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Stephen R. Payne, Mumba Chalwe

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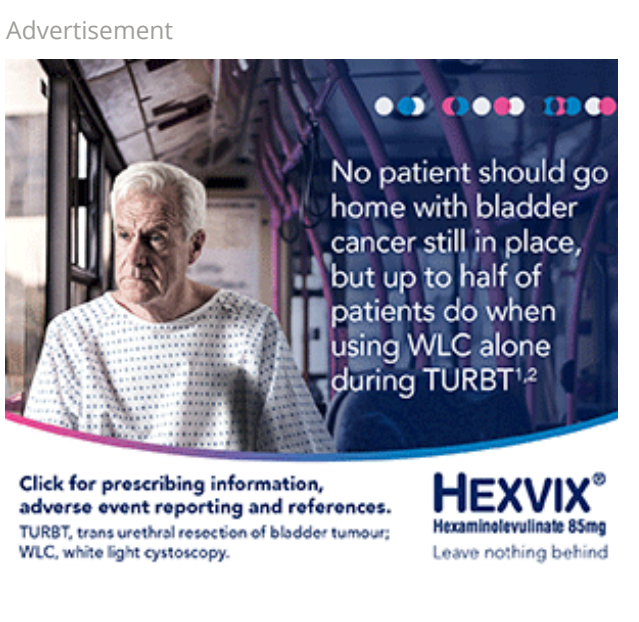

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Abstract

Delivering urological humanitarian aid to countries with greater need has been provided by urologists associated with British Association of Urological Surgeons (BAUS) Urolink over the last 30 years. Urolink has realised the need to understand where that need is geographically, what tangible help is required, and how assistance can be delivered in the most ethically appropriate way. The World Bank stratification of countries by per capita gross national income has helped in the identification of low-come countries or lower-middle-income countries (LMICs), the vast majority of which are in sub-Saharan Africa. The medical and socioeconomic needs of those country's populations, which constitute 17% of the global community, are substantially different from that required in higher income countries. More than 40% of sub-Saharan Africa's population is aged <14 years, it has a substantially reduced life expectancy, which influences the type of pathologies seen, and perinatal complications are a major cause of morbidity for both mother and child. There is a significant problem with the availability of medical care in these countries and almost a third of global deaths have been attributed to the lack of access to emergency and elective surgery. Urologically, the main conditions demanding the attention of the very few available urologists are congenital anomalies, benign prostatic hypertrophy, urolithiasis, urethral stricture, and pelvic cancer. The management of these conditions is often substantially different from that in the UK, being limited by a lack of personnel, equipment, and access to geographically relevant guidelines appropriate to the healthcare environment. Assisting LMICs to develop sustainable urological services can be helped by understanding the local needs of linked institutions, establishing trusting and durable relationships with partner centres and by providing appropriate education that can be perpetuated, and disseminated, across a region of need.

Introduction

Understanding the urological needs of low-income countries (LICs) or lower-middle-income countries (LMICs) demands a broader insight into the healthcare environment of the locality and the needs of the population, before even considering the specific urinary problems they may present with. Identifying the countries that may constitute this economic group, the means of financing healthcare, the majority health issues they face, and the availability of accessible treatments are all major factors confounding the management of the health of their population. Understanding the relevance of those issues, their impact on the presenting urological pathology and the service available to deal with it, helps in an appreciation of where assistance is required, what type of help is needed and how it can be provided.

Urolink [1] was established >30 years ago to try and provide help to countries, with a specific urological need, as part of the BAUS's initial contribution towards the provision of global care. Its founding ethos, to provide links, visits, training, and equipment to countries less developed than the UK where a need existed, has had to evolve due to the changing ethical and technological needs of their partner countries and, latterly, its ability to provide direct face-to-face assistance. In the continually evolving world of global surgery it is even more important that we understand what the needs of the LMICs are, and how these can be addressed in the most ethically appropriate way for a continuing sustainable contribution to global health.

