

Case Study



Integrating ScanTrainer into Ultrasound Simulation Training Programs

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About the Author

Simon Richards has been a practicing sonographer since 1995, with particular interests in general medical, vascular and point of care ultrasound. He has a wealth of experiences teaching in the clinical environment and has been the Medical Ultrasound Course Lead at Teesside University since 2005. In collaboration with The Northern School of Radiology, he set up the Regional Ultrasound Simulation Centre to teach student sonographers and clinicians in the safe practice of ultrasound. He has been the Chair of the Consortium for the Accreditation of Sonographic Education (CASE) since 2016.

Introduction

The following is a summary of 3 years' experience using ScanTrainer to teach and assess a wide range of health care professionals in the safe use of medical ultrasound. It will start with an outline of the first steps necessary for all learners and continue with suggestions for specific groups, including student sonographers, midwives, vascular technicians and medical trainees in radiology and obstetric and gynaecology. These experiences can then be incorporated into your own educational practices to allow learners to become simulator competent. To be simulator competent the learner will be familiar with probe manipulation and orientation, have a knowledge of the basic principles of ultrasound, basic control operation and be able to successfully complete simulated cases on the ScanTrainer.

In total we have five (5) ScanTrainer systems, all equipped with the Trans-abdominal (TA) and trans-vaginal (TV) haptics. The systems are installed with the latest 2017 software and include all available courses, which are:

- Basic Principles
- General Medicine
- Gynaecology
- Obstetric
- Emergency Medicine

Four (4) of these ScanTrainers are housed within the Regional Ultrasound Simulator Centre (RUSC), where the majority of teaching takes place. There is also one (1) ScanTrainer within a maternity department to allow the learners to engage with the training closer to their base hospital. The RUSC also contains several ultrasound machines, observational cameras to demonstrate exemplar techniques and record electronic teaching media and phantoms to teach interventional procedures.

As the use of ultrasound at the point of care increases and with the expected implementation of ultrasound apprenticeships and direct and graduate entry education, the need for effective simulation training is essential. Traditional models of education are untenable and cannot manage the number of professionals who want/need to be trained. To ensure patient safety, simulation must be incorporated into this training and in an increasingly litigious world it is only right that before any learner performs an ultrasound examination on a patient, they are simulator competent.

First steps

To achieve the greatest impact, it is essential that the learners engage with their simulation training at the start of their ultrasound journey. If they do not there is the potential for significant and potentially dangerous errors and misunderstanding to develop in their practice. On several occasions, using the ScanTrainers has allowed the identification and correction of significant issues in professionals who had already been assessed as competent using traditional methods. Since we incorporated simulation into training, practice placements have commented on how well prepared the learners are compared to those previously who did not have the benefit of using simulation.

All learners, regardless of their background and how they propose to incorporate the use of medical ultrasound into their practice, are encouraged and expected to complete the **Skills Learning** section of the **Basic Principles Course**, which includes:

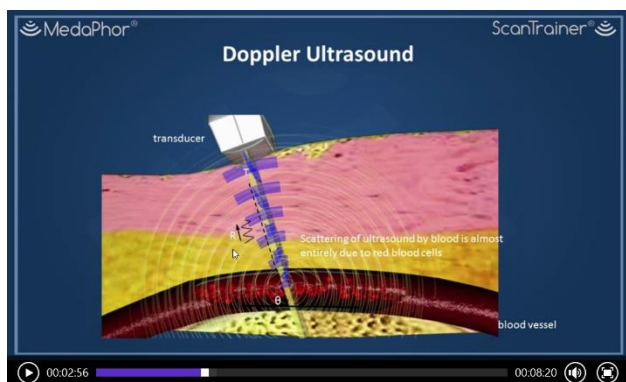
- Ultrasound Physics (ALR-PI-001)
- Probe manipulation (TAS-PM-PI-101)

Completing this **Skills Learning** section lays the foundations for safe ultrasound practice and clarifies misconceptions about the nature of the ultrasound image and how the practitioner produces and interprets it.

