

St. Michael's Hospital General Internal Medicine POCUS Rotation

Rotation objectives and structure adapted from Dr. Mathilde Gaudreau-Simard (University of Ottawa) and Dr. Rob Arntfield (Western University)

Supervisor: Dr. Drew Brotherston

Site: St. Michael's Hospital – Unity Health Toronto

Introduction

This elective is open to 1-2 General Internal Medicine fellows (PGY4/5) per block with demonstrated interest in advancing skill in point-of-care ultrasound (POCUS).

The program will consist of a 4-week block in line with the academic calendar. Consideration may be given for a 2-week elective on a case-by-case basis. Blocks will be scheduled in April/May for the next academic calendar starting in July.

Training Goals & Objectives

General Learning Objectives

1. Develop a basic understanding of ultrasound physics, 'knobology' / ultrasound machine controls, and transducers for the use of ultrasound at the point-of-care.
2. Understand the different ultrasound modes and their diagnostic applications (2D, M-mode, colour doppler, spectral doppler).
3. Generate quality ultrasound images across different organ systems (cardiac, lung, abdominal, vascular).
4. Interpret ultrasound images to answer specific questions at the point-of-care.
5. Develop strategies for the integration of point-of-care ultrasound within the busy workflow of the general internist.
6. Understand the limitations of ultrasound technology, its user-dependence, and appreciate common imaging artifacts and pitfalls.
7. Identify the role for comprehensive diagnostic studies in the case of complex clinical questions and develop an appreciation of the limits of point-of-care ultrasound.

Specific Learning Objectives

Medical Expert

- Execute appropriate organ-specific imaging protocols:
 - Cardiac:
 - 5-standard views: 1) Parasternal long axis; 2) Parasternal short axis; 3) Apical four chamber; 4) Subcostal four chamber; 5) IVC.
 - Lung and pleura:
 - Four zones imaged per hemithorax.
 - A-lines, B-lines, lung sliding, consolidation, effusion.
 - Abdomen:
 - Free fluid assessment: Three-zone FAST exam.
 - Hydronephrosis assessment: Longitudinal and short-axis bilateral kidney and bladder scan for post-renal obstruction assessment
 - VExUS: Venous excess ultrasound for volume overload / venous congestion including IVC, portal vein, hepatic vein, renal vein, renal artery.
 - Vascular
 - Deep vein thrombosis assessment: Two-zone compression ultrasound of lower extremities.
- Demonstrate basic competence in identifying common pathologies:
 - Cardiac:
 - Left ventricular systolic dysfunction
 - Pericardial effusion
 - Valvular abnormalities (aortic regurgitation, aortic stenosis, mitral regurgitation, mitral stenosis)
 - Right ventricular dysfunction
 - Lung and pleura:
 - Pleural effusion
 - Pneumothorax
 - Pneumonia
 - Pulmonary edema
 - Atelectasis
 - Abdomen:
 - Ascites
 - Hydronephrosis
 - Vascular
 - Deep venous thrombosis
- Become familiar with ultrasound physics and artifacts:
 - Ultrasound artifacts: mirror image, enhancement, edge, side lobe, ring-down, and reverberation.
 - Doppler physics: distinction between continuous wave (CW) and pulse wave (PW) spectral Doppler, aliasing, pulse repetition frequency, and the Nyquist limit.
- Integrate point-of-care ultrasound into clinical decision making:

- Identifying clinical scenarios in which point-of-care ultrasound can provide useful information in the care of a patient.
- Develop an understanding of test characteristics of point-of-care ultrasound (sensitivity, specificity) for the different applications listed above.
- Integrate ultrasound findings with clinical information and provide a specific recommendation for the clinical care team.
- Identify patients and assessments where clinical questions require escalation to more comprehensive diagnostic imaging services.

Communicator

- Verbal communication of ultrasound findings to the care team when they require urgent/semi-urgent attention or management.
- Triaging of scans for discussion with rotation supervisor based on certainty and uncertainty in findings.
- Timely completion of documentation of ultrasound findings via a report on the patient's chart

Collaborator

- Liaise with the different consulting services and multi-disciplinary team(s) providing care for the patient.
- Understand the need for involving other specialties/consulting services based on point-of-care findings or complexity of the assessment required.

Manager

- Generate images and provide clinical assessments and recommendations in a timely manner.
- Create a portfolio of point-of-care ultrasound studies.

Health advocate

- Integrate ultrasound into clinical care pathways to complement other imaging modalities.
- Recognize that patient positioning may cause discomfort or be disruptive for patients.
- Appreciate the responsibilities of other health care providers and limit disruptions in other aspects of a patient's clinical care.

