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APPENDIX 1 - EM PoCUS APPLICATIONS

The following list includes the most commonly used PoCUS applications in emergency medicine (EM). This list is not to be viewed as a curriculum, nor is it expected that every emergency physician should be expected to be competent in all of these applications.

1. RESUSCITATIVE AND DIAGNOSTIC APPLICATIONS

   a. Cardiovascular
      i. Transthoracic views and Transesophageal echo (TEE)
      ii. Cardiac - pericardium, cardiac form, cardiac function, valves
      iii. IVC - filling/volume assessment
      iv. Abdominal aorta - aneurysm
      v. Deep vein thrombosis (DVT) - upper and lower limb

   b. Respiratory
      i. Thoracic - pleural fluid, hemothorax, pneumothorax
      ii. Lung - pneumonia, pulmonary edema

   c. Gastrointestinal
      i. Bowel - bowel obstruction, appendicitis
      ii. Hepatobiliary - gallstones, cholecystitis, biliary dilatation
      iii. Peritoneum - hemoperitoneum, ascites, pneumoperitoneum

   d. Genitourinary
      i. Renal - hydronephrosis, renal calculi
      ii. Bladder - bladder volume and emptying
      iii. Female pelvis - ovarian cysts, pelvic fluid
      iv. Testicular - torsion, epididymo-orchitis, hydrocele

   e. Pregnancy
      i. Transabdominal and transvaginal assessment
      ii. First trimester pregnancy complication - PV bleeding, ectopic pregnancy

   f. Musculoskeletal
      i. Joint effusion
      ii. Fractures
      iii. Dislocations
      iv. Soft tissue (muscle/tendon) injury, infection and inflammation

   g. Cutaneous
      i. Cellulitis
      ii. Cutaneous and subcutaneous abscess
      iii. Cutaneous and subcutaneous foreign body identification

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h. Head and Neck
    i. Ocular - retina, chambers, optic nerve sheath

i. Multisystem
    i. Trauma
    ii. Shock
    iii. Dyspnea
    iv. Cardiac arrest
    v. Chest pain
    vi. Abdominal pain

2. PROCEDURAL GUIDANCE
    a. Cutaneous abscess drainage
    b. Cutaneous foreign body removal
    c. Cricothyrotomy
    d. Endotracheal intubation
    e. Guided therapeutic injections
    f. Joint aspiration
    g. Lumbar puncture
    h. Paracentesis
    i. Pericardiocentesis
    j. Peritonsillar abscess drainage
    k. Reduction of fractures and dislocations
    l. Regional and peripheral anesthesia
    m. Suprapubic catheter
    n. Thoracentesis
    o. Vascular access

APPENDIX 2 - SUMMARY OF EVIDENCE FOR EMERGENCY PoCUS APPLICATIONS

Summarizing the evidence for the use of POCUS is challenging because unlike other diagnostic tests where research is primarily focused on test performance (namely sensitivity and specificity), the value POCUS is further scrutinized in terms of patient-oriented outcomes and system performance measures such as time to diagnosis or length of stay. This represents a shift towards identifying value-added practices and represents a much-needed transition in healthcare research and resource allocation. That said, it presents challenges in terms of synthesizing and presenting the research. Add to this the operator-dependent nature of POCUS, and not surprisingly, the evaluation of POCUS literature is understandably complex.

In this document, the authors have strived to include a combination of test performance metrics, patient outcomes and system performance measures (when available). To date, there is still a paucity of prospective POCUS research focused on patient-oriented outcomes but the authors do believe there is a sufficient evidence in the current literature to support the recommendations within this document.

As such, whenever possible, test performance metrics are presented from meta-analyses or systematic reviews, or "real practice" study designs where multiple providers have enrolled patients. Patient outcome measures are included whenever possible but should be interpreted carefully as they most often represent associations (see evidence for use of POCUS in AAA, BIP and penetrating trauma as examples). System performance metrics (such as time to diagnosis, length of stay, or costs of care) are also included but their generalizability is also limited given the range of confounding factors associated with these metrics including, but not limited to, physician and hospital resources, access to other imaging tests, specialist support, and the like.

