

Surgery, Public Health, and Pakistan

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Abstract

Background Surgical healthcare is rapidly gaining recognition as a major public health issue. Surgical disparities are large, with poorest populations receiving the least amount of emergency and essential surgical care. In light of recent evidence, developing countries, such as Pakistan, must acknowledge surgical disease as a major public health issue and prioritize research and intervention accordingly.

Methods We review information from various sources and describe the current situation of surgical health care in Pakistan and highlight areas of neglect.

Results Pakistan suffers an annual deficit of 17 million surgeries. Surgical disease kills more people than infectious diseases inclusive of tuberculosis, HIV/AIDS, diarrheal disease, and childhood infections. The incidence of trauma and maternal mortality ratio are staggeringly high. There is a severe dearth of surgical and anesthesia-related epidemiological data. Important information that would help to drive policy and planning is not available. Corruption and neglect have led to a dilapidated health care infrastructure. Surgical care is largely inaccessible to the poor, especially those living in rural areas. The country faces a dearth of healthcare professionals, especially paramedics, anesthetists, and surgeons. Unsafe surgery and anesthesia poses a significant risk to patients. There is no national policy on surgical illness and the preventive aspects of surgery are nonexistent.

Conclusions Consistent with other underdeveloped countries, surgical care in Pakistan is dismal. Neglecting surgery and safe anesthesia has led to countless deaths and disability. Physicians, researchers, policy makers, and the government health care system must engage and commit to provide access to emergency, essential, and safe surgical care.

Introduction

In recent years, surgery has been rapidly gaining recognition as a major public health issue and various aspects have been highlighted. The burden of surgical disease, although unknown, is thought to be significant with an estimated 234 million surgeries being performed annually around the world [1]. Disparities in access to surgical care are a major concern with only a quarter of the world's surgeries being performed in poor and low-income countries, which make up 70% of the world's population [1]. Surgery has been estimated to prevent 11% of the world's disability adjusted life years [2] but is believed to be an even larger contributor to the global burden of disease. The provision of basic surgical care has been shown to be a highly cost-effective intervention [3, 4]. Injuries, cataracts, acute abdomen, obstetric complications, malignancies, and congenital anomalies are examples of fatal or severely debilitating conditions that are amenable to surgical intervention. Access to surgical care has been deemed an essential component of human rights [5]. Surgical safety is another important public health concern, because surgery itself may lead to significant morbidity and mortality with an annual estimate of 7 million complications and 1 million deaths worldwide [1]. Preventable anesthesia-related morbidity and mortality is estimated to be even higher [6].

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Surgery, around the world, is increasingly being recognized as a primary care strategy essential to improve health. However, low- and middle-income countries (LMIC) have suffered the brunt of this delayed recognition [7]. Governments have failed to prioritize surgery and millions continue to die around the world due to unmet surgical needs [8, 9]. These are preventable causes of morbidity and mortality. Recent research in the epidemiology of surgical disease must be considered by governments, nongovernmental organizations (NGOs), development donors, and global health experts. Developing countries, such as Pakistan, must acknowledge surgical disease as a major public health issue and prioritize resources, research, and intervention accordingly. Most of the recent situational analyses are generated from African countries and there are limited data from South Asia.

We describe the current situation of surgical health care in Pakistan. We identify and discuss key areas of neglect that require immediate attention. Solutions are proposed that apply not only to Pakistan but also to many LMICs.

