BLACK WOMEN ARE 3 TO 4 TIMES MORE LIKELY TO EXPERIENCE A PREGNANCY-RELATED DEATH THAN WHITE WOMEN, EVEN AT SIMILAR LEVELS OF INCOME AND EDUCATION.


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Dear Global Surgery Enthusiasts, Readers & Citizens of the World,

The words "I can't breathe" are familiar to me in various ways, from hearing those words in the hospital by my patients struggling to breathe with chronic lung disease, to the streets of my crowded city, where someone may struggle with the fumes from an old car's exhaust pipe. However, those same words have recently transformed into a new, more complex meaning bringing much pain to my heart.

Racism, xenophobia and intolerance are problems prevalent in all societies and throughout moments of history, entire races have been treated as lesser humans. Currently, these range from the oppression of students in schools, job and housing discrimination, and lack of access to quality health care. During these times, we must expand our views and put ourselves in the shoes of those who have vigorously been quelled just to ensure the status quo. We believe that the existence of racial discrimination and racism is a matter of concern to all human beings, that racism and racial prejudice are significant factors contributing to the inhibition of human rights and fundamentals to freedoms.

With the Black Lives Matter movement, we stand in solidarity with black health workers and black communities worldwide. In our hopes to eradicate racism and discrimination, we are committed to engaging the medical community in dialogue around this essential context. By fighting and advocating against racism, we give someone a chance, a chance at life, a chance to live and finally a chance to explore their full potential. The only way humanity stands a chance amid all this chaos and uncertainty is if we choose to stand together and raise our voices against intolerant attitudes.

We hence ask of you to put in the efforts needed to tackle racial injustice and all kinds of inequality within your environment and day to day life, to become a part of the generation that not only fought the battle to eradicate a viral pandemic but also a generation that destroyed a much deadlier disease, racism. Our efforts advocating for justice shall continue so that one day a black student like myself can feel free to live, breathe and serve in a world that sees him not through the colour of his/her skin but as a HUMAN BEING.

With love always,

Aemon B Fissha

aemon@one.surgery
Surgical disease accounts for a significant portion of the global disease burden, and although the international community recognises global surgery's importance, there is still much that needs to be done to ensure that the billions of people currently in need of surgical care have access to treatment.

In this 10th edition of Voices of One Surgery, we echo our community's message that surgery is as an integral part of public health, equally relevant amidst all the other healthcare priorities of society. Herein are 10 Global Surgery facts that the One Surgery advocacy team highlights in order to expand on the foundations of global surgery.
2. WHO COINED THE TERM GLOBAL SURGERY?

In 2008, during the quest for global health equity, Drs. Paul Farmer and Jim Y Kim described surgery as the “neglected stepchild of global health”. However, it was in 2014 when the “Global Surgery” term was first coined by them and it was quickly adopted worldwide by those seeking to improve access to surgical healthcare within global health.

However, there emerged a jungle of definitions due to the absence of an international consensus on the exact meaning of this term.

In 2014, in order to better set objectives and define strategies for the future, and to end the increasing confusion about the optimal definition, the Lancet Commission officially described Global Surgery in literature. Their now widely accepted definition for Global Surgery may be summarized as follows: “an area of study, research, practice, and advocacy that seeks to improve health outcomes and achieve health equity for all people who require surgical care, with a special emphasis on underserved populations and populations in crisis.”

1. LACK OF AFFORDABLE SURGERY BANKRUPTS FAMILIES AND ECONOMIES

Seven out of ten people in low-income countries are at risk of spending more than 10% of their total income on out-of-pocket payments for surgical and anaesthesia care when surgical care is required. On the other hand, in high-income countries, fewer than one in ten of people are exposed to this financial risk. 81 million individuals across the world face financial ruin due to expenses incurred while receiving surgical care each year.

And as a result of failing to treat curable surgical disease, trillions of dollars are lost in the worldwide economy to disability and death. Young people (between the ages of 15 to 44 years) account for almost 50% of the world's injury-related mortality, representing a significant proportion of a country's economically-productive workforce.