The Link between Wealth and Health

Even in wealthy countries, such as the United States, a link between income and access to healthcare is well-established which, through clinical, behavioural, social, and environmental mechanisms, has been shown to affect the longevity of its citizens [2]. In less fiscally robust environments untreated morbidity, a reduced access to care, long-term impoverishment, and the inappropriate use of drugs all contribute to an inability to earn. In a socially unsupported environment this helps generate a negative feedback loop known as the 'health poverty trap' [3]. This 'trap' has multiple longer-term social and economic ramifications that ultimately perpetuate the poverty of the country affected, resulting in poorer health for, and premature death of, its population [4].

Philanthropists recognised this issue long before a link between money and health was clearly defined, identifying the huge differences in many countries ability to provide healthcare as far back as the 19th century [5]. However, their perceived benevolence was often acquisitive and, therefore, not always provided with the most altruistic of intentions [6]. During the mid-1920s the League of Nations Far Eastern Bureau started collecting epidemiological data in Africa, which initiated the co-ordination of successful international initiatives to promote global public health [6]. A much broader recognition of the principal of a global right to health was instituted following the establishment of the United Nations (UN) and World Health Organisation (WHO) after the second world war [7]. The gulf in the availability of healthcare between richer and poorer nation states was then identified as a particular problem demanding intervention from those with the greater ability to provide it [8].

In the 1960s the governments of wealthy countries, mainly in the northern hemisphere, established aid programmes through organisations such as the Peace Corps [9]. These, together with humanitarian groups such as the International Red Cross, Red Crescent and WHO, carried the banner for the provision of humanitarian healthcare by concentrating their efforts on the eradication of individual diseases or conditions. However, by the 1970s it had become apparent that this paradigm had translated into little benefit in regions that lacked the basic infrastructural needs of a sewage system, potable water, adequate food, health clinics, and a rudimentary knowledge of illness and its treatment [10]. Due to dissatisfaction with the often bureaucratic, frequently inefficient and, sometimes, morally suspect relief work sponsored by these centralist organisations [11], many individuals opted to form independent not-for-profit public-private humanitarian partnerships, which became established as non-governmental organisations (NGOs). Most NGOs are charities, their charitable status often being focussed on a particular need such as disaster relief, specified illnesses, or providing generic or specialist support from an institution, a geographical region, or a specialism [12]. In 2001 Roy Widdus [12], reporting for the WHO, emphasised that all humanitarian aid, whoever provided it, should fulfil the following maxim: 'New ventures should be built on need, appropriateness, and lessons on good practice learnt from experience'.

Identifying Need

The need for help in less privileged communities is very much dependent upon identifying, where and what assistance is required, and in what form help should be provided. The most dominant healthcare needs are to improve public health by dealing with infectious diseases, malnutrition, unclean water, low levels of sanitation, and exposure to toxins [13] before considering the medical, surgical, or urological needs of the community. However, the provision of more specialised healthcare in a manner fitting for a high-income country (HIC) has also been recognised as rarely being appropriate, or acceptable, in a LIC setting [14] because of a multiplicity of factors influencing when treatment is received and, consequently, the outcomes from management. Complications from, and late presentation of, disease states are often brought about by those factors causing delays in treatment for the underlying condition (Table 1) [15]. These may be due to a lack of organisation, facilities, personnel, or the technology to effect treatment. Together, these confounders constitute the 'three delays framework'.

Table 1. Factors responsible for impeding the delivery of high-quality healthcare.

Type of delay	Type of delay	Factors in causation
First delay	Delay in seeking care	Finance
		Distance from care
		Culture/belief
		Poor education
		Low confidence in the medical system
Second delay	Delay in reaching care	Distance from care
		Scarce medical capacity
		Poor transportation systems
Third delay	Delay in receiving care	Availability of appropriate levels of care
		Lack of personnel
		Lack of diagnostic equipment
		Lack of surgical equipment
		Infrastructural support e.g. blood supplies

The 'three delays framework'.

Where is Help Needed?

The World Bank classifies countries dependent upon their per capita gross national income (Table 2) [16], which has helped stratify the links between economics and national health and assisted in demonstrating where support might be necessary. This stratification has shown that over a third of the world's populations have an income of <$4100 per year and are, therefore, liable to fall into the health poverty trap. It has, therefore, also facilitated identification of countries who have a limited financial ability to structure healthcare for their citizens, and those individuals who will have a major issue with affording medical intervention.