The **Ultrasound Physics** teaching is excellent. The content is appropriate and covers the core physics syllabus for all but the most advanced student groups. The majority of the presentations are just over 10 minutes in duration and are delivered by a recognised expert in ultrasound physics, Professor Neil Pugh. To watch these presentations will take approximately one and a half hours. The learners can listen to these presentations at the ScanTrainer; however, I encourage them to watch these online at home using the **ScanTrainer Cloud**, so they can maximise the learning experience in familiar surroundings.

The **Ultrasound Physics** teaching includes:

- The nature of Ultrasound
- Basic Principles of real-time scanning
- Doppler Ultrasound
- Image Optimisation
- Artefacts
- Safety
- Transducer movements
- Scanning Planes



Ultrasound Physics
Modules

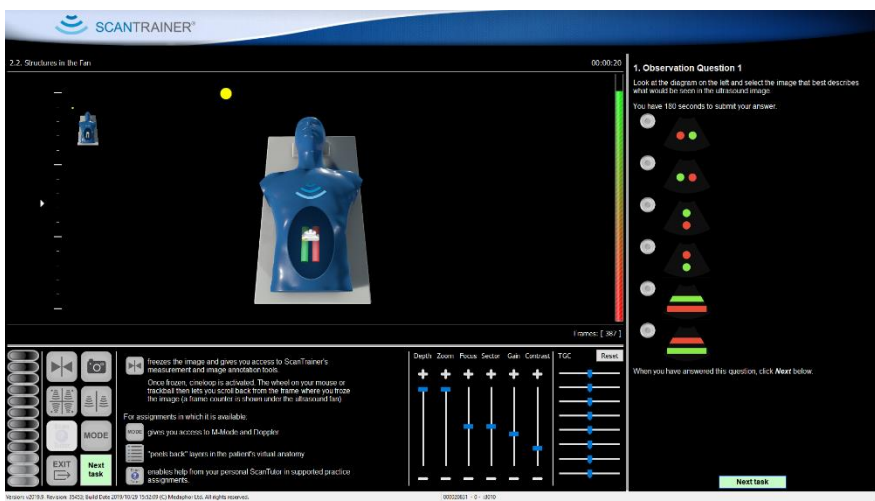
The **Probe Manipulation** teaching provides an excellent foundation of spatial co-ordination and probe orientation, using innovative models. It is divided into four sections:

1. Introduction
2. Spatial relationships
3. Examining structures 1
4. Examining structures 2

Using a series of exercises the learners are shown how to manipulate the probe and how structures appear when they are in the ultrasound beam. Before engaging with the clinical, region specific teaching I ask the students to engage with the first three sections above; introduction, spatial relationships and examining structures 1. I do this as I believe the examining structures 2 section is too complex for a new student at the start of their ultrasound learning journey. I encourage them to revisit this section once they have completed some of the clinical courses and have some experience of scanning patients as the exercises in examining structures 2 section provide the learner with an opportunity to demonstrate a thorough understanding of probe manipulation.

Before the learners engage with the ScanTrainer for the first time, we deliver a short introductory session. During this session we create individual user accounts, explain the correct use of the haptics and how to engage with the learning and assessment of the individual courses. It typically takes students two hours to complete the first three sections and another 2 hours to complete the more complex final section; however, if a student is struggling to understand the complex nature of probe manipulation it is easily identified at the start of these exercises and further support can be offered by a tutor. Incorporating the ScanTrainer into my teaching has enabled me to identify struggling learners much earlier than using traditional teaching methods.

I do not presently use the **Skills assessment** section in my educational delivery but it could be used as part of formative or summative assessment processes.



Probe Manipulation Module

The next steps

After completing the **Basic Principles** course the students progress to the clinical courses of interest and these will be different for each student group. I will now outline how I deliver the training for the following learning groups:

- Radiology trainees
- Student sonographers
 - Radiographers
 - Midwifery
 - Vascular
- Obstetric & Gynaecology trainees
- Students undergoing training in third trimester growth scans

Radiology Trainees

We teach radiology trainees in the first and second year of their training - stages ST1 and ST2.