SURGICAL CONDITIONS ARE ESTIMATED TO COST LOW- AND MIDDLE-INCOME COUNTRIES UP TO USD 12.3 TRILLION IN LOST ECONOMIC OUTPUT BY 2030.

3. GLOBAL SURGERY IS NOT ABOUT PHILANTHROPIC SURGICAL MISSIONS IN LMICS

Global surgery strives for equality in access to safe, affordable surgical care around the world and requires much more than performing surgery alone. Surgical missions in low-resource settings are important but not sufficient to achieve global surgery goals. For example, advocacy, research and education are indispensable areas to reduce inequality in surgical care and health care in general.

Essential to these missions is that they are conducted properly. By performing surgery for two weeks in an area poor of surgeons and then leaving everything as before, one may have helped a few patients, but this will not bring major changes in global access to surgery. Sustainability, on the other hand, is crucial. Educating local surgeons, supporting to set up a system where the community itself can maintain surgical health care are some examples to ensure lasting changes. In doing so, it is, of course, fundamental to respect local values and opportunities and not simply to impose foreign healthcare principles.

International exchanges are however an important way of creating awareness, and are known to strongly nurture the commitment of students and doctors for global surgery. Being confronted with and experiencing unfair inequity in access to surgical care from nearby, might impact ones personal beliefs and life goals much more profoundly than just reading or hearing about it.

But most importantly, everyone can commit themselves to the global surgery cause, wherever they are based. Surgical missions are important but Global surgery objectives can not be reached without the necessary organisation and strategy planning, advocacy, education, technical support, research and communication technologies.
5. NATIONAL SURGICAL, OBSTETRIC, AND ANAESTHESIA PLANS ARE THE FIRST TIME SURGICAL DISEASES HAVE BEEN INCLUDED AND ADDRESSED IN THE NATIONAL HEALTHCARE PLANS IN MANY COUNTRIES

National Surgical, Obstetric, and Anesthesia Plans or NSOAPs describes a framework to improve the delivery of surgical care based on the World Health Organization’s 6 building blocks for health care system strengthening. These 6 blocks involve delivering of surgical services through a complex integration of infrastructure, a well-trained workforce, quality and safe services, information management, adequate financing and governance. To ensure that the NSOAPs development and implementation is effective, current gaps in health care must be identified and solutions should be tailored to the needs of the specific low and middle-income country (LMIC). Although the list is not exhaustive, notable countries that have completed or are in the process of developing NSOAP include Ethiopia, Zambia, Nigeria, Tanzania, Rwanda, and Pakistan. In 2016, Zambia became the first country to adopt NSOAP modeled on the Lancet Commission’s theoretical framework.
6. SURGERY IS JUST AS IMPORTANT AS OTHER GLOBAL HEALTH CONCERNS

Despite the popular belief that the burden of surgical diseases is not large enough for it to be included in the global health agenda, the Lancet Commission on Global Surgery has shown that the surgical conditions account for 28–32% of the overall global burden of disease. Additionally, surgically treated diseases account for an estimated 4.2 million deaths within 30 days of surgery – which is more than from all causes related to HIV, malaria, and tuberculosis combined.

7. YOU CAN NOW OBTAIN A HIGHER DEGREE IN GLOBAL SURGERY

There is a growing academic interest in studying global surgery in its own right, with healthcare professionals, scientists, economists and industry working together to tackle some of the barriers that surgical services face across the world. To name but a few, the University of British Columbia offer a Masters of Global Surgical Care, with Kings College, London and the University of Cape Town offering Masters programmes with dedicated global surgery themes.

8. GLOBAL SURGERY RESEARCH IS RAPIDLY INCREASING

The quantity of research in global surgery has substantially increased over the past 30 years. The volume of scientific production on global surgery increased from 14 publications in 1987 to 149 in 2017 and to this day continues to exponentially rise. OneSurgery has developed a research index, tracking and archiving scientific publications in relation to global surgery, archiving over 500 publications in the last 24 months alone. (https://research.onesurgery)

9. THERE ARE 70-TIMES AS MANY SURGICAL WORKERS PER 100,000 PEOPLE IN HIGH-INCOME COUNTRIES COMPARED WITH LOW-INCOME COUNTRIES

There is a large workforce imbalance in the world, with a major discrepancy in the numbers of qualified surgeons, anaesthetists and obstetricians. Establishing training programmes in low and middle income countries (LMICs) is a critical component of the global surgery agenda.

