SPECIAL REPORT

When surgeons are rarer than resources - our experience with improving access to thoracic surgery in an urban setting: A special report

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Abstract

With progressive globalisation enabled by technology, there is an increased interest in finding viable solutions to the myriad health problems faced by developing countries. In countries like Pakistan, occasionally the challenge is not a dearth of material resources but rather unavailability of expertise. The current paper was planned to share a model that was successfully implemented in the urban setting of Karachi, Pakistan, from 2012 onwards which significantly improved access to thoracic surgery for underprivileged individuals. Our model focussed on a qualified thoracic surgeon reviving a defunct thoracic surgical unit thereby optimising the use of resources already available in the community. The key to efficient outcomes was direct managerial control by the surgeon who first educated himself in the various processes involved. The model, with its challenges and solutions, has good potential for adaptation in other urban settings in the developing world.

Keywords: Thoracic surgery access, Underprivileged settings, Low-cost care model.

Introduction

Progress in technology has propelled globalisation in the recent decades. With this process, a growing international sense of responsibility has evolved towards provision of healthcare to individuals regardless of their national affiliations or socioeconomic status.[1] Approximately a third of global disease burden is attributable to surgical problems.[2] However, delivery of surgical healthcare is complex due to its multidisciplinary nature. An efficient marriage of expertise, surgical material, supporting specialties like anaesthesia, post-operative nursing, blood banking and physical capital is required for quality outcome. Unlike other major global health issues, like diarrhoea where a mobile health worker can single-handedly pursue patients at their homes and intervene with highly effective yet cheap treatments, surgical healthcare delivery is far more complex. This has undesirable consequences. A study from Pakistan estimated that there were 187 deaths per 100,000 persons per year from acute surgical illnesses, which was higher than deaths from infectious diseases, including tuberculosis (TB), human immunodeficiency virus / acquired immunodeficiency syndrome (HIV/AIDS), diarrhoeal disease and childhood infections.[3] In the context of thoracic surgery, late presentation and poor secondary prevention compounded with endemic TB, multi-drug resistant TB (MDRTB), hydatid disease and smoking lead to an increased burden of pleural disease requiring surgery. This is especially true as infective pleural diseases become increasingly difficult and expensive to treat as the delay to a qualified healthcare provider increases. A para-pneumonic effusion that may have responded to antibiotics and chest tube thoracostomy in the first week will most likely require surgical decortication if the patient presents with a few weeks' delay. Add more time to the delay and the patient may require more drastic measures like a pleurocutaneous window.

The social dynamics in Pakistan are further complicated by an additional element of charity. Studies suggest that Pakistanis donate greater than 1% of the GDP to charity with an estimated annual donation of $2 billion.[4] This results in an unexpected situation of availability of tangible resources but limitation of healthcare delivery due to expertise becoming the rate-limiting step. This phenomenon is further accentuated due to ongoing brain-drain from South Asia to the Middle East and the West.

In the face of this increasing disease burden, innovative solutions focussing on pooling available resources in a sustainable fashion hold the key to improving access to thoracic surgery. The current paper was planned to share our experience of establishing a low-cost thoracic surgery healthcare delivery system in Karachi, Pakistan. The model (Figure) has potential for adaptation in similar situations across developing countries.

