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Research Article

Feasibility and Timeliness of Clinician-Performed Point-of-Care Echocardiography in Suspected Acute Myocardial Infarction: A Prospective Observational Study from Sri Lanka

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Abstract

Background: Acute myocardial infarction requires rapid assessment and treatment. Point-of-care echocardiography (POCE) may provide immediate bedside cardiac information, but its feasibility and timeliness within busy, resource-constrained emergency settings are not well described.

Methodology: A prospective descriptive observational study was conducted in the Emergency Treatment Unit of Teaching Hospital, Anuradhapura, from July to August 2023. Adults presenting with symptoms suggestive of acute myocardial infarction were assessed using clinician-performed POCE. The primary outcomes were the feasibility and timeliness of POCE during early emergency assessment. Time from admission to medical assessment, first electrocardiogram, and POCE was recorded. POCE findings, emergency interventions, and agreement in identifying regional wall-motion abnormalities were also assessed.

Results: Of the 245 patients who consented, 219 were recruited, and 171 had sufficient data for analysis. The median age was 58 years, and 138 (80.7%) were male. POCE was performed within 5 minutes in 35 (20.5%) patients and within 10 minutes in 86 (50.3%). The corresponding numbers for the first electrocardiogram were 30 (17.5%) and 75 (43.8%), respectively. POCE was performed before the first electrocardiogram in 79 (46.2%) patients and concurrently in 19 (11.1%). Regional wall-motion abnormalities were identified in 125 (73.1%) patients. The sensitivity and specificity of Regional Wall-Motion Abnormalities detected by the medical officer in detecting ST-segment elevation myocardial infarction on the first ECG were 95% and 90%, respectively. Thrombolysis was administered to 74 patients and primary percutaneous coronary intervention to 38. Agreement between the emergency treatment unit medical officer and the emergency physician in identifying regional wall-motion abnormalities was 94.2%, and between the emergency treatment unit medical officer and the cardiologist was 95.9%.

Conclusion: Clinician-performed point-of-care echocardiography was feasible and could be performed rapidly during the early assessment of suspected acute myocardial infarction. Regional wall-motion abnormalities identified by trained medical officers showed high sensitivity for ECG-defined ST-segment elevation myocardial infarction and good agreement with expert assessment. POCE may therefore serve as a useful bedside adjunct to electrocardiography in resource-constrained emergency settings.

Keywords: Point-of-care echocardiography, acute myocardial infarction, chest pain, regional wall-motion abnormality, emergency department

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Introduction

Acute myocardial infarction is a time-critical cardiovascular emergency in which delays in recognition and treatment can result in myocardial damage, complications and death. Serious mechanical complications, including acute mitral regurgitation due to papillary muscle rupture, ventricular septal rupture, ventricular free-wall rupture and pseudoaneurysm formation, may occur following acute myocardial infarction and require prompt recognition and management [1]. Therefore, emergency assessment pathways need to provide rapid and clinically useful information to support early decision-making.

Ischaemic heart disease represents an important health burden in Sri Lanka, with cardiovascular risk factors such as hypertension, diabetes and dyslipidaemia contributing substantially to disease burden [5,6]. Patients presenting to emergency departments with chest pain and other symptoms suggestive of acute myocardial infarction constitute a heterogeneous population, and only a proportion ultimately have myocardial infarction [7,8]. Furthermore, acute myocardial infarction does not always present with typical symptoms. Atypical presentations may complicate early clinical recognition and potentially delay appropriate investigation and treatment [9]. These challenges highlight the need for rapid bedside assessment that can complement conventional diagnostic approaches.

Electrocardiography (ECG) remains central to the initial assessment of suspected acute myocardial infarction, particularly for identifying ST-segment elevation and guiding urgent reperfusion therapy. However, conventional ECG criteria have limitations in detecting acute myocardial ischaemia and coronary occlusion [10,11]. The emerging concept of occlusion myocardial infarction further emphasises that clinically important coronary occlusion may occur without fulfilling conventional ST-segment elevation myocardial infarction criteria [15,16]. Thus, although ECG remains indispensable, additional bedside information may be valuable during the early assessment of patients with suspected acute myocardial infarction.

