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| **Business Proposal for a Replacement Ultrasound Machine**  Acute Medicine Unit  Date | *Trust logo* |

**SITUATION**

The current Acute Medical Unit Ultrasound machine has been condemned. Attempts to repair it have been unsuccessful; with medical physics deeming the components to be obsolete. Replacement parts are no longer available for ordering. This has rendered the Acute Medical Unit without access to a working point of care ultrasound machine. In order to continue to provide safe, efficient and effective care for our acutely unwell patients, a replacement machine is required.

**BACKGROUND**

Point of care ultrasound is currently used for the following procedural and diagnostic purposes within Acute Medicine:

* **Peripheral Venous Access**: in patients with limited/difficult peripheral veins (e.g. previous chemotherapy, multiple previous venepunctures, intravenous drug use). Direct visualisation of peripheral veins with ultrasound reduces the number of failed venepunctures, reducing harm and distress to the patient.
* **Central Venous Access:** for patients requiring resuscitation +/- inotropic support (e.g. Septic Shock) and for those patients with no peripheral access requiring IV therapies. Ultrasound guided insertion of central venous catheters reduces the risk of harm from potentially fatal complications such as carotid artery puncture and pneumothorax.
* **Thoracic Ultrasound:** to confirm or refute the presence of a pleural effusion, consolidation, pulmonary oedema or pneumothorax. This expedites the correct diagnostic pathway, along with early referral to the appropriate specialty team. Diagnostic pleural aspirations are performed as a bedside procedure via direct ultrasound visualisation. Following their diagnostic procedure, patients can be considered for discharge from AAU with respiratory follow-up, negating the need for an acute admission. For acutely breathless or hypoxic patients with large pleural effusions, ultrasound guided therapeutic pleural aspiration or insertion of a chest drain can safely be performed in AAU early in the patient pathway. This reduces length of stay for those requiring admission, as ordinarily, their procedure would be delayed by a day or two in AMU.
* **Abdominal Ultrasound**: to confirm or exclude the presence of ascites in liver patients, allowing for early diagnostic ascitic taps to be performed when assessing for sepsis due to SBP (Spontaneous Bacterial Peritonitis). To assess for hydronephrosis in patients presenting with an AKI (Acute Kidney Injury). Early identification of hydronephrosis allows the patient to be directed to the appropriate specialty (i.e. Urology if hydronephrosis confirmed).
* **Basic Echocardiography**: in an acutely unwell shocked patient where the cause of shock is unclear. Differentiating between cardiogenic or septic & hypovolaemic shock, allows for correct patient placement (i.e. CCU if cardiogenic or tamponade / pericardial effusion. HDU if septic or hypovolaemic)
* **Assessment of Shock:** to guide fluid management in difficult to assess patients.

Carrying out such procedures requires the availability of the following ultrasound probes:

* Vascular access (linear) probe
* Curvilinear probe – for thoracic, abdominal & renal US
* Echo (phased array) probe

**Training**:

In addition to direct clinical use, the medical trainees benefit from training in ultrasound. CVC insertion under ultrasound guidance is a mandatory requirement of the GIM & AIM curriculums. In the near future, basic ultrasound training will be mandatory for all our acute medical registrars in the form of FAMUS (Focused Ultrasound in Acute Medicine) accreditation. Finally, all respiratory registrars require accreditation in Level 1 Thoracic Ultrasound (or equivalent).

Within the current consultant group, we have 1 consultant accredited as a FICE (Focused Intensive Care Echocardiography) supervisor and another as a FAMUS supervisor. Being able to train our acute medical trainees in the necessary ultrasound competencies here at XXX, will make our unit an attractive hospital to train in.

**Patient Safety & Guidelines:**

Completion of the Surviving Sepsis Campaign bundle requires access to ultrasound in order to achieve the bundle (CVC insertion to commence Noradrenaline). Equally, the British Thoracic Society (BTS) mandates pleural effusions be drained under ultrasound guidance.