Extended Focused Assessment with Sonography in Trauma (E-FAST)

The Focused Assessment with Sonography in Trauma (FAST) exam has been used in blunt and penetrating trauma since the 1990's to identify the presence of hemopericardium and abdominal free fluid, which in the setting of trauma, usually represents hemoperitoneum from solid organ injury (1). More recently, the FAST has been extended (E-FAST) to include an evaluation of the chest for hemothorax and pneumothorax (2,3). Since all of these clinical entities have the potential to cause hemodynamic compromise, the FAST exam is part of the primary survey and resuscitation phase in the current ATLS guidelines (4). In a meta-analysis of approximately 18,000 patients, the test characteristics of the FAST exam were a sensitivity of 78.9% and specificity of 99.2% (5). The lung portion of the exam for pneumothorax and hemothorax has sensitivities of 90.9% and 96.2% with specificities of 98.2% and 100% respectively (3,6). Although patient-oriented outcomes data related to the extended portion of the FAST exam is lacking, use of the FAST exam proper results in clear patient benefits. Studies have demonstrated shorter delays to the operating room, fewer computed tomography (CT) scans, shorter hospital stays with fewer complications, and most importantly, increased survival (7–9).

Thoracic

Thoracic ultrasound is used to evaluate the differing pleural surface artifacts that occur predictably with certain disease processes. These have been well described in the European literature since the 1990s (10). "A lines" are horizontal reverberation artifacts that occur consistently with air filled lungs, such as in normal or COPD patients. "B lines" represent interstitial fluid and are hyperechoic vertical lines that arise at the pleural surface and stretch at least 15 cm. When present diffusely and bilaterally, these represent interstitial syndrome, which encompasses pulmonary edema, pneumonitis and pulmonary fibrosis (11). Recent meta-analyses have concluded that the presence of diffuse B lines has a sensitivity of 85-94% and a specificity of 92-93% for diagnosing acute decompensated heart failure (ADHF) (12,13). A study of ED patients with undifferentiated dyspnea undergoing a combined cardiac and lung ultrasound protocol (LuCUS) showed that the US findings resulted in medication changes for almost half of the 50 patients in whom COPD and ADHF were initial diagnostic possibilities, and that the more tailored management plan was correct in all but 1 patient (14). Thoracic ultrasound is relatively easy to learn to perform but takes some practice to interpret (11). In one study performed by physicians and medical students after 30 min of lecture and 2 hr of hands on training, the level of agreement with an experienced physician sonographer was a Cohen kappa of 0.82 (15).

Abdominal Aortic Aneurysm

The purpose of the abdominal aorta scan is to detect the presence or absence of an abdominal aortic aneurysm (AAA). Patients with a ruptured AAA can present with a variety of nonspecific symptoms, contributing to a high rate of misdiagnosis. In an unstable patient with symptoms suggestive of aneurysm rupture, the diagnosis of an AAA using POCUS can facilitate immediate surgical consultation and disposition directly to the operating room. Time to diagnosis and surgical management have a direct impact on mortality for this disease (16). A recent systematic review found that emergency physicians have a high accuracy for the detection of AAAs, with a combined sensitivity of 99% and specificity of 98% (17). For patients presenting with a suspected AAA, the use of POCUS led to faster time to diagnosis, reduced time to operating room, and lower mortality compared with patients where POCUS was not used (18).

First Trimester Pregnancy

The purpose of first trimester pregnancy ultrasound is to rule in an intrauterine pregnancy (IUP) in patients presenting with symptoms concerning for a possible ectopic pregnancy. In this patient population, the finding of an IUP virtually rules out ectopic pregnancy and allows for a safer and faster discharge from the emergency department (19). A systematic review of 10 studies found that emergency physicians have a sensitivity of 99.3% for ruling out ectopic pregnancy (20). Heterotopic pregnancy (simultaneous IUP and ectopic pregnancy) is rare, but should be considered for patients undergoing fertility treatment. For hemodynamically unstable patients with a positive beta-hCG, the POCUS findings of no definitive IUP in combination with free fluid in the peritoneum can facilitate transfer directly to the operating room (OR). Emergency physician-performed POCUS is associated with a significantly shorter time to OR for patients presenting with ruptured ectopic pregnancy (21). In symptomatic but stable pregnant patients, the presence of free fluid in the abdomen predicts the need for surgical intervention with a positive likelihood ratio of 112 (22).

