

A STUDY ON THE EFFICACY OF MODIFIED RADiUS PROTOCOL FOR QUICK ASSESSMENT OF DYSPNOEA IN EMERGENCY ROOM

Respiratory Medicine

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ABSTRACT

INTRODUCTION: Patients often present to ER(EMERGENCY ROOM) with dyspnoea due to multiple causes. Diagnosing the cause and early intervention leads to decrease in Mortality and Morbidity. Due to lack of radiological Facilities like CXR/CT and 2D ECHO in peripheral centres at all the times, patients coming to ERs with Dyspnoea are often not accurately diagnosed. Modified rapid assessment of dyspnoea in ultrasound (RADiUS) protocol can quickly assess the cause and help to initiate treatment at the earliest. **AIM:** To study the efficacy of modified RADiUS protocol for quick assessment of dyspnoea in ER. **MATERIALS:** 56 patients presenting to ER between August 2021 and April 2022 were studied using modified RADiUS Protocol. **METHOD:** The study involved assessing all the four components of RADiUS protocol like heart, inferior venacava and lungs, to determine the cause of dyspnoea as respiratory or cardiac. The primary end point is the time taken to reach a probable diagnosis using Modified RADiUS protocol. The secondary end point is confirmation of diagnosis with radiological and cardiac evaluation. **RESULTS:** Out of 56 patients, 49 patients could be diagnosed using Modified RADiUS protocol. In remaining 7 patients, neither cardiac nor respiratory lesions were found and cause could not be determined. Primary end point: The average time taken for each diagnosis was 11 minutes. Secondary end point: Radiological and cardiac evaluation confirmed the diagnosis in 98% of patients. In 2 patients, the diagnosis by 2D ECHO was different from that of RADiUS. **CONCLUSION:** Modified RADiUS protocol can be used to assess dyspnoea in ER rapidly and can differentiate between cardiac and respiratory cause of dyspnoea with good accuracy. This test can be done bedside and in point of care settings. So, it's important diagnostic tool in Emergency settings.

KEYWORDS

Emergency Room(ER), Dyspnoea, RADiUS (Rapid Assessment of Dyspnoea in Ultrasound)

INTRODUCTION:

Acute dyspnea is a common symptom in the ER. Undifferentiated shortness of breath or dyspnea is a common presenting symptom of patients cared for in emergency departments and critical care units. The standard approach to dyspnea often relies on radiologic and laboratory results, causing excessive delay before adequate therapy is started. Rapid diagnosis and treatment are essential to reduce the morbidity and mortality. Use of an integrated point-of-care ultrasonography (PoCUS) with modified RADiUS Protocol approach can shorten the time needed to formulate a diagnosis, while maintaining an acceptable safety profile. However, the modified Rapid Assessment of Dyspnea with Ultrasound (RADiUS) protocol was the first to standardize the POCUS approach to undifferentiated dyspneic patients.

Aims and objectives:

To study the efficacy of modified RADiUS protocol for quick assessment of dyspnoea in ER.

To diagnose the various causes of dyspnoea and the time taken to attain the final diagnosis using modified RADiUS protocol.

Inclusion criteria :

Patients came to ER with complaints of Dyspnoea .
Patients with Age group more than 18 years.

EXCLUSION CRITERIA:

Patients who are already diagnosed for the cause of dyspnoea
Patients who do not give consent for study.

Pregnant women.

MATERIALS:

Study design: Observational study

Study location: Emergency Department, Alluri Sitarma Raju Academy of Medical Sciences, ELURU

Study Period: August 2021 to April 2022.

Study population: Patients arriving to ER with chief complaint of dyspnoea.

METHOD:

The study involved assessing all the four components of modified RADiUS protocol like heart, inferior venacava and lungs, to determine the cause of dyspnoea as respiratory or cardiac using POCUS (Point Of Care Ultra Sound) and arrive at diagnosis and confirmed with other investigations (CT Chest, Chest X-ray, 2DEcho etc.). Acoustic mismatches among aerated lungs, pleura, chest wall, and pathologic conditions produce artifacts useful for diagnosis of pneumothorax and pulmonary edema and help in detection of subpleural, pleural, and chest wall pathologic conditions such as pneumonia, pleural effusion, and fractures. Visual assessment of cardiac contractility and detection of right ventricular dilatation and pericardial effusion at focused cardiac US are critical in patients presenting with acute dyspnoea and trauma. Additional US examinations of the inferior vena cava for noninvasive volume assessment. The primary end point is the time taken to reach a probable diagnosis using Modified RADiUS protocol. The secondary end point is confirmation of diagnosis with radiological and cardiac evaluation.

