College of Human Medicine
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Routine Supplemental Oxygen in Acute MI

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Clinic Scenario

While seeing patients in a rural primary care clinic in Clare, I saw several patients with a history of myocardial infarction (MI). These encounters prompted me to reflect on the acute management of MI and the evidence behind commonly used interventions. I became interested in the routine use of supplemental oxygen in patients who are not hypoxic at presentation. This topic is especially important in rural areas, where transport times are long and hospital resources are limited.

Background & Significance

- MI occurs when acute coronary artery occlusion leads to myocardial ischemia and necrosis. Diagnosis is based on symptoms, ECG changes, and elevated cardiac troponins.[1]
- Common symptoms: retrosternal chest pain radiating to the jaw or arm, dyspnea, diaphoresis, nausea, or syncope.[2] MI is relatively common and males are twice as likely to be impacted.
- Risk factors: diabetes, hypertension, obesity, and tobacco use.[1]
- Management: aspirin, nitroglycerin, beta-blockers, and reperfusion.[3]
- Historically, supplemental oxygen was routinely administered to all patients with suspected MI, regardless of oxygen saturation. Oxygen was believed to improve myocardial oxygen delivery and reduce ischemic injury.[4]
- However, recent evidence has questioned the benefit of oxygen therapy in patients who are not hypoxic.[4-7] Given the continued use of oxygen in emergency and prehospital settings, clarifying its role in non-hypoxic MI patients is important to ensure evidence-based practice and avoid unnecessary intervention.

In adults with acute MI and normal oxygen saturation (SpO2 ≥ 90-94%), does routine supplemental oxygen therapy compared to room air improve mortality, myocardial function, or infarct size?

Search Strategy

Literature was primarily searched using PubMed, with additional articles obtained from ScienceDirect, New England Journal of Medicine, and AHA Journals. Keywords and Boolean Logic include (acute coronary syndrome OR myocardial infarction OR ACS) AND (prehospital OR emergency medical services OR EMS) AND (supplemental oxygen OR oxygen therapy) AND (routine oxygen OR normohypoxia OR oxygen only for hypoxia).

Limits/Filters:

- Most studies published between 2012-2018; more recent publications were limited, reflecting a lack of newer evidence.
- Expanded searches included terms like hospital and clinic, but only studies aligning with original search criteria were included.
- Select studies included primary research and reviews relevant to supplemental oxygen in MI.
- Only RCTs were included.

Search Results

Table 1: Characteristics and Key Findings of Included Studies Evaluating Routine Supplemental Oxygen in Acute Myocardial Infarction

Author and Year	Study Aim/Hypothesis	Study Design And Participants	Interventions and Comparison	Outcomes Measured	Results	Strengths and Limitations
Hofmann et al., 2017 (DETO2X-AMI)	Does supplemental oxygen reduce mortality in patients with acute MI who are not hypoxic?	○ RCT, registry-based, open-label ○ 6,629 adults with acute MI and SpO_2 ≥ 90%	Supplemental oxygen 6L/min. Comparison was room air	Mortality at 30 days and at 1 year, rehospitalization with MI, death, and troponin levels	No reduction in mortality or improvement in outcomes	○ large randomized, registry-based trial ○ no blinding, excluded critically ill patients[5]
Khoshnood et al., 2017 (SOCCER)	Does supplemental oxygen affect myocardial function in non-hypoxic patients with STEMI?	○ RCT, open-label trial with blinded outcome assessment ○ 87 adults with STEMI, SpO_2 ≥ 94%	Supplemental oxygen 8L/min. Comparison was room air	Wall-motion score index and left ventricular ejection fraction 2-3 days after PCI and 6 months follow up	No improvement or worsened myocardial function	○ randomized design with imaging follow up ○ small sample size, imaging outcomes versus clinical outcomes[6]
Stub et al., 2015 (AVOID)	Does supplemental oxygen reduce myocardial infarct size in non-hypoxic patients with STEMI?	○ RCT, open-label ○ 441 adults with confirmed STEMI and SpO_2 ≥ 94%	Supplemental oxygen 8L/min. Comparison was room air	MI size, recurrent MI, arrhythmias, mortality, and infarct size at 6 months by cardiac MRI	Increased markers of MI and larger infarct size at 6 months	○ randomized with objective biomarkers and imaging ○ no blinding, some exclusions, and incomplete 6-month MRI[7]

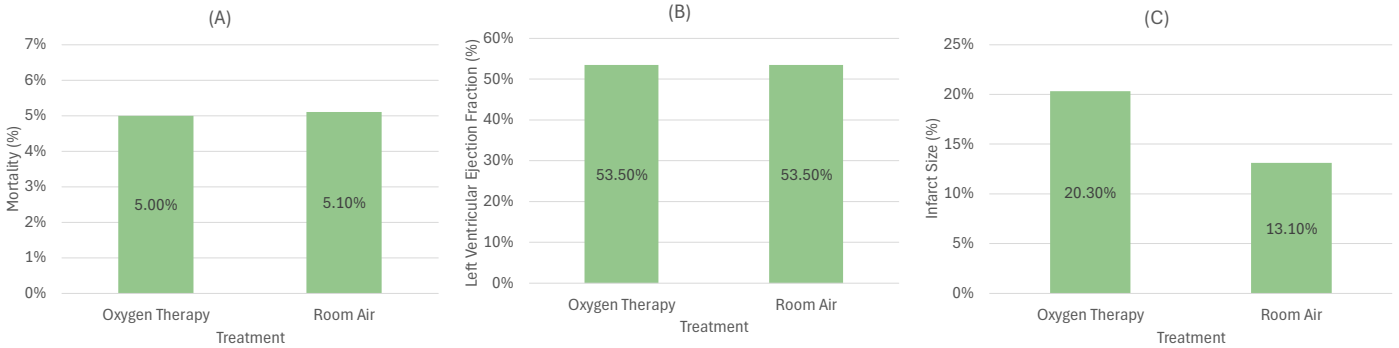


Figure 1: Impact of supplemental oxygen versus room air on key outcomes in acute myocardial infarction: (A) one-year mortality (DETO2X-AMI [5]), (B) 6-month left ventricular ejection fraction (SOCCER trial [6]), and (C) infarct size at 6 months (AVOID trial [7]).

Conclusion

- Key takeaway: Routine supplemental oxygen does not improve outcomes in patients with acute MI who are not hypoxic (SpO_2 ≥ 90-94%).
- Clinical implications: Oxygen should be reserved for hypoxic patients, reducing unnecessary interventions, potential myocardial injury, and conserving resources.
- Implementation Recommendations: Reinforce adherence to current guidelines and ensure staff consistently check SpO_2 before administering oxygen.
- This analysis is limited by the small number of available studies, older publications, and variability in study methods and outcomes. Most trials focused on select patient populations, so findings may not fully generalize to all patients, including those in rural or resource-limited settings.
- Suggestions for further research: Explore pre-hospital oxygen strategies in rural or resource-limited settings, low-flow or titrated oxygen for borderline saturations, and study whether supplemental oxygen reduces anxiety or chest pain perception in non-hypoxic patients.

Referenced Literature

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