for the examination (i.e., its composition and the proportion that each topic area contributes to the examinee's grade on the required items) is publicized and available for all candidates to view before taking the examination[21] (see List 1 for a recent blueprint). The passing level for these required questions is 80% or more correct answers.[22] There are an additional 200 items of general questions and 200 items of clinical vignettes. The blueprint for these general questions and clinical vignettes is also publicized. The passing levels for general questions and clinical vignettes are determined by norm-based relative assessment. Each individual is informed of the exact results of his or her examination performance, the pass level of the examination, whether he or she passed or failed, his or her scores on each category, and his or her position in the distribution of total applicants. In 2006, the total number of applicants taking the examination was 8,602, and the number of successful candidates was 7,742 (90.0%): 5,213 men and 2,529 women. Success rate was 93.9% for the new graduates and 57.3% for the others; the success rate was 88.5% for men and 93.3% for women[23].

Before 2001, test items were created solely by the members of the examination committee and were publicized, but since 2001, faculty of medical schools and teaching hospitals, as well as members of the Japan Medical Association, have contributed to the development of the test items and the used items will not be publicized.

List 1

The Topic Areas on the Japanese National Examination for Physicians and the Percentage that Each Area Contributes to the Examinee's Grade on the Required Items in Each Topic, 2006*

- Patient's rights/medical ethics (4%)
- Society and medical services (2%)
- Medical information and certificates (2%)
- Structures and functions of the human body (3%)
- Medical interview (6%)
- Principal symptoms (15%)
- General physical examination (13%)
- Basic clinical tests (5%)
- Basic clinical decision making (4%)
- Primary ambulatory care (9%)
- Principal diseases/traumas/syndromes (10%)
- Fundamentals of treatment and basic clinical skills (8%)
- Team approach of medical services (3%)
- Lifestyles and risks for health (6%)
- Psychological/social aspects of patients (5%)
- Quality and safety of medical services (3%)
- General aspects of being educated (2%)

*This examination is given once a year to all graduates of Japanese medical schools and includes 100 required items among its 400 total items. The passing level for the required items is 80%. The type of information on the list above is publicized and available to all candidates before taking the exam or more correct answers. In addition, there are 200 items of general questions and 200 items of clinical vignettes. The separate blueprint for these general questions and clinical vignettes is also publicized.
Adapted from: Study Committee of National Licensing for Health Personnel. Guidelines for the National Examination for Physicians. 2005 Edition. Tokyo: Mahoroba Co. Ltd; 2004. Used by permission.

Initial Postgraduate Clinical Training and the Matching System

Those who obtain a National License for Physicians may proceed to the next step, an obligatory initial postgraduate clinical training program (i.e., residency training), which lasts two years. Japanese formal postgraduate training originated in 1946 as a compulsory one-year internship, but it was eliminated in 1968 because of the inappropriateness of the curricula and the lack of financial support for the interns. It was replaced by a noncompulsory two-year postgraduate clinical training system. An ordinance from the Ministry of Health, Labor, and Welfare, Number 158, was legislated[24] in 2002, and a new two-year postgraduate clinical training system started in 2004. The curriculum focuses on providing a solid grounding and effective training in primary care and general medicine, regardless of the possible future specialty choice of the physician. The curriculum stipulates that the first year of training should be devoted to general internal medicine (no less than six months), general surgery, and emergency medicine (including anesthesiology). Additional required training (done in the second year) includes education in pediatrics, obstetrics and gynecology, psychiatry, and community medicine. Training under the new system is a requirement for any physician who was registered on April 1, 2004 and thereafter, if he or she intends to engage in patient care.

The teaching hospitals for the postgraduate training are classified into three types. *Independent hospitals* train residents independently; these hospitals are university hospitals and principal, large teaching hospitals. *Administrative hospitals* train residents in collaboration with *cooperative hospitals,* each of which plays a supplementary role in cooperation with an administrative hospital.

To make residency training effective, trainees must be paid reasonably, and so-called "moonlighting" is strictly prohibited by law. The work hours of residents are limited to prevent overwork. On June 3, 2005, the Supreme Court of Japan ruled that one resident's death had been the result of overwork in a university hospital. The court stated that although the trainee could be regarded as a learner on the one hand, in Japan, trainees must also be regarded as laborers

under the Labor Standards Law when they are engaged in medical services under the supervision of teaching faculty. This definition of a resident's status fostered a new rule by the Supreme Court, mandating that a trainee's formal working hours should be principally limited to 40 hours a week, as is the case with all ordinary workers in Japan. However, such limitation of labor hours is applied only for the initial required two years, and not to the senior residents of the third year or higher, or to faculty.

