

The Relativity of Suitability—The Surgical Appliance Conundrum in Africa

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Much work has been performed in trying to identify the reasons behind the big disparity in the availability of surgical services in African low-income countries (LICs) (1-3) when compared to more developed regions of the world. Several factors have been identified, including the lack of trained manpower (1-3); a lack of infrastructure (4); poor roads, transport (3); electricity and basic amenities (5); and the non-availability and/or unsuitability (6) of surgical appliances (equipment, instruments, aids, and implants).

Significant effort is being made in the training of manpower. The College of Surgeons of East Central and Southern Africa (COSECSA), the West African College of Surgeons (WACS), and other sister organizations have been making serious headway in improving the surgical workforce (7-9). Several universities and ministries of health have strengthened their training programs, thus producing more surgeons, nurses (10), and technicians to cater to the ever-increasing surgical demand in the Sub-Saharan region. Over the past decades, infrastructure and the availability of electricity, water, and other basic amenities have also shown a gradual improvement, albeit at a pace much slower than aspired.

The question of the availability and suitability of a surgical appliance is a complex one, felt more acutely in

poorly funded public sector hospitals. Whereas the need for these adjuncts in surgery is unquestionable, the type, make, and characteristics of surgical appliances best suited for use in the African LIC context is a question left unanswered for too long.

When the Best Is Just Not Good Enough!

The value of an appliance is proportional to the duration for which it can provide reliable service.

Often, purchasing decisions are based on the “perceived” value of the product rather than its “real” value.

Whereas the “perceived” value of an appliance is vague and subject to individual biases based on personal experience, the “real” value is quantifiable (albeit dependent upon several pre-conditions including maintenance, repair, regular after-sales services, and its durability in the physical environment where it is being used).

It is interesting to note that the “real” value of an appliance can differ vastly depending upon whether the calculation is done in the setting of a high-income country (HIC) or in that of an LIC. This is precisely due to the appliance’s performance being dependent on the previously mentioned pre-conditions, which are far more easily available in an HIC than in an LIC. On the

other hand, the “perceived” value is quite comparable in the two scenarios (due to the fallacious argument that what is good for an HIC is good enough for an LIC). Many purchases are made based on the “perceived” value of a product, leading to significant after-purchase regret. As a particularly glaring example of this, recently, at a quaternary-level hospital in the region, four image intensifiers (C-arms) broke down “beyond repair” in 4 years. The reason for the damages (as reported by the maintenance staff) was the unpredictable surges in the electric supply, in turn, caused by an apparently “unfixable” wiring problem in the operation theater complex that was, as it is, built 120 years ago during colonial times. All the C-arms were top-of-the-line, world-class products of reputed brands with high “perceived” values. Now, if these C-arms came equipped with inexpensive built-in current stabilizers with surge cut-off, the whole problem could have been avoided, with the consequent saving of tens of thousands of dollars. (To be fair, these machines were built for use in HICs, where a predictable and consistent electric supply is guaranteed!).

There are some peculiar similarities in the Operating Rooms (ORs) located in African LICs.

The erratic electric supply in our ORs with frequent power failures and fluctuating voltages is legendary! Electrical equipment without sufficient built-in protection against electrical surges is not likely to survive very long. Surgical appliances are often discarded due to the non-availability of a certain type of fuse rather than because of a problem more complex than that!

In our environment, the Achilles’ heels of operation theater tables, patient transfer trolleys, portable OR lights, and even anesthesia machines are their WHEELS! Many of these modern OR equipment are fitted with wheels coated with thermoplastics like Teflon (to decrease vibration and avoid static energy generation). Whereas these wheels work reliably in a modern OR with seamless polymer flooring, when used on the irregular cemented/tiled floors of our district and provincial hospitals, the equipment’s plastic wheels are the first to get damaged, rendering the entire equipment

immobile and practically useless, often within a few weeks of its arrival!

Again, in the LIC setting, with equipment being scarce and demand being high, it is usual to transport the available equipment through long distances within the hospitals. Shock resistance, water-, and dustproofing therefore become other important factors determining the suitability of appliances and equipment in this context.

One of the most important aspects determining suitability is the locally available after-sales and maintenance services for that appliance.

There is a palpable mismatch between what material is needed and what material is available for purchase/use in the region. Curiously, this malady also affects philanthropic donations from HICs to public hospitals in LICs.

It should be pointed out here that several functioning hospitals in the region run by private business or charitable organizations/foundations do not suffer from the issue of surgical appliance incompatibility or unsuitability. Universally, these hospitals have integrated mechanisms to address important issues such as maintenance and checks of equipment and appliances on a regular basis. Many of these organizations are based outside the region, often in HICs, and follow strict operational procedures. This is in stark contrast to the poorly funded and managed government sector hospitals which, while attending to the largest chunk of the population, are afflicted by the peculiar problem of appliance incompatibility, unsuitability, or unavailability.

The Afri-SAS Index

The need of the moment, therefore, is to be able to define the “real” value of a surgical appliance in the LIC context. A value-based numerical system is needed, which can be calculated and assigned to an OR appliance.

