Oxygen Therapy in Normoxic Patients With Confirmed or Suspected Myocardial Infarction & Acute Coronary Syndrome

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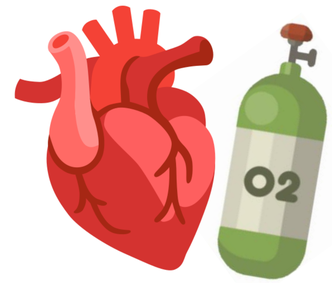
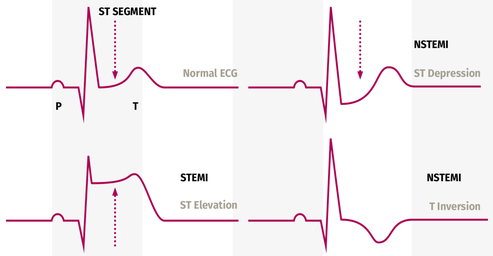


BACKGROUND

Supplemental oxygen therapy in normoxic (admitting pulse oximetry > 90%) patients with suspected or confirmed myocardial infarction (MI) or acute coronary syndrome (ACS) has been relatively universal in healthcare systems for decades. Evidence of this is the well-known treatment course for ACS expressed as the pneumonic "M.O.N.A."- standing for Morphine, Oxygen, Nitroglycerine and Aspirin (Alencar, 2018). Recent research has examined any benefits provided by supplemental oxygen therapy during ACS and MI, especially for those patients presenting with a clinically "normal" pulse oximetry reading. This project examines the results of five high-quality randomized controlled trials (RCT's) that suggest that administration of supplemental oxygen therapy to normoxic MI/ACS patients provides little to no clinically significant benefit to patient outcomes.



N.A., (2022). *Thrombosis Advisor.* Illustration of normal ECG and ECGs showing STEMI and NSTEMI. https://www.thrombosisadviser.com/en/professionals/knowledge-base/arterial-thrombosis/acute-coronary-syndrome/introduction

OBJECTIVE & METHODS

The objective for this project was to explore the following PICOT Statement:

In normoxic adult patients with suspected/confirmed myocardial infarction or acute coronary syndrome, does supplemental oxygen therapy improve patient outcomes compared to remaining on ambient air?

Database: PubMed
Study Type: Randomized Controlled Trial (RCT)
Terms Used: "oxygen therapy AND myocardial infarction"
Date Range: 2015- 2022
Language: English
Other Criteria: peer reviewed articles, primary research studies

This search yielded 63 results, from which five studies were selected.

LITERATURE REVIEW

Authors & Publish Year	Research Type	Evidence Level (Melnyk & Fineout-Overholt)	Evidence Level (Johns Hopkins Nursing EBP)	Sample Size	Dependent Variable	Results
Hoffman, R. et al. (2018)	RCT	II	1A	n = 2,807	• 1-year mortality • Rehospitalizations for MI after 1 year • Cardiogenic shock after 1 year • Stent thrombosis after 1 year	**No clinically significant relationship found;** **p= 0.41** **p= 0.73** **p= 0.95** **p= 0.64**
James, S.K., et al. (2020)	RCT	II	1A	n = 5,010	• 1-year mortality • MI rehospitalizations after 1 year • HF rehospitalizations after 1 year	**No clinically significant relationship found;** **p= 0.47** **p= 0.77** **p= 0.57**
Khoshnood, A. et al. (2017)	RCT	II	1A	n = 87	• Wall-motion score index (0 & 6 mo.) • Left Ventricular Ejection Fraction (0 & 6 mo.) • BNP (0 & 6 mo.)	**No clinically significant relationship found;** **p= 0.342, p=0.816** **p= 0.159, p=0.948** **p=0.062, p=0.880**
Stewart, R.A. et al. (2021)	RCT	II	1A	n = 40,872	• STEMI mortality (30-day and 1-year) • NSTEMI mortality (30-day & 1-year) • Unstable Angina mortality (30-day & 1-year) • Non-ACS mortality (30-day and 1-year)	**No clinically significant relationship found;** **p=0.027, p= 0.063** **p= 0.84, p= 0.31** **p= 0.14, p= 0.36** **p= 0.71, p= 0.013**
Stub, D., Smith, K., Bernard, S. (2015)	RCT	II	1A	n = 441	• Biomarkers (Troponin, Creatinine kinase) • In-hospital recurrent MI rate • Mortality rate at 6 months • CMR imaging after 6 months	**Significant increase in peak CK in the oxygen group compared with the no oxygen group (p= 0.01). Trop p= 0.18.** **There was an increase in the rate of in-hospital myocardial infarctions for the oxygen group (5.5% vs 0.9%, p= 0.006.** **p= 0.32 – No significant difference found.** **Median infarct size (CMR) was increased in the oxygen group compared with no oxygen group (p=0.04).** **These results suggest that hyperoxemia in MI/ACS patients actually causes further injury to the myocardium.**

