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DOOR-TO-BALLOON TIME AND QUALITY OF LIFE AFTER PRIMARY PCI IN STEMI

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ABSTRACT
ST-elevation myocardial infarction (STEMI) requires rapid reperfusion to limit myocardial injury. Primary percutaneous coronary intervention (PPCI) is the preferred reperfusion strategy when it can be delivered within the recommended time, and door-to-balloon (DTB) time is an important indicator of emergency cardiac care performance. Quality of life after PPCI is also an important patient-centred outcome. This study examined the relationship between DTB time and quality of life in patients with STEMI after PPCI and identified clinical factors associated with quality of life. A quantitative observational analytic study with a cross-sectional design was conducted among 142 patients with STEMI who underwent PPCI at the National Cardiovascular Center Harapan Kita Hospital, Jakarta. Participants were selected purposively and comprised 71 patients in the on-time group and 71 in the delayed group. Quality of life was assessed using the Indonesian version of the Seattle Angina Questionnaire-7 (SAQ-7), a validated instrument with good construct validity and test – retest reliability (ICC $\geqslant$0.78). Univariate and bivariate analyses were followed by binary logistic regression. Statistical significance was set at $p<0.05$. The mean DTB time was 73.85 minutes in the on-time group and 142.54 minutes in the delayed group. Overall, 93 participants (65.5%) had good quality of life. The proportion with good quality of life was 78.9% in the on-time group and 52.1% in the delayed group ($p=0.001$). Bivariate analysis also showed significant associations for comorbidity burden ($p=0.023$), left ventricular ejection fraction (LVEF) ($p=0.020$), physical limitation ($p<0.001$), and angina frequency ($p<0.001$). In the final multivariable model, DTB (OR=2.794; 95% CI: 1.215–6.426; $p=0.016$), LVEF (OR=2.342; 95% CI: 1.064–5.154; $p=0.034$), and length of stay (OR=1.213; 95% CI: 1.030–1.429; $p=0.021$) were significantly associated with quality of life. Quality of life after STEMI and PPCI was associated with timely reperfusion, ventricular systolic function, and length of hospital stay. Strengthening rapid STEMI pathways and monitoring functional recovery may support better patient-reported outcomes.

Keywords: door-to-balloon time; left ventricular ejection fraction; primary PCI; quality of life; STEMI

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INTRODUCTION

ST-elevation myocardial infarction (STEMI) is an acute cardiovascular emergency characterised by myocardial ischaemia, electrocardiographic ST-segment elevation, and acute coronary occlusion. The underlying event commonly involves plaque rupture, erosion, or dissection followed by thrombus formation, resulting in abrupt reduction or cessation of coronary blood flow. Rapid restoration of coronary perfusion is therefore central to limiting myocardial injury and improving outcomes (European Society of Cardiology, 2023). Primary percutaneous coronary intervention (PPCI) is the preferred reperfusion strategy for eligible patients with STEMI when it can be performed within the recommended time. The interval from hospital arrival to device activation or balloon inflation is commonly assessed using door-to-balloon (DTB) time. Shortening treatment delay is clinically important because prolonged ischaemia can increase myocardial injury and adversely affect subsequent cardiac function (Byrne et al., 2023; De Luca et al., 2012; Mentias et al., 2017).

Survival, however, is not the only relevant outcome after STEMI. Patients may continue to experience angina, reduced exercise tolerance, functional limitation, anxiety, and restrictions in daily activities after successful PPCI. Health-related quality of life (HRQoL) therefore provides complementary information about recovery from the patient's perspective. The Seattle Angina Questionnaire-7 (SAQ-7) captures key dimensions of health status in patients with coronary disease, including physical limitation, angina frequency, and perceived quality of life (Adji & Handayani, 2018; Soo Hoo et al., 2016).

Previous studies have identified several factors associated with post-PPCI health status, including ventricular function, symptom burden, comorbidity, and length of hospital stay. Faster reperfusion may limit infarct size and preserve left ventricular function, whereas more extensive disease and residual symptoms may adversely affect recovery (Reindl et al., 2020; Sugiharto et al., 2023; Wang et al., 2023). Nevertheless, the relationship between DTB time and patient-reported quality of life may vary according to clinical characteristics and the subsequent recovery process. This study examined the relationship between DTB time and quality of life among patients with STEMI after PPCI at the National Cardiovascular Center Harapan Kita Hospital (RSJPDHK), Jakarta. It also assessed demographic and clinical factors associated with quality of life and identified factors that remained significant in a multivariable model.