Table 2. The World Bank classification of countries dependent upon per capita gross national income.

World Bank grouping	Annual per capita income (American dollars)	Acronym	% World population
Low-income countries	≤$1045	LICs	12.4
Lower-middle-income countries	$1046–$4095	LMICs	25.3
Upper-middle-income countries	$4096–$12 695	UMICs	25.3
High-income countries	>$12 696	HICs	37

When considering the geographical location of the world's 27 LICs all apart from Afghanistan, North Korea and the Syrian Arab Republic are in southern Africa (Table 3) [17]. This region also hosts the greatest number of the 55 countries in the LMICs economic group with some in North Africa, across the middle East/West Asia bloc, a variety of Pacific states, the Indian sub-continent, and smaller percentages at other locations.

Table 3. The World Bank geographical distribution of countries dependent on wealth classification as LICs or LMICs.

Geographical location	Low-income economies, %	Lower-middle-income economies, %
Africa North	–	7.3
Africa South	88.9	32.7
East Asia	3.7	10.9
Indian sub-continent	–	12.7
Pacific states	–	14.6
South America and Caribbean	–	10.9
Middle East, West Asia	7.4	10.9

According to the UN Population Division's World Population Prospects 2019 Revision, it is estimated that ~17% of the world's population live on the African continent with a majority between the ages of 18–35 years [18]. This diverse population group is rapidly expanding [15], is culturally completely different to that seen in HICs, and presents with a myriad of problems that may be peculiar to the African population. As can be seen from Table 4 [19], life-expectancy in the East African countries allied to Urolink is much lower than seen in the UK, the paediatric population is very significantly larger and infant mortality is much higher.

Table 4. Population, life-expectancy by sex, size of the paediatric population and infant mortality for the Urolink partner countries in East and Central Africa together with UK data for comparison.

Country	Population	Life expectancy (males), years	Life expectancy (females), years	Population aged <14 years, %	Infant mortality
Ethiopia	120×10^6	55	58	40	$39/10^3$
Malawi	19×10^6	60	64	43	$35/10^3$
Tanzania	60×10^6	64	68	44	$38/10^3$
Uganda	43×10^6	60	65	47	$40/10^3$
Zambia	11.6×10^6	60	64	44	$34/10^3$
UK	67×10^6	80	84	18	$4/10^3$

What Surgical Help is Needed?

It is estimated that 5 billion people do not have access to safe, affordable surgical or anaesthetic care, and 90% of the populations of LICs and LMICs, mostly in rural or marginalised communities, cannot access basic surgery [15, 20]. In 2010, an estimated 16·9 million lives in the world's poorest regions (32·9% of all deaths globally) were lost from conditions requiring surgery [21]. This figure significantly surpasses the 3.53 million deaths from HIV/AIDS, tuberculosis and malaria combined [22]. In 2000, communicable diseases (CDs) were the predominant cause of mortality in LICs, but this demographic is changing as life-expectancy increases, with a consequent increase in the burden posed by non-communicable disease (NCD). Table 5 shows the incidence of mortality, indicative of the health needs, by World Bank economic groupings [23].

Table 5. The 2019 estimated causes of death, and the incidence of the dominant causes in World Bank economic groups.

	Global, %	LICs, %	LMICs, %	UMICs, %	HICs, %
CD	21.7	34.2	21.7	7	6.3
Maternal and neonatal	6.9	12.6	6.9	1.2	0.3
Nutritional	0.5	1.4	0.4	0.4	0.1
NCD	62.6	42.2	62.6	84.2	87.8
Malignancy	16.8	7.3	10	21	25.4
Cardiovascular	32.2	18.8	28.3	40	30.8
Injury	8	11	8.8	7.7	5.6

Using Africa as the exemplar, it is evident that disease patterns differ across various populations consequent upon a mixture of environmental factors, the prevailing socioeconomic conditions, as well as indigenous cultural norms and practices; these affect the populations' perception and understanding of disease. Only 6% of the surgical procedures carried out globally are performed on the 35% of the world's population in LMICs [15], this underlines the fact that access to elective and, especially, emergency surgical and obstetric care is often very limited. Consequently, there is poor treatment of trauma and large numbers of neonatal deaths resulting in untreated obstetric complications. Additionally, there is an increasing problem with late presentation of NCDs such as cardiovascular disease and cancer, with long-term socioeconomic consequences for the population and the country [20, 22].

