



## **PERIOPERATIVE ECHOCARDIOGRAPHY & ULTRASOUND (PEERS) FELLOWSHIP**

### **Goals and Objectives**

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## Perioperative Echocardiography & Ultrasonography (PEERS) Fellowship

### Definition

Perioperative echocardiography & Ultrasonography (PEERS) refers to utilization of Transesophageal Echocardiography (TEE), Transthoracic Echocardiography (TTE) and/or Point Of Care Ultrasound (POCUS) during the perioperative period in the management of patients undergoing non-cardiac surgery.

### Fellowship Program

The PEERS program is novel, and it is anticipated to have a rapidly expanding role in the perioperative management of high-risk procedures and high-risk patients undergoing non-cardiac surgery. One of the major obstacles is the lack of training opportunity on this technology in the perioperative setting. The Department of Anesthesia & Perioperative Medicine, Western University is pleased to offer PEERS Fellowship training program with a wide range of clinical applications.

The Fellowship consists of the following rotations;

- Non-cardiac ORs (Main rotation)
- Cardiac ORs (one block)
- Pre Anesthesia Clinic
- Post Anesthetic care Unit (PACU)

The Fellowship comprises 12 months of hands-on training, which provides the fellow with adequate time to rotate through various echocardiography(echo) / Ultrasound (US) rotations. The fellow is expected to spend 3 days per week in the specialty and 2 days working independently in the non-cardiac operating rooms.

### Goals and objectives

1. Achieve PEERS cognitive and technical skills. (See Tables 1-3.)
2. Develop advanced Echo/US skills in performing qualitative and quantitative assessment of hemodynamics.
3. Gain a wide range of clinical experience in hemodynamic management of high-risk procedures and high-risk patients undergoing non-cardiac surgery.
4. Meet the requirements of NBE for examination and certification.
5. Provide leadership in PEERS.

There will be periodic formal evaluations of the fellow's progress at the end of each

rotation. Each fellow keeps a logbook of all cases performed and reviewed during his/her training. The fellow is expected to be actively involved in a research project with a national presentation i.e. Canadian Society of Anesthesiology Annual meeting.

### Details of the fellowship rotations:

#### **Non-cardiac operating rooms Rotation**

The non-cardiac ORs is the base of this fellowship training program. The fellow will start his/her rotation in the non-cardiac ORs and will have the chance to be familiar with the current institutional Echocardiography/US machines, transducers, ultrasound modalities and scanning techniques. Different echo/US and normal structure are taught during the first few weeks of the rotation. The fellow is encouraged to study echo text books, published guidelines and related ultrasound topics. Efforts are made to ensure appropriate booking, sufficient volume and diversity of cases. As the fellow advances with his/her echo/US skills, focus is drawn on indications, clinical applications and hemodynamic management of complex cases. The fellow will be assessed for his/her technical and cognitive skills periodically and booking will be adjusted accordingly. The specific goals and objectives of the non-cardiac echocardiography ranges from an initial basic knowledge to more complex hemodynamic management which include:

- Ultrasound physics and knobology
- Operate and navigate through the echocardiography machine
- Safe insertion of the TEE probe
- Acquiring images, saving, storing and reporting
- Indications and contraindications
- Normal echocardiography cardiac structures, blood velocity and directions
- Normal cardiac function
- Full comprehensive echocardiography exam
- Abnormal echo/US findings
- Perioperative hemodynamic management of patients with significant cardiac lesions.
- Rescue echo.

#### **Cardiac OR Rotation**

This rotation will be booked in the last three months of the fellowship (March –June). It allows the fellow to consolidate his/her TEE knowledge and provide the fellow with

the chance to assess patients with severe or critical cardiac lesions. It also provides the fellow with the chance to assess cardiac surgical repairs of different lesions (pre and post bypass). It is a one-month full-time rotation (one block).