Cardiac troponin is another important component of acute myocardial infarction diagnosis. High-sensitivity cardiac troponin has enabled more rapid diagnosis in many patients. Still, interpretation can be challenging because elevated concentrations may occur in conditions other than acute myocardial infarction, including renal disease, sepsis and heart failure [12,13]. Furthermore, serial assessment may be required in some patients, while access to high-sensitivity troponin testing may be constrained by resource and cost considerations in some healthcare settings [14]. These limitations create a potential role for bedside imaging that can provide immediate information while laboratory and other investigations are being undertaken.

Echocardiography provides direct assessment of cardiac structure and function and can identify regional and global ventricular abnormalities, valvular pathology, pericardial disease and mechanical complications of acute myocardial infarction [2]. Point-of-care echocardiography (POCE) extends this capability to the bedside, allowing appropriately trained clinicians to perform focused cardiac assessments during the initial evaluation of acutely ill patients [3,4]. Its portability, non-invasive nature and capacity to provide immediate information make it particularly attractive for emergency care.

Regional wall-motion abnormalities are an important echocardiographic manifestation of myocardial ischaemia and may occur early following coronary occlusion. Evidence suggests that emergency physicians with appropriate training can identify regional wall-motion abnormalities using focused echocardiography. In a study of patients with acute myocardial infarction, emergency physicians with basic echocardiographic training demonstrated good ability to identify regional wall-motion abnormalities [17]. More recent evidence similarly supports the potential of emergency physician-performed focused cardiac ultrasound to identify regional wall-motion abnormalities in patients with acute coronary syndromes [18]. These findings suggest that POCE may provide clinically relevant information during the early assessment of patients in whom conventional investigations are inconclusive or delayed.

The feasibility of incorporating ultrasound into acute clinical workflows has also been demonstrated using portable and pocket-sized echocardiographic devices. Studies have reported that pocket-sized

echocardiography can provide useful cardiac information within short examination times and can improve or supplement initial clinical assessment [20,21]. However, the ability to use POCE effectively depends on appropriate training and operator competence. Previous work has emphasised the importance of structured training in echocardiography and the development of adequate skills before clinicians undertake focused cardiac examinations [19].

The potential relevance of POCE is particularly important in resource-constrained emergency settings. The Emergency Treatment Unit of Teaching Hospital, Anuradhapura manages many acutely ill patients within a busy clinical environment. Investigations requiring additional personnel, patient transfer or laboratory processing may introduce delays. In contrast, clinician-performed POCE can potentially be undertaken at the bedside as part of the initial clinical assessment, while images can be stored for subsequent review. Its value in such a setting therefore depends not only on the information it provides, but also on whether it can be performed consistently and sufficiently rapidly within routine emergency workflows.

Despite the growing international literature on emergency POCE, evidence describing its practical implementation in Sri Lankan emergency care remains limited. There is a need to understand whether clinician-performed POCE can be integrated into the early assessment of patients with suspected acute myocardial infarction and how rapidly it can be delivered in a busy, resource-limited Emergency Treatment Unit. Establishing its feasibility and timeliness is an important first step before considering wider implementation.

Therefore, this study aimed to assess the feasibility and timeliness of clinician-performed point-of-care echocardiography for the early assessment of patients presenting with suspected acute myocardial infarction in the Emergency Treatment Unit of Teaching Hospital, Anuradhapura.

Methods

Study design and setting

A prospective descriptive observational study was conducted in the Emergency Treatment Unit of Teaching Hospital, Anuradhapura, from 1 July to 31 August 2023 to assess the feasibility and timeliness of clinician-performed point-of-care echocardiography (POCE) during the early assessment of patients presenting with suspected acute myocardial infarction.

Study population

Patients aged over 20 years presenting to the Emergency Treatment Unit with chest pain or discomfort and/or shortness of breath, with or without associated autonomic symptoms, were considered for inclusion when the attending medical officer clinically suspected acute myocardial infarction. Patients who did not provide consent or were aged 20 years or below were excluded.