Cardiac Ultrasound

Cardiac POCUS can help facilitate diagnosis and guide management for a variety of patient presentations including cardiac arrest, shock, shortness of breath, and chest pain. The cardiac POCUS exam includes evaluation for left ventricular dysfunction, right ventricular dilation, and pericardial effusion. For patients in cardiac arrest, cardiac POCUS can help to distinguish between true pulseless electrical activity (PEA) and pseudo-PEA. Patients with true PEA or cardiac standstill have a very poor prognosis, with a negative likelihood ratio of 0.18 for achieving return of spontaneous circulation (23). In the appropriate clinical context, this finding may support termination of resuscitation. Conversely, cardiac arrest patients with electrical asystole or PEA may in fact have coordinated cardiac activity with a non-palpable pulse. In these patients, POCUS can help to identify reversible causes of cardiac arrest such as cardiac tamponade, pulmonary embolism, hypovolemia, and myocardial ischemia (24).

Patients with pericardial effusions often present with nonspecific and variable signs and symptoms. In one study, 13.6% of emergency department patients with unexplained dyspnea had an unsuspected pericardial effusion (25). Emergency physicians have been shown to have a sensitivity of 96% and specificity of 98% for detection of pericardial effusions (26). For patients with unexplained shock, the absence of a pericardial effusion on POCUS rapidly rules out cardiac tamponade. Cardiac POCUS is a standard component of the Focused Assessment with Sonography for Trauma (FAST) examination. For patients with penetrating cardiac injury, cardiac POCUS is associated with a reduced time to operating room and improved survival rates (8).

In patients with undifferentiated shock, determination of left ventricular function can be extremely valuable for determining diagnosis and guiding resuscitation. A poorly contracting left ventricle may lead to initiation of inotropes, whereas an empty and hyperdynamic left ventricle may lead to aggressive volume replacement. In stable patients, cardiac POCUS can help to identify patients with occult left ventricular failure presenting with nonspecific signs and symptoms. Conversely, in unstable and hypotensive patients, emergency physicians have shown that they can accurately determine left ventricular function (27). Qualitative estimation of left ventricular function by emergency physicians has been shown to be accurate and strongly correlates with quantitative measurements (28). Emergency medicine trainees have been shown to have a high accuracy for determining left ventricular function after only three hours of proctored training (29).

Patients with massive pulmonary embolism have a high mortality rate and can present with shock or cardiac arrest without any prior symptoms. Early thrombolytic therapy has been shown to reduce mortality in these patients (30). In the right clinical context, a cardiac POCUS revealing a dilated right ventricle (RV:LV ratio >1) can lead to rapid diagnosis and treatment in patients too unstable to undergo a CT scan. Emergency physicians have a specificity of 98% for the identification of right ventricular strain when compared with comprehensive echocardiography (31). In patients suspected of pulmonary embolism, the finding of right ventricular dilation on cardiac POCUS has a specificity of 98% (32). The sensitivity of cardiac POCUS for pulmonary embolism is only 50%, therefore CT remains the gold standard for this diagnosis in stable patients.

<u>Inferior Vena Cava</u>

Ultrasound assessment of the inferior vena cava (IVC) can help to determine a patient's volume status and differentiate between categories of shock. In emergency department patients, a small IVC (<1-1.5cm) that demonstrates significant (>50%) collapse with inspiration is associated with low central venous pressure (33). In unstable patients, a small collapsing IVC points towards hypovolemia or distributive causes of shock. In contrast, a plethoric IVC points towards an obstructive or cardiogenic cause of shock. For patients with undifferentiated dyspnea in the emergency department, a plethoric IVC has a sensitivity of 84.4% and specificity of 92.9% for congestive heart failure (34). In pediatrics, a low IVC to aorta diameter ratio (<0.8:1) is associated with volume depletion (35).

<u>Central Venous Catheterization</u>

Central venous catheterization (CVC) is associated with various complications, such as arterial puncture, pneumothorax, nerve injury, infection and unsuccessful placement (36). The evidence for ultrasound guidance mitigating these complications is particularly strong for internal jugular vein cannulation, where it increases the likelihood of first pass success (OR 1.57) and reduces complications, including arterial puncture (OR 0.29) (37). Benefits in using ultrasound guidance have also been found for femoral vein insertion (increased first pass success rate, OR 1.73) and subclavian vein insertion (decreased arterial puncture, OR 0.21 and hematoma, OR 0.26) (38). In 2001, the Agency for Healthcare Research and Quality endorsed ultrasound guidance for central venous catheterization as a strongly encouraged patient safety practice based on the high quality of evidence in the literature (39). Since then, ultrasound-guided CVC has been further endorsed by the UK's National Institute of Clinical Excellence (NICE), the American Society of Echocardiography, the Society of Cardiovascular Anesthesiologists, and WINFOCUS (40–42). There is no clear consensus on how best to teach this skill. However, use of a task trainer with repetitive deliberate practice and feedback has been demonstrated to be superior to traditional teaching methods (see one, do one, teach one) with respect to skill acquisition and retention (43–45).