Surgical health care in Pakistan

Burden of surgical disease

Pakistan has a population of 177 million people of which 64% live in rural areas [10]. Average life expectancy is 63 years [10], and the annual per head expenditure on health is just US \$18 of which the government spends US \$4 per capita [11]. There are no reliable estimates of the number of surgeries currently performed in the country or the number of associated avoidable complications. Blanchard et al. in 1983 conducted a survey of 19 district hospitals catering to population of 11 million and found the annual rate of surgeries to be 124 surgeries per 100,000 [12]. Ahmed et al. in a community survey in the north of Pakistan in 1999 estimated the rate of surgeries to be 411 surgeries per 100,000 population per year [13]. In contrast, the average rate of surgery in high-income countries is estimated to be 11,110 per 100,000 population [1] times that of the latest figures from Pakistan. These figures depict a deficit of 18 million surgeries per year. High-income countries may be overprescribing surgical services, and the optimal rate of surgeries is unknown. A number of affluent countries have annual surgical rates greater than 20,000 per 100,000 population [12]. Even though the rate of 11,110 may be an overestimate, it is a reasonable working estimate of the optimal rate of surgeries. The rate of 411 surgeries per 100,000 per year in Pakistan is very likely to be an underestimate, because these surveys were not conducted in major cities; however, even if we triple the rate of surgeries to 1,200 per 100,000, Pakistan still suffers a deficit

of 16.8 million surgeries per year. Such a tremendous unmet need results in unnecessary suffering and death (Table 1). Ahmed et al. estimated 187 deaths due to an acute surgical illness per 100,000 persons per year [13]. This is higher than the collective deaths caused by infectious diseases inclusive of tuberculosis, HIV/AIDS, diarrheal disease, and childhood infections in Pakistan, which account for 164 deaths per 100,000 population per year [14]. Such high mortality results from the lack of access to surgical health care, poor quality of surgical services, and nonexistent patient safety strategies as described below.

Injuries, anesthesia, and obstetrical care as major contributors to the burden of surgical disease

Data on trauma and maternal mortality are available in Pakistan; however, information on surgical interventions and anesthesia are not. Trauma poses a significant burden to the country. Analysis of the National Health Survey of Pakistan (1990–1994) estimated the rate of unintentional injuries to be 4,590 per 100,000 per year amongst people older than age 5 years and 4,780 per 100,000 per year among children younger than age 5 years [15, 16]. Injuries account for 67.8 deaths per 100,000 population per year, which is twice that of the United Kingdom (34.6/100,000/year) [14]. In contrast tuberculosis causes 57 deaths per 100,000 population per year with an incidence of 279 per 100,000 population [17]. The unmet need for surgery can be reflected by the high reported maternal mortality ratio of 376 per 100,000 live births and extremely low rate of C-sections of 7.3% [18, 19]. The World Health Organization recommends a C-section rate of 15%; however, rates in most western countries exceed 20% [20]. Maternal mortality in most western countries is less than 10 per 100,000 live births. In Pakistan, 75% of women deliver at home and lack of surgery for postpartum hemorrhage is the most common cause of maternal mortality, accounting for more than 27%. Inequities in access to care are a major issue, and the MMR ranges from 785 per 100,000 in the province of Baluchistan to approximately 175 per 100,000 in urban areas [18]. Approximately 90% of the richest quartile accessed prenatal services by a skilled health care professional in the year 2006–2007 as opposed to only 35% or the poorest [18].

Anesthesia-related deaths also are a significant cause of surgical deaths [6]. A recent study from West Africa demonstrated 2.6 deaths per 100 anesthetics; most of these were uncomplicated cases in young patients [21]. The major causes included cardiovascular problems, aspiration, and postoperative hypoxia. The authors identified 93% deaths as avoidable. A study at one of the best centers in Pakistan demonstrated anesthesia to be responsible for 34% of all postoperative deaths [22]. Anesthesia-related deaths

Table 1 Summary of neglected aspects

Estimated deficit of 17 million surgeries per year
High incidence of surgery-related deaths, including trauma and high maternal mortality ratio
Dearth of manpower: surgeons, anesthetists, paramedics
Lack of data
Surgical facilities inadequate in rural areas, short of supplies, water, electricity, and basic needs
Vacant positions in rural areas, health professionals concentrating in towns and cities
Tertiary care hospital in cities overburdened
Emigration of doctors and paramedics
Lack of government spending on health
Lack of national policy or programs for surgery and surgical disease
Lack of accountability at large public hospitals; patient safety is a major issue
International funding and advocacy not geared toward surgical care
Emergency surgical care not available or affordable for most
Law and order

are expected to be much higher in public and rural settings; however, there are no current data on this.

