

A DEVICE FOR TEACHING URODYNAMIC TECHNIQUES

Hypothesis / aims of study

Training in good urodynamic techniques is essential for delivering high quality urodynamic services. For this reason, the International Continence Society (ICS) has accredited courses in urodynamics across the world to promote good urodynamic practice. The practical element of the course is an important feature of the learning package, requiring demonstration equipment. However, the ICS stipulates that the course should be free of specific manufacturer involvement, which will never be possible while demonstration is given on a particular machine. We have therefore designed a Urodynamic Trainer to be a manufacturer-independent tool for instruction in urodynamic techniques.

Study design, materials and methods

For ease of use the training simulator does not use water. Two dummy pressure transducer domes are used and these are fitted with taps above and below, the positions of which are automatically sensed. Syringes are fitted with touch sensors to detect a flushing action and a trainee operated switch mimics the patient coughing. The person delivering training can artificially introduce signals corresponding to water leaks and air bubbles using switches on the device. The vertical position of the transducers above the table is sensed ultrasonically. The pressure signals that would result on a real urodynamics machine are simulated on a computer screen via USB connection.

The key features needing to be incorporated were agreed upon by an iterative process of discussion and mock-ups, taking advice from urodynamicists, urodynamic nurses and technicians and clinical engineers.

Results

The training features finally included are:

- Setting reference level
- Correct tap positions
- Setting zero (before and during test)
- Cough (good, poor, absent)
- Correct resting pressure
- Leak in line
- React to flush

The design challenges have been to provide an affordable device which emulates a real urodynamics machine and patient responses, whilst offering ready access in a teaching environment. The front panel is pictured in Figure 1.

The resulting system simulates a scrolling graph of p_{ves} , p_{abd} and p_{det} responding in real-time to the actions performed on the unit, an example screen being shown in Figure 2. It is a portable unit which can be used on any desk surface, allowing trainer and trainee inputs to simulate real-life situations.

It has been used on three urodynamic teaching courses to date.

Interpretation of results

The major technical challenges to providing a viable, affordable, manufacturer-independent tool for instruction in urodynamic techniques have been achieved. Future developments, such as modelling of patient behaviour and direct signal injection to urodynamic equipment, are also under consideration.

Concluding message

The device is now being manufactured and marketed under a royalty agreement with the inventor host institution.



Figure 1. The Urodynamics Trainer

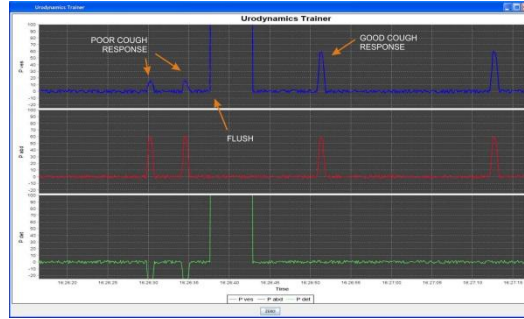


Figure 2. Screenshot of flush correcting simulated poor cough

Specify source of funding or grant

Device design was funded by the Institute.
Device development was funded by E2L Products Ltd, with whom the Institute has a royalty agreement.

Is this a clinical trial?

No

What were the subjects in the study?

NONE