



# CAEP EMERGENCY ULTRASOUND COMMITTEE SPECIAL CAEP24 NEWSLETTER

Greetings POCUS enthusiasts,

CAEP24 in Saskatoon is finally here! In the upcoming days, there are many exciting POCUS-related presentations, interactive sessions at the learning expo and of course the not to be missed Great Canadian POCUS Championship.

To keep you in the loop, we have compiled a list of daily events included in this newsletter. Also be sure to check out the POCUS-related abstracts for CAEP24.

We look forward to seeing you soon!

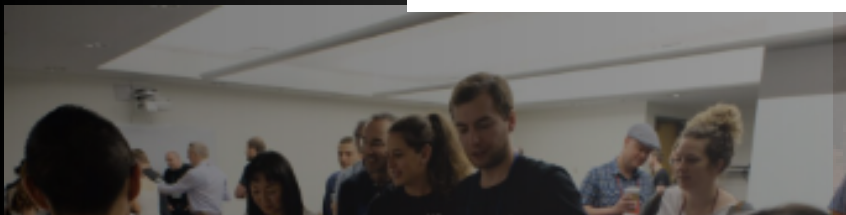
-Talia Burwash-Brennan

Newsletter  
Highlights

POCUS-Related Events

CAEP24 POCUS Abstracts

## Happening Today!



### The Great Canadian POCUS Championship

Today June 8th at 10:30 am  
& June 9th at 10:45 am



### EUC Social

Contact: [dkim000@gmail.com](mailto:dkim000@gmail.com) or [@dan\\_\\_kim](https://www.instagram.com/dan__kim)  
for more details

# POCUS-Related Events and Presentations

## Saturday, June 8, 2024

1030-1200: Gillian Sheppard & Team - **Great Canadian POCUS Championship - Qualifying Round**, Lower Level, Centennial Hall A  
1300-1700: Tom Jelic & Team - **Preconference CAEP Ultrasound Guided Nerve Block Workshop**, Centennial Hall C  
1900-late: **EUC Social/Dinner**, Paul Olszynski's backyard (DM @dan\_\_\_kim if interested in attending)

## Sunday, June 9, 2024

1045-1215: Gillian Sheppard & Team - **Great Canadian POCUS Championship - Qualifying Round**, Lower Level, Centennial Hall A  
1500-1700: Emma Burns, Daryl Graham, Lianne McLean - **Pediatric POCUS: Little People, Big Fun**, Learning Expo - Main Level, Gallery BCD  
1500-1700: Paul Olszynski - **Ultrasound Guided Procedures**, Learning Expo - Main Level, Gallery BCD

### POCUS Research

1430-1438: Tan A. Artificial intelligence vs expert for point-of-care ultrasound assessment of the inferior vena cava in the emergency department. Moderated poster, Main Level, Gallery A  
1446-1454: Andani R. Rural and remote Canadian emergency medicine physicians' experiences using point-of-care ultrasound. Moderated poster, Main Level, Gallery A  
1724-1732: Russell M. What lies beneath: lower left sternal border overlies the left ventricle in most patients. Top 7 Research Moderated poster, Main Level, Gallery A  
1732-1740: Chandra K. ECHOSIM: Brief simulation-based TEE training in cardiac arrest. Top 7 Education Moderated poster, Main Level, Gallery A

## Monday, June 10, 2024

1050-1110: Lianne McLean - **Level Up Your Pediatric Procedures With POCUS**, Everyday Excellence in EM track, Lower Level, Centennial Hall A  
1110-1130: Daryl Graham - **Pediatric POCUS: Transforming Pediatric Emergency Medicine**, Everyday Excellence in EM track, Lower Level, Centennial Hall A  
1230-1330: **EUC Annual Meeting**, TCU Place - Main Level, Gallery Suite I

### POCUS Research

1150-1200: O'Neill K. Improving the rate of use of fascia iliaca compartment blocks in patients presenting with hip fractures. Oral presentation, Lower Level, Centennial Hall B  
1150-1200: Chandra K. ECHOSIM: Asynchronous simulation-based training of resuscitative transesophageal echocardiography in emergency physicians. Oral presentation, Lower Level, Centennial Hall C

