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GLOBAL HEALTH (K MCCAMMON, SECTION EDITOR)

The Current Status of Global Urology

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Abstract

Purpose of Review Everybody will be aware of the inequality in the provision of healthcare across the planet, but relatively few people will be aware of the scale of the problem. In this article, we will summarize what is known about the problem, what is being done to address the deficiencies and an argument will be made for a more collaborative approach.

Recent Findings There has traditionally been sparse data on the outcomes of surgical humanitarian missions. Recent studies assessing the effects of planned mission trips have revealed widely varying complication rates. There continues to be little published on long-term outcomes of these missions. New work suggests the importance of collaboration between visiting surgeons and the surgical staff in host countries.

Summary The role of coordinated premission planning and postmission healthcare is crucial to the success of surgical missions. There is also an increased focus on collaboration in global surgical humanitarian missions between all stakeholders. Increased calls for accountability as regards the benefit of these missions will require the use of validated outcomes measures to evaluate the effectiveness of these efforts.

Keywords Global partnerships · Global surgery · Surgical mission · Medical mission

Introduction

Global surgery refers to the practice of surgery throughout the world, but particularly incorporates a focus on the provision of surgical care across all healthcare systems [1•]. The inequities in access to treatment of surgical disease have only recently begun to attract wider attention. The millennium ushered in an international collaborative statement setting out certain goals to be achieved over the next 15 years (i.e. by 2015). All of the items listed would be welcomed—eradication of extreme poverty and hunger, universal primary education, promotion of gender equality, reduced child mortality, improved mental health, combat against HIV, AIDS and malaria, ensured environmental sustainability, and the formation of global partnerships [2]. However, surgery was not mentioned as a priority, and this exclusion ultimately led to the report by the Lancet Commission on Global Surgery [3].

The Lancet Commission on Global Surgery

Of the 7.4 billion people on the planet, 5 billion do not have access to surgery within 2 h of their home. This lack of availability of emergency surgery is responsible for 30% of all avoidable deaths, constituting more deaths than does HIV, malaria, and tuberculosis combined [3]. At any one time, 33 million people face catastrophic expenditure on health care.

There is a global shortfall of 14.3 million surgical procedures annually with the biggest shortfall being in the region commonly denoted as sub-Saharan Africa where 5625 extra procedures are required for every 100,000 of the population [3].The estimated cost of addressing this shortfall is $350 billion, but the economic cost of ignoring it for those nations is far higher at an estimated $12.3 trillion [3]. Moreover, the cost effectiveness of surgical interventions for surgical disease compared to other widely instituted public health strategies for medical disease has been demonstrated to be comparable [4].

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The Lancet commission chose the critical distance in time away from a centre capable of delivering surgery as 2 h because that is a critical period of time when dealing with emergency laparotomies for peritonitis and for obstetric emergencies. But the realities on the ground are even more complex. If one lives within 2 h of a surgical centre, that may be true for most of the year, but it may be a journey of many days during the rainy season. Also, even in the event of developing life-threatening abdominal sepsis arriving at the surgical centre is only part of the problem.Even in circumstances where distance is not a barrier, necessary surgery in low and middle income countries (LMICs) is often impeded by expense and lack of providers or care teams [5, 6]. There may be problems raising the funds for surgery for 33 million people [3, 6]. In urology, where many surgeries address quality of life issues, this is even more common. Thus, the problem in low income countries (LICs) is not just the availability of a particular operation but the problems of affording the service and also problems with access.

The Current State of Global Surgery

As mentioned above, surgical conditions are a major contributor to the shortfall in global healthcare. In fact, the richest one-third of the world's population undergo 73% of the surgical procedures [7]. These data put into stark relief the considerable unmet surgical need in LMICs. Despite the expense of surgical endeavours, it is imperative that we find ways to bring adequate surgical care to the masses. The lack of access results in preventable mortality as well as persistent morbidity that diminishes the productivity of survivors [8]. It is largely in this latter area that urologic conditions come into play. Apart from malignancy, urosepsis and trauma, urologic surgical conditions generally inhibit productivity and greatly diminish quality of life, making it difficult for sufferers to contribute to their family and the larger community. Paediatric urology in particular suffers from a dearth of local practitioners in LMICs [9]. This has led to a lack of treatment of congenital disorders ranging from hypospadias to bladder exstrophy with complex conditions being the most neglected (Kisa, Scotland, submitted).[1]

