Improving ECG Interpretation Skill of General Practitioners Through Massive Open Online Course

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INTRODUCTION: Electrocardiogram (ECG) is a non-invasive, cost effective, and quick diagnostic tool to aid in management of various cardiovascular diseases and non-cardiac conditions. General practitioners should have the ability to interpret ECG. Massive open online course (MOOC) provides a flexible way to learn independently anywhere and anytime. We developed and evaluated an ECG learning MOOC integrated with "Mobile ECG" application and live discussion sessions with experts.

METHODS: We conducted a quasi-experimental study with subjects recruited from general practitioners who were willing to learn ECG from MOOC. The inclusion criteria were as follows: (1) registered as MOOC participants; (2) finished all modules and quizzes completed pretest and posttest. Statistical analysis was done using SPSS and Excel. Additional data were collected from a 4-point Likert scale questionnaire and open-ended questions to measure user satisfaction.

RESULT: 12 out of 17 (70,6%) participants completed the study, with the majority belonged to the age group <30 years old (83,3%). Time spent by each participants to finish the course varies between 7 to 80 days. The average of pretest and posttest scores were 6,17 and 7,50 respectively, with gain score of 1,33. The user satisfaction questionnaire showed that the learning media was easy to use (M=3,58), the organization of module was easy to follow (M=3,67), the materials were in accordance with the needs of general practitioners (M=3,50), the quizzes were relevant to the topic (M=3,42), the interface design intrigued the users to learn more (M=3,33), the course had suitable duration of learning (M=3,50), and overall gave adequate training to practice as a doctor (M=3,42).

DISCUSSION: The significantly improved score (p=0,005) as well as the positive result from user satisfaction survey demonstrate the potential of MOOC as an effective ECG learning tool for general practitioners.

CONCLUSION: Learning through Massive Open Online Course helps general practitioners to improve their ECG interpretation skills.

Keywords: ECG; massive open online course; general practitioner

Lactate and Bicarbonate Levels at Admission in Patients with Cardiogenic Shock: Higher or Lower Values Are More Deadly?

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INTRODUCTION: Acidosis presents in the late stages of many diseases, and often indicates poor prognosis, thus associated with mortality in patients with cardiogenic shock (CS). Acidosis generally manifests in two ways: increased lactate and decreased bicarbonate concentrations. This paper therefore analysed the association between high lactate concentrations and low bicarbonate levels with in-hospital mortality for patients with CS.

METHODS: This paper analysed 280 patients with CS Society for Cardiovascular Angiography and Intervention (SCAI) class B to E, in Sardjito Hospital Yogyakarta from January 2022 to June 2023. Blood gas analysis were taken in the first 24-hours on admission. Clinical outcomes were followed during the inpatient stay. Analysis was conducted using receiver operating characteristic (ROC) curve, and the resulting cut-offs were tested using Pearson's Chi-Square and logistic regression.

RESULT: Higher lactate levels were found to be associated with in-hospital mortality in patient with CS (cut-off ≥3.755 mmol/ml; $p<0.001$), with sensitivity of 54.1% and specificity of 68.8%. Meanwhile, the opposite association were found with bicarbonate where higher levels indicated better survival (cut-off ≥18.05 mmol/L; $p<0.001$), with sensitivity of 67% and specificity of 55.9%. This results still hold when patients SCAI class were considered, where higher lactate (p 0.046) and lower bicarbonate levels (p 0.004) had higher probability of in-hospital mortality irrespective of the SCAI class.

DISCUSSION: During CS, tissue hypoperfusion and organ failure lead to metabolic deficiencies and a treatment‑resistant CS phenotype. This paper suggests that patients with CS who possessed higher lactate and lower bicarbonate levels are more likely to die in every SCAI shock stage, implying that these biomarkers provide additional mortality risk beyond of shock severity.

CONCLUSION: Higher lactate and lower bicarbonate levels predict in-hospital mortality in patients with CS. Patients with CS who possessed higher lactate and lower bicarbonate levels should therefore be recognized as high‑risk subgroup.