## Tuesday, June 11, 2024

1430-1450: Paul Olszynski - **Zen and the (st)Art of Undergraduate POCUS**, The Learning Continuum track, Lower Level, Centennial Hall C  
1530-1605: Tom Jelic - **Nerve Blocks Every Emergency Physician Should Know**, The Leading Edge track, Lower Level, Centennial Hall B  
1605-1620: Dan Kim - **Top 5 POCUS Papers You Should Know From 2023**, The Leading Edge track, Lower Level, Centennial Hall B  
1620-1635: Kayla Furlong & Gillian Sheppard - **Delirium & Agitation in Older Adults: The Role of POCUS**, The Leading Edge track, Lower Level, Centennial Hall B  
1635-1650: Gillian Sheppard - **Early Pregnancy POCUS: Is It Time to Evolve?** The Leading Edge track, Lower Level, Centennial Hall B

### POCUS Research

0800-1530: Marshall RA. A matter of the heart: Guided by transesophageal echocardiography during CPR, healthcare providers modify the area of compression. Poster, Main Level, Gallery A  
0800-1530: Sahota IS. PENG in the ED: A novel regional anesthesia technique for hip fractures. Poster, Main Level, Gallery A  
0800-1530: Sheppard G. Integration of POCUS into an existing undergraduate medicine anatomy course. Poster, Main Level, Gallery A  
1610-1620: Chandra K. The diagnostic accuracy of bedside ultrasound in patients with suspected acute aortic dissection: Systematic review and meta-analysis. Lightning Oral presentation, Main Level, Gallery C  
1630-1640: Ali N. Are emergency physicians able to identify sonographic signs of massive pulmonary embolism? Lightning Oral presentation, Main Level, Gallery C

## Wednesday, June 12, 2024

0935-0955: Dennis Cho - **POCUS - The Ultimate Debiasing Tool**, The Leading Edge track, Lower Level, Centennial Hall B

### POCUS Research

0945-0955: Al Ghamdi F. Comparing short axis versus long axis ultrasound-guided techniques for internal jugular vein cannulation: A meta-analysis of clinical outcomes and safety. Lightning Oral presentation, Main Level, Gallery C



2025

**Montreal**

Palais des Congrès de Montréal

May 25<sup>th</sup> – May 28<sup>th</sup>

# CAEP24 POCUS RESEARCH ABSTRACTS

## **1) Artificial intelligence vs expert for point-of-care ultrasound assessment of the inferior vena cava in the emergency department - Drs. Alan Tan, Karan Chawla, Daniel Dongjoo Lee, Jordan Chenkin - University of Toronto**

### Introduction

Point-of-care ultrasound (POCUS) has become a crucial tool in the management and work-up of emergency department (ED) patients at the bedside. Assessment of the inferior vena cava (IVC) collapsibility index (CI) is a surrogate of central venous pressure (CVP) and can assist in determining the type and severity of shock. Recent advancements in artificial intelligence (AI) have led to the creation of POCUS machines that provide automatic calculations of these findings. The objective of this study is to determine the accuracy of CI measurements made by POCUS AI tools compared to those made by an expert sonographer.

### Methods

A convenience sample of ED patients who are alert with no critical illness were invited to participate in the study. An expert scanner and a novice scanner calculated the IVC CI both manually and using an integrated POCUS AI software. The order of using AI and manual measurements was randomized for each patient, and the operators were blinded to the other operator's measurements. A third, blinded expert reviewer reviewed the archived clips and served as the reference standard. The primary outcome of this study was the accuracy of the IVC CI by a novice scanner using AI and by an expert scanner measured manually compared to that of an expert reviewer. Secondary outcomes include comparison of scan time, IVC diameter, and CI between novice and expert for both manual and AI measurements.

### Results

A pilot phase of 10 patients (60% male, average BMI 24.04) have been recruited in the study. The mean absolute error between the AI CI calculation done by the novice and the manual CI calculation done by the expert was 15.22%. The CVP of three patients were misclassified as a result of this error (two instance of normal CVP considered low, and one instance of low CVP considered normal). The average scanning time for the novice AI group and the expert manual group were 70.1s and 102.3s, respectively.

