RECURRENT LOW-RISK CHEST PAIN IN THE ED

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****BONUS CONTENT: This summary is featured on the Skeptics Guide to Emergency Medicine Episode #337 *AMAZING GRACE-1 HOW SWEET THE GUIDELINES – RECURRENT, LOW RISK CHEST PAIN IN THE EMERGENCY DEPARTMENT.***
Available at: https://www.thesgem.com/2021/07/sgem337-amazing-grace-1-how-sweet-the-guidelines-recurrent-low-risk-chest-pain-in-the-emergency-department/

Scope of Guideline: "All practicing ED clinicians (physicians and advanced practice providers) responsible for the evaluation and management of undifferentiated chest pain in community and academic settings, as well as healthcare systems and hospitals responsible for care pathways in this population.

Inclusion: Adult patients with recurrent low-risk chest pain

Exclusion: N/A

Key Words: recurrent low-risk chest pain

Key Questions/Recommendations: *Each recommendation is accompanied by the "strength" of recommendation and the level of evidence (LoE) supporting that recommendation*

Q1. (P) In adult patients with recurrent, low-risk chest pain, (I) is a single troponin versus (C) serial troponins needed for (O) ACS outcomes within 30 days?	**R1.** In adult patients with recurrent, low-risk chest pain, for >3 h duration we **suggest** a single, high-sensitivity troponin below a validated threshold to reasonably exclude ACS within 30 days. (Conditional, For) [Low LoE].
Q2. (P) In adult patients with recurrent, low-risk chest pain, and normal or non-diagnostic stress testing within the last 12 months, (I) does repeat stress testing versus (C) no stress test have an effect on (O) MACE within 30 days?	**R2.** In adult patients with recurrent, low-risk chest pain, and a normal stress test within the previous 12 months, we **do not recommend** repeat routine stress testing as a means to decrease rates of MACE at 30 days. (Conditional, Against) [Low LoE].
Q3. (P) In adult patients with recurrent, low-risk chest pain, is (I) admission to the hospital versus (C) stay in the ED observation unit versus (C) outpatient follow up recommended for (O) ACS outcomes within 30 days?	**R3.** In adult patients with recurrent, low-risk chest pain, there is **insufficient evidence** to recommend hospitalization (either standard inpatient admission or observation stay) versus discharge as a strategy to mitigate major adverse cardiac events within 30 days. [No evidence].
Q4. (P) In adult patients with recurrent, low-risk chest pain and a negative cardiac catheterization	**R4.** In adult patients with recurrent, low-risk chest pain and non-obstructive (<50% stenosis) CAD on prior angiography within 5 years, we **suggest** referral for

defined as less than 50% stenosis (E) what is their risk of subsequent ACS and time to ACS? **Q5.** (P) In adult patients with recurrent, low-risk chest pain and a negative cardiac catheterization defined as no coronary disease (0% stenosis) (E) what is their risk of subsequent ACS and time to ACS? **Q6.** (P) In adult patients with recurrent, low-risk chest pain and a negative coronary CT angiogram (E) what is their risk of subsequent ACS and time to ACS? **Q7.** (P) In adult patients with recurrent, low-risk chest pain, (I) what is the yield of depression and anxiety screening tools in (O) healthcare use and return ED visits? **Q8.** (P) In adult patients with recurrent, low-risk chest pain, (I) what is the role of referral for anxiety/depression in (O) healthcare use and return ED visits?	expedited outpatient testing as warranted rather than admission for inpatient evaluation. (Conditional, For) [Low LoE]. **R5.** In adult patients with recurrent, low-risk chest pain and no occlusive CAD (0% stenosis) on prior angiography within 5 years, we **recommend** referral for expedited outpatient testing as warranted rather than admission for inpatient evaluation. (Conditional, For) [Low LoE]. **R6.** In adult patients with recurrent, low-risk chest pain and prior CCTA <2 years with no coronary stenosis, we **suggest** no further diagnostic testing other than a single, high-sensitivity troponin below a validated threshold to exclude ACS within that 2-year time frame. (Conditional, For) [Moderate LoE]. **R7.** In adult patients with recurrent, low-risk chest pain, we **suggest** the use of depression and anxiety screening tools as these might have an effect on healthcare use and return ED visits. (Conditional, Either) [Very low LoE]. **R8.** In adult patients with recurrent, low-risk chest pain, we **suggest** referral for anxiety or depression management, as this might have an impact on healthcare use and return ED visits. (Conditional/Either) [Low LoE].