METHOD

This study used a quantitative observational analytic design with a cross-sectional approach. The study population consisted of patients with STEMI who underwent PPCI at RSJPDHK during 1 January–30 October 2025. The population was 320 patients and 142 participants were included in the analysis, consisting of 71 patients with on-time DTB and 71 patients with delayed DTB. Participants were selected using purposive sampling. Inclusion criteria were age ≥18 years; first STEMI treated with PPCI; PPCI performed 3–10 months before quality-of-life assessment; preserved orientation and ability to communicate; and willingness to complete the study questionnaire online or by telephone. Patients with cardiogenic shock, malignant arrhythmia, cardiac arrest during hospitalisation, fibrinolytic reperfusion, or chest pain/dyspnoea during questionnaire completion were excluded. Data collection was conducted at the RSJPDHK outpatient clinic from 1 December 2025 to 15 January 2026.

The independent variables included DTB timeliness and selected demographic and clinical characteristics: age, sex, marital status, education, length of stay, number of comorbidities, LVEF, number of occluded coronary vessels, arrival type, symptom onset, and STEMI location. The dependent variable was quality of life. Clinical and hospital-record information was combined with patient-reported questionnaire data. Quality of life was assessed using the Indonesian version of the Seattle Angina Questionnaire-7 (SAQ-7). The instrument contains seven items representing physical limitation, angina frequency, and quality-of-life perception. The source manuscript reports that the Indonesian version has demonstrated validity and reliability. Adji and Handayani reported item correlations above the critical r value ($r=0.278$; $n=50$; $p<0.05$), with item correlations ranging from 0.565 to 0.998 across the three domains and Cronbach's alpha of 0.904. Piscesiana reported Cronbach's alpha of 0.963. These findings support the use of the Indonesian SAQ-7 for assessment of health-related quality of life in this study. Data were analysed using univariate, bivariate, and multivariable procedures. Categorical variables were examined using the chi-square test, while the Mann–Whitney test was used for non-normally distributed numerical variables. Binary logistic regression was used to identify clinical factors independently associated with quality of life. Statistical significance was defined as $p<0.05$. Odds ratios (ORs) and 95% confidence intervals (CIs) were reported for the final model.

RESULT

Participant characteristics

The two groups contained 71 participants each. Mean age was similar between groups, while the delayed group had a longer mean hospital stay and a lower mean total SAQ-7 score. The delayed group also had a longer mean symptom-onset interval.

Table 1.
Numerical characteristics of participants (n=142)

Variable	On-time range	Mean ± SD	Median	Delayed range	Mean ± SD	Median
Age (years)	22–79	54.82 ± 11.06	55.00	32–82	54.38 ± 11.14	54.00
Length of stay (days)	2–12	4.82 ± 1.85	4.00	2–24	5.76 ± 3.02	5.00
STEMI onset	1–11	5.88 ± 2.66	6.00	1.5–12	8.19 ± 3.45	9.00
Total quality-of-life score	34–100	89.65 ± 14.48	96.00	24–100	82.32 ± 17.60	86.00

Table 2.
Selected demographic and clinical characteristics by DTB group (n=142)

Characteristic	Category	On-time **f** (%)	Delayed **f** (%)
Sex	Female	7 (9.9)	10 (14.1)
	Male	64 (90.1)	61 (85.9)
Marital status	Married	67 (94.4)	65 (91.5)
	Not married	4 (5.6)	6 (8.5)
Education	Primary/secondary	42 (59.2)	47 (66.2)
	Higher education	29 (40.8)	24 (33.8)
Comorbidity	None	9 (12.7)	7 (9.9)
	1	24 (33.8)	19 (26.8)
	2	20 (28.2)	25 (35.2)
	≥3	18 (25.4)	20 (28.2)
LVEF	Normal	41 (57.7)	36 (50.7)
	Mild	19 (26.8)	20 (28.2)
	Moderate	11 (15.5)	13 (18.3)
	Severe	0 (0.0)	2 (2.8)
Coronary vessels	Single-vessel disease	43 (60.6)	19 (26.8)
	Multivessel disease	28 (39.4)	52 (73.2)
STEMI location	Anterior	15 (21.1)	15 (21.1)
	Inferior	8 (11.3)	4 (5.6)
	Extensive anterior	15 (21.1)	21 (29.6)
	Inferior-posterior	14 (19.7)	14 (19.7)
	Inferior-RV	19 (26.8)	17 (23.9)
SAQ-7 physical limitation	Very good	58 (81.7)	46 (64.8)
	Good	10 (14.1)	15 (21.1)
	Less good	3 (4.2)	10 (14.1)
SAQ-7 angina frequency	No angina	56 (78.9)	31 (43.7)
	Monthly	12 (16.9)	33 (46.5)
	Daily	3 (4.2)	7 (9.9)

Overall, 93 participants (65.5%) had good quality of life and 49 (34.5%) had less good quality of life. Good quality of life was more frequent in the on-time group (78.9%) than in the delayed group (52.1%). The on-time group also showed a greater proportion of normal LVEF and single-vessel disease, whereas multivessel disease was more common in the delayed group.

