**FACULTY CONTACT**: Dr. Angela Maxwell (ED Attending)

**RESIDENT CONTACTS**: Marc Delaney, Margarita Ramos

**FELLOW CONTACT:** Angelica DesPain

**BACKGROUND:**

Point of Care Ultrasound (POCUS) is the practice of non-radiologist clinicians using bedside ultrasound to gather and interpret their own imaging data to answer specific focused clinical questions. More and more physicians are using POCUS as part of their physical exam, quickly gathering new clinical data to help improve diagnosis, clinical management and procedural performance. The body of literature supporting POCUS is now well established, with a vast array of clinical applications in both general and subspecialty medicine. While it may seem advanced, several studies have shown that even novice sonographers with only a few hours of training can pick up an ultrasound probe and perform clinical exams with similar accuracy to more experienced sonographers.

*“The course will […} be focused on arming residents with the fundamentals they need to jump start a career-long effort in learning to provide better care to their patients by implementing POCUS in clinical practice”*

This two-week elective is designed to introduce pediatric residents to the basic utilization of point-of-care ultrasound. The course will introduce residents to a core group of classical exams and concepts, but will be focused on arming residents with the fundamentals they need to jump start a career-long effort in learning to provide better care to their patients by implementing POCUS in clinical practice. Residents will gain familiarity with the scope of how POCUS is relevant to many pediatric specialties but will also be able to tailor their experience to useful applications in their chosen or expected career field.

The curriculum consists of hands-on-training, didactic sessions, simulation sessions, and supplemental reading materials to develop background knowledge of main areas of POCUS. Residents will be given the opportunity to practice and develop their skills by scanning patients in the emergency department with the ultrasound faculty (ED physicians).

**LOGISTICS:**

Two week elective will be offered annually from October – June (with exception of holiday blocks). Residents can take this course as part of their call-free elective or selective time during any year of residency. Residents can repeat the course for repetition to solidify knowledge. Residents are still required to fill out and upload a selective/elective sheet to MedHub at the completion of the course.

As to balance the goals of maximizing resident access to this learning opportunity and providing each resident ample hands-on time in scanning, there may only be one “Full-time” and one “Part-Time” resident per week.

The **“full time”** resident is on the course for the full two weeks, and has the full course responsibilities outlined in this curriculum. This includes 3 scan shifts per week, and can therefore claim two module days per week by doing the extra required course material. The full time resident is expected to have some shifts of shared scanning time with maximum one additional learner, but will also have at least two 1:1 hands on scanning shifts with ED attendings.

The **“part time”** resident is not officially enrolled in the full course and can only sign up for two shifts per week maximum if another resident or learner is also signed up for the same week. The part time resident can only claim one module day on the selective/elective form by performing two of the five required videos and 2 of the required readings. *This means these residents may have to make arrangements to fill the rest of their elective time during the week with other elective experiences.*
 Your welcome email will go over how to sign up for shifts. You are expected to sign up for shifts at least one week in advance, and **to send a reminder email to your designated preceptor** 1-2 days before the shift**. Signing up** for clinical shifts is done **by entering your name on the “scan shift” google calendar (more instructions to followmailed to you) AND emailing** Marc Delaney (madelaney@cnmc.org) and Margarita Ramos (MRAMOS3@childrensnational.org).

**CURRICULUM / REQUIREMENTS (See table )**

* Five required online “Sonosim” interactive educational videos designed to cover basic US concepts. Log-in information will be assigned to you at beginning of course welcome email.
* Completion of reading material outlined in table below (selected readings from Pediatric Emergency Critical Care and Ultrasound, S. Doniger). **Please pick up this text book on the first few days of your rotation from the Chief resident’s office**.
* Six 2-4 hour scheduled scanning sessions in the emergency department with direct supervision by an ED attending trained in ultrasound (Rosemary Mohtat, Alyssa Abo, Joanna Cohen, Simone Lawson, Angela Maxwell, PEM US Fellows)
	+ Each session will focus on a specific system with teaching prior to scanning. However, any interesting diagnoses that are present in the ED will offer opportunities for scanning. Given this, please complete the modules and reading as early in the course as possible **and complete “US Basics” module before first shift**.
* **Attend quality assurance (QA) sessions** where ultrasounds from the previous week will be reviewed. This is every **Monday at 10am** in the ED conference room. This will be posted on the US calendar where you sign up for shifts as well, and faculty will be expecting you.
* Attend monthly GW-CNMC Journal Club if the session falls during your two-week elective. These dates will be as seen on the PEM US calendar.
* Optional SonoSim ultrasound simulator cases available to you in the Simulation Center.
* **Completion of course Pre-test and post-test (<10m each).**

