2c Organisational Deficiencies in Developing Countries and the Role of Global Surgery

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INTRODUCTION

Surgical care in developing countries faces the dual challenge of limited financial and organisational resources. Limited financial resources imply a dearth of funds for necessary materials, such as surgical equipment, while limited organisational resources imply a limited ability to best combine and utilise existing material and human resources.

The predominant view, at least in advanced economies, is that the financial needs of developing countries are dire, without equally appreciating other institutional and organisational deficiencies that characterise economic underdevelopment. As a result, largely financial fixes, such as material donations and doctors from developed countries volunteering to perform surgeries for free, are popular. However, in the absence of a more holistic vision, such assistance remains temporary, operating more as a stopgap measure than a purveyor of structural change. Donor- and volunteer-exhaustion is not uncommon, and when funds dry up, it becomes clear that the local surgical system is still stagnant, with little lasting improvement to surgical care quality or outcomes.

This chapter offers a different viewpoint, which is that a big part of the problem stems from the underutilisation and poor organisation of the most valuable medical resource in any country – human capital – and that while additional funding can help, it cannot automatically or mechanistically fix this problem. The reality for many local doctors in developing countries is that they must perform their standard medical duties in a healthcare system that offers them little support. This involves not just material support in the form of equipment and other necessities, but also organisational support in the form of incentivised and effective training; equipped nursing and assisting staff; clear guidelines and protocols regarding medical error, accountability, and liability protection; clear protocols about communication with different healthcare institutions; incentives for data collection and research; and many more.

This weak organisational environment imposes numerous burdens on the local surgeon,

a primary one of which relates to training and learning. Surgeons are unlikely to be motivated or able to engage in high-risk surgeries, such as spine surgeries, or to keep up with continually evolving global best practices, and surgical care quality is likely to remain poor. Funding and sporadic international volunteer missions do not fix this problem either, as some of the skills fundamental to improving surgical outcomes must be learned by actively and consistently engaging and supporting the local doctor.

For this particular need, global surgery can make a lasting difference: missions that not only provide clinical service but also train doctors and advance their long-term capabilities would work around some of the local organisational deficiencies, thereby facilitating structural change in a challenging environment and complementing financial assistance. This chapter focusses on why these programs matter and what they could look like.

The chapter is structured as follows. The 'Organisational Challenges in Developing Countries' section expands on the concept of 'organisational deficiency' in healthcare systems and argues that this has been not been at the forefront of global surgery concerns in dealing with developing countries. The 'Learning and the Local Surgeon' section explains why and how limited organisational resources impede learning and training, especially in highly demanding surgical fields, such as spine and early-onset scoliosis (EOS) surgery, and the repercussions for the local surgeon. The 'Role of Global Surgery' section argues that, while local institutional shortfalls are likely to be rigid, global surgery can alleviate part of the problem by training sets of local surgeons and enhancing their incentives and capacities to learn, innovate, and conduct research. Therefore, global surgery can circumscribe at least some of the challenges associated with limited organisational resources and help promote services such as spine surgery. The 'Conclusion' section summarises and concludes the chapter's arguments.

ORGANISATIONAL CHALLENGES IN DEVELOPING COUNTRIES

In the simplest terms, organisational efficiency refers to the ability to combine and use (i.e. organise) resources efficiently, hence to make the most out of existing resources. This includes the organisation of material resources, such as (in a medical setting) from whom to buy medical equipment, how to distribute it across departments, how to market and expand the hospital's reach, and so on. It also includes the organisation of personnel resources, such as overseeing hiring and training and managing, facilitating, and supporting the work of doctors, nurses, administrators, and others. Because organisational efficiency is tied to the strength of the institutions that oversee material and personnel, it can also be referred to as institutional efficiency.

Therefore, whereas financial constraints imply there is a limited total amount of resources available (small pie), organisational constraints imply there is a limited ability, due to weak institutions, to manage these resources successfully (to make the most out of the existing pie). These are two related but distinct concepts. Greater resources (a bigger pie) may ease organisational constraints, but this will not happen if institutional quality remains poor and if there is a lack of streamlined and efficient bureaucracy to manage finances and personnel. Organisational inefficiency within an institution may also create organisational inefficiency between institutions, as it becomes more difficult to coordinate tasks and communicate with each other.