Peripheral Intravenous Insertion

Peripheral IV insertion can often be challenging in the emergency department, with failure rates up to 26% in adults and 54% in pediatrics (46). Failure of IV insertion often leads to more invasive procedures such as central venous catheters and exposes patients to increased procedural risk and discomfort. Ultrasound guidance allows the identification and cannulation of non-palpable veins such as the basilic and cephalic veins of the upper arm. In a study of patients with difficult IV access, emergency physicians had higher success using ultrasound guidance compared with the blind approach (97% vs 33%) (47). Ultrasound-guided IV insertion has also been shown to be faster, require fewer punctures, and leads to higher patient satisfaction than the blind technique. The use of ultrasound-guided peripheral IV insertion is associated with a reduction in central venous catheter use in the emergency department (48).

Gallbladder

Biliary ultrasound focuses primarily on whether gallstones and signs of cholecystitis are present (thickened wall, pericholecystic fluid and sonographic Murphy's). Emergency physician-performed biliary ultrasound had test characteristics of 89.8% (95% confidence interval [CI] = 86.4% to 92.5%) and 88.0% (95% CI = 83.7% to 91.4%) in a large systematic review (49). Although biliary pathology is not frequently life-threatening, the ability to rule it in or out as a cause for a patient's pain has the potential to improve ED flow, aid in efficient decision-making and allow for cognitive unloading. One large study demonstrated that patients presenting after hours with right upper quadrant pain had their length of stay shortened by 73 min (20%), if the patient had a point of care ultrasound rather than a consultative radiology ultrasound (50).

Renal

Renal ultrasound can help confirm the diagnosis of renal colic and risk stratify these patients for likelihood of complications (51). Several studies have shown that point of care ultrasound for hydronephrosis has sensitivities and specificities in the range of 72%-86% and 73%-82% respectively (52,53). One large pragmatic trial of more than 2500 patients with suspected renal colic showed that there was no difference in 30 day complication rates or return ED visits between patients who had CT scans, consultative radiology ultrasound, or point of care ultrasound performed by emergency physicians (54). Indeed, the European Association of Urologists Guideline on Urolithiasis suggests that ultrasound should be the first line investigation for patients with suspected renal colic (55).

Soft Tissue

Emergency ultrasound has been used to both diagnose and remove soft tissue foreign bodies with good accuracy. One study demonstrated that after a 20-minute training session, emergency physicians and residents were able to identify skin and soft tissue foreign bodies with a sensitivity of 96% and specificity of 70% (56). Another prospective case series showed that ultrasound guided foreign body removal had an 88% success rate (57).

Ultrasound is also helpful in identifying and managing soft tissue infections. It has been shown to improve diagnostic accuracy over clinical impression alone, when compared to the criterion standard of incision and drainage. In Squire's study of 100 patients with suspected abscess, the sensitivity and specificity for ultrasound was 98% and 88% respectively, compared to 86% and 70% for the clinical exam (58). Another study demonstrated that emergency ultrasound changed patient management in 56% of patients with soft tissue infections (59).

APPENDIX 3 - INFECTION CONTROL ISSUES ASSOCIATED WITH POINT OF CARE ULTRASOUND EQUIPMENT

1. Ultrasound Machines and Transducers

    a. *Cleaning* - A mechanical process that removes visible soil (organic and inorganic) from objects and surfaces. Cleaning is an essential first step to any disinfection process since physical debris may interfere with effectiveness of chemical or physical agents. For ultrasound transducers, this means wiping off visible gel and debris with a towel or dry wipe prior to any other process.

    b. *Low level Disinfection* - A chemical process that eliminates live bacteria, some fungi and enveloped viruses. Examples include solutions or wipes impregnated with 3% hydrogen, 0.5% enhanced action formulation hydrogen peroxide, some quaternary ammonium compounds (QUATS), phenolics and diluted sodium hypochlorite (e.g., bleach) solutions. The contact time required for disinfection depends on the manufacturer's instructions.