But what about the quality of the surgery for those who have overcome the various hurdles to having the procedure? A recent study looked at the 30-day mortality after emergency abdominal surgery. The paper showed that the mortality rate was three times higher in low income countries than in high income countries (HICs). They pointed out that death following surgery was also greater than that from HIV, malaria and tuberculosis combined. The authors questioned whether the cause of the increased mortality was the quality of the surgery or absence of correct procedures such as the WHO preoperative check list [10•]. The paper at first sight would seem to undermine all the initiatives trying to increase the availability of surgery, but there are multiple other factors. There were no data given about the delay between onset of symptoms and the eventual surgery. One would predict that the patients in LICs present far later, and therefore, the mortality rates and complication rates would be expected to be far higher. Finally, the 30-day mortality is influenced by the quality of the postoperative care. In fact, it may well be that low quality care is as large a driver of poor outcomes as lack of care [11]. Intensive care and high dependency units are rare in low income countries. Thus, there may not be any possibility of ventilation outside of the operating theatre.

An insight into this was gained when one of the authors representing a global health charity—The Medi Tech Trust—was approached by a paediatric team in Benin to help build a small high dependency unit for their patients. They had reviewed 317 children presenting with a need for emergency surgery in their centre between January 2008 and December 2010. There were 38 deaths of which 23 occurred before surgery could take place. Neonatal surgery represented 19.56% of the activity and also dominated the fatalities with a 71% death rate [12]. They surmised that the factors contributing to the fatalities were the lack of experienced paediatric anaesthesia, transport and administrative hurdles in getting to surgery and finally the lack of any neonatal intensive care. The critical need for paediatric and adult anaesthetic support in LMICs has been convincingly documented [13, 14]. (The Medi Tech Trust approved the proposal to fund the high dependency unit, and the building construction is planned to be completed in May 2020).

The inescapable conclusion is that there are huge numbers of people in LICs who are dying from potentially treatable diseases. One cannot separate the provision of health care from the financial restrictions to that community. Therefore, many of the approaches which make good sense in HICs are not appropriate for LICs. A worrying question is whether it is possible to achieve modern quality surgical outcomes in low income settings.Infrastructure, personnel and resources are often lacking in LMICs. While it may be extremely challenging to address issues of infrastructure, there can and must be a reevaluation of profit-driven healthcare equipment/ instruments in LMIC settings. It is sometimes not possible for LIC surgeons to manage surgical indications with the most up to date or safe procedures [11]. In urology, the lack of resources is amplified by the prohibitive cost of urologic equipment and disposables in many countries. As such, open surgery is the most commonly used modality for urinary tract calculi. Alternatively, some urologists from LMICs have learnt to improvise and innovate to take care of their patients, developing

[1] Kisa P, Scotland KB, Afshar K, MacNeily A. Global surgery: surveying unmet pediatric urological needs in low- and middle-income countries. Submitted

cost-effective alternatives to practices that are otherwise beyond the financial capability of many health systems [15].

Surgical Missions

Over the last several decades, in an attempt to bridge the gap between surgical need and surgeons with the expertise to address this need, global surgical missions have been undertaken. These range from single practitioner trips to established groups with multiple surgeons and support staff. An increasing number of organizations perform an increasing number of surgeries during humanitarian missions [16, 17] .While these efforts are all well-intentioned, they appear to have had varied success. The actual impact of surgical missions is unclear due to sparsity of peer-reviewed publications that have reported outcomes of these missions. Many missions have little accountability, with entirely unknown real outcomes and almost no empirical data [18, 19•]. There is no standard for the reporting of data. Further, due to the diversity of mission types, it is challenging to evaluate the published data that do exist.

Since the recommendations of the Lancet Commission on Global Surgery [3], there has been some effort to collect long-term data on recognized surgical indicators [20]. However, long-term follow-up is rare, and the few groups who have published results presented data focused on limited performance indicators. Several of the published studies are retrospective and few presented patient-reported outcomes using validated methodology [21].

