

Background

Lifebox is a UK charity concerned with improving surgical safety globally through the provision of essential equipment and introduction of tools proven to reduce surgical mortality and morbidity. We are starting by ensuring every operating room and recovery bed globally has access to a functioning pulse oximeter and that health professionals perform basic safety checks for surgical patients. This document describes the process by which we sustainably introduce pulse oximeters (and the checklist) to a country and complements the two manuals that have been developed on how to run a Lifebox training workshop.

Stages of oximetrization

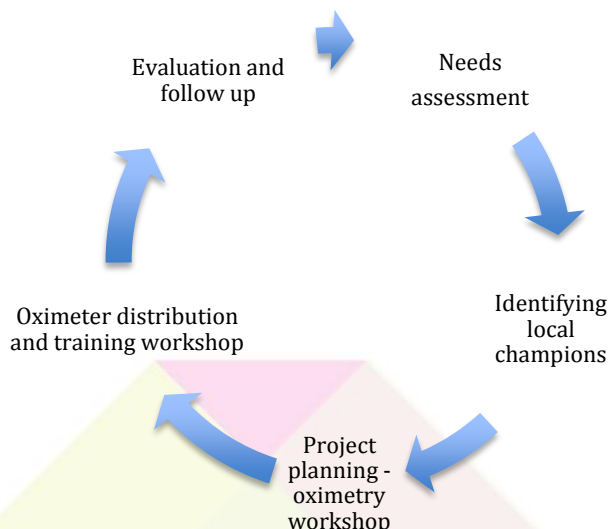
1. Context

We aim to ensure each functioning operating room and each recovery bed globally has access to a functioning pulse oximeter. Data from published literature estimates that there are approximately 77,700 operating rooms that do not have access to pulse oximeters, putting hundreds of thousands of lives at risk.

In addition, we know that risks of dying from surgery or anaesthesia are higher in developing countries and this is in part due to the concept of task shifting; where the absence of adequate numbers of specialized doctors has led to surgical and anaesthetic care being provided by less qualified cadres such as nurses and technicians.

To sustainably improve patient safety during surgery therefore requires a tailored approach that includes both the delivery of essential equipment (oximeters) to those operating rooms that don't have them, in combination with training the appropriate staff in pulse oximetry and surgical safety.

Our oximeter distribution follows a project cycle:



1. Needs assessment

In order for us to know how many oximeters are required for a particular region or country, we need to have robust data on how many hospitals there are, how many functioning operating rooms and recovery beds there are and how many staff require training. We collect this data through our own needs survey or through established contacts in each country e.g. data provided to us from the relevant Ministry of Health. Once we have compiled the data on oximetry need for a region or a country, we can then develop an appropriate model for introducing pulse oximeters to those who need them.

Our survey requests the following:

- Name
- Job title
- Contact information
- Hospital information (address and type of hospital)
- Number of anaesthesia providers (Drs, technicians, nurses)
- Number of surgical providers (Drs, technicians, nurses)
- Operating department information (no. theatres, no. recovery beds, no. functioning pulse oximeters)
- WHO surgical safety checklist information (do they use it, is it visible, would they like training?)

Our needs survey is either collected in paper form or distributed and collected electronically through coded PDF forms that can be exported into an excel spreadsheet using Adobe Acrobat Pro software. Completed PDF forms should be saved together in a dedicated folder and each form should be saved as the Hospital name (without commas). We have collected over 300 surveys to April 2013.

2. Identifying local champions

Local champions are often anaesthesiologists, surgeons or other health professionals who are heavily involved in surgery or providing surgical care (e.g. a senior anaesthesia technician). These individuals are crucial to help us collect data on what the oximetry and training needs are, help arrange the logistics of a training workshop and to follow up and evaluate the pulse oximeters after distribution. They also serve as our main contact point for each site so it is important to keep in touch with them and support them with whatever questions they might have. In some situations, there may be more than one champion (from different backgrounds) in the same country wanting to work with us. In these situations, it is best to try to coordinate efforts and to keep everyone reliably informed as plans progress to ensure the most effective use of time and resources.