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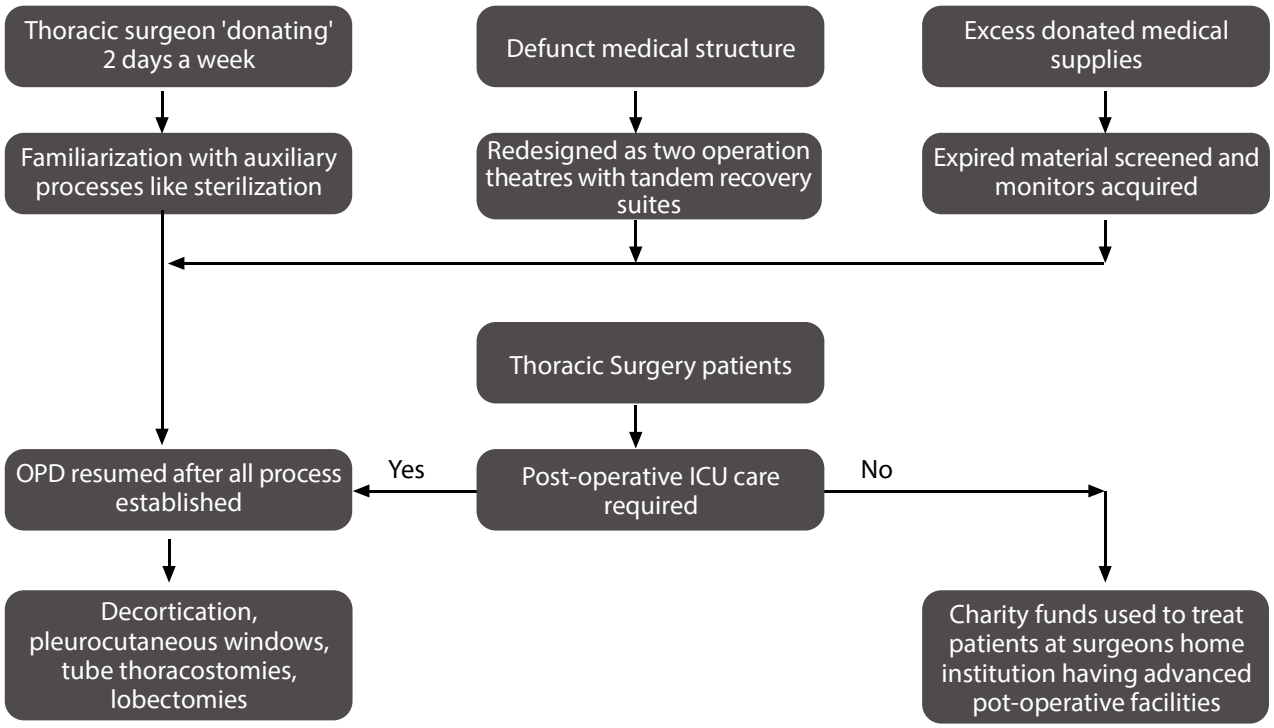

Figure: Consolidation of individual elements.

Methods and Results

Karachi is one of the largest metropolitan cities of the world. The city caters to not only the health needs of its own extensive population, but also to the requirements of surrounding areas owing to the lack of advanced healthcare facilities in peripheral areas. As such, many rural inhabitants with advanced healthcare needs, like those warranting surgery, come to the city. With a severe shortage of thoracic surgeons, the lack of healthcare in this specialty has even been picked up by mainstream media.[5]

In the aftermath of the 2010 floods, a sharp increase in charitable donations led to accumulation of excess medical and surgical supplies. However, despite the presence of material and patients, most of the donated supplies were mothballed due to lack of expertise. As such the vice-chancellor of a particular institution proposed collaboration with thoracic surgical expertise at the Aga Khan University Hospital (AKUH), Karachi, which led to an 'operate and transfer' project completed over two years from 2012 to 2014.

The said institution already had much of the physical resource prerequisites, including space for the operative and clinical setup, donated chest tubes, absorbable and non-absorbable sutures, surgical instruments, ventilators, autoclaves, single lumen endotracheal tubes and even flexible bronchoscopes. However, a sterilisation process was non-existent and there were no monitors available for intra-operative or post-operative monitoring.

The process was initiated by making the operation theatres (OTs) functional before opening clinics. Two theatres were refurbished and supplied with monitoring equipment donated as a one-year charity rental by the manufacturers. Two additional monitors were also donated for use in a two-bed post-operative recovery area.

The next step was to establish of instrument sterilisation services. Operational training for the autoclave was imparted to support staff. Following this, drape cloth and sterile instrument pack wrapping paper were acquired at low-cost through wholesale purchase and sterilised using the autoclave with different protocols for fabric versus paper.

In terms of human resources, the thoracic surgeon leading the effort spent two fixed days per week at the facility. Operational hours were from 9am to 2pm. Early

closing hours were designed to allow support staff to continue with secondary jobs/private practice in order to ensure sustainability in terms of retaining support staff that would be trained over the following months.