### Conclusion

Preliminary data suggest CI measurements made by an integrated POCUS AI software is inferior to those made by an expert POCUS scanner with longer scanning time. This resulted in the misclassification of CVP by the AI tool when compared with manual scanning by expert.

## **2) Rural and remote Canadian emergency medicine physicians' experiences using point-of-care ultrasound - Rafiq Andani, MBBS, CCFP(EM) (University of Manitoba), Gillian Sheppard (Memorial University), Queen Jacques (Memorial University), Yanqing Yi, PhD (Memorial University), Taft Micks (University of Manitoba), Tom Jelic (University of Manitoba), Jordan Stone-Mclean, David Bradbury-Squires and Michael Parsons (Memorial University)**

### Introduction:

Point-of-care ultrasound (POCUS) is an evolving clinical tool with significant potential to enhance patient care, particularly for an estimated 7 million Canadians in rural, remote, and under-resourced areas. While POCUS training and utilisation have been evaluated at the regional and national levels, a specific national appraisal of its use

and distribution in rural settings remains unexplored. Such an appraisal is crucial to quantify the dissemination, uptake, and integration of POCUS into emergency medicine workflow in rural and remote clinical environments. This study aimed to assess POCUS usage, training levels, and the barriers to training and usage faced by rural emergency physicians in Canada.

#### Methods:

A modified version of a previously validated electronic survey of rural POCUS utilisation was distributed to rural and remote physicians practising in Canada. The data was analysed using descriptive statistics and analysis of variance to examine associations between demographic factors (years in practice, age, and distance to referral site), POCUS training, and POCUS usage.

#### Results:

A total of 168 participants completed the survey. Ninety-four percent of participants reported using POCUS on a regular basis. Of these, 98% found their devices compatible with their level of training and 95% reported that the devices met their clinical needs. Barriers to obtaining POCUS training included the high cost of POCUS courses (63%), the distance to the training centre (48%) and the inability to take time off (43%). Only ~2% of physicians reported a lack of training or inability to maintain competency (<1%) as barriers to POCUS utilisation.

#### Conclusion:

The study provides foundational insights into the distribution of POCUS in Canada's rural and remote emergency physician practice. This will help to guide effective strategies to mitigate barriers to POCUS training and utilisation and ensure equitable resource distribution

### **3) What lies beneath: lower left sternal border overlies the left ventricle in most patients - Mackenzie Russell, Ali Almaleki, Chau T. Pham, Joseph Newbigging, Revathi (Rey) Nair, Olivia Woo, Andrew Ujvary, Tracy Wilson, Michael Heynen, Tom Jelic, Paul Olszynski**

#### Introduction:

Current resuscitation guidelines recommend the lower half of the sternum as the landmark for the area of compression (AOC). Multiple studies using computed tomography, magnetic resonance imaging, and echocardiography have demonstrated that the current AOC may result in outflow obstruction and inadequate left ventricle (LV) compression. A recent study mapping cardiac anatomy to surface landmarks revealed that placing the rescuer's palm at the intersection of the left sternal border (LSB) and inter-nipple (IN) line would overlie the LV in the majority (72%) of study participants (healthy volunteers). We sought to validate the results of the previous study through enrollment of patients.

#### Methods:

Patients between the ages between 20-90 years were recruited in Saskatoon (SK), Winnipeg (MB), and Kingston (ON) over a 3-year period (2021-23). Biometric data including sex, age, height, weight, and intercostal level of the IN line were collected along with past medical and

surgical history. Transthoracic ultrasound was performed to determine cardiac anatomy along a 10-point grid made of the 3rd through 7th intercostal spaces (rows) intersecting the LSB and midclavicular (MC) lines. Data was analyzed using descriptive statistics.

#### Results:

159 patients were enrolled in the study (mean age 56.3 +/- 1.2 years, mean BMI 27.7 +/- 0.5), with 82 males (52%) and 77 females (48%). 81 (51%) had one or more medical conditions. The LV was identified along the LSB in 128 (80.5%) of patients. When using the IN line to determine LV location, 56/159 (35.2%) had exact agreement, though the landmark performed better amongst males (33, 40.2%) than females (22, 28.6%). When combining the intercostal space above and below the IN line (representing a palm-width during compressions), the LV would be below in 99 (62%) of study patients. Alternatively, placing the palm over the most common ICS (5th) at the LSB would overlie the LV in 119 (75%) of patients.