The local champion might find it useful to read the “Lifebox guides” on how to run a pulse oximetry workshop that provides details on what needs to be done beforehand and how to follow up the oximeters after the main distribution event.

In some very large or diverse countries (e.g. Ethiopia), it may be necessary to work with different groups or individuals and tailor our approach for each setting.

It can sometimes be difficult to ascertain whether an individual who is new to Lifebox is reliable or trustworthy enough to take responsibility for a large donation of oximeters or to ensure a workshop is delivered successfully. If there is uncertainty, it can be helpful to do a mini risk-assessment:

- Can you check their credentials with someone who has already met them?
- Have they published in the medical literature?
- Are they members of a national or professional society?
- Are they recommended by somebody who is known to Lifebox?
- Have they got a proven track record in training or education from another NGO?
- Do you know anybody else in the given country that could arrange to meet them?
Do you know of anybody who is planning a trip to the given country in the near future, who might be able to meet with them?

None of these measures can guarantee an individual’s authenticity but can help when deciding who can take the lead on a Lifebox project in any given country.

3. Project planning – oximetry workshop

Once it has become clear how many oximeters are needed to meet the national or regional oximetry gap and how many individuals need to be trained, workshop planning can begin in earnest. The Lifebox guides may be useful background reading for local or international partners during the early stages of planning.

The oximetry workshop, oximeter distribution and checklist implementation are summarised using the following logical framework. This will be useful when applying for workshop funding and reporting to donors. It isn’t always necessary to “prove” that you have reached your project goal. However, it is vital that you are able to demonstrate that you have attained your outcomes.

Goal	Indicator	Source of verification
Reduction in surgical mortality and morbidity	<ul style="list-style-type: none"> Reduced number of perioperative deaths Reduced number of perioperative complications (e.g. hypoxia) Reduced number of post operative complications (e.g. wound infection) Reduced instances of unplanned return to theatre Reduced rate of readmission 	<ul style="list-style-type: none"> Hospital/Theatre registry Anaesthesia logbooks Case notes
Outcome(s)	Indicator	Source of verification
Anaesthesia providers and recovery staff use oximeters appropriately for all cases	All patients undergo surgery whilst being monitored with an oximeter	Anaesthesia logbooks
Improved safety culture among individual health workers	Improved safety culture scores on surveys	Safety culture surveys
Improved teamwork of operating room staff	Briefing and debriefing meetings held each day	<ul style="list-style-type: none"> Meeting attendance register Meeting minutes
Basic safety checks performed for every patient undergoing general anaesthesia	<ul style="list-style-type: none"> Presence of completed checklists in theatre Checklist policy visible in theatre Pre-incision antibiotic administration Observed use of the checklist 	<ul style="list-style-type: none"> Checklist folder in theatre Checklist posters & policy visible Medication charts Observation tools
Output(s)	Indicator	Source of verification
Anaesthesia providers and recovery staff trained in appropriate use of oximeters	<ul style="list-style-type: none"> Improvement in test scores Attendance at training workshop 	<ul style="list-style-type: none"> Test scores Attendance register
Anaesthesia providers and recovery staff trained to monitor hypoxia and manage it accordingly	<ul style="list-style-type: none"> Improvement in test scores Attendance during "Clinical Scenarios" 	<ul style="list-style-type: none"> Test scores Attendance register
Checklist policy developed and implemented	Presence of policy documents in each theatre	Visible documents
Multidisciplinary teams trained together on surgical safety	Attendance at training	Attendance register
Activities		
Oximeters distributed to all ORs		
Oximetry tutorials 1 & 2 delivered to all anaesthetic and recovery staff		
Oximetry training manuals distributed to all anaesthetic and recovery staff		
Anaesthetic log books provided to all anaesthetic staff		
High level meetings held with key stakeholders to engage them in developing a safe surgery policy		
[enter number] Checklist training workshops held for multidisciplinary staff		

- Logistics arranged for oximeter delivery

We can liaise with Acare to arrange the order and start the shipment process. On average, a shipment from Taiwan to Africa takes approximately 10 working days. There will need to be a named contact in the destination country who can take responsibility for the shipment and clearance through customs. Although the \$250 US dollars covers the cost of shipment, any customs duties levied at the border need to be either waived or paid for by the end user. Therefore, it is crucial to discuss this with your end user prior to commencing shipment.

