Lessons from Legos: Diagnostic imaging equipment for Third World countries

Sarah Conway, MD

Many companies generously donate imaging equipment to impoverished regions like sub-Saharan Africa; however, according to the World Health Organization, as high as 70 percent of medical equipment donated to developing nations becomes unusable. This is simply tragic and wasteful. Donated imaging equipment that soon ends up in a medical equipment "graveyard" instead of assisting in the diagnosis of sick patients doesn't help anyone.

Our mission should be to create a product that won't simply become a useless white elephant that will only take a toll on the environment. To this end, the goal of designing imaging equipment for Third World countries should be simple: Think easy-to-repair, small, and light. It doesn't help to donate *complicated* imaging equipment to Third World countries, because it is quite likely that the local population will not have the proper infrastructure or technically skilled workers either to readily obtain spare parts or to make repairs if the equipment breaks.

To create access to care and imaging in these countries, the equipment created and donated should be as simple to build and repair as a Lego creation, and as light and easy to use as a piece of simple Shaker furniture. Therefore, when designing equipment to aid nations without sufficient infrastructure, creating the most *uncomplicated* machine possible to obtain diagnostic-quality images is most helpful. How should this be accomplished? Here are some of my ideas:

Think small and light. Smaller and lighter equipment than that typically found here in the U.S., along with fewer adjoining parts, should in theory be very portable and easy to repair. For example, ultrasound probes which have attached iPhone- and iPad- like screens are small and easy to handle. Ideally, the screens should have parts very similar if not identical to other portable devices.

Create simple spare parts. Many of the hospitals do not have the equipment or skilled technicians to repair broken medical devices or imaging equipment. As such, parts should be simple to use when making repairs (such as being able to "snap onto" a given piece of equipment, much like a Lego building block). Training should be supplied to the technician at the medical center in advance, in the event of future product failure. A handy guide to demonstrate how to repair the equipment would also be useful.

Design with the environment in mind. Reuse, reduce, and recycle. In addition, using raw materials that are environmentally sound creates less of a footprint when the machine eventually does need to be retired to the equipment graveyard.

Remember that each facility has unique needs. It is better to design a product for the actual populations that will use it, rather than taking a one-size-fits-all approach. Talk with the radiologists; let them describe what their needs are at their particular facility.

Access is not always created by excess. Sometimes the simplest and most economical health solutions are the best ones. The simpler and more cost-effective product will often be the most effective and easiest to use by medical professionals who live and work in areas with little infrastructure. As Ludwig Mies van der Rohe, one of the greatest architects of the 20th century once said, "Less is more."

Sarah Conway, MD, is a board-certified diagnostic radiologist and President of Delphi Radiology Associates, a Health Solutions Consulting™ firm.