The difference is stark between advanced and developing countries both in the size of their resources and the strength of the institutions that manage these resources. In developed countries, resources are relatively abundant and institutions are strong, with streamlined bureaucracy and relatively transparent rules and chains of command. In developing countries, by contrast, resources are, by definition, limited, institutions are generally weak, bureaucracy is more haphazard, and rules are less transparent [1]. This also makes coordination between different institutions difficult, slow, and potentially chaotic [2]. For these reasons, it is more difficult, in developing countries, to set expectations and plan forward in almost all settings (not just the healthcare sector). Therefore, when we talk about 'resource-limited' countries, it signifies that there are limitations on both financial and organisational resources.

In developed countries, because institutions are relatively strong and bureaucracy is streamlined, it is easy to overlook the problems that could arise organisationally, and the distinction between themselves and developing countries has been understood, at least historically and in popular discourse, in terms of the extent of financial resources (as exemplified by the prevalent language of 'rich' versus 'poor' countries). The fact that development requires much more than just having more resources is exemplified by the vastly different outcomes of resource-rich developing economies. For example, in 2019, the top two oil-rich countries in West Africa – Angola and Nigeria – had a combined average gross domestic product (GDP) per capita of $3,000 while the top two oil-rich countries in the Persian Gulf – Saudi Arabia and the United Arab Emirates – had a combined average GDP per capita of about $30,000. Similarly, many countries receive aid and financial assistance from the West, but this aid is not equally successful across the board, owing in part to institutional differences that influence how the funds are utilised [3].

Because global surgery programs are predominantly developed and organised by healthcare institutions and surgeons from the United States and Europe, the viewpoints of global surgery are largely informed by this perspective. Financial or quasi-financial assistance via donations or short-term volunteer missions are the primary concern of a majority of programs; see for example Gutnik et al. [4] on estimated financial contributions and Shrime et al. [5] on short-term surgical missions. (Volunteer missions are quasi-financial because they are equivalent to providing funding for those surgeries, with the funding source being the international surgeons who forgo their standard fees.)

Financial and quasi-financial assistance certainly alleviate short-term supply problems but cannot, on their own, address long-term problems. Providing funds for equipment and other purchases is of limited helpfulness if the domestic workforce is unable to utilise these resources effectively. Similarly, volunteering to conduct surgeries offers a short-term service that cannot be sustained nor replicated if local surgeons do not eventually learn how to provide this service themselves. In turn, as will be discussed in the 'Learning and the Local Surgeon' section, improving the ability of medical personnel to utilise resources effectively and to learn best practices is highly demanding on organisations. Therefore, the effectiveness of global surgery's financial assistance to developing countries is tied to complementary organisational improvements that allow local healthcare providers to learn and adapt some of those fundamental skills brought by global surgeons.

Of course, global surgery and the contributions of international surgeons cannot and would not be able to fix a developing country's healthcare system. Institutions are historically rooted and difficult to change except in the very long term, and, even then, institutional change is the outcome of the interaction of domestic political and economic factors [6]. In fact, part of the appeal of limited programs such as donations or volunteer surgeries is that they are doable and pragmatic in their goal of offering short-term relief. Nonetheless, while global surgery cannot be expected to change a country's institutions, there are ways it can use its resources to allow local surgeons to work around some of these organisational problems that are likely to persist in the long run.

In particular, global surgery – through its administrative bodies and networks of surgeons – can work with local institutions to offer space, skilled surgeons, and logistical support to train sets of local doctors on global best practices; in turn, as suggested above, this also supports the efficacy of financial and quasi-financial assistance to developing countries. The next section addresses more closely the concept of learning and innovation in developing countries, using EOS surgical training as an example. It will elaborate why training is not an automatic outcome of greater funding and needs to be organised and supported strategically, thereby paving the way for a discussion of the role of global surgery in this area.

LEARNING AND THE LOCAL SURGEON

The Learning Process

To set the stage for a discussion on the training of local surgeons, a useful starting point is the

distinction between information and knowledge. Per economists who study how people learn in different settings, *information* describes a set of 'blueprints' that can be easily codified and freely transferred to a person who reads them [7]. For example, a simple set of instructions for putting together a child's toy constitutes information in that the full instructions can be written out, and the person who reads it will, with little effort, understand how to carry out the instructions perfectly.