Infrastructure

The healthcare system

Pakistan has a dual healthcare system consisting of public and private hospitals. Public health facilities are three-tiered [23] (Fig. 1). The first step includes a basic health unit (BHU) in every few villages, which caters to a population of 10,000–15,000. BHUs are attached to a Rural Health Center (RHC), which provides for approximately 50,000 people. Together these provide primary health care services and serve as referral centers for district hospitals (DHs), which provide inpatient and acute care services for a population of 200,000–2 million. DHs are secondary health facilities; they have operating services and provide basic surgical care, such as obstetric care, basic trauma, and orthopedic services, and simple surgeries, such as abscess drainage, appendectomies, and hernia repair. These are supported by tertiary-level hospitals, which are large teaching centers located in major cities that provide a wide range specialty services.

Inadequacies in the system

Theoretically this is an effective system; however, most of the BHUs, RHCs, and DHs are not functional [24]. They suffer from an excessive lack of maintenance, supplies, and personnel. In some regions of Pakistan, approximately 60%

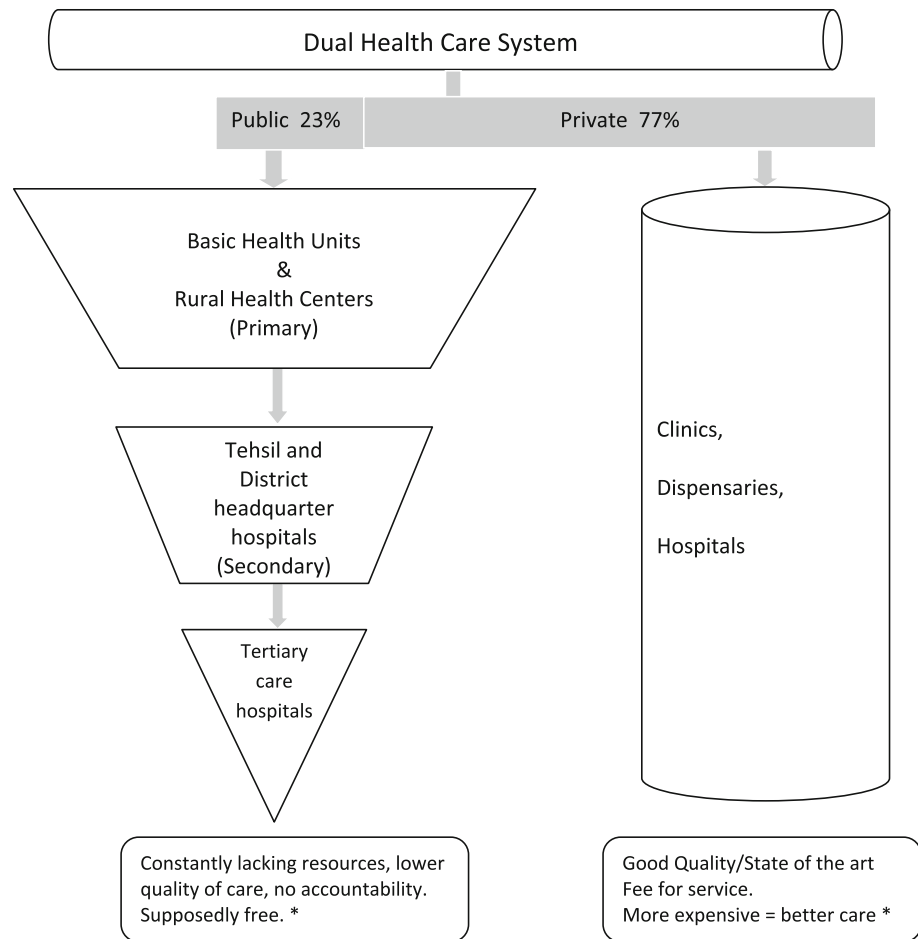
BHUs are without electricity, 70% without running water, and more than 90% have no toilets [25]. Patients are expected to make unofficial payments, which often are high [26]. Doctors appointed to primary and secondary level centers often are absent and instead indulge in private practice in the cities (many still retain their governmental posts and salaries) [24, 27]. Corruption at multiple levels makes this easily possible [28]. If a surgeon is present often there is no anesthetist. As a result, patients have to travel hours and often days to receive “emergency” medical and surgical care, including emergency obstetric care. A survey of referral systems demonstrated no surgical or emergency obstetrical care services at first level of care facilities [27]. Complications, such as obstetric fistulae, are rampant in the poor and nonexistent in the affluent further highlighting disparities in access to health care. The incidence of obstetric fistula in Pakistan is estimated at approximately 3,000–5,000 cases per year [29]. In a recent survey, the top three reasons for not accessing skilled healthcare were cost, distance/lack of transport, and not thinking it was necessary [18].