10. THERE ARE INCREASING PLATFORMS TO ADVOCATE FOR GLOBAL SURGERY

As the momentum gathers pace for global surgery, diverse and exciting platforms are developing to further the agenda.

From the Global Surgery Foundation, recently established in Geneva (https://www.globalsurgeryfoundation.org/), to the dynamic activities of Incision (https://incisionnetwork.org/) and One.Surgery's own platform with its magazine, blog and podcast network, the future is bright for promoting global surgery goals for many years to come.

GLOBAL SCALPELS, A PODCAST DEDICATED TO GLOBAL SURGERY, HAS PRODUCED 20 EPISODES AND COUNTING!

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WHY BLACK LIVES MATTER IN GLOBAL SURGERY

NELSON UDEME-ABASI
In these tumultuous times, no single topic has been capable of capturing the attention of the global psyche than that of institutional racism – except of course COVID-19, which, in its quarantine conundrums, has simply emphasized uneasy truths about already established healthcare inequalities. And amidst the myriads of opinions and heartfelt expressions surrounding racism, there is a subtle global surgery archetype, rightly described by Alyssa Scheiner et al. as “A Bold New Face of Colonialism” in the notable Global Surgery pro-con debate article.

So, what has Black Lives Matter got to do with global surgery? To answer this question, we could as well ask why black and ethnic minority populations in higher resource countries are faring poorly in the response to COVID-19 in comparison to their population averages? Or even more simply, just why is the access to safe surgery lacking in many low income countries? It may be that the answers are steeped in centuries of bygone history, or perhaps there remains institutionalized barriers to this day that are subtly or inadvertently preventing races, regions, populations to develop.

Indeed, black history has been devastating, but questioning why this is would force us to explore why slavery happened and the ironic savagery of colonialism and in turn we might be entrapped in the vicious cycle of blame games, pointing fingers, crying foul. What however is important is why such histories should be rebranded and used as a yardstick for justifying how black people are seen and treated. In the case of global surgery, the argument goes that what begins as a subtle phenomenon, if unchecked, would become a solid pressure point.
For example, the evolution of global health from "tropical medicine", focusing on only the weird and wonderful diseases unbeknownst to the colonial powers, to international health and then global health, where clinical missions are discouraged as unethical, but financial aid, educational syllabi, and research agendas remain narrowly controlled.

Within the global health sphere, one will often see uneven partnership models, inequity in co-authorship of global research works or the cruel act of letting unqualified students or residents from higher income countries meddle with procedures appropriate for qualified local trainees and many more.

However, global surgery, the newest petal in the global health flower, really has the rare privilege and opportunity of correcting many sources of racial injustice in the here and now.

Such topics that delve into the issues of racism are usually volatile and potentially divisive. Highly progressive global health initiatives such as global surgery should not shy away from discussing such topics as there is a chance that other health-related enterprises may glean one or two things from global surgery. All concerned persons, facilities, governments or regions should have a confab where issues bordering on racism, inequity and injustice in global surgery should be discussed. In effect, the global surgery community could be a pacesetter to the global community on how issues surrounding BLM should be handled within global health.

About the author

Nelson Udeme-Abasi is co-chair and coordinator of InciSioN Nigeria as well as the Director of Programs, Policies and Projects for the University of Uyo Medical Students Association UUMSA, Uyo Nigeria. He is passionate about global surgery leadership, innovation in surgical care and socio-economic dynamics of accessing quality healthcare.

REFERENCES

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QUEST FOR ANSWERS: LESSONS FROM GENEVA

BY ANKIT RAJ

ANKIT IS A JUNIOR DOCTOR FROM INDIA WITH INTERESTS IN GLOBAL HEALTH, INTERNATIONAL RELATIONS AND HEALTH POLICY
On a particularly windy day in the summer of 2018, I stood facing the majestic architecture of the Palais des Nations, home of the United Nations Office in Geneva. All bright-eyed and bushytailed, I was overwhelmed by a potpourri of emotions—confusion, awe, excitement, nervousness, nonchalance, and trepidation.