Study Procedure

On arrival at Teaching Hospital, Anuradhapura, patients presenting with chest pain or other symptoms suggestive of acute myocardial infarction were initially assessed by the triage nurse. Patients with suspected cardiac symptoms were directed for immediate assessment by the admitting medical officer and subsequently managed within the Emergency Treatment Unit. The medical officer and nursing officer at the Emergency Treatment Unit jointly undertook the initial reception, clinical assessment and, where necessary, immediate stabilisation of the patient.

Following the initial clinical assessment, the attending Emergency Treatment Unit medical officer requested the first ECG in line with routine clinical practice. The ECG request was initially communicated verbally to the nursing officer, followed by completion of the written request form. As the ECG technician was not stationed within the Emergency Treatment Unit, the nursing officer contacted the technician by telephone to attend and perform the ECG. The time of Emergency Treatment Unit admission and the times of initial medical assessment and first ECG were recorded.

POCE was undertaken at the bedside by the Emergency Treatment Unit medical officer as part of the routine clinical assessment of patients in whom acute cardiac pathology was suspected. POCE could be performed at any point during the initial assessment according to the clinical judgement of the attending medical officer and did not require the patient to be transferred from the Emergency Treatment Unit or to wait for a separate imaging service. The study did not introduce a separate POCE pathway or alter routine clinical management.

Patients meeting the study eligibility criteria were invited to participate following the initial clinical assessment. Written informed consent was obtained from patients with decision-making capacity before enrolment. For patients who were critically ill, had impaired consciousness, or lacked the capacity to provide informed consent at presentation, written consent was obtained from a legally acceptable

representative or accompanying next of kin using a separate surrogate consent form approved by the ethics review committee. This allowed inclusion of patients with severe presentations while ensuring ethical recruitment procedures. Patients then completed a structured questionnaire and data collection form, either directly or through the accompanying representative where appropriate, to obtain demographic, clinical, and investigation-related information. Data collection was undertaken without interfering with routine patient care or delaying investigations or treatment. Patients requiring immediate clinical intervention were managed according to clinical priority irrespective of study participation.

The time of Emergency Treatment Unit admission was used as the starting point for assessment of the timeliness of investigations. The times of initial medical assessment, first ECG and POCE were recorded prospectively. The sequence in which POCE and the first ECG were performed was also recorded to determine whether POCE was performed before, concurrently with, or after the first ECG.

POCE examinations were performed using the focused cardiac examination routinely undertaken by the assessing medical officers. The examination included assessment of left ventricular global and regional systolic function, right ventricular function, end-point septal separation (EPSS), the rule-of-thirds assessment, valvular abnormalities and pericardial effusion. Other clinically relevant findings identified during the examination were also recorded.

All medical officers performing POCE had received initial training from the Emergency Treatment Unit emergency physician and had at least six months of in-service experience performing POCE in the Emergency Treatment Unit of Teaching Hospital, Anuradhapura. POCE images were stored on the point-of-care ultrasound machine. An emergency physician and a cardiologist independently reviewed the recorded examinations and were blinded to the medical officers' original interpretations. Their assessments were used for the secondary analysis of agreement in identifying regional wall-motion abnormalities.

Data collection

Clinical and demographic data were prospectively collected using a pre-designed data collection sheet. The recorded variables included presenting symptoms, relevant medical history, initial ECG findings, POCE findings, timing of clinical assessment and investigations, and the diagnosis made during the Emergency Treatment Unit stay.

Point-of-care Echocardiography (POCE)

POCE was performed at the patient's bedside by the Medical Officer assessing the patient. The focused examination included assessment of left ventricular global and regional function, right ventricular function, End-Diastolic Septal Separation (EDSS), rule of thirds, valvular abnormalities and pericardial effusion, with other relevant findings recorded when present.