Tertiary care centers in the cities are overburdened and are essentially required to cater to primary, secondary, and tertiary healthcare needs of the population [27]. Siddiqi et al. estimated the rate of utilization of primary health facilities to be less than 0.6 patient visits per person per year [27]. They also demonstrated that 75% of patients who present at secondary referral facilities and 44% who present at higher level facilities could have been managed adequately at primary care facilities. Anecdotal evidence, media reports, and personal experience demonstrate that tertiary hospitals also suffer from a constant lack of maintenance and supplies. Quality of care is dismal and only the very poor patients seek treatment there.

Lack of human resources

Surgical care has not been a priority for the government or for donor agencies. Most of Pakistan therefore has been unable to build the infrastructure needed for emergency and essential surgery. This situation is not different from many low-income countries around the world [30]. Pakistan has approximately 66 hospital beds [23], 79 registered physicians, and 39 nurses per 100,000 population [31]. The government currently spends 0.54% of the GDP on health care, which has declined from 0.72% in the year 2000 [32]. The number of surgeons is not known. However, Blanchard et al. estimated the number of trained and untrained surgeons in rural Pakistan to be 0.36 per 100,000 populations [12]. In comparison, the United States has approximately twice the number of hospital beds ($n = 307$) and 16 surgeons per 100,000 population—44 times that of Pakistan [33, 34]. Another major void is the absence of physician

Fig. 1 Flow chart of existing health care system. *A general scenario has been provided, which may not always hold true. For example, some hospitals provide quality care at low costs and some public hospitals function adequately, but these are exceptions



anesthesiologists and other anesthesia providers. Trained anesthetic workforce is vital to the provision of surgical care [35]. The number of anesthesiologists in the country is again not clearly known; however, it is thought to be less than the number of surgeons. The Pakistan Society of Anesthetists (PSA) estimates that there is approximately 1 anesthesiologist per 200,000 population (personal communication with president PSA). Anesthetists, more than surgeons, concentrate in urban areas and cities. Blanchard et al. in their study amongst 19 district hospitals found that 9 hospitals had no surgeons, 7 had no obstetricians, and 11 had no anesthetists [12].

Alternates to the public system of health care

The void in quality healthcare is filled by profit-oriented private hospitals [36]; 77% of healthcare is provided by private organizations [11]. Unlike public hospitals, these hospitals receive nothing from the government and patients are expected to pay out of their pockets. As a general rule, the higher quality of services that a hospital provides, the higher the expense. Often poor patients opt to sell all assets to receive healthcare at a private hospital rather than risk a

public hospital. As a result, a large number of people incur catastrophic health expenditure (expenditure that destabilizes their economic situation) and a large number of people are pushed below the poverty line due to expenditure on healthcare. Surgical care is unavailable to most of the rural population and is too expensive for many in the cities. This enables “quackery” (untrained individuals posing as doctors) to flourish. The Pakistan Medical Association estimates that there are more than 600,000 quacks in the country who provide low-cost services to unknowing patients. They perform simple surgeries, such as circumcisions, abscess drainage, and cyst removals. Instruments and even syringes are reused many times without adequate sterility. Medical care often is provided as a shotgun approach by prescribing two pills of every antibiotic in the market. A household survey in Karachi demonstrated a high rate of irrational antimicrobial use in the population of which more than 90% was prescribed by a “physician” [37].

