New insights into ultrasound training

Objectives:
1. The importance of task deconstruction for teaching ultrasound
2. How Ultrasound Training Solutions approaches practical teaching sessions
3. Teaching tools I can’t do without
If ultrasound was easy……

• There is an urban myth that we often encounter:
  • if you view enough YouTube videos and...
  • If read enough texts and blogs....
  • you will be able to DO ultrasound

• BUT – would you be happy to get in a car with someone who has learnt to drive from watching videos and reading books?

• Video and text material are important components of the learning process:
  • they disseminate knowledge of what is possible...
  • they provide resources to assist in recognising patterns of normal and abnormal sonographic appearances...
  • they provide the opportunity for a quick review and refresh of sonographic approaches

• BUT these resources do not help learners – at whatever stage of their career - to pick up the practical skill of scanning
Introducing the concept of task deconstruction I

- How many of you have taught your kids how to tie their shoelaces?
- Was it easy?
- You need to break down the task into small, easy and repeatable steps

Introducing the concept of task deconstruction II

- How many of you have built Ikea furniture?
- Then you will know and appreciate that you MUST get each and every step right along the way for a successful build or you get to the end with leftover pieces
- IKEA are the masters of task deconstruction

**Teaching ultrasound is no different**

- As teachers of ultrasound our key objective should be to take an IKEA philosophy and extend it to the field
- We must break down the act of performing an ultrasound into a set of key steps and from that develop focused instructions
- This takes a deep knowledge and the ability to identify road blocks to learning
- By deconstructing the steps we can develop a systematic approach that will reduce barriers to learning and ultimately speed up the skills acquisition process
Introducing the concept of task deconstruction III

- A fabulous resource that explains the skills deconstruction approach and philosophy we apply at Ultrasound Training Solutions is a paper written by Delwyn Nicholls.
- This informed the development of our seven step training model.

Teaching psychomotor skills in the twenty-first century: Revisiting and reviewing instructional approaches through the lens of contemporary literature.

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What we do at Ultrasound Training Solutions – step 1: Physics

- Physics is fundamental
- There’s no avoiding it – learners must develop an understanding and appreciation of the way sound interacts with tissue.
What we do at Ultrasound Training Solutions – step 2: Appreciation of anatomy in 3D

- Knowledge of anatomy is one thing – being able to conceptualise anatomy spatially in a 3 dimensional space is another.
- We have learned from years of experience that understanding anatomy in 3 dimensional space is the rate limiting step in any ultrasound teaching situation.
- This is only further complicated by the 2 dimensional rendering of an image on a monitor.
- Getting hands on and tactile with modelling clay (or Play Doh™) to model the anatomy and locate the ultrasound beam physically has significantly improved the learning process for everyone.

What we do at Ultrasound Training Solutions – step 3: Probe manipulation

- Concentration is then placed on the development of probe manipulation skills.
- This aspect is often overlooked.
- Key to learning the hand-eye co-ordination skills necessary is to:
  - dedicate a complete practical session to achieving a systematic approach to probe manipulation
  - use consistent terminology
  - apply a step-wise approach to training that reduces sensory overload

At Ultrasound Training Solutions we:

- provide a short demonstration of the probe moves and related changes in anatomy visualised
- ask each student to scan the bladder, practicing each probe move while concentrating on watching their hand – to promote this learning the ultrasound monitor is hidden
- each student repeats the exercise again – first watching only their hand and then watching only the monitor
- we then increase the complexity by using an organ that isn’t positioned straight in the body – such as the kidney – and repeat the probe manipulation exercise
- we utilise props – our ultrasound torch and anatomical models – to put the scan plane and visualised anatomy into context
What we do at Ultrasound Training Solutions – step 4: Image optimisation

• We review image optimisation in an interactive session – utilising a variety of systems to demonstrate the variation and similarities that are encountered in the clinical context
• Practical exercises are employed to reinforce the use of the buttons and tools

What we do at Ultrasound Training Solutions – step 5: Pattern recognition

• We then move onto pattern recognition.
• Key is developing an understanding of sonographic appearances:
  • What does normal look like?
  • What does abnormal look like?
What we do at Ultrasound Training Solutions – step 6: Documentation

• The penultimate piece of the puzzle is documenting findings.
• Our team focuses on providing students with the knowledge to:
  • Know when is the picture diagnostic
  • Identify whether the image is as good as it will get on this patient
  • Depict the optimal images in a given clinical scenario
  • Record representatives images
  • Document findings in the patient record
  • Communicate findings to management team

What we do at Ultrasound Training Solutions – step 7: Incorporation

• The ultimate skill is to provide the student with the confidence, skills and ability to draw appropriate conclusions from sonographic findings and incorporate them into clinical management
• Being aware that ultrasound is only one piece of the puzzle – other pieces are equally important such as taking a clinical history
Stepwise application of new skills

• Once equipped with the knowledge and skills we can then move on to applying the new skills efficiently and effectively
• In the deconstruction of the skills required, we have developed the “G-O-D” approach
- Priority 1 – Get the view: focus on obtaining images of the desired anatomy
- Priority 2 – Optimise the view: focus on getting the best images of the desired anatomy
- Priority 3 – Document the view: annotate correctly, note for incorporation in clinical records
• It is very rare that students see GOD within the time limits of a course

Why task deconstruction works

• The whole reason why our approach to teaching ultrasound works is because we are not overloading the learner
• When learning ultrasound – as with any musical instrument – there is a lot of information that students must process
• Consequently they can only attend successfully to one channel at a time
  • Motor skills
  • Eye skills
  • Clinical skills
Tools that we use to convey the information

- While many would have you believe it is necessary to invest in expensive hi-fidelity simulation tools to teach ultrasound, we would argue differently.

- I could not do my job without utilising the following easily acquired tools:
  - I struggle the most without a pen and whiteboard – teaching ultrasound is a visual sport and so I am continually drawing dodgy anatomy pictures, or diagrams of physics in action.
  - My ultrasound torch – which promotes understanding of what the ultrasound beam is doing.
  - Playdoh, a knife and breadboard for teaching anatomy.
  - Anatomical models – my favourites are the uterus, heart liver and our baby doll.
  - Dead probes – used to promote hand eye co-ordination.
  - The Ultrasound Training Solutions image optimisation reference cards.
  - Visual exemplars of normal and abnormal sonographic appearances.

In summary...

- Today I have shared with you how we approach the teaching of ultrasound at Ultrasound Training Solutions.
- It is important to recognise that successful task deconstruction is critical for removing barriers to learning and accelerating learning.

My challenge to you:

- Go home and practice task deconstruction on a scan you use or teach often.
- Try to write out the instruction for how to get a view – e.g. the bile duct.
  - What is your starting point?
  - What are the consistent and sequential steps that you take to successfully get the view?
- Give the instructions to a non-sonographer, let them scan and see if you’ve been successful.
- Try standing on the other side of the bed where you can’t reach the buttons and make it harder for you to take hold of the probe. This forces you to verbalise the steps and task deconstruct.
- Try something different.

Be aware...

- Don’t make the classic mistake of trying to teach too much at once. Ultrasound is not easy. It is a complex psychomotor skill that takes lots of practice.
- Don’t underestimate how complex ultrasound is.