Definitions:

1) Recurrent chest pain: This was defined as patients who have had a previous visit to an ED with chest pain that led to a diagnostic protocol for its evaluation that did not demonstrate evidence of ACS or flow-limiting coronary stenosis. This included two or more ED visits for chest pain in a 12-month period.
2) Low risk: Low risk was defined by HEART score <4 points (and other scores validated in the ED setting such as the HEART pathway or TIMI score) for disease-related poor outcomes within 30 days all of which require an electrocardiogram (ECG) for risk stratification.
3) Expedited: Time period within 3-5 days of the index ED visit.

Benefits/Harms/Adverse Effects of Recommendations:

Rec	Benefits	Harms
1	Less troponin tests, less serial phlebotomy for patients, more efficient use of hospital resources and ED length-of-stay.	Missed ACS/AMI complications/MACE events; pooled incidence of 30-day AMI or MACE following a single, normal high sensitivity troponin using indirect evidence as 3.4 per 1000 patients (95% CI 2.0–4.8 per 1000)
2	Detection of intervenable CAD to reduce incidence of 30d MACE	Downstream testing harms (radiation, allergic exposures, procedural risks). Extra costs to patients, time inconvenience, stress from false-positive tests.
3	No evidence to inform	No evidence to inform
4	Inpatient evaluation with angiography could lead to identifiable stenotic lesions and immediate intervention. Patient	Routine angiography with allergic contrast reactions, procedural/radiation risks & complications. Bruising/bleeding, perforation, arrhythmias, death. Patient costs, travel time, recovery times.

	satisfaction/reassurance of definitive management.	
5	Same as 4 above.	Same as 4 above.
6	Reduced 30d MACE rates, hospital admissions, low-value testing, patient costs/time consumption.	Further CCTA/angiographic testing harms include contrast reactions and radiation risks (including small but real future cancer risks from a single CT chest scan 0.07%). Patient costs, ED length of stay.
7	Screening for anxiety/depression can improve detection/referral for appropriate consultation & management.	Patient self-response burden in ED. Race/gender bias in current screening tools. Premature closure/ anchoring bias in down-playing potential ACS in anxious/depressed patients (known higher risk of CAD/ACS/complications).
8	Referral for mental health counselling can reduce ED recidivism for low-risk psychosomatic chest pain visits. Improved psychological symptoms.	Same as 7 above. How to automate referral for mental health assessment/interventions with positive screens? Requires local resources, systems-level supports.

Barriers to Uptake:

- Limited published data on patient values/preferences for different chest pain outcomes; some evidence on race/gender bias
- Use of conventional vs. high-sensitivity troponins in your ED
- Access to expedited referral/testing for discharged patients
- Access to observation/inpatient ACS testing (exercise testing, CCTA, angiography)
- Validated anxiety/depression screening tools, and application with ED patients
- Lack of moderate/strong evidence to inform recommendations and creating quality improvement performance metrics for audit-feedback processes

Facilitators of Uptake:

- Creation/implementation of validated shared decision-making tools at the ED bedside (eg. Mayo Clinic tools)

CLINICAL COMMENTARY:

Chest pain is a common and costly source of ED visits and assessments. There is a broad differential diagnosis for acute chest pain, but few of them are high-risk for life-threatening conditions (5%). Missing high-risk conditions, however, leads to potentially significant adverse outcomes for patients, and medicolegal exposure to physicians. These situations are further complicated by recurrent visits for ED chest pain (40% within 1yr), and uncertainty around the "warranty period" after prior negative cardiac tests. Poor understanding of patient values & preferences, and variability in risk-determination for ED chest pain patients makes it difficult to undertake informed shared decision-making.