By contrast, *knowledge* may incorporate components that are tacit, or hidden, because they are difficult to codify because of complexity and context specificity; acquiring this knowledge involves solving problems that are 'ill-structured', for which no automatic solution is available [8, 9]. As a result, knowledge cannot be fully transferred to another person through a manual or a blueprint, and the recipient must actively exert effort to uncover the tacit components and solve the relevant problem. For example, suppose the problem is how to design a large building. One cannot learn how to become an architect only by reading books because designing buildings is highly complex and depends on terrain, weather, building materials, zoning laws, etc. Extensive hands-on experience is necessary to fully acquire that knowledge. This is the reason architects must not only complete schooling in which they read books (codifiable information) but also apply themselves in internships and other projects before they are licensed. In the United States, for example, one must complete a 3-year internship before being licensed.

How and where does the 'uncovering' of the tacit components of knowledge take place? Because much of the tacitness is due to context specificity, the uncovering largely takes place through trial and error on the job itself. Attempting to solve the problem in a controlled setting, such as an architecture internships with supervision, enables people to figure out what works and what does not in the target context and to use that experience to gradually improve their ability to deal with the problem at hand. In that way, the knowledge-acquisition process involves (among other things) solving problems for which no codified solution exists, largely through trial and error on the job. This type of learning process is aptly named 'learning by doing'.

The nature of the learning process implies that, in fields for which problems are highly complex, ill-structured, and context specific, a lot of hands-on experience is necessary, and simply transferring equipment and information is not enough for building local expertise. This is because information transfer is not the same as knowledge transfer. It is critical that the target personnel are afforded the opportunity to get involved directly through guided learning by doing. For this to be successful, it must involve appropriate mentoring, supervision, guidance, assessment, and feedback, and there must be a planned on a time frame that is long enough to sufficiently enable learning from experience and from trial and error.

To sum, learning in highly complex fields is not only potentially financially costly but also highly organisationally demanding [10].

The Surgeon in Developing Countries

Surgical intervention is a prime example of a problem that is highly complex, ill-structured, and context specific. For this reason, surgeons must acquire extensive hands-on experience before they are qualified to operate on patients, through rotations, multiyear residency programs, and potentially further training. Paediatric spinal surgery, particularly the treatment of EOS, is especially challenging. It is continually evolving and requires training in addition to standard orthopaedic surgical training. It is also highly context specific, with the most appropriate procedure varying with the child's medical history, the equipment available locally, and experience necessary for making critical on-the-spot decisions during the surgery itself.

In line with the above discussion, this implies that building local capacity for the management of EOS requires a great deal of organisational resources and that developing countries are at a significant disadvantage in this regard. Building capacity requires experienced surgeons to act as mentors for learning by doing, as well as institutional support in the form of planning and organising the training; patient outreach; equipping the nursing and other auxiliary staff; setting clear expectations about surgical outcomes

and quality; and structuring appropriate intake, follow-up, and accountability procedures. It also requires extensive and transparent coordination between the different relevant institutions of a country, including its healthcare ministry, medical schools, training hospitals, and other hospitals. These organisational facets are somewhat or extremely deficient in countries with limited resources. Added to the existing financial burden of procuring often expensive equipment, this paints a bleak picture for surgical capacity in those countries

What does this mean at the individual level, for prospective spinal or EOS surgeons in a developing country? First, they face significantly more hurdles toward intellectual and clinical development than their counterparts operating in a streamlined bureaucratic system in the United States or Europe. Lack of institutional support also means they have little incentive to enter this highly complex, time-consuming, and risky surgical field, particularly given the high incidence of postoperative complications and unclear ways to protect the surgeon from medical negligence claims. The availability of an untapped market for spine and EOS surgery may motivate doctors, offsetting some of the incentive problem, but here, too, surgeons may encounter a wary population and will need to exert effort to display credibility to build a reputation.

As a result, often only the very ambitious individuals are able to move forward and essentially train themselves. They have to bear much of the burden of finding mentors and scouring training opportunities, coordinating the requirements and opportunities of different healthcare organisations, reaching out to patients, and building a skilled auxiliary team, all while bearing significant risk on the financial and medical side. Instead of institutions fostering medical talent (as in the advanced economies) the result is medical talent arising despite institutional hurdles and inefficiencies. Of course, this means too few spine and EOS surgeons and lack of provision of an important service to spine patients in developing countries. At the turn of the twenty-first century, about 80% of all orthopaedic surgeons in the world resided in 26 advanced economies, and the concentration was likely even higher for orthopaedic spine specialists [11].

