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Radio tags can expose surgical mistakes

Automatic detection could reveal equipment left in the body.

Helen Pearson

Medics are turning to technology to ensure that surgical equipment isn't accidentally left behind in the bodies of patients. The latest idea: tagging gauze pads so that a detector wand waved over the patient triggers an alarm if they haven't all been removed.

It may sound absurd, but even with the most stringent efforts to count up items of medical equipment before, during and after surgery, medics accidentally leave something behind in about 1 in 15,000 procedures — mostly the flat, white gauze sponges used to mop up blood. Some are not detected until many years later. Many cause dangerous infections, require operations and prompt pricey lawsuits.

Several hundred sponges can be used in a single operation, as well as 100 or more pieces of equipment, so mistakes inevitably occur, says anaesthesiologist Alex Macario of Stanford University School of Medicine, California, whose team has tested one technique to prevent errors. This is particularly true in rushed emergency operations, or those involving a sudden change of procedure.

It is difficult to reduce the degree of human error below a certain level, agrees Atul Gawande of Brigham and Women's Hospital in Boston, Massachusetts. Gawande studies surgery and public health, and has calculated that around 3,000 errors involving left-behind objects occur each year in the United States. "If we want to reduce the errors we have to think of technological solutions," he says.

Radio trackers

In the latest technique, 10-cm-wide medical sponges were tagged with coin-sized radiofrequency identification tags, of the type increasingly used in security and goods tracking. A radiowave-emitting wand can trigger and detect a radio signal from these tags, each of which carries a unique ID.

The system is being developed for use in surgery by ClearCount Medical Solutions, a company based in Pittsburgh, Pennsylvania. Working with ClearCount, Macario and his colleagues tested some tagged sponges in a small, simple trial involving eight patients. One surgeon secretly placed none, one or several tagged sponges in an open incision. A second surgeon then waved a 25 cm² detector over the patient.

Macario was concerned that the body might block the radio signal, or that other electrical equipment in the operating room would interfere with it. But the tags worked fine, the researchers report in *Archives of Surgery*¹. They detected all the sponges every time.

Macario says that the method will need some work if it is to become widely used. There is still opportunity for human error, because people might not use the wand correctly or might forget to use it at all. A fully automatic device, such as a doorway detector, might prove better, he says.

Check out

A different idea, being tested by Gawande, is to label sponges with barcodes and swipe each sponge in and out, like supermarket goods. Another is to use small metal bullets that can be found using a magnetic detector. At Stanford, patients are also X-rayed after particularly lengthy or difficult operations to check for overlooked equipment.

Such technologies could be cost-effective, Gawande says. He has estimated that US hospitals spend around \$300 million each year settling lawsuits from lost sponges or other items; so money spent investing in technology could be saved in legal costs.

Macario and Gawande say the radiofrequency tags need more testing and refining. The company will have to show that



Doctor, we seem to be missing several sponges...

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the wand can fit easily into operating-room procedures, Gawande says: it will have to be reliable even when used by untrained personnel, for example. And the chips themselves will have to not fail.

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References

1. Macario A., Morris D. & Morris S. *Arch. Surg.*, **141**, 659 - 662 (2006).

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