In year one, we engage with the trainees right at the start of their training and before they have had any - or minimal - exposure to formal ultrasound training. The aim of the training is to ensure they are simulator competent to perform an upper abdominal ultrasound examination. With this in mind they are asked to complete the **Skills Learning & Assessment** sections of the **General Medicine** course. Within the **Skills Learning** section the students engage with the core skills teaching:

- TA Core General Medicine Upper Abdomen TAS-UA-CS-101

This learning typically takes 10 hours to complete and lays the foundations for safe and competent general medical ultrasound practice, with separate teaching on:

1. Basic Skills
2. Aorta
3. Liver
4. Biliary system
5. Pancreas
6. Right Kidney
7. Left Kidney
8. Spleen
9. Bladder and prostate

After completing the **Skills Learning** section the students then have the opportunity to demonstrate their skills and knowledge by engaging with the **Skills Assessment** section, which includes:

1. Upper abdomen case set 1 (TAS-UA-SA-001)
2. Upper abdomen case set 2 (TAS-UA-SA-002)

This teaching is delivered over three days. All trainees attend an introductory day where they are introduced to the ScanTrainers, ultrasound machine controls, probe manipulation, how to perform an upper abdomen examination and good governance. They then return in small groups for a second day to perform supervised simulation using the ScanTrainers, ultrasound machines and phantoms. All trainees are then timetabled to return for a third day to complete the **Skills Learning** and **Skills Assessment** sections independently. The trainees are expected to pass these sections and tutors monitor their progress on the ScanTrainer. If a trainee finds it difficult to pass a section they are offered an opportunity to demonstrate their abilities to a tutor. We do this as we feel that the ScanTrainer should enhance learning and not prove a barrier to the trainee progressing.

In Year 2, the trainees are invited back to complete the **Skills Learning & Assessment** sections of the **Gynaecology** course. Within the **Skills Learning** section the students engage with the core skills teaching:

- TA Core Gynaecology TAS-G-CS-101
- TV Core Gynaecology TVS-G-CS-201

As with the **General Medicine** course, this learning and assessment lays the foundations for safe and competent gynaecological ultrasound practice, with separate teaching on:

1. Structures of the female pelvis
2. The uterus
3. The ovaries

and additional learning resources, covering:

- A. Patient prep and consent
- B. Artefacts specific to gynaecological practice
- C. Scanning obese patients

After completing the **Skills Learning** section, which typically takes two and a half hours, the students then have the opportunity to demonstrate their skills and knowledge by engaging with the **Skills Assessment** section, which includes:

1. TV Core Gynaecology (TVS-G-CS-201)
2. TA Core Gynaecology (TAS-G-CS-101)
3. Case Studies: Enlarged uterus
4. Fibroid
5. Ovarian masses case set 1 (TVS-G-SA-001)

All of the above are completed during a supervised simulation day in the RUSC. Again, if a trainee finds it difficult to pass a section they are offered an opportunity to demonstrate their abilities to a tutor.

Although it is not part of their formal simulation training the trainees are also encouraged to engage with the **Advanced skills** modules independently, which are:

- TA Advanced General Medicine Liver Segments (TAS-UA-AS-001)
- Fibroid (TVS-G-AS-101)
- Ovarian Cyst (TVS-G-AS-102)
- Early Pregnancy (TVS-O-AS-105)
- Twin Pregnancy (TVS-O-AS-104)
- Miscarriage (TVS-O-AS-101)
- Ectopic Pregnancy (TVS-O-AS-102)
- Difficult Cases (TVS-G-VAS-103)
- Ovarian Mass (TVS-G-AS-104)

and the **Supported practice/ differential diagnosis** module:

- IUCD (TVS-G-DD/ TVS-G-SL)

Obstetric & Gynaecology trainees

All Obstetric and Gynaecology trainees in the UK have to be competent in performing “Basic early pregnancy ultrasound (8-12 weeks)” and “Basic ultrasound assessment of fetal, size, liquor and the placenta”, by the end of their ST3 year. To ensure the trainees are all simulator competent and have a sound understanding of the technique, probe orientation and manipulation, I incorporate the ScanTrainer into a two day course of ultrasound simulation, timetabled for the end of their ST1 year or the beginning of their ST2 year, which includes:

- Completion of the first three sections of the **Probe Manipulation** module
- Completion of the **TA Core Obstetrics 12 Weeks** and the **TA Core Obstetric Fetal Growth** modules within the **Skills learning** section of the **Obstetric** course
- Guidance on equipment manipulation and probe orientation.
- Breaking bad news role play and formal debrief
- Case study scenarios
- Scanning on pregnant volunteers

The ScanTrainer is essential in the delivery of this course and helps to provide an excellent foundation for the trainees, at the start of their ultrasound journey. It also provides an opportunity for the trainers to identify and correct any bad habits learned in practice, as these trainees will have been exposed and have some experience of ultrasound practice. The content of the obstetric clinical modules we use include:

TA Core Obstetrics 12 Week (TAS-O-CS-101)

1. Examination of the uterus and fetus
2. Examination of the fetus
3. Examination of other structures



ScanTutor provides real-time on screen guidance to support learning.

TA Core Obstetric Fetal Growth (TAS-O-CS-103)

1. Confirming viability
2. Assessment of the fetal head
3. Assessment of the fetal head in the transthalmic view
4. Assessment of the fetal abdomen
5. Assessment of the femur
6. Assessment of the amniotic fluid
7. Assessment of the placenta

The 12 week module typically takes 90 minutes to complete and the growth module 3 hours. The trainees are not expected to pass each module as these days are heavily supervised by the tutors and it would be difficult to complete all the tasks in two day; however, any issues are clearly identified and corrected due to the range of activities and close supervision offered by the tutors.

Student sonographers

The ScanTrainer is incorporated into the learning and teaching of the postgraduate medical ultrasound education and is used in conjunction with sessions on probe manipulation, orientation, equipment manipulation and examination technique. At the start of their education all students have to successfully complete sections one to three of the **Probe Manipulation** module. I ask them to complete section four later in their training once they have more experience. Once they have successfully completed this module we ask them to move on to the clinical modules relevant to their practice. The important thing is that they successfully complete all the **Skills Learning** and **Skills Assessment** modules pertinent to them within the first three months of their ultrasound education, as this is when they will gain the most benefit, as after this they will be fully engaged with their clinical placement and will be examining real patients. After this time student sonographers show little interest in engaging with simulated education. As with the radiology trainees, if a student finds it difficult to pass a section they are offered an opportunity to demonstrate their abilities to a tutor.

General Medical Ultrasound Students

Those studying general medical ultrasound will follow a similar route to the first and second year radiology trainees and will engage with the **Skills Learning & Assessment** sections of the **General Medicine** course. Within the **Skills Learning** section the students engage with the core skills teaching:

- TA Core General Medicine Upper Abdomen TAS-UA-CS-101

These students are also expected to be competent at Trans-abdominal (TA) and trans-vaginal (TV) ultrasound examinations so they will also successfully complete the **Skills Learning & Assessment** sections of the **Gynaecology** course. Within the **Skills Learning** section the students engage with the core skills teaching:

- TA Core Gynaecology TAS-G-CS-101
- TV Core Gynaecology TVS-G-CS-201

I also encourage them to engage with, the **Advanced skills** modules, which are:

- TA Advanced General Medicine Liver Segments (TAS-UA-AS-001)
- Fibroid (TVS-G-AS-101)
- Ovarian Cyst (TVS-G-AS-102)
- Early Pregnancy (TVS-)-AS-105)
- Twin Pregnancy (TVS-O-AS-104)
- Miscarriage (TVS-O-AS-101)
- Ectopic Pregnancy (TVS-O-AS-102)
- Difficult Cases (TVS-G-VAS-103)
- Ovarian Mass (TVS-G-AS-104)

and the **Supported practice/ differential diagnosis** module:

- IUCD (TVS-G-DD/ TVS-G-SL)

These obstetric modules are especially important as general medical student will spend very little - if any - time scanning pregnant patients; however, they could easily encounter a pregnant patient during a general medical scan list and this experience spent on the ScanTrainer could be vital.