This discussion also highlights the complementarity between financial and organisational resources. Procuring the right equipment is a financial hurdle for many countries, but even with funding for the right equipment, lack of a skilled staff that knows how to operate this equipment makes the tools more or less useless. Moreover, unlike equipment for which acquisition is largely a financial and operational problem, the acquisition of a skilled staff is much more complex and organisationally demanding. The next section expands on how global surgeons can realistically help promote progress in this challenging and institutionally constrained context, with continued focus on spinal and EOS surgery.

THE ROLE OF GLOBAL SURGERY

Long-Term Training Programs

The most important healthcare resource in any country is the knowledge and skill of its medical staff, but, as discussed above, the nature of the problem of improving surgical training in countries with limited resources is twofold. First, training personnel to solve complex, ill-structured, and context-specific problems, such as spine and EOS surgery, is not only costly equipment-wise, but also highly organisationally demanding. Second, healthcare institutions that would usually be responsible for such training, including teaching hospitals, are usually organisationally weak (to varying extents) in countries with limited resources. They may have limited capability or experience in planning and coordinating who can train medical students and local surgeons, where and how often this training will take place, how it can be funded in the long term, what auxiliary staff is needed, and the set of outcomes/metrics expected and accounted for at the end, among other things. This creates an unfortunate situation in which the regions that need significant improvements in surgical outcomes remain the most in need, even as they occasionally receive financial or quasi-financial assistance from global health organisations.

Laying out the root of the problem clearly is important for thinking about solutions. It is hardly controversial to suggest that the nature

of the learning process itself – and the fact that it is highly organisationally demanding – cannot be changed. Even though there are ongoing advancements in virtual reality (VR) surgical intervention, it is unclear how quickly these advancements will become mainstream in surgical training institutions. Moreover, even if or once VR training becomes widespread, effective use of it to train doctors in developing countries would still require significant organisational effort, albeit in a different capacity.

Therefore, the way forward is to somehow overcome the organisational weakness in countries with limited resources so that training, especially for highly complex surgeries, can be accommodated. While it is almost impossible for global surgery to make drastic changes to a country's domestic institutions, it can support existing arrangements, or offer new ones, for meeting certain realistic training goals.

What would such an involvement of global surgery look like? Though the exact program would be context specific, the main function of global surgery (specifically, the training or education committees of its associations) would be to coordinate between international surgeons, local healthcare systems, and local surgeons:

- **International surgeons.** Global surgery associations can draw systematically on the thousands of members they have and, without too much difficulty, elicit the enthusiastic participation of a sizable number of spinal and EOS surgeons for volunteer training missions. The participating surgeons would be highly experienced in training and mentoring and would be comfortable committing to a program that involves consistent travel (for example, once every 3 months) for a number of years to a specific country or region. They would also be financially comfortable doing this on a volunteer basis but with the understanding that their flights and basic accommodations are provided for. Follow-up and consistency over a sufficiently long time frame is key to generating learning results, for the reasons listed above, and is the primary differentiator between a program like this and the existing popular short-term missions.
- **Local healthcare systems.** Global surgery associations can reach out to various contacts in each potential country of choice to see if there is agreement and enthusiasm among key local actors, such as health ministers and heads of training hospitals, about the desirability of an externally organised multiyear spine/EOS training program. After narrowing down a list of host countries, the difficult but important job is to negotiate key logistics such as where these training programs would take place, how often, what the appropriate metrics who be and how regularly they would be assessed (this is crucial), who would provide the equipment and/or cover the cost of hosting the international surgeons. Ironing out the details is context specific, but it might be important to ask that the local healthcare system bear part of the financial cost if possible. This increases the stakes of the program succeeding and provides an incentive for local administrators to manage and monitor progress closely.
- **Local surgeons.** Though local surgeons' main points of contact will be their own local healthcare administrators and the (visiting) international surgeons, it is beneficial for the global surgery logistics team to also establish some direct contact. Before training, a first step would be to ask surgeons from that country who are involved in global surgery networks what they think the major needs and challenges are of surgeons in their community and their view of the relationship between surgeons and local healthcare institutions. Once the training program is underway, it is important to receive and incorporate feedback from the group of surgeons being trained about the efficacy of training, the areas they need more focus on, and how the training is translating into results in their own local surgical practice.

This type of work would involve some financial costs (though not prohibitive because much of it would be done on a volunteer basis by the relevant committees), but, more importantly, it is highly organisationally demanding. Effectively, the institutions and networks of global surgery would be using their power and resources to ease some of the organisational burden on the healthcare system of the country in question, thereby facilitating the achievement of certain important targets. In a sense, this is parallel to financial assistance (in which funds ease the budget constraints of poor countries) and, as argued above, equally important but more often neglected.