**ASSESSMENT**

To summarise, the possession of an Ultrasound machine would have the following impacts:

Impact on patient care**:** improved quality of care as per guidelines, quicker diagnosis & treatment, help make rapid decisions and move on, potential reduction in length of stay, alleviate distress caused by repeated venepuncture attempts, patient safety – Surviving Sepsis, BTS pleural guidelines.

Impact on resource management – improve bed allocation to appropriate specialty or sub-specialty in a timely manner, reduction in LoS, early discharge from AAU, reduce wastage of cannulas and costly CVC lines & chest drains.

Impact on service provision– avoid costly mistakes i.e. medico-legal cost of procedures not being performed under ultrasound, improves quality of service provision by having the ability to train & accredit medical staff.

Impact on training – ultrasound training is a sought after with general medicine, and is soon to be a core component of training in AIM. Access to an ultrasound machine will ensure the department is an attractive training location for both AIM trainees and any grades rotating through the AMU. It will also support the recruitment of fellows within AMU.

**RECOMMENDATION**

The table below details the available ultrasound machines for comparison, along with financial quotes which have been obtained from various suppliers (table 1). Some of these have been trialled within the XXX Acute Medical unit by the consultants and registrars.

The most cost-effective machine which was trialled and deemed to satisfy the unit’s requirements was the **Siemens PC500**. This includes a 5-year warranty, with no servicing or maintenance fees during the 5-year period. This is beyond the 1-year warranty offered by some of the competing suppliers. In addition, the Siemens PC500 is up to £5,000 cheaper than those with of similar (or even lesser) specification.

As demonstrated throughout the proposal, without a point of care ultrasound machine, we are unable to provide safe care for our patients. It is for this reason, you are kindly asked to consider the purchase of a **Siemens PC500** for the GRI Acute Medical unit. (See attached Siemens quote).

***\*\*NOTE for prospective units: GE Venue and Venue Go, Sonosite Xporte and Mindray TE7 and TE9 would also be worth considering\*\****

**Table 1**

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| **Supplier & Model** | **Cost** | **Warranty +/-Servicing** | **Includes** |
| Siemens P500 | £25,000 | 5-year warranty | Linear, Curvilinear & ECHO probes, doppler, printer, stand, battery pack, initial training, can upload to PACS. |
| Siemens Juniper | £31,000 | 5-year warranty  includes ‘connected for life’ (preventative maintenance/Application and Educational support) | Linear, Curvilinear & ECHO probes, doppler, printer, stand, initial training, can upload to PACS. |
| Esaote MyLabOne | £21,900 | **Warranty info not clear** | Linear, Curvilinear & ECHO probes, doppler, stand, battery pack. Small screen. **\*\*Only one probe can be docked at once, hence increased risk of damage or loss\*\*** |
| Esaote MyLabAlpha | £28,900 | Warranty info not clear | Linear, Curvilinear & ECHO probes. Higher end & superior image quality than above, doppler, stand, battery pack. |
| Fujifilm Sonosite  S-ii Ultrasound System (L22406) | £25,000 | 5 year warranty | Linear, Curvilinear & ECHO probes, stand, 4 hours training. Small screen. **No doppler. \*Only two probes can be docked at once, hence increased risk of damage or loss\*\*** |
| Fujifilm SonoSite Edge II System (L21822) | £29,786 | 5 year warranty | Linear, Curvilinear & ECHO probes, printer, stand, initial training, can upload to PACS. |
| Phillips SPARQ 795090 | £29,143 | 5 year warranty **can be purchased for an additional fee** | Liner, Curvilinear & ECHO probes, printer, stand, battery pack, initial training, can upload to PACS. |
| Canon CUS-X100G  ‘Xario 100G’ Compact Ultrasound System | £27,960.00 | 1 year warranty.   **Require to purchase 4 year warranty for additional £8000** | Liner, Curvilinear & ECHO probes, stand, battery pack (up to 4 hrs), initial training, can upload to PACS. |