

# Safety and Efficacy of Coronary CT Angiography in Patients Presenting with Chest Pain

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## Background

Patients often present to the Emergency Department (ED) with chest pain which can range from a mechanical injury to a life-threatening emergency. Therefore, each hospital has their own protocol for evaluation and treatment of chest pain.

Evidence on coronary CT angiography (CCTA) has demonstrated it is an effective tool for evaluating chest pain of cardiac origin where acute coronary syndrome has been ruled out (Kelly et al., 2017).

## Objective/Purpose

- **Purpose:** To review current literature recommendations on the use of CCTA in the evaluation of patients presenting to the ED with chest pain.
- **Primary objective:** To determine if patients were less likely to experience adverse cardiovascular outcomes (i.e. myocardial infarction, stroke, revascularization) in the 30 days following discharge after evaluation with CCTA versus standard of care (EKG, troponin).
- **Secondary objective:** To determine the efficacy of CCTA on length of stay in the ED.

## Methods

- **Databases:** PubMed, CINAHL, and the Cochrane Library
- **Search terms:** (chest pain) AND (Coronary CT angiography) AND (myocardial infarction OR "major cardiac events") AND (emergency department).
- **Inclusion criteria:** Published in the English language within the last 5 years,
- **Exclusion criteria:** Studies that did not include evaluation of adverse cardiovascular events within 30 days post-discharge, and length of stay in the ED.

## Key

ICA- invasive coronary angiography  
MACE- major adverse cardiac event

## Results

STUDY & DESIGN	INCLUSION AND CONTROL	OUTCOMES
<b>Dedic et al., 2016</b> <ul style="list-style-type: none"><li>● Randomized control trial</li><li>● Multicenter study of five hospitals in the Netherlands</li><li>● N=500</li></ul>	<ul style="list-style-type: none"><li>● Patients &gt;30 years old with acute cardiac chest pain</li><li>● No indication for immediate catheterization</li><li>● Addition of cardiac CT versus standard of care alone (EKG, serial troponin)</li></ul>	<ul style="list-style-type: none"><li>● No difference in revascularization or ICA in 30 days (p = 0.40 and 0.20)</li><li>● No difference in MACE at 30 day follow-up (p = 0.54)</li><li>● No difference in length of ED stay (p = 0.80)</li></ul>
<b>Pena et al., 2016</b> <ul style="list-style-type: none"><li>● Prospective observational study</li><li>● Single-center study based in a Canadian emergency department</li><li>● N=258</li></ul>	<ul style="list-style-type: none"><li>● Patients &gt;25 years old presenting to the ED with chest pain</li><li>● Negative cardiac enzyme and normal EKG</li><li>● Cardiac CT procedure versus standard of care (EKG, serial troponin)</li></ul>	<ul style="list-style-type: none"><li>● No difference in rate of ICA in either group</li><li>● No occurrence of revascularization in either group on follow up</li><li>● No difference in MACE at 30 day follow-up (p= 0.279)</li><li>● Length of ED stay was longer in CCTA group (p&lt;0.001)</li></ul>
<b>Reinhardt et al., 2017</b> <ul style="list-style-type: none"><li>● Retrospective cohort study</li><li>● Multicenter study in nine hospitals in the United States</li><li>● N=1000</li></ul>	<ul style="list-style-type: none"><li>● Patients 40-74 years old presenting to ED with possible ACS</li><li>● Negative cardiac enzyme and normal EKG</li><li>● Cardiac CT versus standard ED evaluation (EKG, serial troponins)</li></ul>	<ul style="list-style-type: none"><li>● Rate of ICA was greater in the CCTA group (p&lt;0.008)</li><li>● No difference in revascularization (p=0.23)</li><li>● No difference in MACE at 28-day follow up (p=0.27)</li><li>● Length of stay was longer in CCTA group (p&lt;0.001)</li></ul>

## References

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- Reinhardt, S. M., Lin, C. J., Novak, E., & Brown, D. L. (2018). Noninvasive cardiac testing vs clinical evaluation alone in acute chest pain: A secondary analysis of the ROMICAT-II randomized clinical trial. *JAMA Internal Medicine*, 178(2), 212-219. doi:10.1001/jamainternmed.2017.7360

## Conclusions

**Occurrence of MACE within 28-30 days following evaluation (including death, myocardial infarction, unstable angina, or urgent revascularization):** No significant difference

**Length of stay in the ED:** There is no consensus of evidence regarding the efficiency of CCTA as measured by length of stay in the ED. Two of three studies concluding that patients who undergo evaluation with CCTA have significantly longer ED stays (p<0.001).

**Rates of Revascularization:** No significant difference could be discerned from included evidence. One out of three studies had no occurrence of revascularization in either group.

**Rates of Invasive Coronary Angiography:** There is no consensus of evidence. One out of three studies demonstrated a higher rate for the CCTA group (p<0.008).

## Clinical Implications

- ❖ These findings demonstrate that CCTA represents a safe diagnostic tool for patients presenting with chest pain, however, more research is needed to discern if it represents additional clinical advantages.
- ❖ In the setting of a global pandemic, shortened ED stays with comparable safety is desirable. Additionally, many underserved populations lack access to adequate primary care making the ED a likely setting for presentation.
- ❖ Therefore, nurse practitioners need to use their clinical judgment to decide on the appropriate risk assessment tool.