Afterall, within a span of a day, I had travelled from the dusty and chaotic streets of the poorest state of India, where public health was a nightmare, to the opulent and beguiling neighborhood of the mecca of public health. The contrast could not have been starker. A contrast of lifestyle, opportunities, security, wellbeing, health, and prosperity. A contrast that many would never experience in their lifetimes and others would not care about.

I grew up in the Bihar of the 90s; an eastern state in India, it was notorious for its lawlessness and backwardness for the most part of the last century. I’d felt strangely at home amongst low resources, fairly average goals, and unfulfilled ambitions. My father worked as an orthopedic surgeon in one of the peripheral towns of this state. A town that I am sure most people wouldn’t even notice if one day it simply vanished from the maps.

Our town occasionally got featured on the national media, but for all the wrong reasons—the kidnapping of doctors, mob violence against a surgeon, kids thrown away right after their birth in the dumpster behind the moldering district hospitals, and so on. There were so many reasons for us to leave the town—decaying public infrastructure, non-existence of a support system, an angry public, and morally corrupted bureaucrats; and so few to stay—an opportunity to provide timely and affordable access to quality surgical care. So we decided to stay.

My early childhood growing up on the streets of this borderline chaotic town shaped my perspective and motivation in medical school. Unsurprisingly, I thought medicine was all about diagnosis and treatment; healing the diseased and tending to the wounded. Not until the later years in medical school did I stumble across global health; advocacy; Geneva; the World Health Organization; equity; universal health coverage; and myriad technical terms that academicians like to mention in fancy literature published in journals inaccessible to the people whose health is being discussed. Naïve as I was growing up in a naïve little town, I thought here is something that I can finally relate to, where I can apply knowledge and experience naturally.
But as the aphorism goes, all that glitters is not gold. As it went, I applied to a precious initiative by a student organization that supports young medical students and early year researchers so that they can participate at the annual World Health Assembly at the World Health Organization’s headquarters in Geneva.

The aim of the program is to expose medical students to the highest decision-making body in the arena of public health and to equip them with the right advocacy and diplomacy skills, and to inspire a future cadre of public health experts. At least, that is what I thought it would be; except that I learned more than the mandated advocacy skills. I learned that hypocrisy exists in the highest echelons and those that preach equity may consciously or subconsciously still practice inequity.

And yet, somehow, both worlds existed. I felt guilty and yet fortunate. Guilty because I had spent a ton of resources to travel so far only to learn about global health and health inequities in an artificial, air-conditioned, opulent environment; but also fortunate because now that I’d learned about health inequity existing in the world, I could better appreciate it.

I am the sum total of the people I have met, challenges I have faced and experiences I have had. And so I am well aware of the limitations of a world where global health discussions are accompanied by expensive conferences, or a world where equity is talked about with escargot and wine. Because the unfairness of our life is inseparable from the unfairness of the society we live in, it is evident that one will not foster without the other. In all its unadulterated rawness, I embraced the wide gulf between where I had come from and where I was at that particular moment. The principle motive for me to revisit this experience and a desire to share it with the world is the current atmosphere surrounding the COVID19 pandemic and the World Health Organization’s response to it.

The organization has been called out by several governments for an alleged late response to the pandemic and an inability to contain it. Others have called out this, and multiple other international agencies, for their one-size-fits-all methods to contain the pandemic. The intentions maybe good, but global health agencies and advocates must keep in mind the reality and the context of a world that also includes poorer and resource-constrained regions. Without including voices from these underrepresented regions, one cannot aim to bring down the pandemic sustainably. Any tool being designed to contain the new outbreaks while sitting in the comfort of a Swiss climate may not adequately represent the needs and desires of a village in Bihar.

My experience that summer in Geneva has further cemented my ideologies and beliefs. Like most peers of my age, I was drifting towards the mirage of a foreign degree and a better lifestyle; however, soon after I came back from Geneva, I realized that it was not what I truly wanted. I wanted to practice global health and not just use the term to rise up the ladder at a place out of touch with reality. After all, how can I blame others of hypocrisy if I walk down the same path? I decided to stay back, like my father did several years back, to train in an area where I wish to make tangible changes, to continue my advocacy for equitable participation at global decision-making tables, and to stand for what I believe in.