Nine medical officers who work in the ETU performed POCE. They used point-of-care ultrasound, including POCE, in daily clinical practice. All medical officers performing POCE had received structured training from the Emergency Physician and had a minimum of six months' clinical experience performing focused cardiac ultrasound in the ETU before study initiation. Quality assurance was provided through independent anonymous review of all recorded examinations by an emergency physician and a cardiologist. However, formal pre-study competency testing and assessment of inter-operator variability were not performed and have been acknowledged as a study limitation.

Assessment of timeliness and feasibility

The primary outcome was the timeliness of POCE, assessed by measuring the interval between Emergency Treatment Unit admission and performance of the POCE examination. The times of Emergency Treatment Unit admission, initial medical assessment, first ECG and POCE were recorded. Door-to-POCE time was categorised as less than 5, 10, 15 and 20 minutes. These intervals reflected the timing data available in the study.

Feasibility was assessed by determining whether POCE could be completed and adequately documented within the routine Emergency Treatment Unit workflow. We also documented the ability to obtain interpretable POCE findings and the practical challenges encountered during recruitment, examination, and data collection.

Data analysis

Data were analysed descriptively using frequencies and percentages for categorical variables and appropriate measures of central tendency and dispersion for continuous variables. Door-to-POCE time was described and compared with door-to-first-ECG time. We also described the sequence of POCE relative to the first ECG and the principal POCE findings. Observer agreement in identifying regional wall-motion

abnormalities between Emergency Treatment Unit clinicians, an emergency physician and a cardiologist was assessed as a secondary analysis.

ST-elevation myocardial infarction was defined based on the first ECG, and the sensitivity, specificity, and positive and negative predictive values for detecting regional wall abnormalities from POCE performed by the medical officer were calculated.

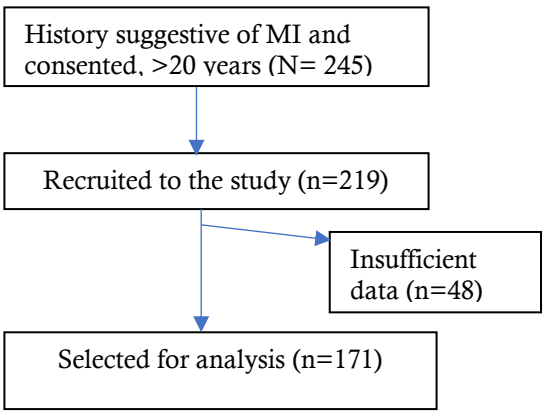
Ethical considerations

This study received ethics approval from the Ethics Review Committee, Faculty of Medicine & Allied Sciences, Rajarata University of Sri Lanka (ERC/2023/24). We obtained written informed consent from participants before recruitment. Patient care was prioritised over research procedures, and patients requiring immediate clinical intervention were not delayed for study participation. This was particularly relevant in the busy Emergency Treatment Unit, where clinical instability, urgent interventions, rapid patient turnover and workload affected recruitment and completeness of data collection.

Results

During the study period, 245 patients aged over 20 years with symptoms suggestive of acute myocardial infarction were consented for participation (Figure 1). Of these, 219 patients were recruited into the study. A total of 171 patients had sufficient data for analysis, while 48 recruited patients were excluded from the final analysis because of insufficient data.

Figure 1



The median age was 58 years (males, 80.7%). The most frequently recorded comorbidities were dyslipidaemia, ischaemic heart disease, hypertension, chronic kidney disease and diabetes mellitus.

Table 1: Characteristics of participants

Characteristic	n (%)
Age, years	
Median (Interquartile range)	58 (47-65)
Sex	
Male	138 (80.7)
Past medical history	
Ischaemic heart disease	67 (39.2)
Stroke	12 (7.0)
Diabetes mellitus	42 (24.6)
Hypertension	59 (34.5)
Dyslipidaemia	84 (49.1)
Heart failure	8 (4.7)
Gastro-oesophageal reflux disease	24 (14.0)
Asthma	4 (2.3)
Liver disease	0 (0)
Chronic kidney disease	43 (25.1)
Major trauma	4 (2.3)

Time from admission to assessment by the doctor

A doctor assessed 72 (42%) of participants within one minute of admission, 109 (64%) within two minutes, 138 (80.7%) within three minutes and 165 (96.5%) within five minutes.

