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Surgical Training Programs in Pakistan

Jamsheer J. Talati · Nadir Ali Syed

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Abstract This paper traces the history and describes the status of surgical training in Pakistan. A key revelation is that excellent surgeons are produced through systems which on formal review might appear to lack standards. Personal characteristics of residents modify outcomes in high volume surgical training units; and consequent variation in quality of outputs is noted. Attention needs to be given to (i) develop new educational systems which are not prolonged costly and cumbersome, and which produce the adequate number, types and spread of highly skilled and cognitively developed empathic surgeons for the country; (ii) the improvement of the health systems which currently impede the development of surgeons and (iii) novel wars of tackling rural urban disparities in health delivery.

Background

The Republics of India and Pakistan were created by dividing British India in 1947. They inherited common British health and medicolegal systems, but disparate levels of education, industry, and infrastructure. They consequently developed different trajectories in growth of postgraduate surgical training programs. At inception, Pakistan had two medical colleges, 48 registered doctors, and a low level of literacy (13%). Systems of training surgeons evolved slowly, first in the longstanding King Edward Medical College (established 1860) and then in Dow Medical College (recognized from 1945). Pakistan at that time relied mainly on surgeons returning from training in the UK to teach future surgeons. Few were able to afford travel abroad for higher training; hence, overall, the health systems suffered an acute shortage of surgeons.

To alleviate the workforce shortage, a College of Physicians and Surgeons of Pakistan (CPSP) was established in 1962 on a national basis, to facilitate training and accreditation, and oversee the awarding of fellowships (FCPS) at the completion of training. At that time, Pakistan's 44 million people (74% of them still illiterate) were served by 0.105 physicians per 1,000, population (P/TP) its nine medical colleges having produced only 4,394 doctors. Pakistan remains short of physicians with the MBBS degree even today (0.473 P/TP in 2005 [1]), but despite the shortage of MBBS graduates, surgical and surgical subspecialty training programs have gradually increased (refer Fig. 1). In addition to the programs accredited by CPSP, institutions do train surgeons in other, parallel programs, leading to the MS degree or Diplomas, as in ophthalmology [2]. These programs are accredited by their respective universities. Surgeons continue to take foreign examinations such as the European Boards and the Royal Colleges of England examinations, sometimes after completing the requirements for local examinations.

As more MBBS graduates became aware of the potential advantages of training abroad, many emigrated to the UK and the USA. Migration outflows exceed the numbers returning, but those who do return strengthen existing training programs as faculty members. Today, as a result of both locally trained and returning foreign-trained

J. J. Talati (✉)
Department of Surgery, Faculty of Health Sciences,
Aga Khan University, P. O. Box 3500, Stadium Road,
Karachi, Pakistan
e-mail: jamsheer.talati@aku.edu

N. A. Syed
Department of Medicine, Faculty of Health Sciences,
Aga Khan University, P. O. Box 3500, Stadium Road,
Karachi, Pakistan