**EDUCATIONAL OBJECTIVES:**

*To be focused on during sonosim sessions, self-directed learning time, and hands-on scanning sessions with preceptors. Students encouraged to expand areas of focus based on career/personal interest in relevant ultrasound applications. Students are expected to be proficient in obtaining and recognizing these views and their relevant anatomy and pathophysiology by the end of the course, to be included on the post-course examination.*

1. **Be Familiar with US Physics/Knobology:**
	1. Gain, depth, high frequency vs low frequency, artifact vs real image.
2. **Be Familiar with Common US Views and Anatomy**:
	1. Abdominal: subxiphoid IVC, Right Upper Quadrant, Bladder view.
	2. Cardiac: Parasternal short and Long axis views, subcostal cardiac view, and apical four-chamber view.
	3. Lung: basic lung and chest wall view superficial, costovertebral recess view, “A/B/C profile” deep lung view.
	4. Misc: superficial skin and soft tissue views
3. **Recognize common important US findings:**
	1. Abdominal: intraperitoneal fluid, hydronephrosis, bladder volume, IVC fluid non-responsive state.
	2. Cardiac: pericardial effusion, global LV dysfunction.
	3. Lung: Pneumothorax, pleural effusion, frank pulmonary edema, lung consolidation.
	4. Misc: tissue abscess, cellulitis, lymph node, IV/LP needle tracking procedural guidance.
4. **Optional additional Views/ Pathology students may choose to focus on based on interest:**
	* 1. Cardiac: FAST exam, signs of cor pulmonale,
		2. Musculoskeletal: joint effusions, fractures
		3. Procedural: arterial puncture guidance, LP guidance,
		4. Abdomen: gallbladder, intussusception, pyloric stenosis, appendicitis

**EVALUATION/FEEDBACK:**

Supervising ED faculty will provide feedback on ultrasound during scanning sessions and Monday QA sessions. A Med-Hub evaluation will be delivered to the residents and faculty supervisors at the end of the rotation to provide feedback and ways to improve the elective. You will also be asked to complete a pre-course and post-course evaluation of your POCUS image interpretation and clinical application skills.

**SIGNING UP FOR ELECTIVE:**

1. [**US ELECTIVE SIGN-UP GOOGLE FORM**](https://docs.google.com/forms/d/12Zd8TbktAf6Od0HgjU4eOcDcm4suSIko9sNWUNnV0NA/edit)
2. Send an **email** to Marc Delaney (madelaney@cnmc.org) and Margarita Ramos (MRAMOS3@childrensnational.org) email telling us that you’ve submitted your preferred dates! We will email you back with availability as it is first come, first serve.
3. Residents must also fill out elective/selective form. If any questions or concerns please contact course representatives.

**SIGNING UP FOR SCANNING SHIFTS:**

(1) The ED Ultrasound scanning calendar will be emailed to you 1-2 weeks prior to starting your elective

(2) Sign up for shifts that work for you by clicking on available shifts and typing your name under the attending’s name (eg. Marc Delaney – resident 10a-2p) In order to maximize the rotation hands on experience, It is recommended to if at all possible avoid fellow scan shifts and scan on dates with the fewest learners

(3) You should have **at least six scanning shifts** during the two week block.