    c. *High Level Disinfection*- A chemical process that eliminates bacteria, mycobacteria, fungi, and enveloped and non- enveloped viruses, but not necessarily bacterial spores. Examples include 6% hydrogen peroxide, 0.55% ortho-phthalaldehyde and 2% enhanced hydrogen peroxide. This is necessary for endocavitary probes or probes used on open skin, even though a probe sheath may be used.

    d. *Sterilisation* - A physical or chemical process that eliminates or destroys all forms of microbial life, including spores. This is not done for ultrasound transducers because of their delicate electronics. (60–65)

2. Assessing Transmission Risk

    The Spaulding Classification is used to classify medical equipment according to the potential infectious risk posed to the patient (66). The classification is as follows:

    a. *Critical Items* - Equipment that is used in normally sterile body cavities and so carries a significant risk of infection if contaminated. Examples include surgical instruments, biopsy instruments and implants. These items must be cleaned and then sterilized, usually with heat.

    b. *Semicritical Items* - Equipment that contacts mucous membranes and non-intact skin and confers a moderate risk of infectious complications. Examples are endocavitary ultrasound transducers, laryngoscope blades and endoscopes. These items must be cleaned and then undergo high level disinfection after every use.

c. *Noncritical Items* - Equipment that comes into contact with intact skin, thus carrying only a small infectious risk to patients. Examples include ultrasound transducers (non-endocavitary), ultrasound machines, bedpans, oximeters and stethoscopes. These should undergo cleaning followed by low level disinfection after every use.

3. Low Level Disinfection Considerations

Low level disinfectant wipes and solutions are often used hospital-wide. Not all wipes are compatible with all transducer brands, so check the machine manufacturer's instructions to ensure compatibility. Alcohol swabs should not be used on the transducer surface since they may cause damage. All users should be taught to clean the probe after every use, and to start by cleaning it with a dry wipe or towel to remove the gel and debris. Then they should apply the wipe or solution for the designated contact time.

4. High Level Disinfection System Considerations for ED Programs

High Level Disinfection (HLD) System implementation should be undertaken in conjunction with the Infection Control Department of the hospital, and should comply with provincial guidelines. An ED considering how best to organise a HLD program should first consider where the best place for transducer processing is. Options include: central processing, a system shared with diagnostic imaging or endoscopy, or an ED-based processing system.
One of the first two options may be best choice in lower volume departments, or when there is either a lack of capital for an ED based system, or a lack of personnel required for consistent system maintenance. A non-departmental HLD process should be quick, readily available in off hours, and have traceability to avoid equipment misplacement.

Choosing to locate the HLD system in the ED allows a faster turnaround time and has a lower likelihood of transducer damage or loss. However, it requires a capital equipment investment, an ongoing plan for maintenance and supplies, and dedicated personnel for maintenance and processing. All systems require a log that details machine and solution testing, and usage dates and times to ensure traceability and compliance. Physicians can process the probes themselves but require upfront training and a clear set of instructions that are readily available at the time of use.
There are essentially three types of systems to choose from:

A) **Soak Station-** A small wall-mounted fumehood that safely contains the chemicals required for HLD, usually >6% hydrogen peroxide or 0.55% Ortho-Phthalaldehyde (OPA). Depending on the agent, disinfection is achieved after a 10-30 minutes soak. The probe must then be well rinsed and dried. The solution replacement time intervals and disposal processes are agent-dependent. An ED contemplating implementing a soak station system needs to train and designate an individual to safely maintain it.

B) **Enhanced Action Hydrogen Peroxide System**- A closed systems that use energized hydrogen peroxide to disinfect probes in 10 minutes or less. Chemical byproducts are simply oxygen and water, and require no disposal or PPE to maintain.

C) **UV-C Disinfection System**- A closed, chemical-free system using UV light to disinfect probes in less than 2 minutes.

