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Editorial

Continuous Monitoring in Global Health Taking Principles of Anesthesia Care Abroad: The Lifebox Model



In 2010, when the World Health Organization initiated, and the World Federation of Societies of Anaesthesiologists subsequently completed a global invitation to tender for the ideal austere-setting pulse oximeter, they landed on a hand-held unit wrapped in an iconic yellow jacket. Known as “the Lifebox(r)” it is the same model that I see now on the finger of the patient being prepped for a cesarean delivery at a small, poorly resourced departmental hospital a few hours southwest of Guatemala’s capital. “Before this came,” describes the Hospital’s Chief of Anesthesia over the steady beep...beep...beep of the Lifebox in the background, “we didn’t have any monitors. I would love to have the best anesthetic machine available, the best vaporizer of the world, the best monitoring—but at minimum I must have a pulse oximeter.”

An estimated 77,000 operating rooms around the world deliver surgical services today without access to a pulse oximeter.¹ Addressing this gap is the fundamental goal of Lifebox Foundation, a nongovernment organization that grew around the World Health Organization’s recognition of surgical safety as a priority—and a crisis—of global proportions. In response to this charge, we have distributed more than 15,000 pulse oximeters and trained more than 6000 providers across 100 countries over the last 5 years.

I am in Guatemala with a small team from Lifebox conducting follow-up on one of these programs. On the day we arrived, only three of the hospital’s operating rooms were in use; the other two were closed-off to elective surgeries because the donated equipment they rely on had broken down 2 months prior and the hospital lacked the biomedical engineering expertise to fix them. Electricity was regularly cut out for periods of up to 30 minutes, and, due to a shortage of trained personnel, use of the designated postoperative recovery area fluctuated daily—more often than not, patients were moved directly from the operating room to either the ward or intensive care unit after a procedure. It is precisely with these parameters in mind that specifications for the Lifebox pulse oximeter were set: intuitive and low maintenance, accompanied by rechargeable batteries lasting 12 hours so that patients could be monitored during long operations despite frequent power cuts, and robust enough to survive the fall off an operating room table onto a concrete floor. Match the equipment to the environment: a simple, yet often neglected approach to equipment design.

Development was just step one; the process of getting the pulse oximeter from point A (the manufacturer) to point B (the finger of this soon-to-be mother) was a challenge that remained to be addressed, one that required bridging not only geographic space but also cultural, systemic, and financial boundaries. This particular unit is 1 of 140 that Lifebox distributed to Guatemala in 2013, a number attained through a national survey of unmet need in operating

rooms and recovery areas. This process was led by Dr. Sandra Izquierdo, past President of the Guatemalan Anesthesiology Society. Of the 44 hospitals in Guatemala, 29 departmental hospitals were functioning entirely without pulse oximetry prior to this distribution. The reality of this number is a risk that anesthesia providers in the United States will likely never have to face: intraoperative monitoring only via “listening by ear,” or, in recognition of pulse oximeter as an “indispensable weapon,” delaying urgent intervention with referral to a better-resourced hospital nearby. “I wouldn’t take the risk to take care of an elective patient without a single pulse oximeter,” states the Chief, whose 17-year position at this hospital has only now experienced zero need for referral of complicated patients.

When Lifebox was formed in 2011, its ethos was, and continues to be, that distribution must be delivered in tandem with training on the use of pulse oximetry to identify and respond to hypoxic events, a complex implementation set into motion by this initial diagnosis of need. While Guatemala is home to more anesthesiologists (medical doctors) than other lower middle-income countries of comparable size, these providers are unequally distributed across the country. As always, rural, difficult-to-access areas face the brunt of this resource shortage.² The ability of Lifebox to deliver its programs across such geographic spread is determined largely by the strength of its professional network; with partnerships at the center of its organizational psyche, the 1-day intensive course was the combined effort of five US faculty members, key members of the Guatemalan National Society of Anesthesia, the Federal Ministry of Health, and support from the American Society of Anesthesiologists. Before it ever touched today’s patient, the yellow box and all it encompasses passed through countless hands from three continents, a partnership that made possible the travel of 46 participants from 33 hospitals to receive the units at a centralized location in Guatemala City.

Over the years, we have heard our fair share of wariness and criticism of equipment donation and distribution in low-resource settings. Machines never arrived, never left the box, never stayed in the public sector, and never lasted 6 months. Through targeted follow-up—either in-person or by e-mail—Lifebox endeavors to overcome these challenges through frequent contact and maintenance support. In March of 2014, 6 months after distribution, a US-based anesthesia resident traveled to Guatemala to conduct semistructured interviews and direct observational assessment of the oximeters distributed and found that 128 of the 130 units followed up were functional and in use—the dysfunctional units were replaced.

Today, 2 years later, we repeat this effort with the support of Dr. Izquierdo, whose success in implementing the surgical safety checklist at her hospital has inspired a tangible desire and action to drive Guatemala’s patient safety work from the frontline to the ministry

of health. Accompanied by Dr. Izquierdo and three medical students from Guatemala City, we find that the numbers we saw in 2014 have largely remained constant. Although this signals “successful implementation,” we know that safe care is more than a numbers game. The follow-up question that weighs heavily on Lifebox’s conscience is: how do we *really know* that we have made an impact on provider practice and patient safety?

What we have learned over the years is that implementing the Lifebox pulse oximeter is a process that reflects many of the same principles that anesthesia providers uphold in their daily care—continuous monitoring and rigorous evaluation. Although our program might appear linear—a countrywide needs assessment with the help of local anesthesia societies, training and distribution delivered and coordinated by both external faculty and high-level in-country support, and in-person follow up—it is anything but. Instead, it requires keeping one’s finger on the pulse of all activities, constantly collecting data to monitor the vital signs of the initiatives we have taken on to allow us to read, interpret, and respond to how our program unfolds on the ground.

The cesarean delivery goes smoothly—the oximeter kept a steady tone and rate throughout, and the patient is wheeled to recovery without any complications. As the Chief says, “We all know that the anesthesiology associations have standards applied for surgeries, for every type of patient, for patients of all acuities ... the minimum standard for monitoring is *this*.” In the context of what we have witnessed as a result of in-person follow-up 2 years after implementation, it is

perhaps this ordinary story—an operation gone well, not a crisis averted—that is most compelling. To continuously monitor the relationship our end users have with their little yellow box is to transcend functional definitions of organizational success as “number of units distributed,” and expand our perspectives to recognize the professionalization of a cadre of anesthesia providers—of the internalization of global standards of practice, quality of care provision, and patient safety as commonplace in day-to-day operations. It is through collecting these data that we are able to monitor a high standard of quality in our implementation process. It is also by growing the partnerships that Lifebox depends on so heavily—from local champions in Guatemala to the global anesthesia community globally—that we can endeavor to drive change toward safer surgery for all.

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