#### Conclusion:

Compared to the previous study, there was a significant increase in morbidity as well as the number of subjects with laterally displaced LVs (under the MC line). As with the previous study, the LV was identified beneath the lower left sternal border (ICS 4, 5, and 6) in most patients (75%). In 62% of study patients, the intersection of the LSB and IN provides a readily identifiable landmark where compressions would be done directly over the LV. Further research on the biomechanical effects of compressions over the lower LSB is warranted.

## **4) ECHOSIM: Brief simulation-based TEE training in cardiac arrest - Kavish Chandra, Kiera Dolan, Rawan Makhdom, Pamela McDougall, Paul Atkinson, David Lewis**

#### Introduction:

Point of care ultrasound (PoCUS) is regularly used in the care of patients with cardiac arrest in the emergency department (ED). Emergency physicians are increasingly using transesophageal echocardiography (TEE) to help guide both in-arrest resuscitation and following return of spontaneous circulation. Prior studies have looked at TEE skill acquisition in emergency medicine residents following a brief learning intervention. Our study aimed to determine if a brief learning intervention is effective at teaching emergency physicians, already experienced with PoCUS, the essential TEE views to help guide CPR.

#### Methods:

We conducted a prospective study on emergency physicians with baseline PoCUS experience at a single ED. Those who agreed to participate viewed a 30-minute module on TEE in the ED and reviewed a four-core view resuscitative protocol, which included the mid-esophageal four-chamber, mid-esophageal long-axis, trans-gastric short-axis, and bicaval views. The physicians completed a baseline assessment of TEE image generation using a simulator, followed by a brief guided practice of the four TEE views. Finally, a post-intervention assessment was conducted. The primary outcome was the percentage of adequate essential cardiac arrest views (mid-esophageal 4-chamber and long-axis) determined by two blinded reviewers using a scoring tool. The secondary outcome was assessing how likely physicians would use TEE in the care of cardiac arrest patients.

## Results:

Twenty emergency physicians completed the study. All participants had PoCUS experience: 60 % had completed a core course, 30 % an advanced course and 10 % received training in residency. The percentage of essential views increased from 55 % (95 % CI 34-74 %) to 95 % (74-99 %;  $p < 0.001$ ) following the guided practice. When participants were asked how likely they would use TEE in the future, 65 % were very likely or likely to do so. Twenty-five percent were unsure and 5 % were unlikely to use TEE in the future.

## Conclusion:

A brief TEE simulation module was effective at teaching emergency physicians with PoCUS experience the essential TEE views in cardiac arrest patients; however, less than half were unsure or unlikely to use TEE in the future. Future studies should explore challenges and barriers to incorporating TEE use in the ED.

## **5) Improving the rate of use of fascia iliaca compartment blocks in patients presenting with hip fractures - Kristin O'Neill, Joseph Boyle, Logan Haynes, Brittany Ellis, Rob Woods, Taofiq Olusegun Oyedokun, MBChB, MMed , Sachin Trivedi**

### Background & Aim Statement:

Patients presenting to the emergency department (ED) with hip fractures often receive opioid analgesics, which are associated with several adverse side effects, especially in older adults. The fascia iliaca compartment block (FICB) is a regional anesthetic technique that is a safe alternative analgesic method which has been shown to improve pain scores and reduce rates of delirium. FICBs have been infrequently used in Saskatoon EDs, with only 3% of patients receiving these between July 2020 and January 2021.

We aimed to have 50% of all patients presenting to the ED with hip fractures receive FICBs in 18 months.