A few not-for-profit organizations and NGOs have stepped forward to meet this unmet surgical need [38–40]. There are a number of surgical facilities that are free of charge or low cost. However, these facilities also are

concentrated in the cities. Some do exist in rural areas, but hiring a surgical team is an ongoing challenge for them. We have personal experience with some organizations that run surgical missions and “camps” from cities to rural areas to provide elective surgical care to those in need. Cleft lips, hysterectomies, tubal ligations, hernia repair, cataract surgeries, and obstetric fistula repairs are some examples. The impact of these NGOs and charity organizations on the unmet surgical need has not been studied and even though they provide excellent service to thousands of patients each year, the void is too immense to be filled by them alone.

Role of politics in healthcare

The disruptive political environment has a major role to play in the dilapidation of healthcare infrastructure. Since inception in 1947, the country has had an ongoing arms race with neighboring India and a major chunk of the GDP has always been allocated to the armed forces. As a result, the army became a strong entity and weakened political governments often were overthrown, resulting in four military coups in the 64 years of existence. Political governments rarely completed their full term; they became fragmented and ethnically polarized. This led to politicians focusing on patronage rather than service delivery [41]. Quick tangible results, such as better roads, were prioritized over long-term, programs such as education and health. Thus, investment in health care, especially public health care, never became a priority. If there was any health-related expenditure, it was focused on new buildings rather than on quality improvement and maintenance of existing structures. This has led to the crumbling and ill-maintained health system of present. Corrupt governments led to increasing debts, which peaked in 1997 when 60% of the public expenditure was on debt servicing [41]. This further aggravated the situation and drove financial resources away from health and education.

Recommendations

The burden of surgical disease is expected to increase. Pakistan’s population is currently growing at a rate of approximately 3 million per year. Motorized vehicles are more common and road traffic accidents more frequent. Violence in the country achieves a new peak every year. Noncommunicable diseases of surgical relevance, such as diabetes and cancer, are increasing. Infectious diseases, such as amebiasis, typhoid, trachoma, and tuberculosis, continue to present with surgical sequelae, and the country has recently witnessed two huge natural disasters that devastated the already crumbling healthcare system.

The population per hospital has been constantly increasing from 1,450 people per bed in the year 2000 to 1,600 people per bed in 2010 [31]. Maternal mortality and anesthesia-related mortality remain unaddressed. The first step is to recognize the growing unmet need for emergency and essential surgical care and to develop targeted policies to address to this issue. Planning healthcare in most LMICs poses a great challenge and many factors come in to play [42]. In this article, we suggest a few priority areas and propose a number of solutions. The areas of prevention, research, and service delivery must be emphasized (Table 2).

Research in surgery

Highlighting the local unmet surgical need and its consequence is imperative, as is providing evidence for practical solutions. Currently, there is no national program to address surgical issues or even a mention of the unmet surgical need in an official paper [31]. At present, there are no reliable estimates for the number of surgeries performed in the country, the burden of surgical disease, or anesthesia-related death rates. The only scientific articles that have been designed to explore this topic were published in 1987 by Blanchard et al. [12] and in 1999 by Ahmed et al. [13]. The results of these publications were shocking and have been discussed above. Recently, an international team of experts from various disciplines recommended six essential measures for assessing national surgical performance: number of operating rooms, number of operations, number of accredited surgeons, number of accredited anesthesia professionals, day-of-surgery death ratio, and postoperative in-hospital death ratio [43]. None of these data are currently available for Pakistan. Estimating unmet surgical needs and assessing availability and distribution of surgical facilities, barriers to access, rate of unnecessary deaths due to surgical causes, gaps in surgical workforce, including surgeons, anesthetists, and paramedics, the economical loss due to the unmet surgical demand, rates of preventable postoperative complications, impact of surgical programs and surgical missions, and disparities in access and outcome is important. This information will advocate for intervention and safety and will inform policy. Many public health experts and policy makers alike still believe that surgical services are too expensive. Available research on the cost-effectiveness of surgical hospitals and surgical programs will slowly inform these perspectives [4]. Economic feasibility often is a driving force for policy makers and funding agencies.