There are little data on long-term outcomes of short-term surgical missions in urology, or indeed in surgery in general. A recent study of general surgery patients treated during an annual 1-week mission over a 5-year follow-up period revealed a surgical and anaesthesia complication rate of 16% while a systematic review of reconstructive surgical missions found low study quality but did reveal a complication rate of up to 22.3% [22, 23]. In urology, there is a dearth of studies on this topic. One of the authors has recently performed a questionnaire-based study on the state of global paediatric urology missions. Surgeons from HICs and LMICs were questioned on the challenges and successes of these missions (Kisa, Scotland et al., submitted)[1].

Recent published reports have questioned any lasting positive impact on the local healthcare system [24]. There is real concern and some evidence that some surgical missions may in fact be harmful [25]. While there are insufficient outcome data, survey-based reports investigating the effects of surgical missions have provided sobering data suggesting that surgeons tend not to use internationally recognized safety guidelines and may perform surgeries outside of their usual scope of practice and, perhaps in consequence, many of these surgeries result in complications that require subsequent corrective surgery or even cause mortality [26]. The goal of medical missions is hopefully sustained improvement in health care, but in reality, the missions may prove to be more beneficial to the surgeons and residents from HICs who are able to improve their surgical skills by virtue of the sheer number of cases they have the opportunity to perform during these short trips. Thus, there is an intensifying debate on the ethics of surgical missions as currently undertaken by many groups [27].

We submit that surgical missions should show actual health benefits on a population level, not just the number of procedures completed. While it is important to document complication rates, we also need to show practical benefit to patients, particularly with respect to surgeries performed for quality of life issues. Based on the emerging body of work, it is apparent that there is currently insufficient use of experiential knowledge. Practitioners from HICs who participate in these missions report little continuity of care in the form of contact between previous and subsequent groups, leading to fractured care (Kisa, Scotland et al., submitted)[1]. There is often little attempt to perform robust needs assessments prior to the onset of these missions, resulting in poor understanding of barriers to care, and lack of identification of appropriate LMIC surgeons both for premission screening and postoperative care. Additionally, there is often minimal development of relationships premission; LMIC surgeons report that there are few attempts to confirm shared goals prior to the start of a surgical mission. Similarly, there are seldom strategies discussed for addressing adverse outcomes. Local doctors must be integral to the mission. In a recently submitted study on global paediatric urology, LIC surgeons pointed out that they were often left to arrange logistics and had little opportunity to get into the operating room to learn (Kisa, Scotland et al., submitted)[1].

Practical Ways in Which HICs and Global Institutions Positively Contribute

There is increasing support for the contention that missions should move toward the global partnership framework [3]. Global partnerships serve to build capacity of local surgical services [28]. Collaboration requires close partnership with healthcare professionals in the host country to safeguard patients and confirm that they receive the necessary postoperative care with local practitioners after the volunteers have departed.

To their great credit, many national and international urological organisations have funds set aside for promoting global partnerships in urology. For example, the Société Internationale d'Urologie (SIU) has until recently funded scholarships for trainees in low income countries to spend a year in centres offering training in more specialised areas of urology that would not be taught in their native countries. The Endourologic Society have travelling scholarships connected

to the World Congress of Endourology, allowing trainees from low income countries to visit major endourological centres to observe and make contacts for the future. The American Urologic Association (AUA) has initiated a care foundation which will be active in global partnerships, and many universities and hospitals in HICs have forged links with their LMIC counterparts.Qualified individuals have formed their own arrangements to visit and teach or are part of philanthropic organisations such as IVUMed and Urolink. Missionary Hospitals contribute enormously to healthcare often in less accessible locations. Alternatively, concentrating on provision of a service rather than on training is the mission of organisations such as Smile for the correction of palatal defects or Mercy Ships and Médecins Sans Frontières (MSF), which provide health care in areas of conflict. As recommended in a recent editorial, there must be "tangible, measurable indicators of progress" [29]. In that spirit, IVUMed has embarked upon several studies evaluating their outcomes after several years of follow-up (McCammon K, private communication). This will aid in efforts to determine the best practices for urologic surgical missions going forward.