What Urological Help is Needed?

Urologically, the differing age demographics of the presenting patient populations influences what has, until now, been seen in LMICs. Classically, there were more paediatric problems associated with genetic abnormalities, larger numbers of patients with inflammatory conditions and urolithiasis than in HICs, and proportionally fewer age-related issues, especially malignancies [24]. However, the rise in life-expectancy is changing that pattern of disease so that chronic NCDs, especially prostate cancer, are becoming more prevalent [15, 25].

Although urological disease only affected 0.3% of the world's population, 0.8% of the people accessing healthcare and 1.2% of NCDs in 2019 [25], the assessment of specific urological needs by the African Medical Research Foundation (AMReF) [26] has highlighted BPH, urolithiasis, urethral stricture, and bladder and prostate cancer as the most prevalent urological conditions requiring attention. Whilst the mix of this pathology has changed in the decade since that study was carried out these conditions continue to be the predominant issues African urologists face. This is almost certainly consequent upon their relative complexity in management, a lack of conservative options for treatment, and the magnitude of the surgery required from the limited number of specialist practitioners available. The conclusions from the AMReF data are at odds with the WHO's global health estimate figures (Table 6) [27]. probably due to the poor activity data available to the WHO.

Table 6. WHO global health estimates 2019.

	Global	LICs	LMICs	UMICs	HICs
Surgical genitourinary disease, *n*	24 530	1258	7119	8919	7232
BPH, %	9.3	3.2	9.4	11.6	7.5
Urolithiasis, %	2.6	2.0	3.2	3.4	1.0
Other urological disease, %	33.0	50.6	51.9	26.1	17.7
Prostate cancer, %	35.2	27.4	22.3	37.5	48.0
Bladder cancer, %	19.9	16.9	13.2	21.5	25.8
Kidney cancer, %	15.6	15.7	9.8	17.1	19.5
Testis cancer, %	2.0	1.8	2.2	2.5	1.4

The incidence of cause-specific disability-adjusted life years (DALYs) by urological cause and World Bank economic groups.

Open prostatectomy, nephrectomy, cystolithotomy, and even pyelolithotomy for staghorn renal stones, are still prominent features of the African practice; something that has been demonstrated by the sample logbooks from trainees in the territory of the College of Surgeons of East Central and Southern Africa (COSECSA). Urethral stricture disease in the LMIC setting is usually associated with primary surgery or re-operation for congenital urogenital conditions, as a consequence of sexually transmitted urethritis or trauma. Pelvic fracture urethral disruption after motor (or road) traffic accidents is the most important urological injury, although obstetric fistulae are an especially complex problem; again, most reconstructive procedures demand open intervention. Cancer, in common with the benign urological conditions mentioned above, typically presents late with established metastatic disease or complications due to the absence of an accessible primary care service to triage patients as well as a lack of screening tests. Demographically, younger age groups are disproportionately negatively affected by advanced malignancy for which few treatment options are often available. The necessity to treat these conditions with inadequate management possibilities, by open surgical intervention, and manage the complications associated with a more invasive method of access, adds substantially to the workload of the few urologists available.

The way in which the urological patient is managed in most sub-Saharan countries is often completely at variance with the expected clinical or operative experience of trainees and surgeons in HICs such as the UK [28, 29]. The COSECSA trainee records show that TURP is the most commonly performed endoscopic procedure, percutaneous nephrolithotomy and ureteroscopic retrograde intra-renal surgery were only performed in a few centres in the 14 African countries the college represents. Laparoscopic, or robotic, surgery are unknown in all but a very few centres.

Service Available to Meet the Need

Any discourse on the predominant urological needs of the sub-Saharan African population would not be complete without addressing the issue of accessibility to medical treatment, surgeons, and specialist urologists. Most sub-Saharan countries have huge doctor to patient ratios, with an even larger specialist doctor deficit in their medical workforce. The practicing urologist in most parts of Africa is typically a generalist treating a range of patients from paediatrics to geriatrics. This requires them to possess skills ranging from open surgery for the entire upper and lower tract; endoscopic skills for the whole of the urinary tract; uro-oncological surgery to reconstructive, laparoscopic, and uro-gynaecological surgery.

