

The Lifebox Project

– saving lives through safer surgery

Regular readers of *Anaesthesia News* will be familiar with accounts from colleagues working in resource-poor settings describing shortages of essential supplies, drugs and equipment for anaesthesia. This is translated into poor outcomes from surgery, with avoidable anaesthesia mortality rates up to 1000-fold higher than reported in the UK (1,2). When a patient refuses consent for anaesthesia in these settings they may be making quite a wise choice!

How can this situation be changed, and how can we make a difference? The WHO Checklist was launched by WHO Patient Safety in 2008 and has become familiar to us all. It has been shown to reduce mortality and complications by over 30% in all settings, but there is one component on the WHO checklist that is not achievable in all places – the presence of a pulse oximeter.

The Lifebox project (www.lifebox.org) has been launched to address this problem. It is a collaboration between the Association of Anaesthetists of Great Britain and Ireland, the World Federation of Societies of Anaesthesiologists and the Harvard School of Public Health. The lead for the project is Dr Atul Gawande, who also led the WHO Safe Surgery Saves Lives project. The aim is to improve the quality and safety of surgery in resource poor settings through introduction of the WHO Surgical Safety Checklist and provision of pulse oximeters, crucially addressing the issue of anaesthesia safety on a global scale for the first time.

Those of you who started training in anaesthesia in the mid-80's will remember sharing oximeters between theatres. By the early 90's when the AAGBI published the first Standards for Monitoring during Anaesthesia, we would not dream of starting an anaesthetic without a pulse oximeter attached to the patient.

Yet there are currently an estimated 77,000 operating theatres around the world where the anaesthetist does not have an access to a pulse oximeter – imagine – no monitor, just a finger on the pulse and a precordial

stethoscope which will hopefully alert you if the patient becomes hypoxic. No wonder perioperative cardiac arrest in children has been reported to be as high as 1:65 in some settings (2).

We take the audible beat-to-beat alert from the oximeter for granted, but as an example of the value of the WHO Checklist and pulse oximetry, we offer you a story from a small mission hospital in Uganda where one of the authors was working. "It had been a difficult day – communication problems, instruments not available, a patient that



The WHO Checklist in use at the Children's Cardiac Centre Addis Ababa



blindness in term newborn infants in South America is the use of unmonitored oxygen therapy: widespread pulse oximetry use could put a stop to this preventable tragedy.

Lifebox is ultimately working for quality and safety improvements across the perioperative process. By establishing viable markets and distribution channels to low-resource countries, we can pave the way for the delivery of other essential equipment, such as secure access to spinal needles for Caesarean section which could improve maternal outcomes.

Linking procurement of oximeters to adoption of the WHO Checklist is a bold vision. Atul Gawande's vision for the future of the Lifebox is equally innovative: for the first time linking quality standards in healthcare to effective procurement of healthcare technologies for hospitals in low-income countries. We believe that this is key to improving global health in the decade to come, and we sincerely hope that you will join us in making it a reality.

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References

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2. Zoumenou E, Gbenou S, Assouto P et al. Pediatric anesthesia in developing countries: experience in the two main university hospitals of Benin in West Africa. *Pediatr Anesth* 2010; 20: 741–747.
3. WHO Safe Surgery Saves Lives <http://www.who.int/patientsafety/safesurgery/en/> (accessed 13th March 2011)
4. WHO Pulse oximetry <http://www.lifebox.org/education/> (accessed 15th March 2011)

was bleeding and no clear management plan. The last patient of the day was an infant for a minor procedure. I helped to induce anaesthesia and settle the patient who was monitored with a precordial stethoscope and a pulse oximeter. I left the room for a break. I was called back about 10 minutes later. The anaesthetist had removed the stethoscope from her ears (it becomes quite painful after a while), so had not noticed the heart sounds becoming faint – fortunately the surgeon had noticed that the audible tone of the oximeter had disappeared. There was no bleeding from the wound and no palpable pulse - the child had suffered a cardiac arrest, probably due to deep halothane anaesthesia, but thankfully it was possible to resuscitate the child rapidly. Had it not been for the pulse oximeter and the prompt response from the team, the outcome may not have been so favourable”.

There was heated discussion about including the question on the WHO checklist sign-in ‘Is the pulse oximeter on the patient and functioning?’ (3). This simple statement is the key to improving anaesthesia safety on a global scale and is the result of determined campaigning from the experts on the anaesthesia team at the WHO – Professor Alan Merry from New Zealand, Iain Wilson, President of the AAGBI, John Eichorn and Jeff Cooper who wrote the original Harvard monitoring standards, and Professor Olaiton Soyannwo from Nigeria.

Since the publication of the WHO checklist there has been an enormous amount of work to make access to pulse oximeters a reality for all patients undergoing surgery worldwide. In 2009 the WFSA issued an RFP for a high quality oximeter that met ISO standards and would be suitable for a low-income setting: low cost, battery as well as mains operated, with a pulse waveform and audible beep that changed with the saturation, robust enough to withstand a fall onto a concrete surface from a height of 1 metre. We know from experience that manufacturers make their money from oximeter probes that are designed not to last, so the RFP took care to specify a robust probe with replacement probes available at low cost. The company that won the tender, after a year-long, international adjudication

process, was Acare Ltd in Taiwan – they have produced a pulse oximeter that far exceeds the original specifications of the WHO and WFSA proposal. The device, which normally retails in excess of US\$600 with probes for \$75, is available to the project for just \$250 (including delivery) with spare probes available for US\$25.

An education team working with the WHO has prepared an award-winning video to explain the principles of pulse oximetry and the practical use of an oximeter during anaesthesia. Additionally the group prepared and structured materials for running a classroom workshop on pulse oximetry and the WHO Checklist, with practical tools such as a logbook and hypoxia management flow chart for daily use in hospital; all of this material is provided on a CD Rom with every Lifebox oximeter package. It is also available for download from the Lifebox website free of charge (4). The educational material also contains information about implementation of the WHO checklist and will soon be available in all six WHO languages. A pilot study is being undertaken to assess the impact of the checklist with pulse oximetry in low-resource settings.

The Lifebox website was launched in February 2011 at www.lifebox.org and it is now possible for hospitals in low- and middle-income countries to purchase the Lifebox oximeter direct from the manufacturer, and to register their need for a donated pulse oximeter if purchase is out of their financial reach. There is also a fund-raising programme to enable donors in high-income countries to donate oximeters to colleagues who do not have access to them and opportunities for clinicians from high-resource countries to purchase oximeters for delivery and use on medical missions to low-resource facilities. With your help we can make a difference!

In terms of improving safety in healthcare, pulse oximeters in the operating theatre are just a start. As oximeters become more commonplace, they will move to the wards and the emergency departments. Millions of children die from pneumonia every year: outcomes could be improved if those children who were sick could be identified and received oxygen therapy. Conversely the most common cause of neonatal