The College of Physicians and Surgeons of British Columbia have published a useful algorithm for guiding ultrasound probe cleaning and disinfection. '*Steps for Cleaning and Disinfection of Ultrasound Probes'* can be downloaded form their website: *https://www.cpsbc.ca/files/pdf/Steps-Cleaning-Disinfecting-Ultrasound-Probes.pdf.*

APPENDIX 4 - ULTRASOUND MACHINE PURCHASE CHECKLIST

1. Machine Manufacturer Information

- Warranty (Machine + Probes)
- Loaner machine: covered in warranty, shipping?
- Educational Support: availability of teaching loaner machines; lead time needed to book these?
- References from other similar departments
- Availability of refurbished probes available for purchase
- Look at specifications for what is included in quote to ensure accuracy: battery, cart, probe dock, probes, calculation packages

2. End User Machine Trial

Aim for 1-2 weeks trial if possible. Make sure your least ultrasound-savvy use it and seek their opinions.

- Durability
- Portability
- Cart maneuverability, storage
- Overall size/footprint
- Screen size and quality
- Battery life and charging time
- Boot-up time
- Utility for both basic and advanced users
- Compatibility with other hospital sites/departments if desired

3. Transducers and Imaging Capabilities

- Trial of all probes that are being considered
- Image quality in easy and hard patients
- Ease of use: probe selection / switching probes / number of probes simultaneously attached to machine
- Ease of use: keyboard / touchscreen / with gloves on
- Ease of use: switching B/M/Colour flow
- Ease of use: access to calculation packages

4. Storage & Workflow

- Ease of data entry
- Hard drive size for manual archiving
- Export images / clips / deidentification
- Compatibility with Third Party System Archiving if needed
- Printer attachments if needed

APPENDIX 5 – RURAL EM PoCUS

This appendix is provided as a guide for all those practicing Emergency Medicine in rural locations, it does not differentiate the training background of those physicians. In this section we highlight the challenges faced by those working in rural hospitals and how these influence the use of PoCUS.

We recognize that Canadian Emergency Departments are staffed by physicians with a variety of training backgrounds including Emergency Medicine and Family Medicine. This especially the case in rural Emergency Departments which may be staffed predominantly by Family Physicians as part of their clinical portfolio (Family Medicine Office, ED/ER, Hospitalist/Inpatients, etc). Throughout this position statement we have used the term Emergency Physician to describe all physicians with appropriate Emergency Department practice privileges.

1. Challenges for Rural EM PoCUS

There are a number of challenges for physicians practicing Emergency Medicine in rural locations that pertain to the use of PoCUS.

a. Variable / limited access to onsite formal diagnostic imaging
b. Variable / limited access to onsite specialist consultations
c. Variable transfer options due to distributed on-call regional services
d. Limited access to local training and supervision
e. Limited access to academic program funding
f. Overlap in clinical roles and responsibilities (ER, clinic, inpatient care, etc)
g. Geographical barriers to clinical resources and supports
h. Variable/ limited ability to develop and maintain sufficient PoCUS skills due to diversity of practice settings and caseload in rural medicine

2. Clinical Scope of Practice

The scope of practice for rural EM PoCUS will depend on local casemix, however it is likely to include the majority of that described in Section 1 and Appendix 1.

With limited access to CT, MRI and Radiology Ultrasound, physicians practicing Emergency Medicine in rural locations may often want to have a broader scope of PoCUS practice than their colleagues working in bigger academic centers.

3. Training and Competency

The principles of training and competency outlined in Section 2 apply to all physicians wherever they practice emergency care. Clearly there are challenges for physicians, working alone or in small groups, gaining access to training and local supervision. Many will travel to complete courses and competency workshops in order to develop their practice. Others receive support from their regional academic center, including distance programs, teleconferencing, simulation and visiting workshops.

These challenges are no different from those that rural emergency physicians face in other areas of continuing medical education, skill development and maintenance of competency e.g. airway management, trauma, stroke etc.

4. PoCUS Program Management

In order to provide PoCUS program leadership and support quality we have recommended that all hospitals with a designated Emergency Department should have a named physician (***PoCUS Lead***) responsible for development and maintenance of the emergency ultrasound program. We have recognized that this may be very difficult to fulfill in small rural hospitals and have suggested that physicians with other 'quality responsibilities' may want to incorporate PoCUS quality into their portfolio. Depending on the number of physicians within a department this may be the department head/medical director. However, there are many examples across Canada of local physician enthusiasts providing high quality PoCUS leadership. These enthusiasts are frequently Emergency/Family Physicians, but can also be from other specialties such as Internal Medicine.

Ideally there will be funding available to support such quality programs, and we would recommend that physicians are appropriately remunerated for their time and leadership responsibilities. In provinces with PoCUS billing codes, some departments have used a proportion of this income to support a PoCUS Lead.

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