In many LMICs access to healthcare is not universal (Table 7) [19], the ability to get care being limited by the ability to pay for, or reach, a medical professional, diagnostic interventions as well as medical or surgical interventions. Many LMICs operate through a tiered access system to healthcare based in the community, patients being triaged through to a primary health centre, a first level (or district) hospital and a higher-level institution (secondary or tertiary hospital) dependent on the clinical need.

Table 7. Healthcare systems and doctor to 1000 patient ratios in the Urolink partner countries in East and Central Africa, with UK data for comparison.

Country	Healthcare system	Doctors/1000 population
Ethiopia	Basic care, mainly centred around primary care	0.1
Malawi	At least 70% of the population access free healthcare funded and provided by the Government through the Ministry of Health. Health insurance schemes have been established since 2000	0.000025
Tanzania	Essential healthcare package	0.05
Uganda	Services in public facilities are supposed to be free, but in many cases healthcare is provided dependent upon *ex gratia* payments to individuals in the system	0.2
Zambia	Public sector healthcare system	1.2
UK	Universal, NHS. National insurance scheme since 1948	2.8

Patients are usually seen initially by unqualified community health workers in a health centre who connect patients (often from remote areas) to providers. Referral is mostly to a first-level hospital where the majority of urgent and planned procedures, as well as post-discharge follow-up, are provided. First-level hospitals are often short staffed and are usually run by general surgeons who have limited expertise regarding their diagnostic capability, ability to stabilise patients for transfer or to handle surgical cases due to trauma, presenting as emergencies or with high-risk conditions [30]. Tertiary centres provide specialised care, training, research, and act as a hub for quality improvement [15]. Specialists, such as urologists, are usually only available in these tertiary institutions but the numbers in LMICs is catastrophically low with an average urologist to patient ratio of around one in a million, this is at complete variance to the ratios of between 1:15 000 in Italy to 1:71 000 in New Zealand [31].

The disparity between the need and the resource to treat is, therefore, twofold. On one hand the African continent has a large, mostly young population with specific urological requirements and on the other hand, it suffers a surgical, and consequently, urological workforce deficit. This is compounded by HICs ability to develop specialised units within a urology department, which provide targeted training and offer sub-specialist services. An urgent requirement, therefore, is to increase the capacity to cater to the needs of the disease patterns of the urological patient in Africa; to study and document them for a wider appreciation of the incidence of the problem, so that an evidence base to improve clinical practice can evolve.

Appropriateness

Defining Appropriate Help

There is often a difference in the health policy of LMICs between the government's perceived priorities and what the population wants [32]. Guidelines have helped the standardisation of care and improved standards in many HICs [33], but have been shown to negatively influence their uptake in situations different from where the data were derived [34]. This difficulty in characterisation of disease prevalence between LMICs and HICs means that the utility of urological guidelines, outside the environment they were formulated in becomes a significant issue. Additionally, the resources to provide evidence-based treatments, access, personnel, equipment, and information technology (IT) infrastructure will almost certainly not be available in a resource-poor environment and are, therefore, probably inappropriate.

So, why have no African urological guidelines been produced? The potential for their development does exist as there are several associations that could constitute member committees to formulate them and initiate data collation; the Pan-African Association of Urology, The South African Urology Association, Urological Association of Zambia, and the Egyptian Urological Association all have this capacity. If they developed context-based, local and regional guidelines, available from a freely available open-access source [34], an increased uptake of locally relevant data would possibly encourage the provision of a more evidence-based practice [34, 35].

Providing Appropriate Help

Delivering sustainable help in resource poor environments is dependent upon clear definition of need and its clear communication to the helper with a realistic plan to achieve it. The host hospital's plan may be impractical [14], but a dialogue between them and the helper should be able to establish what can be realised within the local resource constraints. The lack of access to a reliable electricity supply is a key consideration in the achievability of a plan, as this affects many diagnostic, therapeutic, and operative manoeuvres the helper would depend upon normally, and will influence the ability to utilise virtual learning or mentoring platforms for remote assistance. The use of battery powered equipment such as headlights, diathermy equipment, and mobile telephones for communication, will help. However, an associated absence of diagnostic information and operative supplies [36] may be other major factors in blocking the plan in some settings. To provide a sustainable outcome the helper has to be prepared to be flexible in their approach and demonstrate a process within the confines of what the LMIC system can reliably provide [37].