Table 3.
Bivariate associations with quality of life (n=142)

Variable	Category	Good QoL n (%)	Less good QoL n (%)	p
Sex	Female	12 (70.6)	5 (29.4)	0.638
	Male	81 (64.5)	44 (35.2)	
Marital status	Married	87 (65.9)	45 (34.1)	0.705
	Not married	6 (60.0)	4 (40.0)	
Education	Higher	75 (64.4)	43 (35.6)	0.546
	Lower	18 (70.8)	6 (29.2)	
Comorbidity	≤1	45 (76.3)	14 (23.7)	0.023
	≥2	48 (57.8)	35 (41.0)	
Arrival type	Direct	35 (68.6)	16 (31.4)	0.556
	Referral	58 (63.7)	33 (36.3)	
STEMI location	Non-anterior	54 (71.1)	22 (29.8)	0.135

Variable	Category	Good QoL n (%)	Less good QoL n (%)	p
	Anterior	39 (59.1)	27 (36.8)	
DTB	On-time	56 (78.9)	15 (21.1)	<0.001
	Delayed	37 (52.1)	34 (47.9)	
LVEF	Normal	57 (74.0)	20 (26.0)	0.020
	Abnormal	36 (55.4)	29 (44.6)	
Coronary vessels	Single-vessel	45 (72.6)	17 (27.4)	0.118
	Multivessel	48 (60.0)	32 (40.0)	
Physical limitation	None	90 (86.5)	14 (13.5)	<0.001
	Present	3 (7.9)	35 (92.1)	
Angina	None	82 (94.3)	5 (5.7)	<0.001
	Present	11 (20.0)	44 (80.0)	

Bivariate analysis showed significant associations between quality of life and comorbidity burden, DTB category, LVEF, physical limitation, and angina frequency. Age, sex, marital status, education, arrival type, STEMI location, and number of affected coronary vessels were not statistically significant. The Mann–Whitney test showed a significant difference in length of stay between quality-of-life groups (p=0.015), with a higher mean rank in the less-good quality-of-life group (82.88 vs 65.51). The onset interval was not significantly different between quality-of-life groups (p=0.472).

Table 4.
Final multivariable logistic regression model for quality of life

Variable	B	SE	Wald	p	OR	95% CI
Constant	-3.248	0.650	24.986	<0.001	0.039	—
Comorbidity	0.543	0.422	1.656	0.198	1.721	0.753–3.935
DTB	1.028	0.425	5.847	0.016	2.794	1.215–6.426
LVEF	0.851	0.402	4.473	0.034	2.342	1.064–5.154
STEMI location	0.391	0.414	0.892	0.345	1.479	0.667–3.331
Length of stay	0.193	0.083	5.361	0.021	1.213	1.030–1.429
Occluded vessels	0.097	0.437	0.049	0.825	1.102	0.468–2.596

In the final multivariable model, DTB, LVEF, and length of stay remained significantly associated with quality of life. Patients in the on-time DTB category had 2.79 times the odds of good quality of life compared with the delayed category. Better LVEF was associated with 2.34 times the odds of good quality of life, while longer hospital stay was also associated with the outcome (OR=1.213). Comorbidity, STEMI location, and the number of occluded vessels were not significant after adjustment.

DISCUSSION

DTB time and quality of life

The principal finding was the difference in DTB time between groups and its association with quality of life. Mean DTB was 73.85 minutes in the on-time group compared with 142.54 minutes in the delayed group. Good quality of life was more frequent in the on-time group (78.9%) than in the delayed group (52.1%). This pattern is consistent with the clinical principle that earlier reperfusion limits the duration of myocardial ischaemia and may preserve subsequent ventricular function. Contemporary acute coronary syndrome guidance emphasises rapid reperfusion for eligible STEMI patients, while observational studies have linked shorter DTB with improved clinical outcomes (European Society of Cardiology, 2023; Mentias et al., 2017; Nishio et al., 2023). The delayed group had a much wider DTB range (95–360 minutes), suggesting greater variability in the care pathway. The source manuscript identifies referral, transport, administrative processes, repeated clinical assessment, diagnosis, and catheterisation laboratory activation as potential contributors. Because DTB reflects both clinical decision-making and system efficiency, improvement should address the entire STEMI pathway. Rapid ECG interpretation, early activation of the catheterisation team, and coordinated referral communication may reduce avoidable delays.

