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Choosing the Right Emergency Ultrasound Equipment

The following checklist was developed by ACEP's Section of Emergency Ultrasound

In general, emergency ultrasound applications include (but are not limited to):

- Trauma (Focused Abdominal Scan in Trauma or FAST)
- Cardiac
- General abdominal (including Retroperitoneal Applications)
- Ob/Gyn--transabdominal and transvaginal
- Vascular applications
- Small Parts (vascular access/ foreign body/ testicular/ ocular)

Major concerns include:

- Size and mobility
 - Weight and dimensions
 - Easily mobile
 - Reasonable weight
 - Fits well in patient rooms with multiple tasks occurring
 - ***Width and depth of the machine should be kept to a minimum***
- Platform
 - Cart-based: more practical for most EM applications
 - Stable on ground
 - No need to find a separate surface to place the machine
 - Larger visible screen
 - Hand-carried: ultra-portability may be desirable in certain situations
 - Trauma
 - Medical codes
 - Vascular access

When purchasing emergency ultrasound equipment, take the following into account:

1) Versatility in scanning applications

- Wide variety of probes for purchase (in some degree of rank-order for EUS utility)
 - Curvilinear
 - Linear
 - Transvaginal/ endocavitary
 - Microconvex
 - Phased array

- High frequency linear
- Transesophageal
- Multiple live probe ports (ideally 4 to 6) quickly switched during real time scanning (Emergency physicians are often interested in several different applications, often on the same patient)
 - Cart space that holds multiple probes

2) Unique Emergency scanning concerns

- Boot-up time kept to a minimum (Unstable patients require quick, spontaneous scans)
- Ease of use-multiple users with various degrees of training and technical expertise
- Uniform controls for multiple users (up to 10 different Emergency Physicians per day may use the ultrasound machine)

3) Image quality supercedes additional features (maximize image quality for the price)

- Include color flow, power flow and spectral doppler on higher end machines
- Avoid complicated/ expensive software programs designed for obstetricians/ cardiologists

4) Versatility in output/ archiving options

- EDs vary widely in how they review and archive images: from thermal print to video/s-video and digital cineloops
 - Ability to print/save still images
 - Ability to output both coaxial and S-video
 - Ability to save and output widely compatible digital files/ cineloops - possibly to DVD-RAM/DVD-R
 - Consider versatility in direct compressed output as: mpeg-2, easily recognizable compressed formats (.avi, .mov, etc.), as well as the option for DICOM connectivity for radiology communication
- Cost considerations: avoid proprietary systems that are costly for interface and archiving options-many options are available that will interface with now relatively inexpensive computer systems

5) Reporting Functions

- Apply Emergency Ultrasound Guidelines 2001 for use in reporting functions, and allow free text. Examples:
 - Trauma - peritoneal/ pericardial free fluid presence/ absence
 - 1st trimester pregnancy - IUP (live), NDIUP, ectopic, free fluid
 - AAA - presence/ absence, size
 - Emergent Cardiac - cardiac activity/ effusion/ tamponade
 - Renal - hydronephrosis presence/absence
 - GB - gallstones/ sonographic Murphy's/ wall thickening/ CBD

6) Infection Control

- Transducers that can be cleaned with commonly commercially available cleaners
- Develop probe covers that obviate the need of additional probe disinfection between use
- Affordable one-time sterile probe covers

7) Durability

- Transducers should be able to tolerate a drop test from a waist height
- Plastic housing should be durable

- Wheels should allow the machine to easily go over elevator floor opening and carpet rises.
- Keyboards should be durable with resistance to alcohol, water, cleansers, and gel.

8) Other considerations

- Plenty of attachments/ storage spaces for towels, gel, cleaning supplies, and paperwork that inevitably accompany a machine that is designed for use in many rooms that may not all be stocked for ultrasound use
- Cord considerations-retractable or other devices to avoid cord entanglement, running over cords while moving
- Consider a gel warmer with battery power that can keep gel warm when a machine is frequently moved/ unplugged
- Support personnel and maintenance programs that are reasonably priced and accessible