The smart stethosope

The 'smart stethoscope', which monitors the effectiveness of treatments to shatter kidney stones, has been developed by Professor Tim Leighton from the University's world-renowned Institute of Sound and Vibration Research (ISVR) and Dr Andrew Coleman of Guy's and St Thomas' NHS Foundation Trust. The current procedure, called lithotripsy, focuses thousands of shock waves onto kidney stones in an effort to break them into small pieces, which can then be dissolved by drugs or passed from the body in urine. However, it is difficult to discover exactly when the treatment has succeeded in breaking the stone and patients frequently have to experience more shocks than necessary, or be sent home when an insufficient number of shocks have been delivered to break the stone.

The 'smart stethoscope' listens to the echoes, which reverberate around the body after each shock wave. The device has been used clinically at the London hospitals of Guy's and St Thomas' Health Trust (GSTT) and collaborating company Precision Acoustics Ltd (PAL) has received requests for units from several countries.

Team leader Professor Leighton comments: "In the clinical trials, a nurse operating the device during treatment could correctly predict successful treatments 94.7 per cent of the time, compared to the 36.8 per cent scored by the clinician in theatre using the best currently-available equipment.

"There has been a lot of research in this area worldwide, and one exciting area of interest is in treating kidney stones in future moonbase or manned Mars missions. However, our main focus has been to make kidney stone treatment as effective and safe as possible in developing nations where there is a desperate need. Hence our device is low-cost, and we have published its development."

The smart stethoscope at work

Below are recordings taken from three patients, representing a successful, partially successful and unsuccessful treatment. Each recording consists of a sound from the start of the treatment, followed by one from the end. The sound at the beginning should sound like a sharp 'tick'. If the treatment has been successful, the sound at the end should sound like a duller 'tock' because the kidney stone has disintegrated. Hence a successful treatment is indicated by a "tick-tock" sound.

Listen for yourself, and see if you can discern which of the treatments was successful, which was partially successful and which was unsuccessful:

- Patient 1
- Patient 2
- Patient 3

Read the correct answer.

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Professor Tim Leighton, Institute of Sound and Vibration research

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'Stethoscope' hears kidney stones, BBC News online