That summer, I learned to perform a delicate balancing act between chasing my dreams and staying grounded to my roots, a dance that never quite seems to stabilize. I learned to stop living on dreams borrowed from someone else, but to seek answers over my deliberations on health equity.

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THE INVISIBLE HANDCUFFS

MUNA ROMMANEH
Everyone looks up to someone for inspiration. Whether it is a superhero or a unique person, the inspiring individual always leaves a positive print on our lives. As we grow, we realize that heroes do not always wear capes; sometimes they just wear scrubs and a white coat. Our vision of an inspiring superhero evolves to form an image of a compassionate person saving lives. This hero, a more realistic one compared to the rest, is called a "doctor". With the use of a scalpel or a stethoscope, magic can be witnessed with the blink of an eye. These heroes, along with other dedicated healthcare professionals including nurses and allied carers, are serving the community on daily basis despite any difficulties they may face.

Patients across the globe visit hospitals to see a doctor in their white coat. To them, the white coat is not only part of the doctor’s "medical outfit", it represents professionalism and integrity. It acts as a sign of commitment to care for the ill. Unfortunately, what patients fail to see are the invisible handcuffs that come along with wearing the white coat. It is 2020 and doctors worldwide are standing strong fighting at the frontlines of the COVID-19 pandemic. With the use of their firm fists, their magic tools are manipulated in a steady and an incredible fashion to provide the care needed for those who are suffering. These heroes tend to forget all about their handcuffs and work tirelessly to focus all their attention on their patients.
Not every doctor is handcuffed; however, those in training - both medical and surgical - are sometimes handcuffed and exploited. The case does not apply everywhere, but some countries, such as Jordan, to this day are not paying the majority of their trainee doctors - the same doctors who are taking care of patients in wards, emergency rooms, operating theatres, and clinics. Yes! The invisible handcuffs are restraining the same doctor you first see at your hospital visit.

Training of doctors combines a huge array of tasks aimed at saving their patients, burdensome shifts, and endless paperwork. To no surprise, trainees also have to bear the legal responsibility in case of a medical or surgical error! As they finish their job at the hospital, they walk into their homes only to face different kind of responsibilities; one of those is a financial one. They spend money on their basic necessities such as food, books, rent and bills. Needless to say, it is money that did not come as compensation of their work at the hospital. So, where does this money come from?

Many trainee doctors are left with the same question, how should they meet their financial commitments while abiding with the rules of this unfair game that takes years to be over! Long and sometimes unpredictable working hours, as well as theoretical books that need to be studied leave them with few other options to earn an income. The differences between the doctors' backgrounds play an important role in determining who should train and who should not. Doctors with a wealthier background tend to face fewer issues with joining an unpaid training program since finding a source of income for the years of training may not be a necessity.

Modern day slavery is hitting trainee doctors hard. Unpaid training positions are a form of forced labour. Hospitals are profiting from the trainee doctors' work, while the doctors themselves are not paid for it. Laws to prevent unpaid work experience must be enforced without any gray areas allowing hospitals to take advantage of the doctors' need to train.
The burden of this healthcare crisis has fallen extremely hard on the trainees who are fighting at the frontlines of this pandemic, risking their lives to save the lives of others. Many were forced to move out of their house away from their families to avoid the spread of the virus as they are continuously at risk of getting infected due to exposure. Whether it is the extra personal protective equipment, the lockdown measures taken, or their new accommodations, the trainees are facing a new financial issue due to the increased expenses resulting from the crisis.

Despite the difficult circumstances caused by the pandemic, the trainees have continued to do their job in an impressive way full of courage and bravery. We raise our hats to every trainee working hard in the emergency room, operating theatre, and across the wards of the hospitals! Such selfless acts deserve an award to highlight the importance of the white coat teams in our lives! Let this pandemic trigger an outcry to end unpaid training programs, and pave the way to formulate and tighten laws that protect trainee doctors to end exploitation, forced labour, and modern slavery within the healthcare system. To all trainees across the world, we salute you!