Specific goals and objectives in this rotation include:

- Echocardiography as a diagnostic tool Exposure to a wide variety of cardiac lesions
- Gain experience on how to handle patients with critical cardiac lesions undergoing general anesthesia (GA) using the Echocardiography monitoring
- Understand and experience what patients with critical cardiac lesion can tolerate and what can't tolerate under GA. Compare the clinical findings with the echo images
- Consolidate TEE skills and interpretations of peri-operative findings to help prepare the fellow for the NBE
- Understand the basic concept of different cardiac repairs and the echo images associated with the repair.
- Recognize and appreciate the difference of hemodynamic management in patients presented for non-cardiac vs cardiac surgery.

Appropriate booking for the rotation will be sought to ensure adequate exposure to cardiac cases during the rotation.

### **PAC & PACU Rotation:**

This rotation will be arranged based on availability of cases and operating room booking during the non-cardiac surgery rotation. The fellow is supervised by the assigned staff echocardiographer of the day. The fellow is expected to perform transthoracic echocardiography (TTE) or US based on the clinical indication of the cases. PAC will service as a mini-echo lab station and a sonographer will be available to assist the fellow to perform the TTE/US exam, during which, the fellow gets full advantage of the cardiologist's experience and echo skills.

Specific goals and objectives during this rotation:

- Obtain the knowledge and technical skills of performing TTE exam
- Obtain the knowledge and technical skills of performing POCUS
- Exposure to elective and emergency indications for echocardiography outside the ORs.
- Utilization of different echo modalities, which include 2D, M mode, CFD, PW,

CW Doppler, tissue Doppler and detailed measurements.

- Learning the skills of interpretation, reporting of the findings and ensure proper OR booking and management.

### **Additional Rotations:**

This rotation will be determined based on the fellow's academic progress during the final assessment. It may require additional rotation on specific echo/US modalities. The fellow may also be given extra training in all POCUS exams (Table 3). Dates will be arranged with the fellow and the program director to ensure exposure to different exams is met.

This will include the following US exams:

- Lung/pleura US
- eFAST
- Abdominal exam (kidney, Hepatic, etc.)
- Carotid and hemodynamics
- Leg veins/DVT
- Transcranial Doppler (MCA)

### **Echocardiography CME & Echo Rounds**

This involves:

- Echo/US rounds to discuss different topics
- Echo/US rounds to discuss interesting cases and management
- Cardiac hemodynamic measurement and Calculations
- Review of different cases to ensure an adequate number that required by NBE.

Echo rounds will be conducted on weekly basis and it is the fellow's responsibility, in consultation with the program director, to choose the topic and cases for presentation.

**Table 1: PEERS Knowledge**

1. Basic principles of ultrasound physics and Knobology
2. Acquiring images, transmitting and archiving
3. PEERS indications and contraindications
4. Normal echocardiography cardiac structures, blood velocity and directions.
5. Normal cardiac function
6. Abnormal cardiac function and cardiac lesions
7. Utilization of 2D, M mode, CFD, PW, CW Doppler and tissue Doppler
8. Ability to perform hemodynamic echocardiography assessment and management
9. Recognize one's limitations and appropriately request assistance when needed

**Table 2: Technical Skills**

1. Operation and navigation through the echocardiography machine
2. Selection of the appropriate probe and basic setting
3. Safe insertion of the TEE probe and safe application of other US probes.
4. Perform of focus/limited exams and full comprehensive TEE exam
5. Assessment of hemodynamics including:
  - Loading conditions
  - Ventricular Function / dysfunction
  - RWMA
  - Valvular lesions
  - Shunting
  - Ventricular outflow obstruction
  - Pulmonary Emboli
  - Pericardial effusion
5. Reporting the findings

**Table 3: POCUS Exams & Skills**

- Cardiac Exam (limited TTE exams, parasternal, apical and subcostal views)
- Lung US (Lungs and Pleurae)
- eFAST (hemo-peritoneum and pneumo-hemo-thorax)
- Abdominal US (Hepatic and renal blood flow)
- Transcranial Doppler TCD (Middle cerebral A)
- Carotid Blood flow (Diameter and VTI)
- Leg veins US scanning (DVT)
- Gastric volume assessment
- Airway US