For recurrent low-risk chest pain patients with <50% known angiographic stenosis, the incidence of all-cause mortality and MI is 1.32/100 person-years, (95% CI 1.02–1.62), meaning 1.32 cases are expected for 100 patients followed for 1 year, or 0.66 cases for 100 patients followed for 2 years. For those with zero stenosis, incidence of all-cause mortality and MI was 0.52/100 person-years (95% CI 0.34–0.71), meaning 0.52 cases are expected for 100 patients followed for 1 year, or 0.26 cases for 100 patients followed for 2 years. Patients who had a normal (negative) CCTA were at very low-risk, with a rate of MI of 0.08%, all-cause mortality of 0.4%, and a MACE rate of 0.6% at a median of 2.1 years

follow-up. Patients who had 1%–49% stenosis had corresponding event rates of 1.3%, 0.5%, and 2.4%, respectively.

This suggests that avoidance of admission/in-patient observation may be low yield, and expeditious outpatient evaluations are equally valid. Furthermore, this guideline addresses the "warranty periods" of prior cardiac testing results, so that more informed discharge decisions can be made with the patient, assuming availability of expedited outpatient follow-up. Finally, this guideline addresses the role of mental health (anxiety/depression) issues in recurrent low-risk chest pain patients, and offers guidance on use of screening tools and referral processes.

The formulation of recommendations to answer PICOT questions was based on a broad base of indirect or absent evidence; there was very little direct evidence to inform recommendations. As such, the GRADE process accommodates for such, by incorporating other elements in the Evidence-to-Decision framework (patient/resource/feasibility factors).

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Grading System Used: GRADE (Grading of Recommendations Assessment, Development and Evaluation). Accompanying editorial on SAEM GRACE use of GRADE methods are published at https://onlinelibrary.wiley.com/doi/10.1111/acem.14297 (Carpenter *et al*). Another description of use of GRADE methods in ED guidelines are also recently published (Upadhye *et al*, CJEM 2021; https://doi.org/10.1007/s43678-021-00133-8).

Institute of Medicine 2011 Trustworthiness Standards

Note: a NEATS "trustworthiness" assessment is reported in this guideline (single rater, SU)

Rating Domain	Rating (Good/Fair/Poor)
Establishing transparency	Good
Managing conflict of interest in CPG development group*	Good
Group composition (range of stakeholders involved)	Good
Critical evaluation of supporting evidence	Good
Framing recommendations based on supporting evidence	Good
Clear articulation of recommendations	Good
External review by relevant stakeholders/ organizations	Good
Updating schedule	Good
Implementation issues	Poor*

GRACE-1

For Adult Patients with Recurrent*, Low-risk** Chest Pain

CRITERIA	RECOMMENDATIONS
1 Pain > 3 hours	A single, high sensitivity troponin to reasonably exclude ACS within 30 days Low Level of Evidence
2 Normal stress test within the past 12 months	Repeat stress testing to decrease 30-day MACE NOT recommended Low Level of Evidence
3 For all adult patients with recurrent, low-risk chest pain	No recommendation on hospitalization (neither inpatient or observation stay) No Evidence
4 With non-obstructive (< 50%) CAD on prior angiography in past 5 years 5 With no occlusive CAD (0% stenosis) on prior angiography in the past 5 years	Referral for expedited outpatient testing rather than inpatient admission Low Level of Evidence
6 With no coronary stenosis on CCTA within past 2 years	No further diagnostic testing other than a single high-sensitivity troponin to exclude ACS within those 2 years Moderate Level of Evidence
7 For all adult patients with recurrent, low-risk chest pain	Depression and anxiety screening tools are recommended to evaluate healthcare use and return Very Low Level of Evidence
8 For all adult patients with recurrent, low-risk chest pain	Referral for anxiety and depression management are recommended Low Level of Evidence

***Recurrent Chest Pain:** Two or more prior emergency department visits with chest pain in a 12-month period that did NOT demonstrate evidence of acute coronary syndrome (ACS) or flow-limiting coronary stenosis

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****Low Risk:** HEART Score < 4 points or another validated tool (ie. HEART Pathway or TIMI score) for disease related poor-outcome within 30 days requiring ECG for risk stratification

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