Coaching has been a successful method of surgical skills transfer in a global setting [30]. Everyone from a HIC who takes a trainee from an LMIC is contributing to global surgery provided that the trainee then returns to his native land to practice. Unfortunately, many trainees end up staying permanently in that HIC for various reasons. A more effective approach from the HIC unit would be to concentrate on training in areas which are relevant to the trainee's home nation and resources and to commit to supporting that trainee once he or she returns home. The Lancet Commission highlighted the mismatch between the numbers of doctors and the burden of disease in the world. Africa and South East Asia have the largest burden of disease, but Europe and North America have the majority of the workforce. We should therefore ensure as much as possible that individuals return to their native country as a condition to their period of training.

The second way of contributing is by sending equipment. Equipment which has become surplus to needs may have a second life in a LIC. However, it is important that this equipment will be compatible and useful. For instance, it has been revealed that approximately 30% of equipment sent to LICs as a result of humanitarian drives is actually able to be used [31]. Guidelines for donation of medical equipment have been developed and should be followed [32]. With this in mind, the authors are involved in setting up a web site which will "advertise" any equipment, and this can be requested by centres from LMICs. Bidding will be by need rather than money. It is hoped that this will avoid the problem of mismatch between donated items and the receiving centres. Disposables are also a major problem for LMICs. Many endoscopic procedures which we seek to teach in Africa are actually more expensive than the open surgery they seek to replace. Thus, we must also help reduce the price of the new surgery. Via the Medi Tech Trust, we have now established a way in which hospitals can donate used disposables to our charity rather than to the doctors the hospital employs. The charity accepts all the responsibility for the subsequent use of the disposable item, organises the transport of the items to its storage centre, cleaning of the items and their subsequent dispersal. The issues surrounding the reuse of disposables are that these items are marked by the manufacturers as one use only. Any reuse of the disposable negates the manufacturer's product liability and any institution permitting its staff to reuse such equipment puts that institution at risk in terms of legal responsibility. However, LIC units will reuse single use items until they fail. It would be preferable to have single use items sold at prices appropriate to that nation's economy, but until then, we have to be realistic. In the meantime, we should concentrate on teaching the optimal way of sterilising each item. This is straightforward for a resectoscope loop but more complex with a stone basket. Studies on how best to eradicate retroviruses from different types of equipment would be very opportune when advising how best to reuse equipment in LICs with high rates of HIV patients. Starting as a small movement, we now have four hospitals in the UK and one in Belgium contributing. The volume of disposable transurethral resectoscope loops collected is enough to supply 15 centres in Africa year on year. We hope this initiative will grow, and we invite all readers to contact us if they want to join this movement.

Actually visiting an LIC and performing surgery there would be expected to give the HIC surgeon the most insight into the challenges and hopefully the solutions to the problem of improving surgical outcomes in that LIC. Not all visits are appropriate. It is totally inappropriate for a surgeon to visit a LIC just to gain extra experience or to promote his curriculum vitae. The surgical cases tend to be more complicated, and the equipment tends to be more limited. This argues for strongly recommending that only very experienced surgeons lead global training visits and that even then the surgeon should have prior experience in working in a LIC. As an anecdotal example of an inappropriate visit, a trainee surgeon was invited by an agent for a charity to visit The Gambia to perform arterovenous fistulas for patients being prepared for dialysis. What the agent and the trainee surgeon did not appreciate was that there was a much more experienced surgeon working in The Gambia who could perform the surgery. This surgeon was then obliged to rescue the visiting "expert" who was trying to anastomose the radial artery to a nerve. As intimated above, visiting surgeons should come to provide a service or to mentor the local team so that they can continue providing a service when the HIC surgeon has left. Certain conditions are probably best dealt with by a visiting team until greater numbers of surgeons and better preoperative care prevails. Exstrophy of the bladder is one obvious example.

