### ES-S01

Diagnostic Performance of Transthoracic and Transesophageal Echocardiography in Patients with Cardiac Arrest: ASystematic Review and Meta-analysis

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**Objective:** Focused echocardiography including transthoracic echocardiography (TTE) and transesophageal echocardiography (TEE) has been introduced during resuscitation in patients with cardiac arrest (CA). However, whether TEE exhibits an advantage over TTE in the identification of potentially reversible etiologies was unknown.

**Data Sources:** A systematic review was conducted following PRISMA guidelines. PubMed, Embase, and Google Scholar were searched for eligible studies.

**Study Selection:** We identified articles that evaluated the diagnostic value of TTE and TEE in adult patients with non-traumatic CA during resuscitation. Two authors independently screened and selected articles for inclusion.

**Data Extraction:** We dual-extracted study characteristics and target conditions (pericardial effusion, cardiac tamponade, aortic dissection, pulmonary embolism, regional wall motion abnormality, hypovolemia, and reduced left ventricle function). The quality assessment was performed using the Quality Assessment of Diagnostic Accuracy Studies Version 2 (QUADAS-2) criteria. **Data Synthesis:** The forest plot was conducted, and the pooled test characteristics with the 95% confidence interval (CI) of target findings of TTE and TEE were presented. Fourteen studies with a total of 1,784 patients were included. The etiology of cardiac arrest (CA) was identified in 49% (701/1,444) of patients in the 7 studies of TTE, and 54% (184/340) in another 7 studies of TEE. The pooled area under the curve, sensitivity, and specificity on all target findings of TTE and TEE were 0.991 (95% CI: 0.987-1.000) and 0.992 (95% CI: 0.974-1.000), 0.96 (95% CI: 0.93-0.98) and 0.97 (95% CI: 0.91-0.99), and 0.96 (95% CI: 0.90-0.98) and 0.86(95% CI: 0.55-0.97), respectively. The results were similar in each target condition.

**Conclusions:** During adult non-traumatic resuscitation, TTE and TEE exhibited similar diagnostic performance of target conditions. However, high heterogeneity, high risk of bias, and small-sized samples limited the interpretation of the findings.

#### ES-S02

Point-of-care Application of Diaphragmatic Ultrasonography in the Emergency Department for the Prediction of Development of Respiratory Failure in Community-acquired Pneumonia: A Pilot Study

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Background: Early recognition of patients with community-acquiredpneumonia (CAP) at risk of poor outcomes is crucial. However, there isno effective assessment tool for predicting the development of respiratoryfailure in patients with CAP. Diaphragmatic ultrasonography (DUS) is a developed for noveltechnique evaluating diaphragmatic function via measurements of the diaphragm thickening fraction (DTF) and diaphragm excursion (DE). This study evaluated the accuracy of DUS in predicting the development of respiratory failure in patients with CAP, as well as the feasibility of its use in the emergency department (ED) setting.

**Materials and methods:** This was a single-center prospective cohort study.We invited all patients with ED aged > 20 years who were diagnosedwith CAP of pneumonia severity index (PSI) SIe diagnosed with CAP of pneumonia severe with respiratory failure or septic shock were excluded. Twoemergency physicians performed DUS to obtain DTF and DE measurements.Data were collected to calculate PSI, CURB-65 score, and InfectiousDiseases Society of America/American Thoracic Society severity criteria.Study endpoints were taken at the development of respiratory failure

or30 days post-ED presentation. Continuous variables were analyzed usingT-tests, while categorical variables were analyzed using chi-square tests.Further logistic regression and receiver operating characteristic curve analyseswere performed to examine the ability to predict the development ofrespiratory failure. Intraand reliability examined inter-rater was with intraclasscorrelation coefficients (ICCs).

**Conclusions:** DUS assessment of DTF may reliably predict the development of respiratory failure in patients with CAP presenting to the ED. Patients with DTF > 23.95% may be considered for outpatient management.

**Keywords:** diaphragm, community-acquired pneumonia, respiratory failure, ultrasonography, point-of-care, stratification to prevent overcrowding taskforce (SPOT)

## ES-S03 Point-of-care Ultrasound Case Sharing

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Point-of-care ultrasound (POCUS) has become a valuable tool in medicine and can indeed serve as an adjunct to physical examination. POCUS involves using portable ultrasound devices to obtain real-time images of internal body structures. It provides clinicians with visual information that can enhance their diagnostic capabilities and guide treatment decisions. In this section we show a few cases demonstrating how POCUS can be used as an adjunct to physical examination, along with proposed methods for integrating POCUS into medical education.