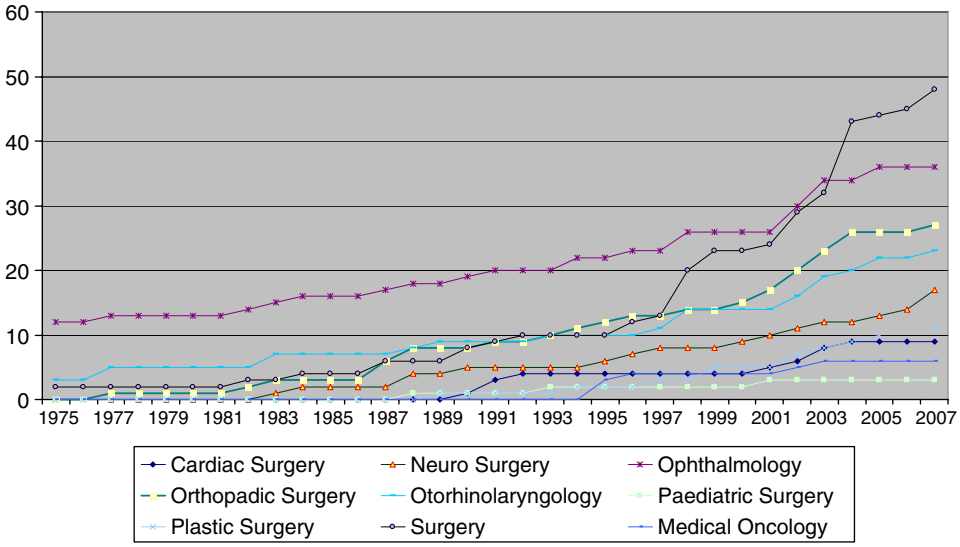

Fig. 1 Growth in surgical training programs in Pakistan 1975–2007

graduates, there are many centers of excellence that provide exemplary cardiac, renal transplant, cancer, and other special surgical services which, by generic effect, impact favorably on the standards of Surgical Training Programs (STPs) even though they may not have a structured residency program. Training facilities in other specialties such as pediatric, cardiac, pancreatic, and hepatic surgery are lagging behind needs. One center in northern Pakistan reports 325 patients with congenital heart conditions detected by echocardiogams in a year [3]. Until recently, there was no pediatric cardiac surgery program for the expected 1.4 million children with cardiac disease (for which 19 cardiac surgeons would be needed by European standards [4]). As a result the 120,000 children born annually with congenital heart disease, only 1,000 are currently being operated on across the nation (personal communication, Dr. Muneer Amanullah, Pediatric Cardiac Surgeon, Aga Khan University, Karachi).

Overall, there has been significant expansion in service, driven by government zeal and an awareness in society, partly awakened by media and socioeconomic improvement. The expansion in service has been possible because of the increasing number of graduates from the training programs in Pakistan. However, the continuing migration trend depletes the applicant pool of the crème de la crème which have, in addition to intellect, rich social networks for effective function in Pakistan. This loss is worsened by migration of trained surgeons who move chiefly to the Middle East, where the locally awarded FCPS degree is recognized.

The surgical training program

All surgeons training for Fellowship of the CPSP (FCPS) are required to pass a qualifying examination (termed FCPS I) before initiation of training. The examination system is transparent and the reliability of every question has been determined; yet in 2006, 9,036 candidates took the examination but only 20% passed [5]. After passing the exam, they then have to undergo 2 years of general surgery rotations and pass an "intermediate module" examination. Three to five more years of intense specialty training or further general surgery training follow. All candidates have to participate in workshops on biostatistics, medical research, writing skills, internet-based learning, and basic technical surgical skills (see http://www.cpsp.edu.pk/index_home.asp). Trainees are provided opportunities for attending surgical conferences, presenting papers, and attending courses and workshops arranged by the surgical subspecialty societies and individual hospitals. There is a final written, clinical, and oral examination. External examiners from the UK, Australia, India, Singapore, and Bangladesh are invited for CPSP examinations.

Assurance of competence

Exemplary institutions, professional societies, and regulatory authorities each in their own way have improved surgical training programs (STPs) and assured quality surgeons to society. However, a regular written feedback system exists in few institutions but many programs are actively improving their evaluation processes.

For candidates working toward the FCPS, the CPSP has many levels at which it seeks assurance of quality. CPSP sets curriculum and rotational requirements for programs and standards for accreditation of institutions; postgraduate committees are expected to provide the internal level of control at program and institution levels; supervisors assigned to trainees are required to understand recent

trends in teaching/learning and assessment, have adequate competency, and procure the required support from hospital facilities. The mechanisms for assuring competence and a fair examination system have received recognition in South Africa, Saudi Arabia, United Arab Emirates, Bahrein, and Canada to name a few countries. In arrangements with Nepal, candidates who have trained in general surgery, ophthalmology, and otorhinolaryngology in Nepal are now eligible for the CPSP fellowship.

The level of adherence to quality assurance mechanisms varies from institution to institution. An exemplary institution such as the Aga Khan University (which hosts 41 postgraduate residency training programs) has rigorously credentialed faculty, and the hospital in which STPs train is recognized by the Joint International Commission for Accreditation. The programs support well-defined curricula in a modified North American-derived residency model evolved for the local environment. Each program is overseen by departmental residency committees that ensure rigor in educational components through assessment, feedback, innovation, and supervision to ensure progressive development of surgeons over the years. Residents are members of various committees.

Many factors contribute to quality assurance. Exemplary institutions provide the milieu—library, research support, high-torque faculty in surgical and other specialties such as anesthesia, radiology, pathology, and medicine—that encourages scholarship, defines assessment systems, and converts feedback into improvements. In highly specialized institutions, general surgery programs ensure rotations of residents through the various subspecialties. The Higher Education Commission of Pakistan (HEC) has provided free internet access to many publications at all public institutions. This has enhanced access to evidence, which in turn improves quality and competence and supports residents in their hesitant attempts at challenging accepted practice. It is encouraging to note that HEC and the US National Science Foundation (NSF) are jointly funding a high-performance research and education network connection to support Pakistan-US science and technology collaborations (http://www.hec.gov.pk/MediaPublication/Press_Releases/2008/April/Apr_9.htm).