LVEF and quality of life

LVEF was significantly associated with quality of life in bivariate analysis and remained significant in the multivariable model. Participants with normal LVEF had a higher proportion of good quality of life than those with abnormal LVEF. LVEF is a clinically meaningful indicator of left ventricular systolic function and may reflect the extent of myocardial injury and recovery after infarction. Previous work has linked post-STEMI ventricular dysfunction with poorer functional status and longer recovery (Reindl et al., 2020; Miyazaki et al., 2022). The finding that LVEF remained significant after adjustment suggests that preservation of ventricular function is relevant to patient-reported recovery, although quality of life is multifactorial.

Length of stay and quality of life

Length of stay differed significantly between quality-of-life groups and remained associated with quality of life in multivariable analysis. The delayed group had a longer mean hospital stay than the on-time group, and patients with less good quality of life had a higher mean rank for length of stay. A longer admission may reflect greater clinical complexity, complications, slower functional recovery, or the need for additional monitoring. The association should not be interpreted as evidence that hospitalisation itself causes poorer quality of life; rather, length of stay may act as a marker of the clinical and recovery burden experienced by the patient. This interpretation is consistent with evidence that complications and clinical complexity contribute to prolonged hospitalisation after PPCI (Sugiharto et al., 2023).

Comorbidity and coronary characteristics

Comorbidity burden was significant in bivariate analysis but was not independently significant in the final multivariable model. Participants with two or more comorbidities had a higher proportion of less good quality of life than those with one or fewer. Multimorbidity may increase treatment complexity and functional burden, but its effect can be attenuated after adjustment for ventricular function, reperfusion timing, and hospital course. Similar evidence indicates that the relationship between comorbidity and post-MI health status varies according to disease type, severity, and other clinical characteristics (Wang et al., 2023). The number of occluded vessels and STEMI location were not independently associated with quality of life. Although multivessel disease was more common in the delayed group, the adjusted association with quality of life was not statistically significant. Coronary anatomy may influence clinical risk, but patient-reported health status also depends on successful reperfusion, residual symptoms, ventricular function, rehabilitation, and psychosocial adaptation. Anatomical complexity should therefore be interpreted together with functional and symptomatic outcomes.

SAQ-7 domains

The SAQ-7 findings showed strong bivariate relationships between physical limitation, angina frequency, and total quality of life. Participants without physical limitation or angina were much more likely to have good quality of life. These results are clinically coherent because recurrent angina can directly restrict activity and increase concern about symptoms, while physical limitation affects independence and participation in daily activities. The findings support the value of patient-reported symptom assessment after PPCI and are consistent with previous evidence that SAQ domains capture clinically meaningful aspects of recovery (Soo Hoo et al., 2016; Wardoku, 2019).

Clinical implications

The findings suggest that improving the timeliness of reperfusion should be accompanied by assessment of ventricular function, symptom burden, and recovery during and after hospitalisation. For hospitals managing STEMI, quality-improvement activities can include rapid triage, early ECG interpretation, pre-arrival activation of the catheterisation team where feasible, clear referral communication, and regular review of DTB performance. After PPCI, nursing and multidisciplinary follow-up should address angina, physical limitation, medication adherence, rehabilitation, and self-management. This integrated approach recognises that technical success of PCI and patient-perceived recovery are related but distinct outcomes.

Study limitations

This study used a cross-sectional design and therefore cannot establish temporal or causal relationships between DTB, clinical characteristics, and quality of life. Participants were recruited purposively from a single tertiary referral centre, which may limit generalisability to other hospitals and health systems. Quality of life was assessed several months after PPCI, so recall and survivorship effects cannot be excluded. The source manuscript did not report an ethics approval number; this information should be added before journal submission if available. Future multicentre prospective studies with repeated SAQ-7 assessments would help clarify recovery trajectories and the temporal relationship between reperfusion delay and patient-reported outcomes.