#### ES-S04

## Point-of-Care Ultrasound in Otolaryngology and Head and Neck Surgery

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The ultrasound applications, examination facilities and methods used by otolaryngology and head and neck surgeons can vary and are unclear. We propose this study to assess the methods used for head-and-neck point-of-care ultrasound (POCUS). This is a prospective survey study conducted from 1 July 2018 to 31 December 2019. Otolaryngology and head and neck surgeons who use POCUS to check the neck in Taiwan with a questionnaire. In total, 30 male and 14 female surgeons engaged in neck POCUS were recruited. Thirty-nine (89%) placed patients in a supine position with the head toward the operator. Forty (91%) surgeons performed US-guided fine needle aspiration (FNA), and 35 (80%) did not use local anesthesia during US-FNA. Thirty-nine (88%) surgeons used the long-axis method to harvest the specimen, forty-one (100%) used a free-hand method. Most surgeons (25, 57%) used 22G needles for US-FNA, and 29 (66%) use 18G for US-guided core-needle biopsy (CNB). For the cost analysis, reimbursements for US-related procedures were relatively cheaper than those for computer tomography (CT) and magnetic resonance imaging (MRI). POCUS can be performed by otolaryngology and head and neck specialists with a wide scope of applications in a cost-effective manner.

ES-S05 POLES:Point of Care Ultrasonography (POCUS) for Local Envenomation from Snakebite

Cheng-Hsuan Ho Department of Emergency Medicine, Tri-Service General Hospital, National Defense Medical Center, Taipei, Taiwan patients at the Emergency Department of Tri-Service General Hospital involves the five-step NIAPS protocol: 1) Notification of the patient's condition, 2) Identification of snake species, 3) Selection of appropriate antivenom, 4) Monitoring of the patient's response using ultrasound POLES, and 5) Evaluation of risk factors for surgical intervention.

To monitor changes in local tissue swelling following snakebite, our hospital developed an ultrasound monitoring process known as Point of Care Ultrasonography (POCUS) for Local Envenomation from Snakebite (POLES). The POLES procedure consists of three steps. In step one, Localization, ultrasound is used to observe the condition of interstitial edema in the tissue. In step two, RPP measurement (rate of proximal progression), the boundary between the inflamed tissue and the normal tissue is identified and marked on the patient's skin. Recordings are taken at regular intervals to track the swelling progression rate (cm/hour) by dividing the distance between the two marks by the time interval. If this rate decreases, the antivenom administration can be withheld. In step three, Doppler ultrasound, an artery within the swollen area is selected and the ultrasound is adjusted to the Doppler mode. The vessel is then adjusted longitudinally, and the Pulse Wave mode is used to observe the systolic and diastolic waveforms of the artery. If there is a diastolic retrograde arterial flow (DRAF), it indicates that the compartment pressure is greater than the patient's diastolic pressure, and acute compartment syndrome is likely to occur. This non-invasive and repeatable procedure enables emergency clinical physicians to quickly and objectively evaluate local tissue changes caused by snakebites. It provides immediate information on swelling location, whether additional serum is needed, and whether compartment syndrome is likely to occur. Emergency clinical physicians can provide appropriate treatment with antivenom therapy and ultrasound (POLES) monitoring.

ES-S06

The clinical procedure for managing snakebite

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# From Ultrasound Education to Clinical Efficacy

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Emergency ultrasound is a newly emerging field in recent years. Due to the diversity of clinical manifestations of emergency patients, the scope of ultrasound is not limited to a single organ system. If traditional ultrasound teaching is used, with direct bedside teaching of patients, it is often limited by random learning and different disease courses of patients, making it difficult for inexperienced doctors to learn and the educational effect is not obvious. How to balance the quality and effectiveness of ultrasound teaching is a topic that ultrasound educators have been thinking deeply about in recent years.

Dr. Lien serves as the planner and trainer at the National Taiwan University Hospital. With standardized courses and small group simulation teaching to improve ultrasound operation skills, an emergency ultrasound team was established. The results of the research have been published in international resuscitation journals (Resuscitation) and included in international resuscitation guidelines (ACLS guidelines). And using emerging technologies to assist teaching, reducing the limitations of teaching time and space, building an emergency ultrasound teaching platform, achieving ultrasound medical education papers "MEUS: Construction and simulation effectiveness of an ultrasound teaching platform" and "The effect of e-learning on point-of-care ultrasound education in novices - Clinical operation effectiveness of the ultrasound teaching platform". Also, we evaluated the impact of ultrasound on the length of stay of emergency patients after training: "Earlier point-of-care ultrasound, shorter length of stay in patients with acute flank pain - Ultrasound can be done within 120 minutes to shorten the length of stay of patients with acute flank pain in the emergency department" and "The effect of point-of-care ultrasound on length of stay and mortality in patients with chest pain/dyspnea - Ultrasound can be done within 180 minutes to reduce the length of stay and mortality rate". Although different diseases, different times for ultrasound intervention, early ultrasound evaluation can reduce the length of stay for patients in the emergency department.

Ultrasound is widely regarded as "the stethoscope of the 21st century". However, how it is applied in practice and its clinical effectiveness are still rare internationally. Dr. Lian's series of research results have verified that after systematic training and joining, ultrasound has both teaching and clinical effectiveness, and helps speed up the process of handling emergency patients.