Door-to-first ECG time vs door-to-POCE time

Table 2 describes the number of patients who have undergone first ECG and POCE within different time intervals from admission to the Emergency Treatment Unit. Within 10 minutes from admission, 21.6% of patients have undergone the first ECG, while 50.3% have undergone POCE. POCE was performed before the first ECG in 79 participants (46.2%), concurrently with the first ECG in 19 (11.1%), and after the first ECG in 73 (42.7%).

Table 2: Number of patients who have undergone first ECG and POCE in different time intervals after admission to the Emergency Treatment Unit

Time from admission (minutes)	First ECG, n (%)	POCE, n (%)
0–5	30 (17.5%)	35 (20.5%)
6–10	45 (26.3%)	51 (29.8%)
11–15	47 (27.5%)	31 (18.1%)
16–20	23 (13.5%)	19 (11.1%)
21–25	12 (7.0%)	12 (7.0%)
26–30	7 (4.1%)	3 (1.8%)
>30	7 (4.1%)	20 (11.7%)

Diagnosis during the Emergency Treatment Unit stay

ST-segment elevation myocardial infarction was diagnosed in 130 participants (76.0%) and non-ST-segment elevation myocardial infarction in 18 (10.5%). Unstable angina was diagnosed in five (2.9%) and angina in six (3.5%). Other diagnoses included heart failure in two (1.2%), gastritis/Gastro oesophageal reflux disease in three (1.8%), aortic dissection in one (0.6%), pulmonary embolism in one (0.6%), cardiac tamponade in one (0.6%) and nonspecific chest pain in four (2.3%).

First ECG diagnosis

The first ECG was reported as showing ST-segment elevation myocardial infarction in 127 participants (74.3%) and non-ST-segment elevation myocardial infarction in 18 (10.5%). Wellen's pattern was identified in two (1.2%), old ST-segment elevation myocardial infarction changes in three (1.8%), a normal ECG in seven (4.1%) and other ECG findings in 14 (8.2%).

Cardiac POCE findings

Regional wall-motion abnormalities were identified in 125 participants (73.1%). Inferior wall abnormalities were observed in 52 (30.4%), inferior plus lateral abnormalities in four (2.3%), anterior abnormalities in 20 (11.7%), septal abnormalities in four (2.3%), lateral abnormalities in five (2.9%), anterior plus lateral abnormalities in 14 (8.2%), anterior plus septal abnormalities in 10 (5.8%) and extensive anterior abnormalities in 16 (9.4%). Global hypokinesia was reported in five participants (2.9%), while 41 (24.0%) had no regional wall-motion abnormalities.

Other POCE findings included abnormal End-Point Septal Separation >7 mm in 53 participants (31.0%), a pathological B profile in 27 (15.8%) and Inferior Vena Cava (IVC) features suggesting fluid overload in 37 (21.6%). Findings suggestive of other conditions included pulmonary embolism in one participant (0.6%), aortic dissection in one (0.6%), pericardial effusion in one (0.6%) and regional wall features suggesting old ST-segment elevation myocardial infarction in six (3.5%).

The first ECG findings and POCE findings were in good agreement (Table 3). Of the 127 patients showing first ECG with ST-segment elevation myocardial infarction changes, 121 (95.2%) had regional wall-motion abnormalities in POCE.

Table 3: Comparison of first ECG and POCE findings

POCE findings	First ECG finding in acute myocardial infarction	
	Yes	No
Regional Wall-Motion Abnormalities	121	4
No Regional Wall-Motion Abnormalities	6	40

The sensitivity and specificity of regional wall-motion abnormalities in POCE, as detected by the medical officer, in detecting ST-segment elevation myocardial infarction were 95% and 90%, respectively (Table 4).