Logistically and strategically, it is very important that long-term does not mean infinite or having a vague end date. Though some flexibility may be necessary as the programs get underway, it is imperative to have an end date in mind at the outset (such as 2 or 3 years). It is also necessary to have a protocol from the beginning specifying what the final goals are and how to assess progress in terms of these goals at regular intervals. This will increase transparency, help avoid complacency in the program, and encourage international surgeons to volunteer their time and effort, knowing that there is a specific desired outcome and end date in mind.

Collaboration over Hierarchy

It is clear from the above discussion that global surgery institutes and networks would not (and cannot) supplant local healthcare institutions but, rather, would collaborate with them to ease some of the underlying constraints and facilitate the achievement of concrete targets. The organisational burden, though in part borne by the international institute owing to its resources, would be shared by the local organisations (such as health ministries and training hospitals), and two-way communication would be essential to continually assess and improve the training programs.

In parallel, the relationship of the international surgeon to the local surgeon should reflect a collaboration rather than a top-down chain of command. International surgeons are there to offer a resource (experience in highly complex surgeries) to ease the learning constraints on local surgeons. Though there is some power dynamic inherent in the mentor-mentee relationship, it is critical to be aware of this and mitigate the hierarchical dynamic to the extent possible.

Fostering a collaborative, versus a hierarchical, approach between the international and local surgeon is important not only because it can aid the working relationship but also because it is imperative for the success of the learning process. As discussed in the 'Learning and the Local Surgeon' section, learning often involves components that are context specific and that must be uncovered with experience and trial and error on the job. This includes how to adapt existing technologies or techniques to best fit the local environment, which is not something that can be known ex ante and is uncovered actively as the technology is being used in the target context. In fact, while developing countries often innovate by producing new technologies at the frontier of science, people in developing countries also innovate when they adapt existing technologies to best fit a complex local context.

With surgical intervention, while international surgeons brings their skills and experience in global best practices, local surgeons bring their intimate familiarity with the local context and a superior ability to gauge how to best adapt these standard practices to that context. For example, the surgeon being trained may figure out, with experience, how to create moderate adjustments in technique that utilise fewer expensive surgical materials, improving the accessibility of this surgery in an environment with limited financial resources (see Ahmad et al. [12]) and the innovation of the four-rib construct for EOS treatment as an example. For this reason, the optimal learning process would combine insight from and feedback between both the international and local surgeon.

From the international surgeons, such a collaborative approach would require a dose of humility and an understanding of their role in perspective, including what they do not know and what they rely on the local surgeon for help with. It requires that international surgeons are cognisant of and work proactively to overcome the ego problems embedded in volunteer missions (for a discussion of this problem, see Ahmad [13]). They should be comfortable

acting as temporarily senior colleagues who are training surgeons in less developed countries to eventually become their peers. There needs to be an active effort to elevate local surgeons to the status of a peer and to not view them as a perennial mentee because that is the point and hallmark of successful training.

From the local surgeons, though in the long run it is in their best interest to form an active part of the surgical intervention and acquire the skill, there may be strong initial reluctance to get involved and potentially be held accountable for the outcomes of complex and risky surgeries. A clear understanding for these surgeons about what constitutes a medical error in these surgeries is helpful as is a measured and gradual approach in which local surgeons become more involved over successive training sessions. A protocol of expected outcomes and frequent assessment of performance would also incentivise local surgeons to exert effort and improve their performance confidence through successive rounds of feedback.

Data Collection

Data supports learning, progress, and innovation in all scientific fields, and surgery is no exception. The collection of data on the outcomes of different surgical techniques is at the heart of understanding what constitutes best practices. In addition, data on the distribution and correlation of different variables – for example, relating to patient characteristics, medical history, and ex post complications – would help surgeons better gauge the local context in which they are operating and innovate accordingly.

Unfortunately, the collection of aggregate medical data in developing countries is difficult [14], which is unsurprising given that it requires both financial and organisational resources. Global surgery cannot suddenly overturn or fix these problems; however, it can facilitate the collection of surgical data on the individual level by the local doctors it trains. Therefore, though macroanalysis of medical outcomes based on large data sets or experimental trials would remain elusive, more micro data sets, building on individual surgeon's experiences, can be encouraged, leading as well to potential research and publication outlets for these surgeons.