In this respect, the African Surgical Appliance Suitability Index (Afri-SAS Index) is being developed by the Centro de Medicina Global (Centre for Global Medicine) of the Maputo-based *Revista Moçambicana de Medicina* (Mozambican Medical Journal).

The purpose of this index is to give a numerical value from 0 to 5 to any appliance used in the OR. They are to be first studied and rated for five qualities: the price, the ease of maintenance, technological appropriateness, resistance to the environment (humidity, dust, and vibration), and the after-sales network of the product (Table 1).

Table 1. The calculation of Afri-SAS Index

Quality being studied	Numerical value
1. Purchase price	0–5 points
2. Ease of maintenance	0–5 points
3. Technological appropriateness	0–5 points
4. Resistance to humidity, dust vibration, and other specificities	0–5 points
5. Service network in Africa and after-sales service guarantees	0–5 points
Afri-SAS Index	Average of all five values given above

Afri-SAS Index, the African Surgical Appliance Suitability Index.

Equipment shall be studied by bio-medical engineers and end-users (surgeons, theater nurses, and other OR staff) using an item-specific questionnaire, addressing numerous aspects of the equipment’s characteristics under the five qualities mentioned.

The calculation of the index shall be a laborious and thorough process.

The final Afri-SAS Index score shall be the average of the values attributed to the five qualities and shall be a decimal number ranging from 0.0 (least appropriate for African LIC settings) to 5.0 (most appropriate for African LIC settings).

The development of this index and the use of it thereof shall bring with it many advantages:

1. The Afri-SAS Index shall abolish the “perceived” value bias in purchasing departments (An OR trolley, regardless of brand, make or country of origin, with an Afri-

SAS Index of 4.3 shall be more suitable for use in an LIC than the one with an index of 3.1!).

2. The use of the index shall impede purchases based on the criteria of “kickbacks” rather than quality.
3. Equipment manufacturers and distributors shall consider realistic pricing. Motivation to provide after-sales services will be higher.
4. “Dumping” of outdated, incompatible, unsuitable, and poor-quality surgical appliances in LICs shall be discouraged.

In the long run, one can hope that the use of the Afri-SAS Index will foster local manufacture of surgical appliances.

Two major hurdles need to be addressed in the development and implementation of the Afri-SAS Index:

Firstly, the elaboration of the assessment criteria for the plethora of surgical appliances is laborious and will require large-scale collaboration among surgeons, engineers, theater personnel, and administrative staff. Monetary commitments for the development of the index will require the selection of suitable partners capable of and interested in providing the required financial support.

Secondly, the acceptability of the Afri-SAS Index to end-users shall depend upon a vibrant marketing strategy. After acceptance, the task of training personnel in the proper use of the Afri-SAS Index shall be the next daunting task.

Despite the challenges, it is reasonable to hope that one day both public and private tenders for OR appliances in the region shall be restricted to products with documented Afri-SAS Indices. Better still, the tenders may specify that only products with an Afri-SAS Index of, say, 3.8 or above need to apply!

For a long time, the argument against the development of LIC-specific technology had been that the market was too small! Not anymore. The market grows and things are moving at a healthy pace in the continent. It is time that Africa-specific criteria and standards are defined. In the field of Surgical Appliances, the Afri-SAS Index promises to be that definite standard.

References

1. Alayande B, Chu KM, Jumbam DT, et al. Disparities in access to trauma care in Sub-Saharan Africa: a narrative review. *Curr Trauma Rep.* 2022; 8(3): 66-94.
2. Farmer PE, Kim JY. Surgery and global health: a view from beyond the OR. *World J Surg.* 2008; 32(4): 533-6.
3. Grimes CE, Bowman KG, Dodgion CM, et al. Systematic review of barriers to surgical care in low-income and middle-income countries. *World J Surg.* 2011; 35(5): 941-50.
4. Nwanna-Nzewunwa OC, Ajiko MM, Kirya F, et al. Barriers and facilitators of surgical care in rural Uganda: a mixed methods study. *J Surg Res.* 2016; 204(1): 242-50.
5. Ajibode H, Jagun O, Bodunde O, et al. Assessment of barriers to surgical ophthalmic care in South-Western Nigeria. *J West Afr Coll Surg.* 2012; 2(4): 38-50.
6. Sichimba D, Bandyopadhyay S, Ciuculete AC, et al. Neurosurgical equipment donations: a qualitative study. *Front Surg.* 2022; 8: 690910.
7. Parvin-Nejad FP, Hoffman GS, Padmanaban V, et al. Surgical subspecialists in West Africa: workforce size, training opportunities, and contributing factors. *Surgery.* 2021; 170(2): 478-84.
8. Mulwafu W, Fualal J, Bekele, et al. The impact of COSECSEA in developing the surgical workforce in East Central and Southern Africa. *Surgeon.* 2022; 20(1): 2-8.
9. O'Flynn E, Andrew J, Hutch A, et al. The specialist surgeon workforce in East, Central and Southern Africa: a situation analysis. *World J Surg.* 2016; 40(11): 2620-7.
10. Saralegui-Gainza A, Soto-Ruiz N, Escalada-Hernández P, et al. Density of nurses and midwives in sub-Saharan Africa: trends analysis over the period 2004-2016. *J Nurs Manag.* 2022; 30(8): 3922-32.