Obstetric Ultrasound Students

Students engaging with obstetric ultrasound education - who are typically midwives and radiographers - will successfully complete the **Skills Learning & Assessment** sections of the **Obstetrics** course. Within the **Skills Learning** section the students engage with the core skills teaching:

- TA Core Obstetric 12 Week (TAS-O-CS-101)
- TA Core Obstetric 20 Week (TAS-O-CS-102)
- TA Core Obstetric Fetal Growth (TAS-O-CS-103)
- TV Core Obstetric With NT (TVS-O-CS-201)
- TV Core Obstetric Without NT (TVS-O-CS-202)

These students are also expected to be competent at Trans-abdominal (TA) and trans-vaginal (TV) ultrasound examinations so they will also successfully complete the **Skills Learning & Assessment** sections of the **Gynaecology** course. Within the **Skills Learning** section the students engage with the core skills teaching:

- TA Core Gynaecology TAS-G-CS-101
- TV Core Gynaecology TVS-G-CS-201

These students are also encouraged to engage with the **Advanced skills** modules, which are:

- Intrauterine Fetal Death (TAS-O-AS-102)
- Early Pregnancy (TVS-)-AS-105)
- Miscarriage (TVS-O-AS-101)
- Ectopic Pregnancy (TVS-O-AS-102)
- TA Advanced Obstetric FASP (TAS-O-AS-001.1)
- Twin Pregnancy (TVS-O-AS-104)
- Cervical Length (TVS-O-AS)

As at the end of their training these students are expected to be competent at all core aspects of obstetric and gynaecological ultrasound we also encourage them to complete:

- Fibroid (TVS-G-AS-101)
- Ovarian Cyst (TVS-G-AS-102)
- Difficult Cases (TVS-G-VAS-103)
- Ovarian Mass (TVS-G-AS-104)

and the **Supported practice/ differential diagnosis** module:

- IUCD (TVS-G-DD/ TVS-G-SL)

Vascular Ultrasound Students

Even though, there is not a dedicated Vascular Ultrasound Course, vascular students will still benefit from the ScanTrainer. After completing the **Basic Principles** course. These students are encouraged to successfully complete the **Aorta** module of the TA Core General Medicine Upper Abdomen (TAS-UA-CS-101). If their practice will involve them scanning the abdomen or pelvis they will also benefit from completing the **General Medicine** and **Gynaecology** course.

Musculoskeletal (MSK)Ultrasound Students

There are no dedicated MSK ultrasound; however, MSK students new to ultrasound will find the **Basic Principles**

Third Trimester Growth Students

As with all other student groups we expect them to successfully complete the **Basic Principles** teaching. The students then move on to the clinical module. We expect them to successfully complete the module **TA Core Obstetric Fetal Growth (TAS-O-CS-103)**. To help them with this we timetable a day at the start of their education where we can supervise them in completing both the **Basic Principles** and this clinical module.

Recommended Modules by Specialty

Module	Estimated Time to Complete	Radiology Trainee	Obs & Gynae	Gen Med Sonograher	Obstetric Sonographer	Vascular Sonographer	MSK	Third Trimester Growth
Skills Learning								
Ultrasound Physics (ALR-PI-001)	1 1/2 hours	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory
Probe manipulation (TAS-PM-PI-101)	4 hours	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory
TA Core General Medicine Upper Abdomen (TAS-UA-CS-101)	10 hours	Mandatory	No	Mandatory	No	Mandatory (Aorta)	No	No
TA Core Gynaecology (TAS-G-CS-101)	1 hour	Mandatory	Option	Mandatory	Mandatory	Option	No	No
TV Core Gynaecology (TVS-G-CS-201)	1 hour 40 minutes	Mandatory	Option	Mandatory	Mandatory	No	No	No
TA Core Obstetric 12 Week (TAS-O-CS-101)	1 1/2 hours	Option	Mandatory	Option	Mandatory	No	No	No
TA Core Obstetric Fetal Growth (TAS-O-CS-103)	3 hours	Option	Mandatory	Option	Mandatory	No	No	Mandatory
TA Core Obstetric 20 Week (TAS-O-CS-102)	3 hours 40 minutes	Option	Option	Option	Mandatory	No	No	No
TV Core Obstetric with NT (TVS-O-CS-201)	2 hours 20 minutes	Option	Option	Option	Mandatory	No	No	No
TV Core Obstetric without NT (TVS-O-CS-202)	2 hours	Option	Option	Option	Mandatory	No	No	No