In 2004, a matching system was implemented and organized by the Council for Matching,[25] a nongovernmental organization. Previously, there had been no nationwide matching system, and the residents had applied arbitrarily to the individual training programs in which they were interested. In 2005, there were proposals of 1,261 training programs, with 11,228 total positions available at 1,016 hospitals. Among 8,472 applicants, 8,100 (95.6%) were matched (46.2% for the university hospitals, 49.4% for other teaching hospitals). Of those who were matched, 2,496 (30.8%) matched to his or her own university hospital, 1,420 (17.5%) matched to another university hospital, and 4,184 (51.7%) went to other teaching hospitals that were approved by the Ministry of Health, Welfare, and Labor. The remaining 372 applicants who did not match to programs probably found positions on their own, through direct negotiation with individual hospitals. After the initial required two-year postgraduate training, the trainee advances in his or her own career path and may enter graduate school, proceed to an advanced clinical training course for a specialist, or serve as a general physician in the community

Advanced Postgraduate Clinical Training Programs for Medical Specialists

The advanced postgraduate clinical training programs for medical specialists are offered by the clinical departments of the medical schools and at a number of teaching hospitals. These training programs are between four and six years in length. During or after finishing this advanced clinical training, the trainee may sit for the board examination for a basic specialty approved by the academic societies. Eligibility for the board examination includes finishing a qualified training period of five years at the designated teaching facility, for which the period of initial obligatory postgraduate training may be counted. Successful applicants are given the title of board-certified medical specialist of the academic society.

The system of medical specialties is organized by the Japanese Board of Medical Specialties,[26] which was established in December 2002 under the auspices of the Japan Medical Congress, the Japan Medical Association, and the Council of Medical Specialties. Eighteen fields were designated as the basic specialties, and the corresponding academic medical societies/associations are responsible for their specialties' board examinations. A physician is allowed to practice in only one basic specialty.

In addition to the basic specialties, there are 26 subspecialty societies/associations and seven societies/associations that cover multiple areas. A physician may practice in multiple subspecialties as long as he or she has already qualified as a specialist in either internal medicine or surgery.

Education at Graduate Schools

Until March 2005, 23 of the 43 national university corporations for medicine and four of the eight prefectural medical schools had changed their principal focus from "school of medicine" to "graduate school." This movement was known as "prioritizing graduate school," following a policy of the MEXT. As a consequence, the faculty belong primarily to the graduate school. However, all medical graduate schools also have undergraduate schools of medicine, and all the faculty of any graduate school concurrently hold positions in the undergraduate schools of medicine.

Both medical and nonmedical graduate courses are provided in all 79 medical schools. The master's degree courses are for two years, and the PhD degree courses are for the succeeding two years. Thirty-seven schools offer master's courses for graduates who have completed a nonmedical undergraduate education. The only schools of public health are at Kyoto University and Kyushu University; in 2007, Tokyo University will be added.

In 2003, the total number of students in the graduate schools who were studying medicine was 16,914, representing 81.4% of the capacity of seats. Among them, 4,460 (26.4%) students were *shakai-jin*, meaning students who have full-time or part-time jobs.[27] To accommodate their work schedules, the contact hours for these students are usually not during the daytime.

Current Issues and Future Perspectives

Stimulated by the model core curriculum as the benchmark, undergraduate medical education curricula have significantly changed in most medical schools in Japan. Eighty-three percent of the schools have implemented a standard core curriculum, and 80% have implemented PBL education in recent years. The nationwide CBT may have accelerated innovation by serving as evidence of effective education. The nationwide OSCE in the CAT also seems to have enhanced the quality of clinical education, judging from the rapidly increasing number (in 49 to 62% of 79 medical schools) of clinical skills laboratories and by the prevalence of teaching skills workshops. The CAT also seems to have influenced the National Examination for Physicians. Preliminary research[22] is under way by the Ministry of Health, Welfare, and Labor to investigate the possible future implementation, after graduation, of national licensing CBTs and OSCEs (different ones from those described earlier) as the bases of the formal National Examination for Physicians.

The proposed model core curriculum was originally intended for quality assurance and to set a minimum requirement for physicians. The next step will be the further enhancement of each individual school's medical education program, using the remaining 30% of school hours that are focused on the individual school's mission.