SUMMARY & CONCLUSIONS

- **Hoffman, et al (2018)** found no statistically significant benefits of oxygen therapy were found compared with standard ambient air when measuring mortality rate at one-year, rehospitalizations for MI or cardiogenic shock within one year and stent thrombosis rates within one year.
- **James, et al. (2020)** concluded that no benefit was observed for adult MI patients who received oxygen therapy compared with ambient air regarding one-year mortality and risk of developing subsequent MI or heart failure within one year.
- **Khoshnood, et al. (2017)** discovered no statistically significant outcome improvement in Wall-motion score index (WMSI), Left ventricular ejection fraction (LVEF) via echocardiogram, and N-terminal pro b-type natriuretic peptide (NT-proBNP) levels after six months for normoxic MI patients that received supplemental oxygen therapy.
- **Stewart, et al. (2021)**'s study of 40,000+ participants results indicate no statistically significant advantage of hyperoxemia over normoxemia in ACS patients.
- **Stub, et al. (2015)** results suggest that oxygen administration for normoxic MI/ACS patients was not clinically connected to an improvement in symptoms, myocardial injury or infarct size but was clinically significant for contributing to worsening patient outcomes. Parameters measures were Cardiac Troponin-I (cTnI) levels, Creatine kinase (CK) levels, Cardiac magnetic resonance imaging, mortality rate at six months, and in-hospital recurrent myocardial infarction (MI).

IMPLICATIONS FOR NURSING PRACTICE & ROLE OF THE CNL

Nursing Practice Implications

- The evidence suggests policy changes supporting no supplemental oxygen therapy to normoxic MI patients.
- **Stub, et al., (2015)** remarks potential of free radical damage to the myocardium in cases of hyperoxemia, concluding there is a statistically significant relationship between hyperoxemia in MI/ ACS patients and further myocardial injury. This may require further clinical research.
- Since studies found that there was no statistically significant advantage or disadvantage to the oxygen therapy, healthcare facilieis may opt to forgo a formal policy change.

Implications for the Clinical Nurse Leader

- Further research should be conducted to achieve a more comprehensive body of evidence
- When adequate data is collected, the CNL would then be charged with critically appraising the data to determine the strength of the evidence
- By doing these things, the CNL's efforts in pursuing lateral integration would be aided by having reliable and non-biased information to present to the interprofessional team when looking to support or drive changes in practice.

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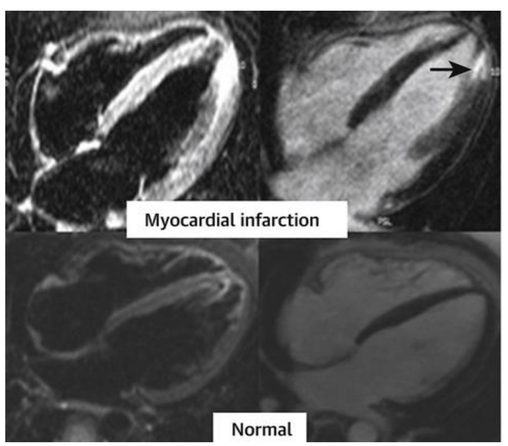

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