Keywords: Lactate; Bicarbonate; Acidosis; Cardiogenic Shock; Mortality

Table 1. Bivariate analysis of in-hospital mortality on lactate and bicarbonate levels in patient with cardiogenic shock

	In-hospital Mortality				
	AUC	Cut-off (pg/ml)	Sensitivity (%)	Specificity (%)	p
Lactate	0.634	≥3.755	54.1	69.1	<0.001
Bicarbonate	0.595	≥18.05	67.3	55.9	<0.001

Saving Life STEMI with Left Ventricular Dysfunction: Its Time To Knocking the Sardjito Door Earlier?

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INTRODUCTION: ST Elevation Myocardial Infarction (STEMI) is caused by total coronary artery occlusion which requires reperfusion immediately. The goal is making the time from onset of STEMI to reperfusion as short as possible, considering that shorter total ischemic time is associated with a more favourable prognosis. The aim of this study is to perform ability of Sardjito Knocking Door Time (SKDT) to predict in-hospital mortality in STEMI patients who underwent PPCI at Sardjito Hospital. SKDT is defined as total ischemic time minus wire crossing time

METHODS: This cohort retrospective study involved 231 consecutive patients with STEMI admitted to Sardjito Hospital from 2021- 2023 who received PPCI. Receiver Operating Characteristic (ROC) curve was used to get the cut-off value of SKDT and Youden Index to get sensitivity and spesifisity. Bivariat analysis with categorical variables of 2 unpaired groups and calculating Odds Ratio (OR) to find out the magnitude of the risk when SKDT is above cut off time on in-hospital mortality

RESULT: The mean age of patients was 61,34 ($\pm$10,83) years old with majority gender being male as 185 (80,1%) patients and highest clinical presentation at admission was STEMI Killip II with 78 (33,7%). Mean Total Ischemic Time was 1129 ($\pm$1413) min, wire crossing time was 191 ($\pm$106) menit and SKDT was 937 ($\pm$1403) min with major outcome is in-hospital mortality in 70 (30,3%) patients. ROC analysis was obtained area under curve (AUC) 0,768 ($p<0,001$) with cut off point for SKDT at 710 min (sensitivity 65,7%, spesificity 78,9%). Patients with SKDT >710 min with OR 7.159 times have a risk for in-hospital mortality ($p<0,001$, CI 3,844-13,334).

DISCUSSION: Recent guidelines have focused on total ischemic time from the onset of STEMI, and a door-to-balloon time of ≤90 min is no longer a target.

CONCLUSION: Prolonged SKDT>710 min is associated with increasing in-hospital mortality in STEMI patients underwent PPCI.

Keywords: STEMI; Primary PCI; In-hospital Mortality; Sardjito Knocking Door Time

ROC Curve
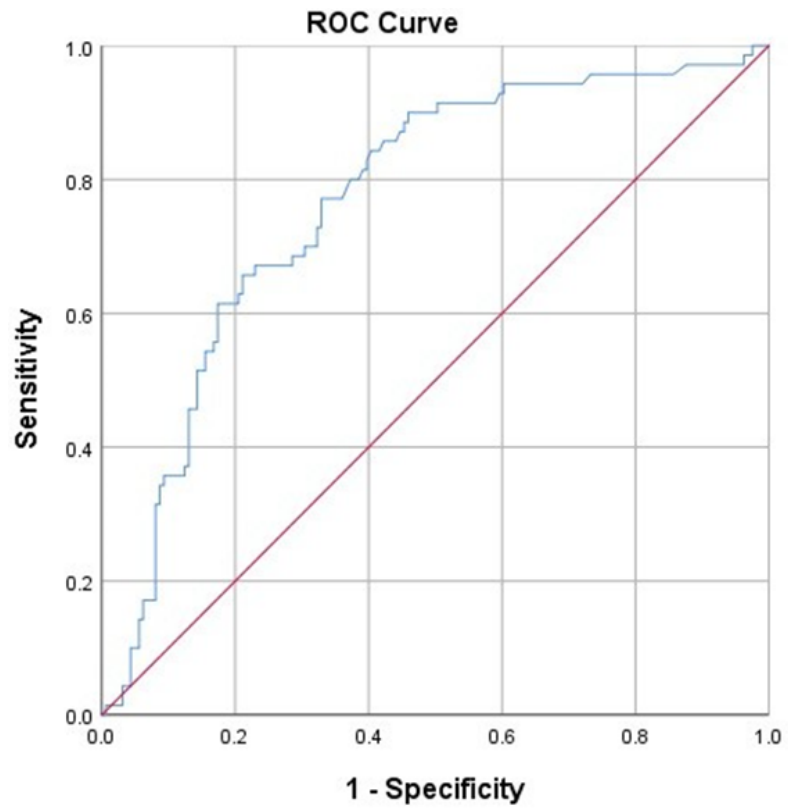
Diagonal segments are produced by ties.