### Measures & Design:

We utilized the Model for Improvement for our project. Our primary outcome measure was the rate of FICBs performed. For process measures, we tracked the number of ED physicians performing the FICBs as well as their self-described comfort in performing the procedure. With respect to balancing measures, we looked at adverse events resulting from the FICB. Over our 18-month improvement project, we held three PDSA cycles. These were designed in accordance with four surveys sent to our ED physician group and consisted of dissemination of educational materials, standardization of equipment carts across our three EDs, educational sessions serving to train ED physicians on how to perform ultrasound or landmark guided FICBs, as well Audit & Feedback and incentive programs. Our measures were collected through a combination of retrospective chart review and analysis of the survey responses.

### Evaluation/results:

The rate of FICBs performed increased from 3.0% to 20.9% over the improvement project period. The number of physicians performing the FICB increased from 6 pre-project to 35. Before our project, only 31.5% of physicians who responded to the survey endorsed being able to independently perform the FICB or teach it. This number increased to 53% after the conclusion of our project. Only one adverse event occurred (arterial puncture), which did not

cause any significant patient harm. We did plot our results on a run chart, but did not meet any rules which would signify non-random variation.

#### Discussion/impact:

Although we did not meet our goal, we substantially increased the number of FICBs performed and the number of physicians performing the procedure. We moved closer to making FICBs part of our culture and standard of care for this patient population. Other EDs seeking to increase their FICB rates should consider using this process.

## **6) ECHOSIM: Asynchronous simulation-based training of resuscitative transesophageal echocardiography in emergency physicians - Kavish Chandra, Kiera Dolan, Rawan Makhom, Pamela McDougall, Paul Atkinson, David Lewis**

#### Introduction:

Emergency physicians are increasingly using transesophageal echocardiography (TEE) in the emergency department (ED). Simulation-based TEE training has been shown to be an effective learning tool to help teach TEE to physicians looking after critically ill patients in the ED. However, it is unclear if very brief asynchronous learning and simulation-based TEE training are also effective for emergency physicians already experienced in point-of-care ultrasound (PoCUS). Our study aims to determine the effectiveness of this type of training.

#### Methods:

We conducted a prospective study on emergency physicians with baseline PoCUS experience at a single ED. Those who agreed to participate viewed a 30-minute module on TEE in the ED and reviewed a four-core view resuscitative protocol, which included the mid-esophageal four-chamber (ME4C), mid-esophageal long-axis (MELAX), trans-gastric short-axis (TGSA), and bicaval (BC) views. The physicians completed a baseline assessment of TEE image generation using a simulator, followed by a brief guided practice of the four TEE views. Finally, a post-intervention assessment was conducted. All views were recorded. The primary outcome was the percentage of total successful views determined by two blinded reviewers using a scoring tool.

#### Results:

Twenty emergency physicians completed the study. The mean age was 39 years old, 30 % were female, the median clinical experience was 5.5 years, and all participants had PoCUS experience (60 % core, 30 % advanced and 10 % received training in residency). At baseline, 63 % (95 % CI 52-72 %) views were successful and following guided practice, it increased to 93 % (84-97 %;  $p < 0.001$ ). Participants generated successful ME4C views 100 % of the time ( $p$  non-significant), MELAX views increased from 55 % to 95 % ( $p < 0.001$ ), TGSA views increased from 65 % to 85 % ( $p$  non-significant), and BC views increased from 30 % to 90 % ( $p < 0.001$ ).

#### Conclusion:

A very brief 30-minute module on TEE in the ED was reasonably effective at generating successful TEE views using a simulator, and increased with guided practice. Future studies will focus on how to maintain TEE skills in physicians who regularly use PoCUS in the ED.

## **7) Integration of Point of Care Ultrasound (POCUS) into an existing undergraduate medicine anatomy course - Gillian Sheppard, Peter Collins, MD, Caitlin Hutchings, Hannah Wadman-Scanlon, BSc, June Harris, MD**

### **Innovation Concept:**

Ultrasonography is a valuable procedural guide and diagnostic tool across many medical specialties. In 2017, a descriptive cross-sectional survey at Memorial University of Newfoundland supported the integration of POCUS into the undergraduate medical curriculum and suggested incorporating specific preclinical/clinical applications of POCUS. The present study describes the integration of POCUS into an existing anatomy curriculum for undergraduate medical students using Kern's 6-step approach to curriculum development.