Table 4: Performance of regional wall-motion abnormalities in POCE in detecting ST-segment elevation myocardial infarction

	%	95% confidence interval
Sensitivity	95.28	90.08 - 97.82
Specificity	90.91	78.84 - 96.41
Positive predictive value	96.80	92.06 - 98.75
Negative predictive value	86.96	74.33 - 93.88

Identification of regional wall-motion abnormalities by medical officers and comparison with the Emergency Physician and the Cardiologist

Identification of regional wall-motion abnormalities by medical officers by POCE had good agreement with

that of the emergency physician (accurate in 94.2% of patients) and the cardiologist (accurate in 95.9% of patients) (Table 5)

Table 5: Accuracy of regional wall-motion abnormalities identification by medical officers in Emergency Treatment Unit

Comparison	Accurate n (%)	Inaccurate n (%)	Inconclusive n (%)
Medical officer vs emergency physician	161 (94.2)	3 (1.8)	7 (4.1)
Medical officer vs cardiologist	164 (95.9)	4 (2.3)	3 (1.8)

Interventions during the Emergency Treatment Unit stay

Thrombolysis was administered to 74 participants (43.3%), primary percutaneous coronary intervention was performed in 38 (22.2%), rescue percutaneous coronary intervention in 2 (1.2%), anticoagulation in 31 (18.1%), and other interventions in 27 (15.8%).

Among the 74 participants who received thrombolysis, 1.35% (n=1) received thrombolysis within 10 minutes, 25.8% (n=19) within 20 minutes, 54.0% (n=40) within 30 minutes, 67.6% (n=50) within 40 minutes, 82.45% (n=61) within 50 minutes and 86.5% (n=64) within 60 minutes. Ten participants (13.5%) received thrombolysis after 60 minutes.

Among the 38 participants undergoing primary percutaneous coronary intervention, 2.6% (n=1) reached the cardiac catheterisation laboratory within 10 minutes, 13.2% (n=5) within 20 minutes, 42.1% (n=16) within 30 minutes, 65.8% (n=25) within 40 minutes, 81.6% (n=31) within 50 minutes and 86.8% (n=33) within 60 minutes. Five participants (13.2%) reached the Cath Lab after 60 minutes.

Discussion

This study evaluated the feasibility and timeliness of clinician-performed point-of-care echocardiography (POCE) during the early assessment of patients with suspected acute myocardial infarction in a busy Emergency Treatment Unit.

The principal finding is that POCE could be incorporated into routine emergency assessment and was available rapidly, with 20.5% of patients undergoing POCE within 5 minutes and 50.3% within 10 minutes of admission. Importantly, POCE was performed before the first ECG in 79 patients and concurrently with the ECG in a further 19 patients. These findings demonstrate that clinician-performed POCE can function as an immediately available bedside investigation rather than an investigation dependent on a separate diagnostic pathway.

The practical significance of this finding lies in the workflow of emergency acute myocardial infarction assessment. ECG remains indispensable for the diagnosis and classification of acute myocardial infarction and for identifying patients requiring immediate reperfusion. However, ECG provides electrical rather than anatomical or functional information, and conventional ST-segment criteria do not identify every patient with acute coronary occlusion. The updated manuscript appropriately recognises this limitation and the emerging concept of occlusion myocardial infarction. In this context, POCE should not be regarded as a replacement for ECG, but as a complementary bedside modality that can provide additional information during the interval between clinical assessment, ECG and laboratory testing. This complementary role is consistent with the consensus position of the American Society of Echocardiography and American College of Emergency Physicians, which describes focused cardiac ultrasound as a bedside tool to expedite diagnostic evaluation and support emergency treatment and triage decisions. [22]

The present study illustrates the complementary role of POCE. Regional wall-motion abnormalities were identified in 125/171 patients (73.1%). Among the 127 patients whose first ECG demonstrated ST-segment elevation myocardial infarction changes, 121 (95.2%) had regional wall-motion abnormalities on POCE. Conversely, four patients without acute myocardial infarction changes on the first ECG had regional wall-motion abnormalities, while five had global hypokinesia. These findings demonstrate substantial concordance between ECG and POCE in this cohort, while also illustrating that POCE provides a different physiological dimension of assessment. However, these data should not be interpreted as demonstrating diagnostic accuracy or superiority of POCE over ECG, because the study did not use an independent reference standard for acute myocardial infarction. Rather, the findings support the potential value of POCE as an additional source of information when the initial clinical and ECG assessment is uncertain.

