

## Association of quality indicators for acute myocardial infarction and mortality: feasibility and validation study using linked nationwide registry data

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**Background:** Quality indicators (QIs) have been increasingly used as tools to assess and improve the quality of care for acute myocardial infarction (AMI). However, it is not known if it is feasible to use the 2020 iteration of international AMI QIs using routinely collected data and, if so, whether higher performance is associated with improved outcomes.

**Objective:** To investigate if routine data are available to measure care quality against the 2020 European Society of Cardiology (ESC) Association for Acute Cardiovascular Care (ACVC) QIs for AMI, investigate whether higher performance is associated with reduced mortality, and to report quality of care during the COVID-19 pandemic.

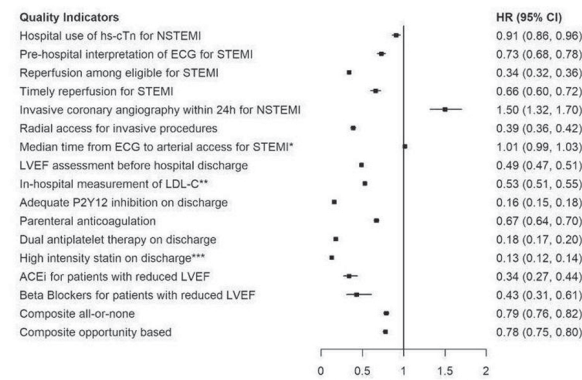
**Methods:** Cohort study of linked data from the AMI and percutaneous coronary intervention (PCI) registries in England and Wales with outcome data from the Civil Registration of Deaths Register between 2017 and 2020 (representing 236 743 patients from 186 hospitals). Baseline ischaemic risk was estimated using the Global Registry of Acute Coronary Events (GRACE) risk score. The likelihood of attainment for each QI based on GRACE risk was quantified using logistic regression and the association with mortality at 30 days, 6 months, 1 year and long-term (maximum 1243 days) was obtained from Cox proportional hazard models.

**Results:** Of 26 QIs, 17 (65.3%) could be directly measured using nation-

wide registry data and were each inversely associated with risk-adjusted 1-year and long-term mortality. At 30 days, the measured QIs with exception of early invasive coronary angiography for non-ST elevation myocardial infarction, were associated with improved survival, and the QIs that had the greatest magnitude for a reduction in mortality were the prescription of secondary prevention medications at discharge; hazard ratio 0.13 (95% CI 0.12–0.14) for statins, 0.16 (95% CI 0.15–0.18) for adequate P2Y12 inhibition, and 0.18 (95% CI 0.17–0.20) for dual antiplatelet therapy (Figure 1). The magnitude of association between the composite QI (CQI) and survival attenuated over time, with greater long-term survival gains observed for the high GRACE risk compared with low- and intermediate-risk (Figure 2). During the first UK lockdown there was an improvement in the attainment for 62.5% of the measured QIs compared with before the COVID-19 pandemic, with a higher attainment for the CQI (43.8% to 45.2%, odds ratio 1.06, 95% CI 1.02–1.10).

**Conclusion:** Care quality for AMI may be evaluated using routinely collected clinical data from the national registries, whereby higher performance is associated with reduced mortality. Such QIs will have a role in monitoring hospital care as demonstrated for COVID-19.

**Figure 1. Risk-adjusted 30-day mortality estimates for each quality indicator attainment**

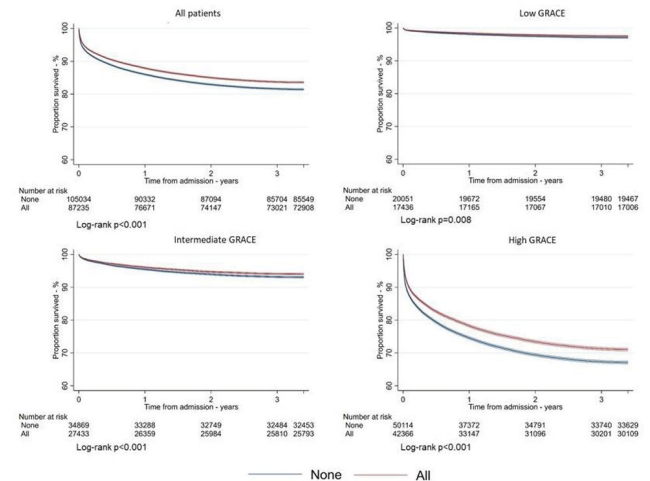


ACEi, angiotensin converting enzyme inhibitor, ECG, electrocardiogram, hs-cTn, high-sensitivity cardiac troponin, LDL-C, low-density lipoprotein cholesterol, LVEF, left ventricular ejection fraction, NSTEMI, non-ST elevation myocardial infarction, QI, quality indicator, STEMI, ST elevation myocardial infarction.

\*Door-to-Balloon time  
\*\*Serum cholesterol measurement  
\*\*\*Discharged on statin

Figure 1

**Figure 2. Trajectories of survival over time for patients with AMI according to all-or-none CQI attainment, by GRACE risk category**



Survival estimates of patients receiving all or none (anything fewer all) of the treatments they were clinically eligible for, presented for all patients and further stratified by their GRACE risk category. Patients were followed from admission for a maximum of 1243 days (3.4 years) indicated as censored time. Risk tables showing number of patients at each yearly interval and at the censor time. AMI, acute myocardial infarction, GRACE, Global Registry of Acute Coronary Events, CQI, composite quality indicator

Figure 2. QI association with long-term mortality