Once the operative setup was completed, attention was shifted to the clinical setup. Rooms were allocated for triage, clinic, office and a changing room for OT staff and patients. Eventually it was realised that time was limited for accommodating 30 patients plus 2 surgeries within a 5-hour timespan. The issue was tackled by efficiency-increasing measures. The clinic was relocated to the immediate vicinity of the OT outside the sterile perimeter. This allowed the surgeon to seamlessly attend to clinic patients in between surgeries, allowing maximum utilisation of time. Medical records were established with carbon paper used to make duplicates that were given to the patients in order to ensure better treatment if the patients required urgent treatment at other facilities on the days that the primary thoracic surgeon was not available at the clinic.

This setup was designed to safely accommodate two surgeries per day. A single patient was operated upon in each theatre and they went to their respective recovery room monitored bed overnight. Following this, they were shifted to the ward as needed. The primary focus in the initial phase was on capacity building and establishing a meaningful and safe system first before expanding volumes. Decortications, hydatid cyst removal and lobectomies formed the bulk of procedures done. Financial constraints meant that video-assisted thoracoscopic procedures were not possible owing to sizeable investment required for instruments. Similarly, pneumonectomies were not performed keeping the level of post-operative patient care available in mind.

It is important to highlight the fact that in publications from even major healthcare setups in the developed countries, like the United States of America, the rate of re-operation in thoracic empyema is surprisingly high.[2] In addition to increased morbidity and impact on the individual patient, re-operation drastically increases costs involved in a philanthropic setup. The solution devised for this problem was standardised use of staged empyema tube removal in all patients presenting for decortication. This led to near negligible re-operation rates at the cost of a more prolonged post-operative recovery period.

Once the system had started operating smoothly, the next phase in terms of increasing volumes was implemented. A second thoracic surgeon was taken on board. Unlike the first surgeon who was working out of philanthropic intent, the second surgeon was hired in a full-time capacity to ensure sustainability. Soon after induction, he took over operations at the facility and increased volumes through daily surgeries and clinics.

During this period the additional challenge existed of patients presenting to the clinic with complex pathologies that the center was not equipped to handle. These patients were assisted by arranging surgeries at the primary thoracic surgeon's home institution which was equipped to deal with complex cases through Zakat and charity. Although this was a less efficient return on investment than the newly-hired thoracic surgeon, it ensured that mechanisms remained where advanced cases could also be addressed when surplus funds were available through charity.

This parallel system eventually evolved in its own right. Another charity hospital with a high load of paediatric thoracic oncology cases adopted this pathway to sponsor thoracic malignancies, including but not limited to sarcomas, mediastinal tumours, teratomas, lung primaries and metastases. This also allowed the charity hospital to pool donated resources with donations given to the primary surgeon's home institution to further increase the potential to assist underprivileged patients with advanced surgeries and commensurate post-operative care. This was especially important since the primary surgeon's home institution is the only center in the province of Sindh conducting complex thoracic malignancy procedures, especially in the paediatric population.

Discussion

Recent years have seen a budding enthusiasm in global surgical care in order to meet Sustainable Development Goals (SDGs) and achieving Universal Health Coverage (UHC).[6] While the Alma Ata Declaration of 1978[7] did not include surgery or anaesthesia in the primary healthcare plans, there are ongoing discussions of including it in the revised declaration. With a growing international interest in delivering better surgical care to underserved individuals, there is a search for customized models arising from the ground realities of the target populations designed to use scarce resources, both tangible and

human, and deliver better care. The social theories are the cornerstone in analyzing the circumstances surrounding global surgical health delivery. Most people believe that surgical care comprises only a small part of the global health burden. This in fact, is a misconception and can be unravelled under Berger and Luckmann's theory[8] of the social construction of reality. Contrary to popular belief of the minor global surgical burden, 5 billion people worldwide do not have access to surgery,[6] 15% of the world's total disability-adjusted life years (DALYs) are lost due to surgical causes.[9] In spite of this significant metric, surgery has become "the neglected stepchild of global health".[10] Consequently, due to various factors, as discussed below, only 3.5% of the world's surgeries are done in the poorest third of the population.[11]

One of the reasons that global surgical health delivery has been neglected is because communicable disease like HIV and TB were a dominant concern for both health authorities and donors.[12] Also, unlike communicable diseases, cardiothoracic surgical diseases do not transmit from one person to another and thus may not rank high as a public health concern.[12] Another contributing factor is the influence of neoliberalism and the user-fee required for surgical procedures. Implementation of user-fee effectively makes expensive surgical procedures inaccessible to the poor. Furthermore, as demonstrated in our project, surgery does not only require clinical expertise from surgeons, anaesthetists and paramedical staff, but also from biomedical teams for autoclaves, equipment and personal protective equipment as well. This is what makes global surgical health delivery challenging, especially in the absence of a Global Fund for Surgery.

