

Clinical Ultrasound Machine Purchasing and Clinical Needs Assessment

Christopher Raio, Robert Strony, John Bailitz

As an institutional or System Wide Clinical Ultrasound (SWCUS) Director, the 1st step in purchasing systems and equipment is to perform a thorough inventory evaluation of all the Clinical Ultrasound (CUS) machines within the hospital or healthcare system. This should include machine age and current performance capabilities. Taking into account current inventory, the SWCUS Director then must identify any additional needs within each division or department. Departments with old and obsolete technology should be considered first regarding fund allocation for updated machine replacement. Health Systems should consider a capital replacement fund that allows departments to upgrade to new machines without the individual department bearing the cost.

POCUS machine purchases throughout the system should be approved by the SWCUS Director, Information Security Systems (ISS) director and the health system Clinical Technology Optimization and Standardization Committee (CTOSC) or equivalent. The SWCUS Director and health system should consider a standardized CUS purchase request. An example from one health system is shown in **Figure 2**. This will enable the SWCUS and the ISS director to match the clinical department to the best machine and negotiate the lowest price while expediting procurement in conjunction with the health system's purchasing department.

The SWCUS Director must consider many factors when conducting a CUS machine purchase analysis. These are outlined in **Table 2**. This will ensure that all CUS machine purchases are acquired at the lowest cost, meet the clinical needs of each individual department and integrate seamlessly with the health systems electronic medical record, image archiving repository and/or vendor neutral workflow solution.

Table 2: POCUS machine purchase analysis

Image Quality
Special Features
Warranty and Service
Cost
Storage Options
Durability and Reliability
Portability
Workflow Capabilities
Transducer Options

Screen Size
User Interface
Educational Resources

Each division/department will have unique equipment needs which will be related to the scope of CUS examinations as well as volume of exams performed. Despite the varying scopes of practice, several vendors offer multiple machine options that will suit all divisions/departments. From a system perspective, deciding on a CUS machine standard can be challenging. A viable option is to invite ultrasound machine vendors to participate in a comparative study at your health system.¹ Clinicians from departments using CUS should be invited and documented feedback on machines given the SWCUS Director.

Determining the number of systems needed for the individual program is also a critical decision that will be made by the SWCUS Director. Several factors must be considered when making this decision. These include:

- Number of involved departments\specialties
- Overall patient volumes
- Estimated ultrasound procedural volumes
- Location of involved departments\specialties (inpatient or outpatient setting)
- Physical plant for individual involved departments\specialties
- Specific ultrasound clinical needs i.e. trauma center, pediatric center, sports medicine, etc.
- Presence of fellowship training program
- Overall number of end users: Attending physicians, residents, medical students, fellows, advanced practice professionals, nurses

The current state of the ultrasound program should also be taken into account. The scope of practice, presence of expertise, education and training opportunities, and current systems in place all should enter into the purchasing decision. There is the potential to negotiate higher trade-in values based on current systems in place and opportunity for future vendors. For machines that are older and have very little trade in value, the SWCUS Director can facilitate asset transfer to the health system’s simulation center or educational training center.

Purchasing from a single vendor or if possible, purchasing the same machine model for all sites (machine standardization) does offer a number of advantages for the SWCUS Director and the hospital system. These include cost reduction for the hospital/healthcare system, standard education and training for users, workflow integration, system setup and maintenance for quality assurance, archiving, and billing. **Table 3** depicts the advantages and disadvantages of deciding on a standard CUS machine for the institution. As CUS has evolved it is often necessary to have standards for cart based, portable and handheld machines to fit with the clinical need.

Table 3: Considerations for Standardizing Machinery

Advantages	Disadvantages
Providers can transition easily between and within departments	May not meet specialized needs for certain departments (musculoskeletal evaluations for rheumatology clinic, advanced obstetric software for labor floor, surgical procedures in the operating room)
Standardized machine presets for CUS applications across platforms	Standardized machine may have too many or too few options for user
Cost benefit when making a large or bulk purchase	Autonomy of choice May be a more expensive option than necessary
Ease of integration with system informatics and workflow solutions (Middleware, EMR, PACS)	

Cost Analysis

Purchasing ultrasound machines as a system “bulk” capital investment offers a significant advantage over buying machines as single units or even purchasing a few machines at the individual departmental level. Most manufacturers have tiered purchasing models depending on the number of machines the institution or health system purchases. The resulting capital expense reduction when approached in this fashion can lead to significant cost savings (40-50%) for the health system. Furthermore, intent to purchase a large number of machines will lend the SWCUS Director significant bargaining power with the manufacturer. One cost-containment measure for smaller hospitals in the system, is the purchase of shared systems to be utilized across departments.

The estimated budget allotment and purchasing process at the individual site are realities that will also affect equipment purchase. As mentioned previously, the SWCUS director must familiarize and integrate with the purchasing process at the institution and become expert at navigating this process. Key decision makers must be identified and relationships built with these players. The budgetary cycle also must be known to the SWCUS Director to help achieve the desired results. Any opportunity to help maneuver through this process must be identified. For example, when major construction and capital projects are underway at an individual site there is often opportunity to “throw in” additional ultrasound equipment. For example, an emergency department that is renovating a fast track area, a regional trauma Center that is investing in its trauma program to obtain American College of Surgery trauma designation, a new Labor and Delivery unit or any large construction project at an individual Hospital all may present an opportune time to purchase additional equipment.

Whenever ultrasound hardware is being purchased it is extremely important to envision system integration into current state and future state workflow. Any IT integration that will be needed must be taken into account and should be approached as a health system enterprise solution. Any additional software needs also should be considered, including any ultrasound workflow, wireless capabilities, middleware or quality assurance resources. EMR integration also must be addressed prior to purchase to ensure that a smooth interface can be achieved.

Reference:

1. Wynd KP, Smith HM, Jacob AK, et al. Ultrasound machine comparison: an evaluation of ergonomic design, data management, ease of use, and image quality. *Regional anesthesia and pain medicine*. *Reg Anesth Pain Med*. 2009;34(4):349-56.