### **Methods:**

In the pilot phase, first year medical students were surveyed about their prior POCUS experience. A POCUS syllabus designed for first-year medical students with no prior ultrasound training. Standardized patients were used as live models for scanning. Each session was taught by qualified instructors from various medical specialties and delivered over 30 minutes as part of a 2-hour gross anatomy lab. Student feedback was collected during the pilot phase. Following formal implementation, the students' POCUS anatomy knowledge was assessed using multiple-choice questions.

### **Curriculum, Tool or Material:**

Each POCUS session was designed to be integrated into existing 2-hour gross anatomy labs for each of the following regions: Thorax, Abdomen, Pelvis, Musculoskeletal, Peripheral Nervous System, and Head & Neck. The sessions took place in a large teaching room where a group of 20 students rotated through the station every 30 minutes. The students' reactions to the integration of POCUS into anatomy were overwhelmingly positive for the pilot phase. When the material was assessed in the formal curriculum, students performed well on the POCUS exam questions.

### **Conclusion:**

The successful integration of POCUS into the anatomy curriculum at Memorial University began with identifying a gap in the curriculum and proceeding purposefully with curriculum design. By describing our methods and providing our educational materials it is anticipated that educators at other medical schools can use these methods to gather evidence to support additions to (or deletions from) the curriculum. Kern's framework was used to work through the various stages of curriculum development and implementation. POCUS can be used to successfully enhance an existing anatomy course within undergraduate medical education. This template may be useful to other educators who wish to integrate this technology into their curriculum.

## **8) The diagnostic accuracy of bedside ultrasound in patients with suspected acute aortic dissection: systematic review and meta-analysis - Kavish Chandra, David Lewis, Paul Atkinson, Alison Manley, MLIS, Sara Hussain, MD**

### **Introduction:**

Acute aortic dissections (AAD) can lead to serious consequences, even death, if not treated promptly. Despite the proven benefits of quick identification and surgery, standard imaging procedures like CT angiography or transesophageal echocardiography can be invasive, time-consuming, and difficult to access in smaller centers. Recent research indicates that bedside ultrasound may be a valuable tool for diagnosing AAD. However, there is significant variability in the accuracy of this method across different studies. Our objective was to evaluate the sensitivity and specificity of bedside ultrasound in detecting AAD.

### **Methods:**

The following process was used to identify relevant studies: electronic databases MEDLINE and EMBASE were searched, and supplementary sources were also consulted, such as expert advice, manual search through reference lists, and abstract books from conferences held within the last 5 years. To be included in the study, patients must have undergone bedside ultrasound and a gold standard reference test. Reports must provide all necessary values to calculate sensitivity and specificity using a 2x2 table. Studies were first screened based on title and abstract, and then subject to a full text review. Finally, a meta-analysis was conducted using Revman software.

### **Results:**

A total of 18 studies were included, representing 2795 patients. Our meta-analysis showed that bedside ultrasound has a sensitivity of 79 % (95 % CI 70-85 %), specificity of 79 % (71-86 %), positive likelihood ratio of 3.5 and negative likelihood ratio of 0.22 for detection of AAD. A summary receiver operating curve shows a high area under the curve and good discriminability power.

### **Conclusion:**

Bedside ultrasound is a reliable and rapid imaging technique for ruling in AAD; however, the specificity limits its ability to rule out AAD.

## **9) Are emergency physicians able to identify sonographic signs of massive pulmonary embolism? - Noman Ali, Jordan Chenkin, Alan Tan, MD**

### **Introduction:**

Massive pulmonary embolism (PE) is a life-threatening condition that has a high mortality rate if not identified and treated promptly. Due to patient instability, it is often not possible to obtain definitive diagnostic imaging such as computed tomography pulmonary angiography (CTPA). Point-of-care ultrasound (PoCUS) has gained increasing attention as a valuable tool for rapid assessment of PE at the bedside. The primary objective of this study is to determine whether emergency physicians can accurately interpret ultrasound clips to rule in and rule out massive pulmonary embolism. Secondary objectives include the evaluation of their knowledge and comfort with PoCUS for the identification of massive PE.