Another clinically relevant finding was the performance of regional wall-motion abnormalities identified by the treating medical officers in identifying ST-segment elevation myocardial infarction as defined by the first ECG. Regional wall-motion abnormalities

demonstrated a sensitivity of 95.3% and specificity of approximately 90% for ECG-defined ST-segment elevation myocardial infarction, with a positive predictive value of 96.8%. Thus, in this cohort, the absence of regional wall-motion abnormalities made ST-segment elevation myocardial infarction less likely. At the same time, their presence was strongly associated with an ECG demonstrating ST-segment elevation myocardial infarction. These findings are consistent with the pathophysiological basis of regional wall-motion abnormalities, which may occur early following acute coronary occlusion, and support their potential value as an additional bedside indicator during the early assessment of suspected ST-segment elevation myocardial infarction. Importantly, these findings should be interpreted as performance against the first ECG rather than as independent diagnostic accuracy for acute myocardial infarction, since the study did not use an independent clinical or angiographic reference standard. Nevertheless, the high sensitivity observed is particularly relevant to the study setting, where POCE could be performed rapidly by the clinician assessing the patient and, in almost half of patients, before the first ECG. This suggests that clinician-performed POCE may provide useful immediate anatomical and functional information while conventional ECG assessment is being arranged.

An important practical finding was the ability of Emergency Treatment Unit medical officers to identify regional wall-motion abnormalities. Their assessments were classified as accurate in 94.2% of cases compared with the emergency physician and 95.9% compared with the cardiologist. This is consistent with previous evidence that appropriately trained emergency clinicians can identify regional wall-motion abnormalities using focused echocardiography [17,18]. The results are particularly relevant to resource-constrained emergency systems because POCE does not necessarily require a cardiologist to be physically present at the time of initial assessment. Instead, a trained clinician can acquire focused images, use them to support immediate decision-making, and obtain expert review when findings are uncertain. The literature also supports the feasibility of bedside and pocket-sized echocardiography within short examination times [20,21].

The practical utility of POCE extends beyond identifying regional wall-motion abnormalities. In this study, POCE identified global hypokinesia and findings suggestive of fluid overload, as well as findings potentially indicating pulmonary embolism, aortic dissection, pericardial effusion and previous myocardial injury. Thus, in a patient presenting with undifferentiated chest pain or dyspnoea, POCE can potentially contribute to a syndrome-based emergency assessment, rather than simply answering whether the ECG shows ST-segment elevation myocardial infarction. This broader role is consistent with the established use of focused cardiac ultrasound in emergency care to rapidly assess cardiac structure, function and important alternative or coexisting pathology [22].

The comparison of investigation times provides further insight into its practical utility. In this Emergency Treatment Unit, 43.8% of patients had undergone their first ECG within 10 minutes, compared with 50.3% who had undergone POCE. The difference appears to reflect local workflow rather than an intrinsic difference between the technologies: ECG acquisition depended on a technician-based pathway, whereas POCE was performed directly by the clinician assessing the patient. The draft manuscript identifies technician availability, telephone notification, paper requests, limited space and high patient turnover as contributors to ECG delays. POCE, in contrast, could be initiated at the bedside without waiting for another staff member. This distinction is highly relevant when considering implementation in other resource-constrained emergency settings.

The findings also need to be interpreted within contemporary acute myocardial infarction diagnostic pathways. The 2023 ESC Guidelines emphasise rapid clinical assessment, ECG and cardiac troponin-based diagnosis, followed by appropriate risk stratification and reperfusion or invasive management. [23] POCE should therefore be considered an adjunct to, rather than an alternative to, established acute myocardial infarction diagnostic pathways. Its value may lie in providing immediate functional information when the ECG is equivocal, when there is discordance between clinical findings and ECG, or when alternative life-threatening diagnoses need to be considered while laboratory investigations are pending. This may be especially relevant to patients in whom coronary occlusion is suspected despite the absence of conventional ST-segment elevation myocardial infarction criteria.