Epidemiologic research in surgery, including trauma, anesthesia, and maternal mortality, must be promoted. Focus in these areas, as well as some specific cancers, will result in a significant decrease in surgical disability and premature death. Enhancing research on diagnosis and

Table 2 Summary of suggestions

Key areas of focus	Proposed mechanisms of improvement
Research	<p>Some key gaps in knowledge have been identified</p> <p>Enhance research capacity of surgical residents</p> <p>Surveillance in hospitals</p> <p>Government and International funds released</p> <p>Surgical camps to publish experiences and outcomes</p> <p>Surgical societies to encourage epidemiological research in surgery</p> <p>International collaborations to build research capacity and collect data</p> <p>International agenda to promote research in surgery</p>
Service	<p>Public–private partnerships to upgrade existing facilities</p> <p>Retain doctors by providing incentives, security, schooling, etc. for family</p> <p>Task shifting: nonphysicians providing medical and surgical care</p> <p>Surgical camps and missions—also to build and train local capacity</p> <p>Train more paramedics</p> <p>Academic centers to establish outreach programs</p> <p>International collaborations to help fund, establish, and train local efforts</p>
Preventive aspects	<p>Surgeons and anesthesiologists should join hands with current preventive programs</p> <p>Noncommunicable diseases of surgical relevance</p> <p>Safe anesthesia and surgery</p>

outcomes will build important databases, which will allow for appropriate services and quality improvement over time. Governmental buy-in must occur for training and research to be sustainable, and international assistance may be needed as well. Surgical societies and academic partnerships will enhance, encourage, and facilitate quality research activities [44]. Nongovernmental organizations also may facilitate this process if encouraged to collect and publish their data and experiences in scientific journals. NGOs contribute significantly to addressing the unmet surgical needs, and they can collect data on burden and complications (Hyder et al., 2011, unpublished data). Incorporating surgery-related questions on ongoing health surveys, such as the demographic health survey or national health survey, could provide important and useful data with regards to burden and inequities in surgical care. A conceptual framework designed to guide researchers to collect data on surgical conditions, burden of surgical disease, and how to define these has already been provided [45].

Western countries and academic institutions may aid capacity development in surgical research. This can be done through research partnerships and collaborations. Currently the Aga Khan University in Karachi, Pakistan, and the Johns Hopkins University have been collaborating toward trauma and injury prevention through a program supported by John E. Fogarty International Center of the National Institute for Health [46]. This project consists of capacity building in trauma research through trainings and seminars to develop local expertise in the field. There are a number of such successful collaborations or “twinning” between academic centers in industrialized nations with

institutions in underdeveloped countries [44]. Developing countries like Pakistan are largely dependent on help from foreign experts to conduct population surveys; availability and acceptance of this help has produced more than 50 national surveys [47]. The availability of international funds is essential for directing public health research and practice toward surgery. A great proportion of research in developing countries is funded by foreign agencies, thereby making the agenda donor-driven. International efforts to control HIV/AIDS for example have resulted in many practice and research programs, including a national AIDS control program to combat HIV/AIDS, even though the current burden is only 2 deaths per 100,000 population with an adult prevalence of 0.1%.