Accordingly, training programs provide a valuable venue to not only teach surgical best practices, but also to demonstrate data collection practices to the surgeons in training. The good news is that with surgery, data collection involves the somewhat time-consuming but not too complicated task of documenting key variables relating to patient characteristics and medical history preoperatively, and key surgical outcomes and complications ex post. Here, too, the sustainability of the training program makes a difference: because training would be organised on a relatively long-term basis with numerous follow-ups for each patient, the local surgeon would be able to use the follow-ups to apply the data collection skills learned in training.

In addition to training, global surgery may also be able to aid the microcollection of surgical data by creating the templates of relevant questions the local doctors would ask, and the observations they would document in the process. These templates can be standardised or somewhat differentiated by region. Such an endeavour would not require a great deal of financial resources, but it would be important to digitise this template, to disseminate it through various local networks, and potentially organise target training sessions for surgeons on the use and long-term adoption of such templates.

CONCLUSION

Healthcare systems in developing countries grapple with limited financial and organisational resources. Whereas the financial constraints are common knowledge, the organisational constraints these countries' institutions face are less well understood; these relate to the ability to utilise existing material and human resources effectively and to coordinate among different institutions to achieve shared objectives. Organisational constraints impede, among other things, effective training of the surgical cadre, especially on highly complex interventions such as spine and EOS surgery. This limits the ability of local surgeons to learn best practices and to refine existing techniques to best fit their local environment and keeps these interventions out of reach for much of the population.

Global surgery, with its organisational resources and network of skilled surgeons, can

help partially offset these problems in target surgical fields by organising long-term training programs, fostering collaboration between international and local surgeons, and facilitating the collection of clinical data at the local level. Such programs would likely be more organisationally demanding than financially burdensome and would go much further in facilitating improvements to surgical care and access in developing countries than only financial assistance and/or short-term volunteer surgical missions.

REFERENCES

1. Rodrik D, Subramanian A, Trebbi F. Institutions rule: The primacy of institutions over integration and geography in economic development 2004. *IMF Working Papers*. 2002;WP/02/189.
2. Bardhan P. Understanding underdevelopment: Challenges for institutional economics from the point of view of poor countries. *Journal of Institutional and Theoretical Economics*. 2000;156(1):216–235.
3. Banerjee A, Duflo E. *Poor Economics: A Radical Rethinking of the Way to Fight Global Poverty*. New York, NY: PublicAffairs; 2011.
4. Gutnik L, Yamey G, Riviello R, et al. Financial contributions to global surgery: An analysis of 160 international charitable organizations. *Springerplus*. 2017;5(1):1558.
5. Shrime M, Sleemi A, Ravilla T. Charitable platforms in global surgery: A systematic review of their effectiveness, cost-effectiveness, sustainability, and role training. *World Journal of Surgery*. 2015;39(1):10–20.
6. Khan M. Political settlements and the governance of growth-enhancing institutions; Unpublished https://eprints.soas.ac.uk/9968/1/Political_Settlements_internet.pdf [Accessed April 7 2020].
7. Nelson R, Winter S. *An Evolutionary Theory of Economic Change*. Cambridge, UK: Harvard University Press; 1982.
8. Dahlman C, Westphal L. The meaning of technological mastery in relation to transfer of technology. *The Annals of the American Academy of Political and Social Science*. 1981;458(1):12–26.
9. Dosi G, Freeman C, Nelson R, et al. *Technical Change and Economic Theory*. Pisa, Italy: Laboratory of Economics and Management (LEM). Sant'Anna School of Advanced Studies; 1988.
10. Khan M. Technology policies and learning with imperfect governance. In: Stiglitz JE, Lin JY (eds). *The Industrial Policy Revolution I*. London, UK: Palgrave Macmillan; 2013:79–115.
11. Dormans J, Fisher R, Pill S. Orthopaedics in the developing world: Present and future concerns. *Journal of the American Academy of Orthopedic Surgeons*. 2001;9(5):289–296.
12. Ahmad A, Aker L, Hanbali Y, et al. Growth-friendly implants with rib clawing hooks as proximal anchors in early onset scoliosis. *Global Spine Journal*. May 2019;10(4):370–374.
13. Ahmad A. What's important: Recognizing local power in global surgery. *Journal of Bone and Joint Surgery. American Volume*. 2019;101(21):1974–1975.
14. Bram J, Warwick-Clark B, Obeysekare E, Mehta K. Utilization and monetization of healthcare data in developing countries. *Big Data*. 2015;3(2):59–66.