RESULTS:

Out of 56 patients, 49 patients could be diagnosed using Modified RADiUS protocol. In remaining 7 patients, neither cardiac nor respiratory cause was found and cause could not be elicited using modified RADiUS Protocol. Sensitivity and Specificity of modified RADiUS Protocol are 78% and 70% respectively.

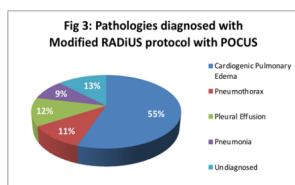
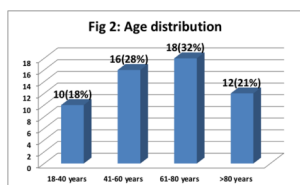
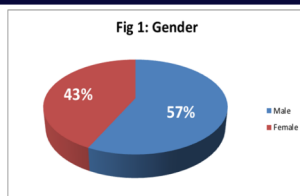
Primary end point:

The average time taken for each diagnosis was 11 minutes.

Secondary end point:

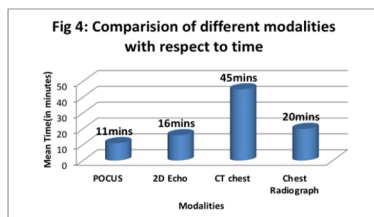
Radiological and cardiac evaluation confirmed the diagnosis in 98% of patients.

In 2 patients, the diagnosis by 2D ECHO was different from that of RADiUS.



DISCUSSION :

In our study, the total of 56 patients; 57% are Males and 32% of patients are in the age group of 61 to 80 years. Out of 56 patients, 55% (31 patients) were diagnosed as Cardiogenic Pulmonary Edema using modified RADiUS Protocol. The mean time to attain a diagnosis using Modified RADiUS Protocol is 11 minutes (With minimum time of 5 minutes and maximum time of 15 minutes). Using clinical diagnosis as the diagnostic endpoint, Modified RADiUS Protocol (POCUS) had higher sensitivity (78% v. 68%, $p = 0.37$) and lower specificity (70% v. 82%, $p = 0.16$) than chest radiography. Modified RADiUS Protocol (POCUS) also had lower positive (65% v. 72%, $p = 0.41$) but higher negative (82% v. 77%, $p = 0.55$) predictive values than chest radiography. Zanolotti et al. compared POCUS and chest radiography in acutely dyspneic patients and found that ultrasound had a higher sensitivity than chest radiography for detecting pleural effusion and lung consolidation [7]. A meta-analysis from 2014 found that ultrasound had a sensitivity of 94.1% and specificity of 92.4% in detecting acute cardiogenic pulmonary edema in dyspneic ED patients [9].



Finally, a meta-analysis from 2015 found that ultrasound had a sensitivity of 95% and specificity of 90% in detecting adult pneumonia [10]. In the same analysis, chest radiography was found to have a sensitivity of 77% and specificity of 91%. In our study, we quantify the time required to perform POCUS, it is emergency physician experience that each component of the protocol takes less than one minute to perform in most conditions, and the results are immediate and average mean time to attain at diagnosis is 11 minutes. In adverse conditions, the protocol may take fifteen minutes or more depending upon operator experience, interruptions from other healthcare providers, the patient's ability to cooperate, and the patient's body habitus.

CONCLUSION :

Modified RADiUS Protocol using POCUS shows immense promise as an initial diagnostic tool. It helps in making a patients' prompt diagnosis and reliable decision making with good accuracy in ER.

There is statistically significant reduction in time taken to make the final diagnosis using modified RADiUS Protocol. Point-of-care ultrasound (POCUS) is increasingly used as

it's ability to be performed quickly, can be interpreted at the bedside by a physician, the lack of radiation exposure and relatively low cost.

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