The shipment will be accompanied by a donation certificate and a letter declaring the value of each oximeter to be \$25 US dollars. This is to try to keep any import duties to a minimum. Sometimes it is worth contacting the Ministry of Health for the destination country as it may be possible for them to waive any customs duties once they are aware the shipment is medical equipment being donated for humanitarian purposes.

- Funding

As the oximetry workshop can be completed over the course of a day, the main outgoing costs will be hire of a venue, catering and providing travel expenses to attendees. A template budget has been developed to help individuals develop their own budgets. In general, a workshop for 40 students can be delivered at under \$5,000 US dollars.

The majority of our funding is restricted to pulse oximeters and therefore, we rely on local and international partners to find the costs to support a training workshop. To date, we have developed a reliable portfolio of partners who are able to support the costs associated with a training workshop and, in some circumstances, the costs of training workshops have been met by local hospitals or Ministries in Health.

4. Oximeter distribution and training workshop

- Summary

The oximeter training workshop takes half a day and is a combination of didactic lecturing and interactive clinical scenarios with a demonstration of the oximeter. The afternoon can focus on introducing the concept of surgical safety and the WHO surgical safety checklist. The oximetry material is best suited to the non-physician anaesthetist, as nurses and technicians are often the cadre of health worker that normally give anaesthesia in the countries in which we operate. In general we recommend that there is one teacher per 10 students. The educational material is on the DVD that accompanies the oximeter and also available to download from our website. It is best to have an oximeter that has been charged for demonstration purposes. We also recommend conducting a pre and post-course test to demonstrate the improved knowledge of the participants and emphasise the use of a logbook to demonstrate change in practice.

The outline for the oximetry workshop is:

- Pre-course test
- Tutorial 1 –basic
- Tutorial 2 – advanced
- Clinical scenarios
- Introducing the Logbook

- How to use the oximeter tutorial
- Post-course test

The checklist can be introduced during the afternoon session and should ideally be taught to a multidisciplinary operating theatre team including surgeons, nurses and anaesthetists. We have developed some workshop material that can be used to introduce the checklist during an afternoon session which can be found in a separate document.

- Oximetry workshop materials

An oximetry workshop for 40 students will require:

Item	Number required
Lifebox training booklets <ul style="list-style-type: none"> – Lifebox tutorials 1&2 – WHO pulse oximetry manual – Hypoxia algorithm – WHO surgical safety checklist – WHO checklist implementation guide 	40
Attendance register	1
Attendance certificates	40
Pre-course tests	40
Post-course tests	40
Log books	40
Oximeters	1 for demonstration

It is useful to have a laptop and projector to display the powerpoint tutorials, which are also found on the educational DVD that accompanies each oximeter.

- Logbooks

Logbooks are the time-honoured method by which practitioners record details of their cases and are useful not only for personal and professional self-reflection, but also serve to provide an accurate record of patient care. They are commonly used in Western practice but the concept of documenting cases can be novel in some low-resource settings.

It is crucially important to impress upon the students that the logbooks are an essential part of clinical practice and will be one of the methods by which we follow up the donated oximeters. They should start using the logbooks for every patient they anaesthetise following the workshop and should be given electronic copies of extra sheets that they can print when the original logbooks are completed.

The following checklists can be helpful when planning an oximetry workshop:

Before the workshop:

- ☐ Oximetry needs identified and accurate?
- ☐ Date of workshop confirmed?
- ☐ Venue confirmed?
- ☐ Target student group identified and informed?
- ☐ Faculty sourced? (international or local)
- ☐ Training materials printed? (inc Handbooks, Checklists, Log books, Attendance register, Attendance certificates) Alternatively, students could be given USB memory sticks with this material pre-loaded
- ☐ AV support confirmed?
- ☐ Educational material for oximetry and the checklist collected from Lifebox?
- ☐ Oximeters shipped?
- ☐ Customs clearance arranged?