Especially encouraging today is the appearance of publications that compare training in Pakistan with standards elsewhere and the working conditions for residents in Pakistan. Some programs seek, partly as external quality control, additional affiliation to Royal Colleges or the European Boards.

Standards attained

The performance of the graduates and the degree to which an equitable spread of surgical care has been attained are good measures of the standards attained. Graduates are employed as faculty in the various STPs. At Aga Khan University, 30% of faculty are trained in its own programs; in most public institutions, the percentage of faculty trained in Pakistan is much higher. While graduates are willing to seek employment within Pakistan, they are generally unwilling to serve in rural areas. To make graduates aware of the realities of rural surgery or surgery in small towns, some private and public STPs require residents to undertake elective rotations in low-resource environments. Some such institutions send their surgery faculty to peripheral hospitals to enhance the learning experience. The Army fosters post fellowship rural service by promising further training at the center for those serving in rural military hospitals. Reluctance to practice in rural areas arises from many adverse conditions unrelated to the quality of programs. As a result, the rural surgery rate in Pakistan remains low at 124 per 100,000 population compared to that in USA (8,253/100,000 [6]). Provision of surgical care to rural populations is a serious unfulfilled need—in the mountainous districts of northern Pakistan, the incidence of injuries and acute abdomens alone has been recorded to be as high as 1,531 and 1,364 per 100,000, respectively [7]. Pakistan, unlike India, does not have a journal devoted to rural surgery.

In some very busy but inadequately supported state (public) hospital services, the faculty face many difficulties in training surgeons. Despite this, the surgeons emanating from the programs are reasonably well trained. This is evidenced by the fact that British citizens travel to Pakistan for plastic surgery and many foreigners seek renal transplants in Pakistan. It is obvious that high-quality surgeons have developed despite poor resources—approximately 95% of the renal transplant surgeons have come from training programs in Pakistan. This is because of certain defining characteristics of these high-volume, low-resource programs and the quality of their inductees. What are these characteristics? Inductees see a large number and variety of patient diseases within a limited time. The Pediatric Hospital of the Pakistan Institute of Medical Sciences each day sees 400 patients in consulting clinics, admits 30, and operates on 15 patients daily. The Accident and Emergency Department sees 100 patients a day (http://www.pims.gov.pk/childrenHospital.htm). While workload varies from training hospital to hospital, residents are exposed to complex abdominal injuries from gunshots, stabs [8], and illegal abortions; diagnostic conundrums from complex intracranial infections masquerading as mass lesions [9]; and a plethora of pathology: *annual loads* of the order of 65 ectopic pregnancies [10], 51 eclampsia cases in 1560 deliveries [11], and 178 head and neck cancers (of which 57 are oral cancers) [12]. In the twenty-first century, they participate in the delivery of 1,620 babies

annually and suffer the anguish of witnessing 485 perinatal deaths [13]. Surely some residents will be affected enough to think of enlarging the scope of education to include upgrading less skilled birth attendants [14]. Residents could see and participate in surgical management of 17 abdominal tuberculosis patients annually [15]. The total adult surgical workload even in private university hospitals, might border on 122,373 patients annually, with average number of 408 visits daily (Aga Khan University statistics, courtesy Dr. Farhat Abbas, Chief Operating Officer).

Operative work volume evaporates learning curves and legitimizes a faculty's delegation of difficult skill-based tasks. In STPs where subspecialty services are absent or rudimentary, general surgeons become adept at a wide range of skills in what are traditionally subspecialty domains, although this occurs without the development of specialized technology-dependent skills. The disease burden is enormous and complex. The advanced stage of the disease when the patients presents causes intense, involved, problem-based learning. Unavailability of healthcare in the rural areas brings to the peripheral hospitals people of different shades of culture and sharpens skills at eliciting information, gaining compliance, learning tolerance, and understanding the sociocultural impediments that accompany poverty.

Graduates from medical colleges have a varied socioeconomic and cultural background as medical education in public sector colleges is very heavily subsidized and the fees are so low that it is accessible to all. Such graduates are very cognizant of the realities in healthcare, which has the potential to make them agents of change, but the milieu is not yet conducive to supporting the sorts of thinking of which these young residents are capable. The potential remains untapped.