The theory of Social Suffering by Paul Farmer can be used to understand how structural violence is a significant barrier to providing healthcare.[13] In addition to insufficient monetary support, lack of access to hospitals for diagnosis, trained surgeons, clean water supply, reliable sources of electricity, oxygen and anaesthesia medications make it exigent to perform even the simplest surgical procedures, let alone complex thoracic operations.[14] Evidence suggests that it is usually the availability of staff, stuff, space and systems which are a hindrance in care in low-resource settings.[15] We share a unique situation arising in a developing country where the potential for care in thoracic surgery candidates was limited by lack of human resources and expertise instead of material resources. A number of valuable lessons were learned that can help guide policy-makers and philanthropists alike.

The first was the realization that it is far more difficult to start anew or restart a surgical healthcare delivery setup rather than maintaining it. Inconsistent policies and intermittent service disruption required far more effort to overcome inertia and hence we advise a focus on sustaining ongoing processes and adding value to them before embarking on completely new undertakings from scratch. Moreover, vertical surgical programmes need to be integrated with horizontal programmes addressing multi-departmental collaborations (medical personnel, equipment technicians, laboratories, blood banks, uninterrupted electricity supply etc.) which improve the infrastructure for optimum impact. In their experience from addressing a similar gap in surgical delivery in Haiti, Farmer and Kim[10] even discussed the need of physicians to be familiar with the building and stocking of OTs if progress is to be made in underserved areas. Forums for networking of healthcare personnel can facilitate the marriage of the multiple aspects needed to deliver meaningful care. Robert Merton's theory[8] of unintended consequences of purposive action underscores an interesting point. Pakistan has a unique training system where the tracks for cardiac and thoracic surgery have been separated by the primary postgraduate degree-awarding body of the country. As opposed to the system in most countries internationally where cardiothoracic surgery represents a combined degree and specialty, the process in Pakistan requires separate residencies for cardiac and thoracic surgeries. Resultantly, with the majority of trainees in the subspecialty opting for cardiac surgery, this has created a vacuum of qualified thoracic surgeons, leading to a drastic decrease in individuals trained and credentialed to perform thoracic surgeries. The final outcome is a lack of care in this critically important subspecialty resulting from the double hit of a shortage of resources and expertise Farmer and Kim[10] discussed the need for commitment to reach the poorest if global surgical health is to be successful. While the models mentioned above deal with two polar opposite approaches, i.e. bring the surgeon to the patient and bringing the patient to the surgeon, it must be kept in mind that there are significant limitations. Any thoracic surgeon choosing to donate time to philanthropic pursuits is limited by geography. Given the primary responsibility

to one's own patients, the surgeon cannot travel far from his home institution to deliver healthcare to the underprivileged regularly. This situation is possible in a massive metropolitan city like Karachi owing to the healthcare requirements of so-called urban slums. This permits the surgeon to tend to his primary patients and easily deliver care to underprivileged within the same geographic confines.

The second constraint is limited volumes in the early phase where a focus on sustainable effort trumps the need for higher volumes. Once the system is operational and supply lines for materials and philanthropic inputs are streamlined, this limitation can be gradually dealt with through capacity building.

Conclusion

Maximizing healthcare coverage for patients in the developing world does not always equate to the injection of material resources. Occasionally, underutilized resources already existing in the community can be used to meet the same challenges. This is especially true in subspecialties where the dearth of surgeons is a significant factor. By encouraging experts to contribute time as a philanthropic commodity, this challenge can be addressed. However, in our experience, it is also critical for medical caregivers to familiarise themselves with the auxiliary processes involved in healthcare delivery. This allows for a low-cost high-efficiency model that is easily reproducible and can contribute to the global effort to provide improved surgical coverage to the underprivileged.

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