The workshop:

- ☐ Attendance registers completed?
- ☐ Oximeter demonstration performed by faculty including inserting the battery, explanation of the base unit and how to handle the probe
- ☐ Pre and post-course tests conducted?
- ☐ Logbooks distributed and explained in detail?
- ☐ Contact details for each oximeter recipient documented?
- ☐ Attendance certificates distributed?
- ☐ Workshop feedback sheets collected?

After the workshop:

- ☐ Oximeter recipient list (with recipient contact details) provided to Lifebox?
- ☐ Workshop feedback sheets provided to Lifebox?
- ☐ Pre and post-course test scores provided to Lifebox?

5. Evaluation and follow up

Lifebox has developed a number of methods of evaluating the education and medical equipment distribution programme. These include:

- Quizzes / Tests
- Feedback questionnaires
- Oximeter donation reports
- Surveys

It is important to measure the impact of your intervention (oximeter donation and training) and there are a few limited ways we can do this:

1. Impact of training workshop, assessing knowledge transfer and behavior change

Quantitative

It is possible to conduct a short multiple choice quiz (MCQ) type exam before and after the two tutorials and case discussions. Comparing the scores of the students before and after the training will enable us to measure the short-term impact of knowledge transfer and retention. If a follow up visit is planned, the MCQ can be repeated at this time to assess whether the workshop is a vehicle for longer-term knowledge transfer.

Qualitative

(i) Student feedback

It is also useful to collect the feedback of the students who attend the training and who are willing to provide testimony about the use of the workshop. Workshop feedback sheets have been designed for this purpose and we recommend using these for every workshop.

(ii) Workshop report

We also request that each workshop coordinator (or local champion) completes a workshop evaluation report soon after delivering their workshop. This is their opportunity to inform us about what activities took place, what went well and what needs improvement.

2. Impact of pulse oximeter donation on clinical practice and patient outcomes

Background

It is important to remember that there are two types of oximeter recipients – those that have been trained at a formal Lifebox oximetry workshop and those that are using Lifebox pulse oximeters through other means (e.g. through their own purchase or donation from a third party). It is important for due diligence to follow up all recipients but acknowledge that different methods will need to be employed for each subgroup.

In general, it is difficult to measure the sole impact of donation of pulse oximeters on patient outcomes (mortality, morbidity) without conducting a rigorously designed randomized controlled trial, which is unethical. Therefore, we can simply rely on practitioner testimonials and proxy measures for impact e.g. number of times a day that the oximeter is used (measuring the number of patients that are monitored).

It is also possible to evaluate the impact of the pulse oximeter on patient care by examining the logbooks that the students keep of their cases following the training workshop. Therefore it is vital that the logbooks are emphasized during the training workshop and that the students are provided with blank logbooks to take away and record their own practice.