There is also a variability in the degree of rigor with which institutions ensure the quality of academic interactions, the opportunity to dialogue and learn with faculty, the teaching and the surgical skills of the surgeon supervisors, and the supporting hospital services required for effective education. The net result is, as Manikandan [16] has noted in India, a variability in what the individual can do at graduation. A little encouraging is a study by Avan et al. [17] that shows that the total academic index (composed of components that residents thought were contributing to their academic growth) among residents was highest for surgical residents (15.81, SD = 4.69).

In addition, there is great variability in the degree to which prior education has prepared the individual to become a responsible physician and diligent and rapid learner. Such factors determine whether the enormous workload will work to benefit the trainee. Faculty who have trained abroad or in institutes of excellence at home value the discussions in which residents are free to challenge professors without reprisal. These useful conversations do not occur in single-surgeon-dominated units which remain grounded in hierarchical and do-it-my-way didactic teaching. Similarly, the physician-dominated environment in public hospitals causes a nurses to be treated as second class and this limits the spearheading of change to one segment of the professional communities—the doctor—a situation that is detrimental to growth of complex surgical subspecialties or the advancement of healthcare in general.

While the flow of patients in government hospitals allows the resident to review a large patient volume and spectrum of disease, to most, speed is a threat to learning because of the risk of superficial rather than thoughtful analysis of pathophysiology. Working conditions, faculty salary, and the state of public hospital services affect the training of surgeons much as it does in India [18] and makes recruitment and retention of teachers difficult. Most full-time faculty supplement their salary income by private practice in the afternoons, away from the government teaching hospitals, thereby reducing resident-teacher contact.

Inadequate maintenance of hospital equipment leads to breakdown of the technology that is essential for training modern surgeons. Citizens demand laparoscopy and ureteroscopy. When the limited number of available laparoscopes, cystoscopes, and lithotrites breakdown, training is seriously affected. While professional societies and universities do hold workshops for which the technology companies provide instruments, few hospitals have year-round established skills lab centers for STPs. Under a Pakistan–US Science and Technology Cooperative Program, a virtual trainer lab for minimally invasive surgery is being set up in Islamabad for the Rawalpindi Medical College (http://www.nationalacademies.org/dsc/PAKUS_Grantees_2006.html).

Exhaustion from clinical workload and the need to supervise every delegated duty (because of deficiencies in the training of other health workers and professionals and shortage of nurses) does not allow the resident to regularly attend journal clubs and mortality and morbidity (M and M) and resident presentation sessions, although these are valued by residents. A study by Kasi et al. [19] has shown that residents work more than 80 h a week on an average, with some specialties (urology and orthopedics) demanding 91–105 h a week. Avan et al. [17] found that 50% of the residents' time was spent in direct patient care, 15% in search of medical literature, 10% in research, 3.8% in administration, and 13% in teaching. This results in an average of 38 h of sleep per week and maladaptive responses to stress, which is prevalent in 60% of residents and present up to a morbid level in 40% [19]. Avan et al. noted that the mistreatment index on reported incidents of

humiliation, sexual harassment, sexual discrimination, ethnic discrimination, and "due credit not given" was lower for surgical than for medical residents.

Challenges

Pakistan does not lack surgeons and physicians who excel in their field. It is the sudden expansion of medical schools and their intake that has temporarily jolted medical education and has affected the quality of middle-level health professionals [20]. Although considerably improved, hospitals in general lack the technological adjuncts required for modern-day surgery. To achieve the number, quality, and distributions of surgeons required to improve the situation, we need visionary strategic planning that searches for innovations that accelerate the rate of progression in surgical training, address teacher education, and distribute health services equitably to the total population. Such planning will require the engagement of surgeons in a dialogue with society and government.

Surgical education is complex. The cautious, slow rate of increase in CPSP-accredited programs (Fig. 1) reflects the limited training sites, the state of existing health systems, and shortage of faculty. High-quality training comes at significant cost in terms of finances, time, and effort. Even with enormous resources and expenditures of hundreds of millions of US dollars, Aga Khan University has to date trained only 339 male and 188 female residents (from 1998 to 2006) and 41 male and 12 female fellows (2004–2006) (statistics given by Dr. Nadir Ali Syed, Associate Dean of Postgraduate Medical Education), indicating the level of resources and time required to nurture individuals and change their thinking.