About Muna

Muna Rommaneh is an intern doctor from Jordan. She is a proactive global health and surgery activist; serving daily as the voice of those suffering from health conditions or lacking access to healthcare services. She is a human rights and youth advocate, empowering vulnerable groups and those who are striving to bring a change in their communities.
We are in pain, seeing how millions groan
In the midst of our anguish,
We all wish it would get better.
We are in agony, seen how millions moan
Hoping to find treatment, a salvation, a liberator

We witness many who fight to survive,
To hope, to believe
Ploughing long distances to have surgery,
To live, to breathe.

Long queues form, stretched far back across
continents,
No choices here,
Only waiting with patience.
We watch with horror, how people trust their
lives to old, rusty, equipment,
Wondering if there is any luck in that next
donated shipment.

We bleed at the deformity, the disability, the
injury
The prolonged labour, the cataracts, the cancer
you visibly see
And yet the longer we wait, the worse it will be
For our time is our loss, our burden, our
pathology.

But the cost of treatment is higher than our
pain.
A year of hard labour and nothing is gained,
We work, we toll, we struggle,
Yes, the simplest operation but we are all in
trouble.
We borrow, we bleed,
We do not have the money we need.

This dire situation, drowning in a sea of
suggestions
What is needed is collaboration.
Surgery is a confusing complexity,
But universal love inspires generosity
To ensure that there is safety in care
We are no longer neglected, no longer unfair.

We seek to bring out the beauty in this
abandon,
Our world is changing, connected, no longer
random.
By listening to each other, we can operate
and plan,
It is love that guides the surgeon’s hand.
Our voices united speak louder than one,
Our finest tools are when we are understood,
Our greatest theatre is our brotherhood.

For we are one world,
We are one network,
We are one family,
We are made with love,
We are One Surgery.
FRUGAL INNOVATION
THE HYBRICLAVE DEVELOPMENT JOURNEY

ANDREW WORKS WITH NOOR MEDICAL IN THE CAPACITY AS COO AND OVERSEES OPERATIONAL PROCESSES FOR PROJECTS IN AFRICA. HE IS A SERIAL ENTREPRENEUR FIRST WORKING ON SOCIAL IMPACT ENTERPRISES DURING HIS TIME AS A SCIENCE EDUCATOR IN PHILADELPHIA AS PART OF THE TEACH FOR AMERICA CIVIL SERVICE PROGRAM.
When Noor Medical spoke to Ngwarati Mashonga, International Director of Riders for Health in 2018, about our ambitions to make medical instrument sterilization possible in off-grid contexts, his response echoed our resolve: “Getting a surgical infection from a health institution should not happen. It is important to have medical instrument sterilization equipment that operates in off-grid contexts.”

The question was not if this was an issue, countless interviews with nurses and doctors, as well as the personal experience of our co-founder Saji Zagha working with health clinics in rural Chad confirmed that. Nor was it really a question of ‘Why’ - a lack of training and equipment ill-suited for the operating context was the principal culprit. Rather, the question for our team was to best figure out the all important ‘how’. How could we best ameliorate this issue?

Framing the problem

Over 1.5 billion people in the world lack access to health clinics with a stable electricity supply. In Sub-Saharan Africa, roughly ¼ health facilities lack electricity access. Globally, over 500,000 healthcare clinics either lack electricity or suffer from frequent electricity grid disruptions. This presents major challenges for the sterilization of medical instruments, which is principally done with autoclave devices requiring large amounts of electricity. Unfortunately, doctors in low-resource contexts have to make tough decisions about delaying surgery, or operating with potentially unsterile and thus unsafe surgical instruments.

Unsafe surgery leads to 1 out of 3 patients in low and middle-income countries suffering from post-operative infections. Unfortunately, this results in 17 million deaths annually.

Searching for Energy

The world’s first steam sterilizer for surgical laundry was designed and produced by Mathias Lautenschläger in 1887. Since this time, steam sterilization has maintained its primacy as the sterilization method of choice for medical purposes. The steam sterilization process is highly energy efficient due to the latent heat released when steam condenses on items. Given its wide acceptance globally, tackling the medical instrument sterilization issue in low-resource settings naturally gravitated our efforts toward steam sterilization.