Delivery of surgical services

Even with current resources, the government and nongovernmental organization can and should upgrade urban and rural health facilities [48, 49]. A number of departments in public hospitals of major cities have been upgraded to state-of-the-art facilities in what is called a “public–private partnership” (PPP). This system harnesses the strengths of both the public and the private sector through a variety of mechanisms to reach a common goal effectively [50]. However, this also is accompanied by a multitude of process-related challenges, and the benefit of such programs remains controversial. For the immediate period, it seems to provide an adequate solution to the lack of access issues that surround surgical health care; however, its long-term efficacy and sustainability is unclear, especially in the

unstable political environment of Pakistan where the state may further neglect its responsibility to provide healthcare. However, if the state has long been unable to provide these essential services maybe a partnership will be successful. The role of PPPs in Pakistan for addressing surgical needs should be explored.

Manpower is a major concern in low-income countries. Even though Pakistan has a low number of physicians per population (79/100,000 population), the solution is not simply boosting training of more doctors. At present, there are two doctors to one nurse in Pakistan [51]—a ratio that needs to be reversed. Paramedical training also is neglected in Pakistan. There are only a few schools for nurses, paramedics, and technicians. Recent studies in low-income countries reveal that nurses and other technicians have the ability to care for many health conditions when properly trained [52].

Historically, physicians have migrated to countries in North American and Europe, contributing to the brain drain that is well known to LMICs. Talati et al. in 2006 estimated a loss of approximately 1,700 physicians per year due to emigration and other reasons [53]. They estimate that approximately 17.6% of practicing Pakistani physicians work abroad. They also acknowledge that these are most likely underestimates. This phenomenon has been increasing and the recently deteriorating security situation of country has its part to play. During the 6-month period from October 2010 to March 2011, approximately 4,000 doctors requested no objection certificates from the Pakistan Medical and Dental Council (PMDC) to leave the country to find employment elsewhere (personal communication, PMDC). Strategies to retain trained personnel need to be assessed and implemented. A recent survey identified that increasing physician income, improving working conditions, mandatory home country service, and increased collaborations would retain more physicians [54].

Emigration of health professionals is a universal problem for LMICs. Western countries also experience relative scarcity of specialized physicians with few surgeons practicing in rural areas [55]. In the year 2010, 190 doctors graduated from the College of Physicians and Surgeons of Pakistan (CPSP) in the surgical disciplines (personal communication, CPSP registrar). The CPSP is the sole licensing and examining body for postgraduate medical education in Pakistan. If we assume that the number of surgeons in Pakistan at present is approximately 2 per 100,000 population (5.5 times that quoted by Blanchard et al.) and we continue to produce surgeons at the same rate as present, it will take us 75 years to bring the density of surgeons to 8 per 100,000 population, which will still be half of the U.S. rate. This does not account for the increasing population or surgeon losses due to emigration,

retirement, death, and change of practice. In Pakistan, to train a surgeon takes 5 years of medical school followed by 5 to 6 years of postgraduate training. The financial remuneration during the postgraduate years is enormously inadequate and most surgeons-in-training are dependent on other sources of income for their livelihood. After completion of training, the majorities concentrates in cities or leave the country to seek a better lifestyle. Rural areas are thus always lacking physicians, especially surgeons and other specialists.

In contrast nurses, paramedics, and technicians are more easily trained, are cost-effective, and are more likely to remain close to home. Bypassing extensive surgical training by what is known as “task shifting” is an option worth considering. In Nigeria as part of a government initiative, general practitioners (GPs) were trained in basic surgeries and posted at district hospitals. They performed emergent and elective procedures. This program halved the referral rate to larger centers and 100% of the trained GPs remained at their post [56]. Many surgical procedures and anesthetics in Pakistan are performed by general practitioners, especially in areas where surgeons and anesthesiologists are lacking. Blanchard et al. found that 12 of 40 surgeons were experienced GPs rather than trained surgeons [12]. A number of countries have developed programs that train nonphysicians to handle health care, and recent studies have shown that this may be a feasible and safe way to meet the demand for surgery and anesthesia [52, 57]. Task shifting is a reasonable approach for the surgical crisis in Pakistan. Lessons learned from countries that have taken task shifting initiatives can be used to pilot such strategies in Pakistan.