Common procedures should preferably be taught to the local team. There are very few trainers and a multitude of LIC sites in need of assistance. When faced with the dilemma of where to go one has to choose between where the need is greatest and where one can do the most good. We would argue that our first priority is to train in centres with an established training program. A centre training nationally would be preferred to a centre with just local trainees, and the best of all is a centre with international trainees. It is possible to effect major changes in the way a common condition is treated in that country.

A Plea for a Coordinated Drive

Clearly, there is a huge disparity between the surgical care of individuals in LICs compared to HICs. This is enough to cause large differences in the chances of survival. The disparity is affected by the infrastructure in that country. Even within Sub-Saharan Africa, one can find countries with most citizens having cover by a nationalised health care (e.g. Rwanda), subsidised health care only for government employees (Kenya) or a purely private system such as South Africa [33]. These will clearly affect the delays in patients in need of emergency surgery, and for 30 million people on the planet, the surgery is unaffordable. Even with these constraints however, there is much that surgeons from HICs can do to improve the quality and even quantity of surgery in LICs. In the first wave, it probably makes sense for us to train in established training centres. As part of the partnership between HIC and LIC surgeon, part of the plan should be for the LIC surgeon to pass on his skills to his colleagues and trainees.

One of the authors gained his initial experience of global partnerships when he was invited by a previous trainee to teach PCNL in Sri Lanka in 2012. He concentrated on training two of the local surgeons, so that they could pass their skills on to their colleagues. Training was by making two trips each lasting a week in a 3-month period followed by regular annual visits for the next 5 years. These annual visits evolved into international training visits with trainees from Sri Lanka alongside trainees from the UK and Africa being taken through PCNL by an experienced international faculty. Sri Lanka has moved on from an island where urinary tract calculi were treated almost exclusively by open surgery to endoscopic treatment in almost all cases [34]. The model used in Sri Lanka where the partnership continued with bringing trainees from LICs to that centre for specialised training should be considered as a way of continuing contact and of helping with the spreading of that technique to other centres in that LIC. A secondary effect is that the trainees are more likely to become the global trainers of tomorrow [34].There is a huge need for swelling the ranks of trainers and potential trainers from HICs. The site intersurgeon.org is useful as a site for recording potential partnerships. An established training group can therefore expand into new countries based on these contacts. It is probably better therefore that surgeons interested in contributing to global partnerships first join one of these established groups. Additionally, one wants to avoid any significant differences in technique between successive training groups visiting that centre until the centre has enough experience to be able to pick and choose between the various techniques used.

By forming an alliance of established trainers under the name of Global Partnerships in Urology, we hope to have a key champion in every country who will report annually on any training initiatives and whose job is also to promote the importance and the personal rewards coming from involvement in global training. We hope to make it clear to every institution that the equipment which is surplus to requirements or is condemned for use in that hospital might have a very useful role in a LIC. (For example, an Xray gown which is condemned because it has microcracks is still a godsend compared to no Xray gown at all). The potential of collecting disposables and donating them to a charity such as the Medi Tech Trust will be discussed in many more nations. The lessons learned will be shared widely and teaching materials shared. Groups should publicise any upcoming training trips so that the number of seasoned trainers is maximised. We need to work with industry to persuade them that by aligning the costs of equipment to the bank balances of HICs that they are missing out on 90% of the market. We need a large coordinated army of trainers and an even larger number of support staff to help with the transportation of equipment and the coordination of projects. It is only by doing this together that we will make lives safer around the globe.

Conclusions

We join others in arguing for the development and advancement of global surgery. In the immediate timeframe, we strongly advocate for the establishment of robust, well-planned global partnerships as an ethical and effective means of providing otherwise unavailable access to surgical care.

Authors' Contributions Both authors developed the idea for the manuscript. KS performed the literature review, and both authors drafted and critically revised the work.

Data Availability All data referenced has already been published or is under review in peer reviewed publications.

Compliance with Ethical Standards

Conflict of Interest K. Scotland declares she has no conflict of interest. G Watson is the Chairman of MediTech Trust. He otherwise has no conflict of interest.

Ethics Approval Not applicable.

Consent to Participate Not applicable.

Consent for Publication Not applicable.

Code Availability Not applicable.

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