Serum Creatinine and Coronary Plaque on Atherosclerosis, More or Less?

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INTRODUCTION: The risk of coronary atherosclerosis increased in all stages of the impairment of renal function. Serum creatinine (sCr) is proposed as the marker of renal function and coronary artery disease (CAD). However, the relation between sCr and coronary plaque characteristics still remains unclear. This study was designed to evaluate the relationship between sCr and the presence and severity of coronary atherosclerosis in subjects undergoing MSCT coronary angiography for suspected CAD.

METHODS: This cross-sectional study includes 444 subjects from the MSCT coronary angiography registry in Hasan Sadikin General Hospital Bandung from January 2020 until September 2022. Severe stenosis was defined as lesions causing >70% luminal stenosis or Left Main >50% or 3-vessel obstructive (≥70%) disease. All images were interpreted immediately after scanning by an experienced cardiologist.

RESULT: Three hundred and forty-five (77.7%) subjects had atherosclerotic plaque and 99 (22.3%) had none. Furthermore, after multivariate adjustment with gender, hypertension, and DM, sCr level independently increased the risk of developing atherosclerotic plaque [OR 6.671, (1.67-26.49, p-value 0.007)] and after multivariate adjustment with age, and gender, sCR independently also increased the risk of developing severe stenosis [OR 2.99, (1.15-7.71, p-value 0.024)].

DISCUSSION: Increased sCr level could be an indicator of an early nephrovasculopathy, which correlates with early development of atherosclerosis. Moreover, it was reported that sCr level behaves as a marker of pro-inflammatory state, and inflammation-mediated endothelial dysfunction that has been shown to be associated with the occurrence of cardiovascular events.

CONCLUSION: This study demonstrated that sCr has significant association with the presence and severity of coronary atherosclerosis detected by MSCT. Further studies are needed to promote its use in predicting whether patients with high sCr need more aggressive risk modification and/or treatment regarding CAD.

Keywords: coronary atherosclerosis; serum creatinine; sCR; coronary computed tomography angiography

Multivariate logistic regression analysis demonstrating the association between cardiovascular risk factors including serum creatinine and the presence of coronary plaque.			
CV Risk factors	OR	95% CI	p Value
Age	7.26	8.08-3.95	<0.001
Gender (male)	0.433	0.229-0.822	0.010
HT	2.029	1.18-3.48	0.010
DM	2.85	0.93-8.71	0.065
Serum Creatinine	6.671	1.67-26.49	0.007
Multivariate logistic regression analysis demonstrating the association between cardiovascular risk factors including serum creatinine and the severity of coronary plaque.			
CV Risk factors	OR	95% CI	p Value
Age	2.67	1.68-4.25	<0.001
Gender (male)	0.412	0.246-0.689	0.001
Serum Creatinine	2.99	1.15-7.71	0.024

Table 1. Multivariate logistic regression analysis demonstrating the association between cardiovascular risk factors including serum creatinine and the presence and severity of coronary plaque.