Graduate-entry programs represent a minor movement in Japan; they offered fewer than five seats in 23 (or 63%) of 36 medical schools in 2006.[5] There are two contrasting examples. Since 1975, Osaka University provided graduate entry for 20 seats (20% of the 100 new enrollees) focused on fostering medical scientists. But the experiences in the past 24 years proved that the number of 20 graduate-entry students was ineffective for that

purpose and not necessarily satisfactory (M. Tohyama, personal communication, 2006). Beginning in 1999, the number was reduced to 10 seats, and later in 2000 it was split into five seats for the ordinary graduate-entry course and five seats for the MD-PhD course. On the contrary, Tokai University started graduate entry in 1987 for 15 seats to enroll students who were more mature and more motivated to be good physicians; Tokai University has increased the number of positions available to 40 students among 100 seats, beginning in 2006. Further systematic controlled studies will be necessary to evaluate the impact of graduate-entry programs for both tracks: the development of good physicians and the development of medical scientists.

Recently, there has been discussion regarding the role of university hospitals in the general clinical education of students. Previously, university hospitals were the principal sites for pre- and postgraduate clinical education. However, too much specialization of university hospitals as tertiary hospitals caused the basic clinical education for undergraduate medical students to be inappropriate and insufficient. To cope with this situation, 66 (84%) of 79 university hospitals sent their students to teaching hospitals in the community as part of their formal clinical education. The new nationwide matching system also revealed that a little more than half (51.7%) of the trainees in 2005 preferred a training site outside of the university hospitals, presumably seeking a more appropriate environment for primary care training. It will be important to foster greater cooperation between the university hospitals and cooperative institutions in the community.

Japanese graduate schools for medical sciences remain in need of additional changes.[27] The report[28] of the Central Deliberating Council for Education to MEXT in 2006 pointed out the necessity of stipulating the mission and goals of individual graduate schools. The report also stated that the curricula in graduate schools were not well structured and that the educational experience was too much of an apprentice system. The exit outcomes of graduate schools were not always evident, nor were they always appropriately designed.

Although innovation in Japanese medical education is not yet sufficient, there has been substantial—even remarkable—change, largely because of well-informed government intervention. More innovations are under way and the motivation for change is continuing, judging from the dramatic changes that have been observed since the previous 2001[29] and 2003[30] reports of the biannual survey made by the Association of Japanese Medical Colleges.

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Teaching and Learning Moments

Learning About Clinical Uncertainty

I had just walked in the doorway. "I can't believe this is going to be all over," Mrs. Smith said, and she walked up to me before I could say anything. "The doctor said that it's probably cancer, you know, the thing they found on the CAT scan," she continued. Mrs. Smith was the wife of Mr. Smith, a patient I had admitted to the neurology service four days ago. Mr. Smith had a three-month history of memory loss and sharp personality changes. A mild-mannered, laid back businessman who ran a successful business for decades had developed into a dependent who never knew what day it was, rarely understood where he was, and was so anxious that he writhed back and forth in his hospital bed. This was his third hospital admission—and his wife wanted answers.

She started to cry. I still hadn't even said a word. "We've been going on like this for so long, and we finally are getting close to an answer. I'm sorry for being so emotional."

"I understand," I said back to her, "You've been down a long path, and anyone would feel like you do now. We're not sure that this finding is cancer, as you know. What I can promise you is that we'll do everything we can to get to the bottom of this."

What struck me after our conversation was that the idea that her husband might have cancer in fact filled her with relief. Her tears were tears of relief, not tears of pain. I almost felt mad at Mrs. Smith.

I have thought about Mrs. Smith often in the few months that followed. With more clinical experience, I know now that I was wrong to think that Mrs. Smith should have felt differently. In a position of extreme uncertainty, when devastating diagnoses were always possible, she finally was able to grasp what had begun killing her husband. That uncertainty had been tearing her apart. She wasn't relieved about cancer. She was relieved because she could see an end to her uncertainty.

This episode and others like it over the course of my third year of medical school have been humbling. I have learned how difficult clinical uncertainty can be—not only for the patients, but for us medical students as well. As an undergraduate, I studied chemical and biomedical engineering, and I had become accustomed to clear, precise answers.

Medicine is different. During my first two years of medical school, our problem-based curriculum showed me that medicine would not prove as precise as my undergraduate studies. But at least in the classroom cases, the diagnosis was clear. Over the course of my third year, by contrast, I have had to accept cases in which patients are discharged without a clear diagnosis. That uncertainty is unsatisfying for doctors, and disconcerting for patients.

Two of the hardest lessons I have learned over the course of this past year, therefore, are first that clinical answers are not always clear, and that dealing with a system as complex as the human body necessitates a lack of precise understanding. More crucially, I have begun to confront how that uncertainty can take a toll on patients. Before I started medical school, I had thought that nothing must be more devastating to a patient than a crippling diagnosis. Now I know that for many patients, the uncertainty of not knowing can prove far more frustrating. Mrs. Smith and I have both learned that lesson the hard way. It has been one of my toughest lessons in medical school—but I will be a better doctor for it.

Note

Some identifying details have been changed to protect patient confidentiality.

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