3. Follow up

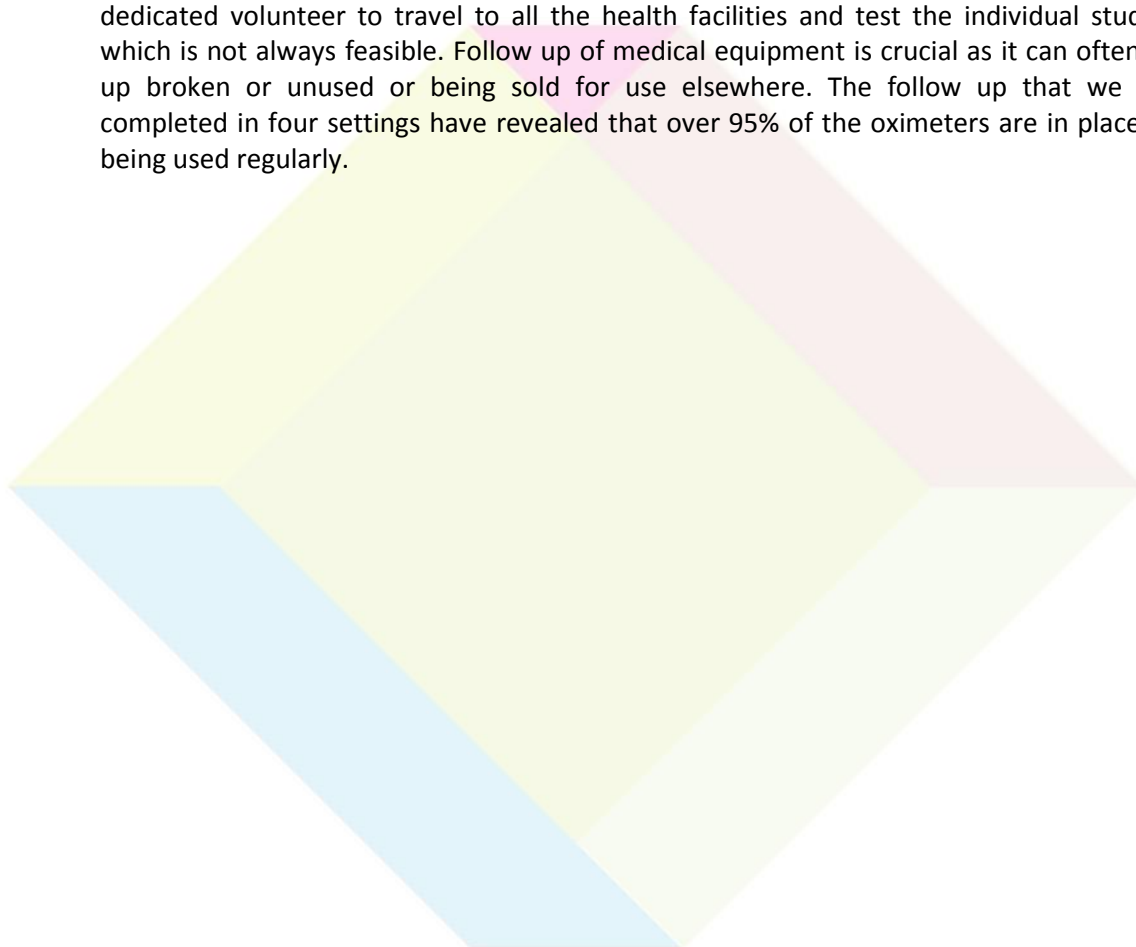
Following up medical equipment donations can be tricky, particularly in the low-resource setting where communication can be difficult and movement of staff is high. However, follow up is crucial to We have developed two methods of following up the donated equipment, taking into account difficulties with accessing email.

(i) Survey monkey

The first method is a simple questionnaire, designed using survey monkey. This should be distributed to each oximeter recipient approximately 3-6 months following the workshop. The account needs to be regularly monitored for activity and results need to be regularly exported.

(ii) Follow up telephone survey

We follow up the donated oximeters between 3-6 months after distribution and, wherever possible, after 12 months. This is done in a variety of ways but relies on a survey that we have developed for this purpose. When possible, a repeat of the MCQ quiz done at a 3-6 month interval can demonstrate long term knowledge transfer but this would require a dedicated volunteer to travel to all the health facilities and test the individual students which is not always feasible. Follow up of medical equipment is crucial as it can often end up broken or unused or being sold for use elsewhere. The follow up that we have completed in four settings have revealed that over 95% of the oximeters are in place and being used regularly.



Core documents

- Lifebox needs survey
- Instructions on how to analyse the needs surveys
- Core publications (Funk, Haynes, Weiser)
- Educational material – MCQs, tutorial 1 and 2, clinical scenarios, logbooks, WHO checklist, WHO checklist manual
- Lifebox guide – for local partners
- Lifebox guide – for international partners
- “How do we oximetrise a country?” 2 pager
- Budget template
- Workshop attendance register
- Workshop attendance certificates
- Oximeter recipient register
- Donation evaluation report
- Follow up survey