Many private hospitals do not provide trauma care due to security risks to staff. Friends and family of dying patients often exhibit aggressive and violent behavior, which is detrimental to hospital infrastructure, staff, and other patients. Local governments must have an obligation to protect health professionals. Mandatory rural service has not been implemented in Pakistan. Many LMICs have utilized mandatory service as a solution to the dearth of doctors in rural areas. The lack of security also contributes to the absence of such programs that have the potential to address the surgical and anesthesia needs outside the urban areas. Improved civilian security is essential to addressing the dearth of manpower on a large scale.

Academic partnerships have the opportunity to reach underserved communities. Large academic centers in cities with outreach programs in rural areas have the potential to impact district hospitals with manpower and data collection. Surgical missions or “camps” also have the potential to become formalized and expanded on a large scale. It is more feasible for national surgical teams to make regular short trips to rural areas than an international team visiting

irregularly [58]. NGOs and charity organizations should be encouraged to establish free-of-cost surgical facilities and the local government and international organizations should support such endeavors. An example is CHEF international, which, through international collaborative efforts, has developed comprehensive eye care in a number of districts of Pakistan [59]. International organizations can provide a variety of surgical services, education, and training [60]. The impact that these programs have on decreasing the burden of surgical disease remains to be elucidated.

Preventive programs

A substantial amount of surgical-, obstetrical-, and anesthesia-related morbidity and mortality is preventable. With such a high burden of surgical disease and limited human and financial resources, prevention is of key importance. Preventive programs can be useful to decrease the burden of cardiovascular surgery by promoting exercise and healthy lifestyle activities, GI, lung, and urological cancer surgery by antismoking and awareness campaigns, trauma surgery by promoting safe driving and use of protective equipment, plastic surgery by preventing burn injuries and clefts, eye surgery by limiting the inappropriate use of steroids and promoting self-hygiene, and renal transplant needs by diagnosing and treating renal problems earlier. Many nonsurgical specialties have been advocating and pushing for these low-cost interventions, and surgeons need to join in the struggle. Another role of prevention is decreasing the complications associated with surgical care. Hand washing is still nonexistent in many surgical wards of Pakistan, and DVT prophylaxis also is inadequate. Simple and low-cost innovations can make a large difference. Something as simple as a checklist has been demonstrated to be beneficial to prevent postoperative complications and deaths in many countries [61]. Programs on patient safety can go a long way to prevent anesthesia and surgery-related morbidity and mortality.

Most patients with surgical cancer present very late in Pakistan. Many times these tumors have become incurable due to the delay in diagnosis. In such a situation, cancer screening programs have a major role to play. However, there is at current no national level initiative to screen for cancer. Many private hospitals do offer screening procedures; however, this is not affordable for the poor and most of higher-income people are still unaware of these procedures. Raising awareness for screening can make a big difference. Recently the Pakistan Medical Association launched a free-of-cost mobile mammography service; some other institutions perform free breast cancer screening as a once-a-year event. There are organizations that provide HPV vaccines for adolescent girls free-of-cost. Again, all of these are small programs concentrated in

cities. Such initiatives need to be evaluated and expanded to a national level.

Conclusions

Consistent with other underdeveloped countries, surgical care in Pakistan is dismal. Neglecting surgery and safe anesthesia has led to countless deaths across the spectrum of the Pakistani population and has contributed significantly to disability. As communicable and noncommunicable diseases and trauma further contribute to the burden of disease, the role of surgery will only become more important. Until emergency surgery is available for maternal hemorrhage and obstructed labor, the maternal mortality rates in Pakistan will continue to be unacceptably high. To reverse the disability and premature death related to all surgical disease, local, national, and international efforts must insist on access to emergency and essential surgery and safe anesthesia. To attain this goal, physicians and the government healthcare system must engage and commit to these efforts. In a resource-limited environment, such as Pakistan, priorities need to be identified. The first step is to generate reliable estimates of the burden of surgical disease and quantify existing resources. Successes have been achieved in other low- and middle-income countries, and these may serve as an example to Pakistan.

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