Powering the steam sterilization process in low-resource settings became our principle challenge. The first step toward designing such a device came in 2018, when a chance encounter with a local mechanical engineer, Enock Musaisizi, first led the team toward a solar-thermal solution. Enock had designed a simple solar-thermal device to generate steam by concentrating the sun’s energy onto a large polished aluminum dish. This route was taken as electricity was often not available where Enock worked: “Deep in the village where I grew up … we could actually experience a week without electricity,” he says. The implications were clear: A workable solution would have to be solar.

Over the next few months, Enock worked with Noor Medical to conduct additional tests and modeling, both in Germany and in Uganda. Musasizi brought his extensive local knowledge and the Noor Medical team brought in additional resources to validate market needs and iterate through designs. The prototypes generated sufficient temperature and pressure for sterilization using solar energy – but the approach did have its downsides: Namely, it became ineffective on cloudy days and lacked user-friendliness (e.g., adjusting the solar collecting dish every 15 minutes was required).
NOOR MEDICAL CO-FOUNDER FEDERICO CASTILLEJO AND ENOCK MUSASIZI TESTING AN EARLY HYBRID CLAVE PROTOTYPE
A different approach in utilizing the sun’s energy would be required if the Hybriclave was to have any real applicability for health clinics in low-resource settings. Thankfully, advances in lithium-ion technology (price per kWh has fallen 90% since 2010) and the utilization of robust electrical components within the device allowed us to develop a power system capable of using various energy inputs - including electricity and other thermal sources, e.g. cookstoves. Thus, utilizing a proven technology for the sterilization of medical instruments, combined with a design approach to provide additional power inputs, allowed us to develop an autoclaving device more suitable for low-resource settings. The current version includes a battery backup system with optional Solar-PV module to power the device off-grid.

Frugal innovation

From the beginning, our product development pathway has been guided by the concepts of frugal innovation and resource-constrained innovation. Though there is some overlap between these concepts, we delineate them as follows:

1) Resource-constrained innovations: low-cost alternatives of existing Western products (i.e. cost innovations), re-designed and tailored to be particularly suited for resource-constrained customers in emerging markets (i.e. good-enough innovations).

2) Frugal innovations: Represent novel products and services that allow new applications specifically developed for customers in resource constrained contexts.

Development of the Hybriclave has required the modification and cost reduction of autoclave components to increase their robustness and applicability to low-resource contexts. For instance, the Hybriclave pressure vessel is fitted with electric coils and wiring capable of withstanding the high temperatures which may be present when utilizing the system with a thermal source of energy, such as a cookstove. Additionally, working with our local partner, Bodawerk, the system utilizes battery backup packs which are assembled in Uganda and utilized for the conversion of Boda Bodas to an electric drivetrain. They’ve passed the robustness test, and were a perfect solution already vetted for low-resource settings.
Moving Forward

It’s one thing to solve a technical problem in a way applicable to a particular environmental context, and another to do so while being useful and practical for people utilizing it. The Hybriclave development journey was started by utilizing a solar-thermal system, but we quickly realized that sterilization technicians simply would not use such a device, even if it did increase their medical instrument sterilization capacity at their clinics. As we move forward, we’re reminded that frugal innovations require continued testing with the users of said products. The people interfacing with such products are the real litmus test for whether a technology will have its intended impact.

Designing for the local context, both in terms of the infrastructure available and the usability of a product, are thus critical for achieving that vision. Over the course of this year we’ll be placing a greater focus on the usability aspect of our Hybriclave device. If you or someone you know works at a rural health care facility in Uganda or neighboring countries, please contact us to learn more about our user-interface testing program at info@noor-med.com. To learn more about Noor Medical please visit our website or follow us on Facebook, LinkedIn and Twitter.

Website: https://www.noor-med.com/
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JORDAN BAECHLE

Jordan is a medical student at Meharry Medical College, Nashville, TN and the founder of SurgeonBox
Just over a year ago One.Surgery published our story on the origins and aspirations of SurgeonBox. We expressed our motivations and desires to develop standardized, low-budget laparoscopic trainers and modules for trainees around the globe, but especially for those in areas of dire need of trained surgeons transitioning towards adopting minimally invasive techniques. Although minimally invasive operations have become the standard of care in many developed countries due to their shorter hospital stay, decreased infection rates, and morbidity, the transition has long outpaced that of the developing world. Ameliorating global surgical disparities not only require increased access to surgical treatment but also access to the equivalent standard of surgical care.