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| **Course Objectives And Learning Materials:** |
|  | **Views** | **Findings** | **Doniger Reference Readings** | **Open-Book Module** |
| **US Physics/ Knobology** | B-Mode, M-Mode, Doppler Modes, US Physics | Gain, depth, high frequency vs low frequency, artifact vs real image. | 1, S2 | Fundamentals of Ultrasound (1-1.5hr) |
| **Abdominal** | Morrison’s Pouch/ RUQ View, subxiphoid IVC, Bladder view | intraperitoneal fluid, hydronephrosis, bladder volume, IVC fluid non-responsive state. | 9, 10, 11,16 | Rapid Ultrasound in Shock (RUSH) Exam (1hr) |
| **Cardiac:** | Parasternal short and Long axis views, subcostal cardiac view, Apical four-chamber view. | pericardial effusion, global LV dysfunction. | 5, 7 | Cardiology (1-2hr) |
| **Lung** | Basic lung and chest wall view superficial, costovertebral recess view, “A/B/C profile” deep lung view | Pneumothorax, pleural effusion, frank pulmonary edema, lung consolidation | 6 | Pulmonary (1hr) |
| **Misc:** | superficial skin and soft tissue view, | tissue abscess,cellulitis, lymph node, foreign body IV/LP needle tracking procedural guidance. | 15, 18, 19 | Introduction to Ultrasound-Guided Procedures (1 hour) |

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| **Additional based on interest: *(optional)*** | Cardiac: FAST exam,Musculoskeletal: joint effusions, fractures, Procedural: arterial puncture guidance, LP guidance,Abdomen: gallbladder, intussusception, pyloric stenosis, appendicitis | See supplemental Videos/Readings Table below. |

**Sonosim Open-Book Modules:**

These can be found here: <https://sonosim.ttlms.com/signon/index.cfm>

You will receive log-in information from an email “SonoSim Support at support@sonosim.com.” Bookmark this website and save your login info. Please email a rotation contact as listed on the top of this document if you have not received your login information by the Sunday before your rotation. As seen in the curriculum table above, you must complete five modules: Fundamental of ultrasound, Cardiology, Rapid Ultrasound in Shock (RUSH), Pulmonary, and Introduction to Ultrasound-Guided Procedures. You must pass the mastery test at the end of the module (can retake as many times as you want). While you have a total of 4 module-days during this course, it works best if you can do as many modules early on in the course as possible then focus on the hands on sessions and looking through the additional reading ideas material as listed in the table. Each of the 5 modules should take you an hour each, and are best done in conjunction with the course text book.

You will notice that the SonoSim courses are based on a series of videos and engagement questions. You can speed up or slow down the videos, and your responses to the multiple choice questions throughout are for educational purposes only. Based on this, it is generally more important to pay close attention to video content than spend excessive time on the questions, and you may skip some participation questions without penalty. However, these similar questions show up on the mastery exams and you don’t get the chance to review your mastery test until you pass (75% or higher) so reading them is helpful. You are required to complete and pass each mastery exam unless otherwise specified. The mastery exams are **open book** and you should feel free to use the relevant suggested readings or any other materials. These modules contain a lot of information, and each can take 1-2 hours each, but are meant to serve as a useful reading /video source. The videos are among the most condensed but relevant series of images and references available and can be really helpful. **Please do not hesitate to email a course contact if you find you are spending over 2 hours on any given module, are overly frustrated by any of these modules, or if you need additional help/resources**.

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| **supplemental reading/videos table (optional)** |
| **Topic** | **Video** | **Doniger Reading** |
| **(1) Physics and Knobology** | https://vimeo.com/46937198 | 1, S2 |
| **(2) FAST/eFAST** | https://vimeo.com/52896340https://vimeo.com/34118863 | 4 |
| **(3) CARDIAC/IVC** | https://vimeo.com/44570642https://vimeo.com/44575412 | 5, 7 |
| **(4) LUNG** | https://vimeo.com/46515236https://vimeo.com/51212231 | 6 |
| **(5) ABDOMEN** | https://vimeo.com/37877537https://vimeo.com/93051990 https://vimeo.com/42164365 https://vimeo.com/87759897 | 10, 11 |
| **(6) RENAL AND BLADDER** | https://vimeo.com/69556457 | 9, 16 |
| **(7) VASCULATURE** | https://vimeo.com/52819569https://vimeo.com/44255343https://vimeo.com/41543020 | 15 |
| **(8) Musculoskeletal** | https://vimeo.com/46518256https://vimeo.com/41682960 | 19 |
| **(9) SOFT TISSUE** | https://vimeo.com/50144679 | 18 |