The management of most urological conditions is within the scope of a tertiary facility in a low-income setting if they are appropriately equipped; it is also the ideal site to initiate specialist training systems so that they can develop into regional training hubs. This paradigm has been hugely successful in the relationship between Urolink and East Africa, with a longstanding liaison between it and the Kilimanjaro Christian Medical Centre (KCMC) in Moshi Tanzania [38, 39]. Providing and maintaining endoscopic, and other highly technical operative equipment that a HIC relies on may make some procedures both unaffordable and impractical in the LMIC environment [40].

Targeted education, or mentoring, of all grades of staff is something that helper organisations can achieve as long as they understand the educational needs of the host, and how that teaching or training can be delivered [15]. Clinical activity in the host setting, ideally discussed in a similar way to a multi-disciplinary meeting, serves as a multi-input training exercise and is often the best way of determining what may achieve the optimal outcome for the patient. Education has frequently been delivered face-to-face in the host country and has proven the most cost-effective way of providing education to a large number of people, this is usually delivered in an environment they are used to working in and in which the helper can see what is appropriate for that country [41]. Following the 2020 coronavirus (COVID-19) pandemic, a lot of education and even mentoring, has been provided remotely and this, or a blended approach with face-to-face tuition, may well be the way a lot of urologists in LMICs are supported in the future [42].

It is vitally important that anyone helping in the educative process is giving something to the liaison with the host department so that they develop a durable relationship with demonstrable, sustainable, benefit. Ethical considerations should be paramount when considering a link with a urologist in a resource-poor setting [43] to ensure that no one in the host institution is disadvantaged by the presence of surgeons, trainees or nurses from the helper HIC [44, 46, 45].

Good Practice Learnt from Experience

Urolink's original mission statement has stood the test of time and, whilst challenged by the inability to travel due to COVID-19, has continued to support its link centres by adapting to their needs using a digital platform. The lessons it has learnt over the last 30 years revolve around the ability to work with partners invested in the provision of a sustainable end-product.

Urolink is very cognisant of the need to collaborate and co-operate with similar NGOs and not to compete, to the detriment of a host, with those affiliate organisations. Developing durable links from UK-based units with teams in the host countries has enabled it to build trusting long-term relationships that have endured across generations of surgeons on both sides [47]. Listening to what the host's needs are and providing this in a sustainable way despite the resource restrictions of the environment is the ultimate objective. We have learnt that money and time only go so far, so providing the most cost effective and sustainable solution in as short a time as possible is essential. Planning and good communications with your host are an integral part of that solution [48]. We have found that the donation of equipment without significant prior knowledge of its intended use, whether that use is for the widest benefit or not, or how it will be maintained, is foolhardy.

The most durable help that Urolink has provided is education, which has been a bi-directional phenomenon. The provision of training in an LMIC environment has allowed the perpetuation of practice that benefits current and future specialists and, ultimately, the patients living in their locality. Giving UK-based trainees a flavour of specialist healthcare in a completely different environment helps their appreciation of healthcare resources in the UK, and often facilitates career-long associations with centres they can help [47].

Global surgery has changed dramatically over the last 30 years. Urolink's core values, and objectives, have, however, remained pertinent despite necessitating modification as a consequence of the evolving needs of the LMICs it has been associated with, and those it hopes to become associated with in the future.

Conflict of Interest

None declared.

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Abbreviations

AMReF	African Medical Research Foundation
BAUS	British Association of Urological Surgeons
(N)CD	(non-)communicable diseases
COSECSA	College of Surgeons of East Central and Southern Africa
COVID-19	coronavirus disease 2019
HIC	high-income country
LIC	low-income country
LMIC	lower-middle-income country
NGO	non-governmental organisation
UN	United Nations
WHO	World Health Organisation

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