Although learning to perform laparoscopy is inherently challenging, simulation-based training is increasingly recognized as a promising supplement to on-the-job training in fostering a broad range of skills and expertise outside the operating room. Reduced depth perception by two-dimensional rendering, degraded visual information from a single-point camera, bi-manual dexterity, handling long instruments across a fulcrum, and reduced tactile feedback all contribute to challenges in mastery. Among the various types of simulation, box trainer exercises have proven pivotal in developing fundamental MIS coordination. Although laparoscopic trainers have a less realistic interface, they establish a foundation of generic skills and hand-eye-screen coordination required for minimally invasive operations.

The primary obstacle in the expansion of fundamental MIS skills towards broader use is access to such equipment and instruction. Several projects have demonstrated resourceful low-cost trainer box designs; however, few offer a standardized scalable design that is both low-cost, lighty and storage-tweight and readily reproducible from raw materials. The aim of SurgeonBox was to design and create a low-cost laparoscopic trainer cost-effective for large scale production.

The design proposed here is a product of interprofessional innovation and may be an effective means of overcoming the major limitations of cost and portability in the expansion of surgical simulation exercises to low- and middle-income countries. The multiple camera and instrument ports enable coordination training from different viewing and ergonomic axes allow participants to simulate various types of surgeries. The dimensions (43cm x 32cm x 23cm) provide adequate capacity for a relevant range of motion coordination and ensure that the diagonal measurement of 56cm to accommodate the standard laparoscopic instrument for more efficient portability and storage.

The versatility of this design and activity boards empower the creativity and resourcefulness of the user to develop new tasks and protocols or follow well-established curriculums such as the McGill Inanimate System for Training and Evaluation of Laparoscopic Skills. We believe the innovations described here to have broader implications beyond and apply to larger organizations aiming to expand surgical education. Aside from the United States, low-cost trainers described are now being used in Canada, Mexico, Honduras, Argentina, Chile, Brazil, Spain, Greece, Czech Republic, Afghanistan, Saudi Arabia, Uganda, Kenya, Singapore, and Australia. The low-weight design further enhances the cost efficiency by reducing shipping cost and the volume rate can also be further optimized when shipping collapsed units in bulk to be assembled on-site.
NOTES:
1. Material: 48 ECT C Flute Corrugated
2. Color - White - 2 sided
A global surgery education outreach program aiming to provide hundreds of units for trainee personal-use or to aid in transition towards minimally invasive procedures may opt to invest in local manufacturing options to help meet immediate demands. On the other hand, a single trainee hoping to create their own standardized box trainer and training modules may do using common materials. The USB cameras used in this study are available on common market sites and have even been substituted in other studies using phone and tablet cameras. Laparoscopic instruments training instruments are also commercially accessible but are becoming more widely available for donation from medical centers as the market continues towards more single-use disposable tools.

Future initiatives expanding on and translating different laparoscopic teaching methods and mediums such as written, diagram, video, and in-person or live-stream video conferencing could further the impact of low-cost box trainers in expanding the field towards a more common and effective means of intervention.

Furthermore, tele-teaching has gained an increasing amount of support as the video feed from the computer can be shared with an experienced surgeon located far away to provide insightful tips and mentorship. We believe a standardized simulator box will encourage and improve surgical education research in developing countries by providing a universal foundation for comparison and tracking, whether that be the proposed design here, and adapted version, or something entirely different. As Peter Decker famously quoted, “you can’t manage what you don’t measure”.

In conclusion, our interprofessional team created an affordable laparoscopic training box constructed with low cost materials. By making laparoscopic trainers more affordable and open source, we hope to reduce financial barriers to giving trainees around the globe the opportunity to perfect their laparoscopic skills and encourage industry investment and surgical education research in developing countries transitioning towards minimally invasive techniques and operations.

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Ours is a Circle of Friendships United by Ideals

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