### **Methods:**

We conducted a single-center study at an urban academic health sciences center. All emergency physicians were invited to participate in an online assessment. Participants completed an anonymized web-based baseline questionnaire to assess their comfort and familiarity with using PoCUS for massive PE. They then completed a knowledge assessment and were asked to interpret a series of ultrasound clips, each with a stem describing a patient in shock. Descriptive statistics including standard deviations are reported.

### **Results:**

A total of 30 participants were invited to participate, and 16 (53%) responded. Twelve participants (75%) reported a low confidence level for identifying PoCUS signs of massive PE and 56% reported that the lack of training is the most important barrier to its use. For the interpretation of the PoCUS clips, all participants correctly identified right ventricular (RV) dilation, and 94% (SD 0.24) recognized septal flattening. Only 44% (SD 0.51) were able to identify the signs of chronic RV dilation. Participants scored a mean of 54.4% (SD 12.2) on the knowledge assessment, with knowledge gaps identified in wall thickness (56% correct, SD 0.50) and RV diameter (37% correct, SD 0.51).

### **Conclusion:**

In this study, we found that emergency physicians correctly identified signs of massive pulmonary embolism in a majority of PoCUS clips. However, significant knowledge gaps exist, notably in RV diameter. These findings may serve to guide future training to help fill these knowledge gaps.

## **10) Comparing short axis versus long axis ultrasound-guided techniques for internal jugular vein cannulation: a meta-analysis of clinical outcomes and safety - Faisal Al Ghamdi, MBBS**

**Dr. Imam Abdulrahman bin Faisal University, Nasser AlJoab, MBBS, Ali Aldawood, MBBS**

**Consultant, Mohammed AlGhamdi, MBBS, Abdullah AlMluhim, MBBS**

### **Introduction:**

The introduction of ultrasound-guided internal jugular vein (IJV) access has significantly improved central venous access in comparison to the traditional landmark technique. It has done so by providing real-time visualization of the vein, reducing the number of needles passes and procedure time. The two most commonly used approaches are the short-axis (SAX) and long-axis (LAX) techniques. In this meta-analysis, we aim to compare between the two methods.

### **Methods:**

A meta-analysis following PRISMA guidelines assessed RCTs on adult patients undergoing ultrasound-guided IJV catheterization via short-axis or long-axis view until May 2023. Our primary outcome: first-pass needle success rate. Secondary outcomes: needle passes, attempts, IJV access time, and complications. Databases searched: PubMed, EMBASE, Cochrane CENTRAL, Web of Science, and EBSCO Plus. Exclusions: pediatric studies, non-IJV vein cannulation, non-English, and non-RCTs. Statistical analysis used Review Manager 5.4.1, employing a random effects model for data combination. Results presented as mean differences for continuous outcomes and odds ratios with 95% CIs for dichotomous outcomes.

### **Results:**

From 2680 articles, 11 articles met our criteria with a total of 1183 patients with 590 patients in the SAX group and 592 patients in the LAX group.

First needle pass success rate: Nine of the eleven trials provided data. The SAX group had a significantly greater first-pass needle success rate than the LAX group. (OR 1.91, CI 1.04-3.54;  $P = 0.04$ ;  $I^2 = 60\%$ ).

Number of cannulation attempts: Three trials reported on three needle attempts. SAX approach had significantly less attempts compared to LAX. (OR 0.16, CI 0.04-0.62;  $P = 0.08$ ,  $I^2 = 0\%$ ).

IJV access time: Three trials assess the access time and was found to be significantly less in the SAX group compared to the LAX group. (MD -5.87, CI -8.18 to -3.56;  $P < 0.00001$ ;  $I^2 = 49\%$ ).

Complications: For posterior wall puncture, 4 trials reported and found that it was associated more with SAX. (OR 11.04, CI 3.50 to 34.80;  $P < 0.0001$ ;  $I^2 = 0\%$ ). Hematoma, arterial puncture and catheter-related infections were statistically insignificant.

### **Conclusion:**

In summary, the SAX approach shows advantages in terms of first-pass success rate, fewer cannulation attempts, and shorter IJV access time. However, it is important to note the increased risk of posterior IJV wall puncture associated with the SAX technique. Further research is needed to strengthen the evidence and improve clinical decision-making.