Module	Estimated Time to Complete	Radiology Trainee	Obs & Gynae	Gen Med Sonograher	Obstetric Sonographer	Vascular Sonographer	MSK	Third Trimester Growth
Advanced Skills								
TA Advanced General Medicine Liver Segments (TAS-UA-AS-001)		Option	No	Option	No	No	No	No
Fibroid (TVS-G-AS-101)	20 minutes	Option	Option	Option	Option	No	No	No
Ovarian Cyst (TVS-G-AS-102)	1 hour	Option	Option	Option	Option	No	No	No
Early Pregnancy (TVS-O-AS-104)	1 hour	Option	Option	Option	Option	No	No	No
Twin Pregnancy (TVS-O-AS-104)	2 hours	Option	Option	Option	Option	No	No	No
Miscarriage (TVS-O-AS-101)	40 minutes	Option	Option	Option	Option	No	No	No
Ectopic Pregnancy (TVS-O-AS-102)	1 hour 20 minutes	Option	Option	Option	Option	No	No	No
Difficult Cases (TVS-G-VAS-103)	1 hour 40 minutes	Option	Option	Option	Option	No	No	No
Ovarian Mass (TVS-G-AS-104)	1 hour 20 minutes	Option	Option	Option	Option	No	No	No
Intrauterine Fetal Death (TAS-O-AS-102)	1 hour 20 minutes	Option	Option	Option	Option	No	No	No
TA Advanced Obstetrics FASP (TAS-O-AS-001.1)	3 hours 20 minutes	Option	Option	Option	Option	No	No	No

Module	Estimated Time to Complete	Radiology Trainee	Obs & Gynae	Gen Med Sonograher	Obstetric Sonographer	Vascular Sonographer	MSK	Third Trimester Growth
Skills Assessment								
Upper abdomen case set 1 (TAS-UA-SA-001)	20 minutes	Option	No	Option	No	Option	No	No
Upper abdomen case set 2 (TAS-UA-SA-002)	20 minutes	Option	No	Option	No	Option	No	No
TV Core Gynaecology (TVS-G-CS-201)	20 minutes	Option	Option	Option	Option	No	No	No
TA Core Gynaecology (TAS-G-CS-101)	20 minutes	Option	Option	Option	Option	No	No	No
Case Studies: Enlarged uterus	20 minutes	Option	Option	Option	Option	No	No	No
Fibroid	20 minutes	Option	Option	Option	Option	No	No	No
Ovarian masses case set 1 (TVS-UA-AS-001)	20 minutes	Option	Option	Option	Option	No	No	No
Supported Practice								
IUCD (TVS-G-DD/ TVS-G-SL)	40 minutes	Option	Option	Option	Option	No	No	No

The above times have been estimated at 20 minutes per exercise. If a learner is repeatedly unsuccessful or requires significant support it will take longer.

Advantages of the ScanTrainer Simulator

- The Basic Principles course is excellent and provides an excellent foundation for the learner's safe ultrasound practice. I prioritise this over all the clinical courses.
- The clinical modules provide the learner with a sound knowledge of the relevant anatomy and techniques necessary to perform an ultrasound examination prior to their first contact with a patient.
- It empowers the learner with the skill and knowledge to engage with a clinical placement and gives them the confidence to be successful.
- It reduces the need for volunteers to be scanned during teaching sessions. Not every learner is happy to be scanned and the ScanTrainer alleviates this.
- ScanTrainer enable tutors to identify unsafe practice and struggling students very quickly. We have been able to identify students requiring support much earlier than with traditional methods of ultrasound teaching and this has enabled us to put support mechanisms in place. Previously, struggling students could have "hidden" and would not have been identified till much later in their education.
- The physics section is excellent and provides enough knowledge for all but advanced users.
- Empowers learners with the skills and provides confidence to do TV scans, earlier in their training than previously. After using ScanTrainers male and female student sonographers are happy to perform scans in the clinical placement. I have also found that it helps to clarify image orientation, specific to TV scanning.
- ScanTrainer enable users to learn a wide range of clinical examinations. They can engage with learning for:
 - TA/TV Pelvis
 - Upper Abdomen
 - Upper Abdomen & Pelvis
 - Renal Tract
 - Aorta
 - First trimester Obstetric
 - Anomaly
 - Third Trimester Growth
- Learners have access to areas they may not see in clinical practice. General Medicine students can see obstetric examinations and vice versa. This is an invaluable resource
- The case-based library gives the students an opportunity to see and examine pathology outside of their clinical placement.

