

Hocus PoCUS? Considerations when purchasing an ultrasound scanner

Introduction

Point-of-care ultrasound (PoCUS) scanning is performed by healthcare professionals whose original or primary qualification is not in imaging. Therefore, the scope of PoCUS is specifically limited to the user's clinical specialty.

Over the past decade, there has been an explosion of interest in ultrasonography among pelvic health physiotherapists. It not only assists in the assessment of presenting problems, it also enhances rehabilitation regimes, and improves patient understanding and compliance. Venturing into the world of diagnostic sonography means that new terminology, parameters and skills need to be learned, and both theoretical knowledge and practical skills have to be applied.

Purchasing an ultrasound scanner for your practice is a significant investment, and the sheer range of models and prices is vast. Therefore, it is important that you choose a machine that is suitable for your clinical workflow. The considerations outlined below are not exhaustive and are presented for guidance only. Furthermore, a comparison of individual machines is beyond the scope of the present commentary.

Considerations

Many factors need to be considered when purchasing an ultrasound scanner:

- What will the machine be used for:
 - pelvic health;
 - musculoskeletal (MSK) conditions; and/or
 - general sonography?
- Who is going to use the machine:
 - physiotherapists;
 - gynaecologists, urologists and/or colorectal surgeons;
 - sports medicine physicians;
 - radiologists; and/or
 - rheumatologists?
- Which probes will you need:
 - curvilinear;
 - linear;
 - intracavity; and/or
 - hockey stick?
- Ease of use:
 - knobs or buttons;
 - automatic focus; and/or

- preset programmes for various body/organ areas.
- Portability:
 - handheld;
 - easily carried across sites; and/or
 - cart-mounted.
- Budget:
 - cost of the machine plus the probes;
 - two- (2D) or three-dimensional (3D) scanning; and/or
 - manufacturer support.

While it is important to have a budget in mind, it is sensible to draw up a list of your wants and needs before finally deciding on the amount of money that you are prepared to spend. You may be able to find a machine within your price range that does everything you want, or you may have to compromise.

Areas of use

If you are considering purchasing a scanner that could have shared usage with other specialties within the department or multidisciplinary team, it would be sensible to discuss your requirements with other colleagues. For instance, some advanced MSK practitioners are now performing injections. Most scanners can be used for needle guidance, but some have software that enhances the needle in order to make it easier to see when injecting a patient.

If you will be the sole user, imagine what you would want to be able to achieve in 2 years' time, not just when you begin your ultrasound career. This could be anything from measuring post-void residual volumes of urine in the bladder or assessing pelvic floor muscle (PFM) activation to determining bladder neck descent in stress urinary incontinence or bladder wall thickness in overactive bladder.

Probes

Nowadays, most probes have multifrequency capability. The general rule is: the higher the frequency, the higher the definition of the image; however, the depth of the interrogation of the tissues (i.e. the depth of the tissues within

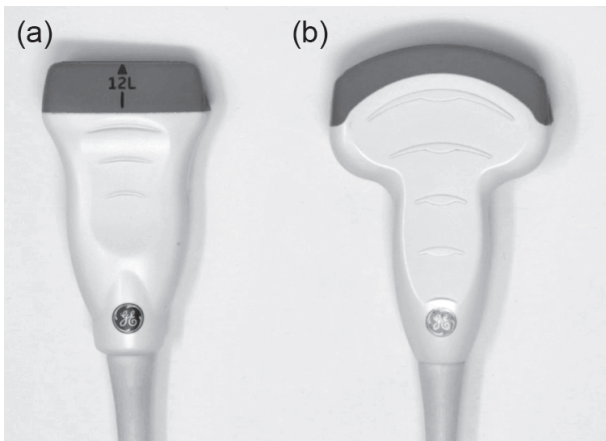


Figure 1. (a) Linear and (b) curvilinear ultrasound probes.

the body being scanned) will be lower and the footprint (i.e. the size of the area being scanned) smaller.

For PFM and bladder scanning, you will need a probe with a bandwidth frequency of 2.5–6.0 MHz and a wide footprint. A curvilinear probe is ideal (Fig. 1), and can be used for both transperineal and transabdominal applications.