CONCLUSION

Among patients with STEMI undergoing PPCI at RSJPDHK, quality of life was associated with DTB timeliness, LVEF, and length of hospital stay after adjustment for selected clinical characteristics. Good quality of life was more common among patients with on-time DTB than among those with delayed DTB. Bivariate analysis also identified comorbidity burden, physical limitation, and angina frequency as significant factors, while age, sex, marital status, education, arrival type, STEMI location, and number of occluded vessels were not significant.

REFERENCES

Adji, A., & Handayani, W. (2018). Reliability and validity of the Indonesian version of the Seattle Angina Questionnaire. Jurnal Kardiologi Indonesia.

Al-Faleh, H., et al. (2024). Determinants of hospital stay duration in STEMI patients undergoing PCI. Circulation Reports.

AlHabib, K., et al. (2021). Delayed PCI and clinical complications in acute MI. European Heart Journal – Quality of Care and Clinical Outcomes.

Byrne, R. A., et al. (2023). ESC guidelines for the management of acute coronary syndromes. European Heart Journal, 44(38), 3720–3822.

De Luca, G., et al. (2012). Association of onset to balloon and door to balloon time with long term clinical outcome in patients with ST elevation acute myocardial infarction having primary percutaneous coronary intervention: Observational study. BMJ.

El-Menyar, A., et al. (2021). Multivessel disease and delayed reperfusion. Journal of Clinical Medicine.

European Society of Cardiology. (2023). ESC guidelines for acute coronary syndromes. European Heart Journal.

Graham, G., et al. (2019). Association of diabetes mellitus with health status outcomes in young women and men after acute myocardial infarction: Results from the VIRGO study. Journal of the American Heart Association.

Graham, G., et al. (2021). Treatment delays and physical function post-STEMI. Journal of Cardiovascular Rehabilitation.

Iruvanti, S., Blumfield, A., Farhan, S., Snyder, C., Johal, G., Sartori, S., Vogel, B., Giustino, G., Melarcode-Krishnamoorthy, P., Kyaw, H., Dangas, G., Mehran, R., Kini, A., & Sharma, S. K. (2023). Determinants of Seattle Angina Questionnaire in multivessel disease patients undergoing percutaneous coronary intervention: Insights from a single-center study. Cardiovascular Revascularization Medicine, 49, 28–33.

Khedri, M., et al. (2022). Delayed reperfusion and health-related quality of life in acute myocardial infarction. International Journal of Cardiology.

Koh, S. J. Q., Jiang, Y., Lau, Y. H., Yip, W. L. J., Chow, W. E., Chia, P. L., Loh, P. H., Chong, T. T. D., Lim, Z. Y. P., Tan, W. C. J., Wong, S. L. A., Yeo, K. K., & Yap, J. (2024). Optimal door-to-balloon time for primary percutaneous coronary intervention for ST-elevation myocardial infarction. International Journal of Cardiology, 413, 132345.

Mentias, A., Gaudino, M., Choudhry, F., et al. (2017). Effect of shorter door-to-balloon times over 20 years on outcomes of patients with anterior ST-elevation myocardial infarction undergoing primary percutaneous coronary intervention. The American Journal of Cardiology.

Miyazaki, S., et al. (2022). Left ventricular dysfunction and length of stay after STEMI. International Journal of Cardiology.

Nishio, R., Ogita, M., Suwa, S., Nakao, K., Ozaki, Y., Kimura, K., Ako, J., Noguchi, T., Fujimoto, K., Dai, K., Morita, T., Shimizu, W., Saito, Y., Hirohata, A., Morita, Y., Inoue, T., Okamura, A., Mano, T., Wake, M., et al. (2023). Shorter door-to-balloon time, better long-term clinical outcomes in ST-segment elevation myocardial infarction patients: J-MINUET substudy. Journal of Cardiology, 81(6), 564–570.

Reindl, M., et al. (2020). Left ventricular function post-STEMI. JACC: Cardiovascular Imaging.

Soo Hoo, S. Y., Gallagher, R., & Elliott, D. (2016). Factors influencing health-related quality of life after primary percutaneous coronary intervention for ST-elevation myocardial infarction. Applied Nursing Research, 30, 237–244.

Sugiharto, F., Trisyani, Y., Nuraeni, A., Mirwanti, R., Putri, A. M., & Armansyah, N. A. (2023). Factors associated with increased length of stay in post primary percutaneous coronary intervention patients: A scoping review. Vascular Health and Risk Management, 19, 329–340.

Wang, X., et al. (2023). Comorbidity burden and QoL after acute MI. Quality of Life Research, 32(1), 75–89.

Wardoku, J. (2019). Physical limitation and multidimensional QoL. Journal of Cardiac Functional Studies.