Top Tips

- An Introductory session is essential, prior to the learners using the ScanTrainer for the first time. This is the opportunity to:
 - create user accounts so you can monitor the learners progress and plan any necessary interventions.
 - ensure the learners are using the equipment properly and safely. ScanTrainer is a powerful, expensive simulator and learners have to be guided on how to get the best use out of it. They also need to be told how to not damage it!
 - introduce core ultrasound knowledge of the image orientation, probe manipulation, anatomy and examination technique.
 - allows you to clearly identify the advantages of the simulators.
- All learners should engage with the **Basic Principles** course before starting their specific clinical modules. This course is excellent and ensures the learner has a solid foundation for their future learning. It also allows the tutor to identify those students who need extra support, very early into their education.
- Stress to the learners the usefulness of the **ScanTutor** function to assist them. A lot of users do not use it unless it is highlighted to them. When they do use it, it clearly identifies the anatomy, probe orientation and clarifies what is required to successfully complete each exercise.
- Use a robust booking system to allocate time to the learners. We use an online booking system. This allows us to allocate time to our students and enables all learners to arrange and reserve a time which best suits them.
- Place the ScanTrainer in a room which can be easily accessed both in and outside of normal working hours. Learners want to engage with the simulators at a time which suits them and access need to be arranged to allow this. Student sonographers want to use the systems before and after academic teaching sessions and busy clinicians want to engage with systems after their clinical shifts and on days off. Ideally the simulators would be accessible at the weekend. Presently I can only offer this for the ScanTrainer sited in the maternity department.
- Adjust the metrics for your practice. The metrics can be disabled to suit your clinical practice. You can set them to make it easier or more difficult for the learner to be successful.
- Train technicians to support the educators and learners. Tutors cannot always be around to support the learners and often they have technical questions about how to work the ScanTrainer rather than clinical queries. Having a technician to contact can improve the learning experience and can often save the day, especially if the learner has travelled a distance to use the simulator. The technician can also create accounts, manage the booking system and liaise directly with Medaphor/Intelligent Ultrasound about software updates and the hardware.
- When possible offer supervised sessions. This ensures the learners get the most benefit from the ScanTrainer. Learners can get disillusioned and annoyed if they do not understand something and they are not successful and often incorrectly blame the ScanTrainer. Usually it is a simple concept which can be easily clarified by an experienced tutor/practitioner.
- Ensure the learners have an ergonomically safe environment. ScanTrainer has the same issues as ultrasound machines and you need to provide appropriate equipment. Ensure the equipment is placed safely on appropriate tables and the learners have access to height adjustable chairs.
- Use the **custom module** feature to create bespoke learning packages for each student group

Conclusion

ScanTrainer is an excellent resource. Traditional methods of ultrasound education require the use of volunteers to be scanned to allow the learners to gain the necessary skill; the ScanTrainer reduces the need for this as learners can gain most of these skills using the ScanTrainer.

Volunteers need then only be used when the learner is ready to perform complete examinations using ultrasound machines. This approach will be essential as learner numbers increase on educational programmes. The cloud-based learning activities maximise the time spent in front of the ScanTrainer and the **Basic Principles** course and **Probe Manipulation** module can provide the learner with the probe manipulation skills and knowledge necessary for safe ultrasound practice, safeguarding the service users and the health care professionals performing the examination.

Tutors can identify students who are struggling with the essential concepts required to perform ultrasound examinations early and plan necessary interventions. The clinical courses and modules allow the learners to identify anatomy and practise techniques in a safe environment to ensure their time in clinical practice is a positive experience. The ScanTrainer should be incorporated into the delivery of present and future ultrasound education.

To find out more about ScanTrainer, please contact hello@intelligentultrasound.com or visit our website www.intelligentultrasound.com



INTELLIGENT
ULTRASOUND®