Scholar

- Gain comfort in teaching point-of-care ultrasound to junior medicine residents in the form of didactic teaching and hands-on sessions.
- Participate in creation of visual-learning media in the form of a screencast or case presentation.
- Participate in multi-specialty teaching rounds as these evolve over time

Professional

- Demonstrate honesty, integrity, and respect in all aspects of patient care, especially as it relates to POCUS.

Responsibilities

The rotator's primary responsibility will be to complete clinically oriented point-of-care ultrasound assessments on patients admitted to CTU or being followed by Consult Medicine. Other medicine subspecialty services (Hematology, Nephrology, Respiriology, etc.) may also request an assessment, which should be completed if clinically appropriate. The rotator will be responsible for contacting the CTU teams/consult services in the morning (8am) to identify patients who would benefit from a point-of-care ultrasound.

Common clinical questions or indications for POCUS will often include:

- Hypoxia
- Hypotension
- New or worsening heart failure
- Volume assessment
- Pleural / pericardial / peritoneal assessments for consideration of drainage (POCUS only; rotator does not perform the procedure)

All scans completed by the rotator will be archived on a secure hospital network drive, reviewed with the supervisor covering the POCUS service, and then documented in the patient's chart. Rotators will be expected to seek out opportunities to perform point-of-care ultrasounds in an independent manner. The volume of solicited scans may fluctuate on a daily basis, but a minimum of 2-3 patients should be scanned daily if performing multi-organ assessments (cardiac, lung, abdomen). Most of the clinical scanning is performed in the morning, with the afternoon utilized for reporting scans, reviewing with the POCUS supervisor, liaising with the clinical teams, and self-directed learning.

This elective will primarily be composed of independent image acquisition and interpretation, with in person and remote reviewing and feedback by the POCUS supervisor. At the discretion and availability of the supervisor, there may also be an opportunity for hands-on supervised scanning.

Study Quotas

Competency in Internal Medicine POCUS is continually evolving, but based on the most current recommendations from CIMUS, a rotator should aim to perform the following as a minimum during a 4-week rotation:

- 30 cardiac POCUS
- 20 lung and pleura POCUS
- 10 abdominal POCUS

Achieving these minimums should be easily attainable over one month, and the rotator is encouraged to explore other areas of personal interest within POCUS not within the ‘core curriculum’ (DVT scans, MSK scans, transcranial doppler, etc.).

Scholarly Activity

Each rotator is responsible for completing a small scholarly project by the end of the rotation, which can be in the form of:

- Case-based POCUS teaching presentation
- Screencast on a POCUS topic of rotator’s choosing

The scholarly project should be discussed with the rotation supervisor during the first week of the rotation, aiming to complete it by the final week.

Call

There is no call requirement (evenings or weekends) for this rotation, but the rotator’s home program may require call coverage at their discretion.

Evaluation

GIM EPAs likely to be relevant and completed on this rotation:

- Foundations EPA #2 – Applying the GIM approach to the ongoing management for patients with common acute general internal medicine presentations
- Core EPA #1– Applying the GIM approach to the ongoing management for patients with common acute general internal medicine presentations
- Core EPA # 9 – Documenting clinical encounters
- Core EPA #17 – Assessing and managing patients in whom there is uncertainty in diagnosis and/or treatment

Additionally, each scan that the rotator logs will be assessed on the following scale, with level 1 and 2 scans defining overall competency:

Level	Assessment	Examples	Action
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1	“No concerns”	This includes studies that may be technically difficult or incompletely answer the clinical question with scanner insight and documentation to this fact. The patient is not at any risk.	No action required (though a reassuring QA note may be sent to the scanner).
2	“Standards met with improvement suggestions”	Error in depth, gain, exam type or other threats to image quality. Errors in interpretation that do not alter management (inconsequential false negative, e.g. trace pleural effusion, gradations in cardiac function severity that are not clinically relevant). Failure to submit studies within 48hrs of acquisition.	QA memo sent to scanner identifying gaps in quality and general advice on means of improvement.
3	“Standards not met with concerns” Potential inappropriate care possible as a result of enacting interpretation and suggestions	Preventable false positive that lead to unnecessary escalation of care, time in hospital or non-invasive treatments. Preventable false negative that leads to delays in care or inappropriate disposition. Repeated, unaddressed Level 2 concerns (more than three instances).	QA memo sent to scanner identifying standard of care breached and reply is required within 7 days. Failure to reply results in upgrade to level 4 concern and mandates suspension of ultrasound privileges and escalation to chief and/or program director (residents) for tribunal.
4	“Standards not met with serious concerns” Assigned for grave errors in integration or integration	False negative scan that results from erroneous, incomplete or out of scope scanning methods. Preventable false positive that leads to unnecessary invasive procedures.	QA memo sent to scanner as well as to program director (resident/fellow)/site chief (attending). Further use of ultrasound is suspended pending tribunal meeting. Consider notification of risk management.