The acceleration of educational programs that inculcate surgical skills is required because, first, there is an enormous deficit in surgical manpower and surgeon-driven facility improvement: for example, in the northern areas of Gilgit, there is only one eye doctor per 100,000 people (http://www.cureblindness.org/where/pakistan/aug1997.html); the government hospital is without a operating microscope. This in a country in which a total of approximately 0.7 million cataracts await intraocular lens (calculated on the basis that 4,000–4,500 cataracts need treatment per million population [21]). Second, additional surgical training sites cannot be set up easily because of teacher and equipment shortages and inadequate healthcare teaching facilities. Only now, after many years of experience, does the Aga Khan University have 338 resident and intern trainees (182 male and 156 females) and 29 fellows (17 male and 12 female) registered for training in 2008. The training of a comprehensive surgeon requires highly developed units that are difficult to set up or upgrade unless health services are also up to date. Health systems have to improve if more residencies are to be opened because the resident is being trained for service; and when s/he graduates the service should provide an environment where learned skills can benefit society. Otherwise, well-trained individuals will continue to leave the country, especially in the face of the existing salary structure for residents, many of whom may previously not been paid.

Subspecialization must proceed because people demand tertiary care, and subspecialty teams allow individuals to develop and practice skills within a limited field, which increases task repetition rate and enhances technical skills. Obviously, concurrent training of many levels of surgical assistants is also required. There is no doubt that Pakistan needs subspecialization in surgical fields. In Pakistan today oral and prostate cancers need sophisticated surgery but do not get the attention they deserve because of inadequate development these fields. How will we do that when we have not been able to train an adequate number of general surgeons? The answer lies in finding the right balance between subspecialty training and general surgical training. This could be derived from the number of surgeons per 1,000 population in other countries, utilization rates (for various services), incidence of the disease, complexity of the procedures required to be performed, the number of patients that await surgical treatment, and guidelines such as those from ACGME which, for example, suggest that 11.4% of postgraduate training should be in specialty surgery and 5.3% in general surgery. These latter data are an interesting shift from the previous numbers of 20% in specialty surgery and 4.2% in general surgery [22]. Perhaps the answer lies elsewhere and we need to ask the question: What can we do during training to develop highly motivated young surgeons who are willing to push their personal limiting envelops forward inch by inch to carve out a niche of specialization which might yet be a new combination of specialties?

The next question will be: Where should such surgeons be positioned? In subspecialization practice, health benefits are greater when surgeons practice in small areas such as towns that have a highly coordinated set of services [23]. If that route is followed, it poses a challenge to government: Should Pakistan explore how to transport rural patients by speedy trains (helicopters are too expensive) to specialized service centers set up in the more "compact" adjacent towns, or should we continue to strive to increase the number of highly trained, more comprehensive surgeons located at the periphery of major towns, close to rural link roads or rail? A review of the number of surgeons available per 1,000 population suggests caution when playing the numbers game. While there is a clear correlation between quality of health and number of healthcare workers [24], the Americans, British, Belgians, and Canadians work with

very different levels of physician health professionals per 1,000 population—the UK as low as 14 per 100,000 (and only four specialists per 100,000) and the USA and Belgium as high as 294 and 330. Currently, there is little evidence that correlates the numbers of surgeons with the quality of healthcare. However, the reality is that given our available minimum estimates, the gap between the numbers of surgeons we have and the number of surgeons in other countries is so enormous that the deficit cannot be overcome by training surgeons. We just do not have the capacity to educate that many.

The solution will lie in innovative approaches that share the burden of providing surgical care between varieties of team members, each working at different levels. Already key individuals in emergency obstetric care, under the ALSO program held with the Aga Khan University, are spearheading the training of teams (which include workers and professionals) rather than training surgeons alone. Looking at the future through rose-tinted glasses, hierarchical structures will be slowly eroded by exuberant, vibrant young residents, training of residents will be standardized, institutional private practice will become enjoyable, and physicians will have respect (and adequate paychecks even in full-time institutionalized public service). In our little utopia, government will support faculty development, increase resident salaries, and improve health services. It is likely that an opening of minds and greater tolerance will emerge and allow, among other things, faculty from neighboring regions of China, India, Iran, Nepal, and Sri Lanka to work side by side with local surgeons. The exchange of experiences about patients with similar levels of poverty who are suffering from similar disease patterns will add value to the trainee's experience.

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