When scanning for diastasis of the rectus abdominis and more-superficial structures, a narrow footprint will suffice, and a probe with a bandwidth frequency of 5–16 MHz is preferred. A linear probe is ideal in this scenario (Fig. 1).

If you plan to extend your scope of practice to include the anal sphincter complex (e.g. when working in an obstetric anal sphincter injury clinic or alongside midwives), then you will need to consider purchasing an intracavity probe. These are long, thin probes that have been designed for insertion into the anal canal or vagina, and produce a 360° image of the area being examined.

If you are working alongside a podiatrist or an MSK colleague specializing in hands and feet, you may wish to consider purchasing an L-shaped “hockey stick” probe (8–18 MHz). These offer a higher resolution and a much smaller footprint, making it easier to scan small, bony areas.

Ease of use

Ultrasound scanning is like driving a car. You have to be able to operate the ultrasound machine with one hand while manipulating the console for good image reproduction with the other without looking at the keyboard. It is important to decide whether you prefer to turn knobs or press buttons because, unless you are ambidextrous, your dominant hand will be steering the probe while your other will be changing the “gears”.

Preset programmes are very useful (e.g. bladder, abdominal and PFM settings). Some functions (e.g. split screen, callipers, easy video recording and still-picture capture) come as standard on all machines. Others (e.g. automatic focus) are machine-dependent. Once again, it is important to consider how your practice may evolve. For instance, might you eventually want to use Doppler to look at urinary leakage and blood flow?

Portability

It is important to consider where you will be using the scanner. If you move across sites, then portability is a must. A cart-mounted scanner (Fig. 2) can be wheeled around the department or along the corridor, but it will not fit neatly into the boot of a car. The downside of portability is that, if you opt for a very small unit, then you tend to lose functionality. Many laptop-sized scanners (Fig. 3) are now suitable for most physiotherapy settings; these offer good-quality imaging and portability at a reasonable cost, and you can always buy a cart, if necessary. Small, handheld units that run through iPads are also available, but again, these do have limitations,



Figure 2. Cart-mounted scanner.



Figure 3. Portable scanner.

especially with regard to image quality when scanning deeper structures.

Budget

Regardless of whether or not you are spending your own money, it is vitally important to do as much as you can to get the best deal. Generally speaking, the more expensive the machine, the better it will be, and you generally get what you pay for when you buy an ultrasound scanner.

Second-hand and refurbished machines may be a viable option. Probes have hardly changed over the past few years; however, software updates are always improving functionality and image quality. If you do decide to purchase a second-hand machine, one that is only a few years old should be fine. Make sure that it has the functionality that you require, and that you are happy with how it performs. Minimal maintenance is

required as long as the probes are not damaged, but batteries may need to be replaced after a few years.

Portable, introductory-level machines start at around £6000 for a 2D machine, whereas cart-mounted units begin at around £45 000. If you require 3D functionality, then the cost of the probe will be more. It is rather like buying a washing machine: why buy one with 30 programmes if you only intend to use five?

Before purchasing any ultrasound machine, you should get to know the company sales representatives, and ask them to loan you a unit for a few weeks to allow you to “test drive” it in your clinic. The machines vary, so compare a few. Do not make a hasty purchase: you need to feel comfortable using a product before you commit to buying it.

Finally, please remember that a machine is only as good as the skills of the clinician using it. Ultrasound scanning is a very operator-dependent modality: the skills are very difficult to acquire, and there is also a steep learning curve. Currently, a group of physiotherapists are working with the Chartered Society of Physiotherapy to develop a framework approach to support the use of ultrasound imaging, and a paper is currently being written by Lucia Berry, Gráinne Donnelly, Sue Innes and myself on the uses of PoCUS in pelvic health. As yet, there are no specific pelvic health courses accredited by the Consortium for the Accreditation of Sonographic Education. A weekend course run by experienced clinicians is a good place to start to learn the knowledge and skills required. However, it takes many hours of scanning and mentoring to become competent to practice as an autonomous individual.

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