The treatment data demonstrate the clinical context in which rapid assessment occurred. Seventy-four patients received thrombolysis and 38 underwent primary percutaneous coronary intervention; 86.5% of those receiving thrombolysis received treatment within 60 minutes, while 86.8% of those undergoing primary percutaneous coronary intervention reached the

catheterisation laboratory within 60 minutes. These findings suggest that patients progressed rapidly through definitive acute myocardial infarction pathways. However, the observational design does not establish that POCE caused or shortened thrombolysis or percutaneous coronary intervention times, and such a causal interpretation should be avoided. The more defensible conclusion is that POCE was feasible within the same time-critical clinical environment in which reperfusion decisions were being made.

The study also highlights an important implementation principle: the value of emergency POCE depends on integration into clinical workflow, appropriate training and quality assurance. The high level of agreement observed in this study occurred in clinicians who had received POCE training and had in-service experience. Contemporary recommendations emphasise that POCE involves acquisition, interpretation and immediate clinical integration by the treating clinician, while distinguishing it from comprehensive consultative echocardiography. [24] POCE should therefore be introduced as a focused, protocolised examination with defined competencies, image archiving and access to expert review, rather than as a substitute for comprehensive echocardiography.

The study has important limitations. Only 171 of 219 recruited patients had sufficient data for analysis, creating potential selection bias. This reflected the practical challenges of conducting a study within a high-volume tertiary-care Emergency Treatment Unit managing approximately 90 critically ill patients per day with only two medical officers per shift. In such an environment, clinical priorities frequently required the attention of medical officers to acutely unwell patients, limiting opportunities for complete study documentation and data collection. Additional challenges arose from the use of a single point-of-care ultrasound machine for all patients in the Emergency Treatment Unit. Limitations in image storage capacity, difficulties in image retrieval, occasional loss of stored examinations, and errors in image labelling contributed to insufficient data.

Furthermore, the additional time required for assigning study identifiers and maintaining study records, together with reliance on paper-based clinical documentation, increased the likelihood of incomplete datasets. Although these factors resulted in the exclusion of a substantial number of recruited patients, they also reflect the real-world operational conditions under which POCE was implemented and evaluated in this study. In addition, this was a single-centre study conducted over a relatively short period of two months, which may limit the generalizability of the findings to other emergency care settings.

In addition, the reported comparison between ECG and POCE should not be used to calculate diagnostic sensitivity or specificity without an independent reference standard. Future prospective studies should evaluate whether an integrated ECG–POCE pathway reduces time to definitive diagnosis and reperfusion, particularly in patients with equivocal ECG findings or suspected occlusion myocardial infarction.

Overall, these findings support POCE as a practical adjunct to conventional acute myocardial infarction assessment in the emergency setting. Its principal advantage is not that it replaces ECG or laboratory testing, but that a trained clinician can obtain additional cardiac information immediately at the bedside, potentially while other investigations are being arranged. In resource-constrained settings, this combination of portability, clinician ownership, rapid acquisition and repeatability may make POCE particularly valuable as part of an integrated emergency acute myocardial infarction pathway.

Conclusion

Clinician-performed point-of-care echocardiography was feasible and could be performed rapidly within the routine workflow of a busy Emergency Treatment Unit. Regional wall-motion abnormalities identified by trained medical officers showed high sensitivity for ECG-defined ST-segment elevation myocardial infarction and good agreement with assessments by an emergency physician and cardiologist. These findings support the potential value of clinician-performed POCE as a rapid bedside adjunct to electrocardiography during the early assessment of suspected acute myocardial infarction. POCE should complement, rather than replace, established electrocardiographic and laboratory-based diagnostic pathways. Its immediate availability at the bedside may be particularly valuable in resource-constrained emergency settings.

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