Literature Review and Grading
***Telemetry Bed Usage for Patients with Low-Risk Chest Pain* (4/19/2020)**
Relevant Papers Chosen for Review or Referenced in CPC Statement (7)

Publication	Grade	Quality	Comments
Van Den Berg P, Body R. The HEART score for early rule out of acute coronary syndromes in the emergency department: a systematic review and meta-analysis. European heart journal Acute cardiovascular care. 2018;7(2):111-9. Epub 2017/05/24. doi: 10.1177/2048872617710788. PubMed PMID: 28534694	A	Outstanding	This is a systematic review and meta-analysis identified 9 studies with 11,217 patients. It also summarizes the current evidence on the diagnostic accuracy of the HEART score for predicting major adverse cardiac events in patients presenting with undifferentiated chest pain to the emergency department. Among patients categorized as 'low risk' and suitable for early discharge (HEART score 0-3), the pooled incidence of 'missed' major adverse cardiac events was 1.6%. The pooled sensitivity and specificity of the HEART score for predicting major adverse cardiac events were 96.7% (95% confidence interval (CI) 94.0-98.2%) and 47.0% (95% CI 41.0-53.5%), respectively.
Fanaroff AC, Rymer JA, Goldstein SA, Simel DL, Newby LK. Does This Patient With Chest Pain Have Acute Coronary Syndrome?: The Rational Clinical Examination Systematic Review. JAMA. 2015;314(18): 1955-65. doi: 10.1001/jama.2015.12735. PubMed PMID: 26547467.	A	Outstanding	A nice systematic review of the performance of history, physical exam, and scoring systems to evaluate patients with chest pain. The HEART score is predictive and appears to be safe in risk stratifying patients.
Sandau KE, Funk M, Auerbach A, Barsness GW, Blum K, Cvach M, et al. Update to practice standards for electrocardiographic	B	Good	This scientific statement commissioned by the American Heart Association provides an interprofessional, comprehensive review of evidence and recommendations for indications, duration, and implementation of continuous

monitoring in hospital settings: a scientific statement from the American Heart Association. Circulation. 2017;136 (19):e273-e344.			electrocardiographic monitoring of hospitalized patients. Of relevance for our review, they found no evidence of benefit for telemetry in low-risk chest pain patients.
Sharp AL, Broder B, Sun BC. Improving Emergency Department Care for Low-Risk Chest Pain. NEJM catalyst. 2018;2018. Epub 2018/06/29. PubMed PMID: 29953116; PubMed Central PMCID: PMCPMC6017981.	C	Adequate	This is a business case study implementing the HEART score across 14 regional hospitals in a multi-hospital system. After analyzing data on over 12,000 patients, it appears the HEART score is a safe and effective method to identify low-risk chest pain patients in the emergency department. Because the case study is not presented as a scientific article it is unclear the quality of the Design and Methodology.
Dressler R, Dryer MM, Coletti C, Mahoney D, Doorey AJ. Altering overuse of cardiac telemetry in non-intensive care unit settings by hardwiring the use of American Heart Association guidelines. JAMA internal medicine. 2014;174(11):1852-4. Epub 2014/09/23. doi: 10.1001/jamainternmed.2014.4491. PubMed PMID: 25243419.	C	Adequate	A cohort study before and after implementation of an evidence-based order set designed to appropriately limit telemetry monitoring. They successfully decreased the amount of telemetry (by more than 40% on various measures) without increasing morbidity or mortality (although not much detail surrounding patient outcomes).
Allen BR, Simpson GG, Zeinali I, Freitas JT, Chapa JJ, Rawson LJ, et al. Incorporation of the HEART Score Into a Low-risk Chest Pain Pathway to Safely Decrease Admissions. Critical pathways in cardiology. 2018;17(4):184-90. Epub 2018/11/13. doi:	D	Outstanding	A retrospective pre/post case series of chest pain patients assessed with the HEART Score and a Decision Pathway. They compared admission rate and MACE. The pathway safely decreased admissions with no significant change in MACE (There was a Non-Statistical decrease in MACE) (N = 31,060; 30 months),

10.1097/HPC.0000000000000155. PubMed PMID: 30418248.			
Perman SM, Stanton E, Soar J, Berg RA, Donnino MW, Mikkelsen ME, et al. Location of In-Hospital Cardiac Arrest in the United States—Variability in Event Rate and Outcomes. Journal of the American Heart Association. 2016;5(10):e003638.	D	Outstanding	This is a retrospective study of adult IHCA events in the Get with the Guidelines—Resuscitation database from January 2003 to September 2010. They found that telemetry may lead to improved outcomes in patients who experience cardiac arrest, however the event rate was very low (0.1 events per 1000 bed days for telemetry units) and included conditions other than chest pain.

High Grade, but Not Relevant; or Relevant, but Low Grade: (10)

Non-invasive assessment of low risk acute chest pain in the emergency department: A comparative meta-analysis of prospective studies. Romero J, Husain SA, Holmes AA, Kelesidis I, Chavez P, Mojadidi MK, et al. A meta-analysis of studies evaluating non-invasive imaging in ED chest pain patients. Cardiac CT Angiography, Stress Echocardiography, and Radionuclide Single Photon Emission Computed Tomography were all "highly accurate." Each has its own strengths and limitations. CCTA has higher accuracy than SE and SPECT but may have other drawbacks. Int J Cardiol. 2015;187:565-80. Epub 2015/04/12. doi: 10.1016/j.ijcard.2015.01.032. PubMed PMID: 25863305. **Grade A; Quality Outstanding; Recommendation - Does not address our question, but good information on imaging choices.**
Cochrane Database Syst Rev. 2018 Aug 13;8:CD012370. doi: 10.1002/14651858.CD012370.pub2. Hospitalisation in short-stay units for adults with internal medicine diseases and conditions. Strøm C(1), Stefansson JS, Fabritius ML, Rasmussen LS, Schmidt TA, Jakobsen JC. A systematic review of short-stay units for medical patients concluded there was not enough information to confirm or refute that short-stay unit hospitalization had relevant effects on quality of life, activities of daily living, non-serious adverse events, and costs. Overall, the quantity and the certainty of the evidence was very low. **Grade A; Quality Outstanding, Recommendation – No, Does not answer our question as it lacks specificity to chest pain patients.**
Coronary computed tomography as a cost-effective test strategy for coronary artery disease assessment - a systematic review. Zeb I, Abbas N, Nasir K, Budoff MJ. Atherosclerosis. 2014;234(2):426-35. doi: 10.1016/j.atherosclerosis.2014.02.011. PubMed PMID: 24769305. The authors performed a systematic review and concluded CCTA either as first line or as a layering test may represent a cost-effective strategy for initial evaluation of patients with CAD prevalence of 10%-50% in both near-term and long-term diagnostic periods. For patients with a CAD prevalence ≥70%, Invasive Coronary Angiography as initial test may be the most cost-effective strategy. **Grade B; Quality Good; Recommendation – No, focuses on imaging.**
Prognostic Value of Coronary Artery Calcium Score in Acute Chest Pain Patients Without Known Coronary Artery Disease: Systematic Review and Meta-analysis.

Chaikriangkrai K, Palamaner Subash Shantha G, Jhun HY, Ungprasert P, Sigurdsson G, Nabi F, et al.

This is a meta-analysis evaluates the value of a Coronary Artery Calcium Score in Acute chest pain patients. The authors suggest that patients without a history of coronary artery disease, ischemic ECG changes, or increased cardiac enzyme levels commonly have a CACS of zero, with a very low subsequent risk of MACEs or death or myocardial infarction. They conclude there is a potential role of initial CACS testing for avoiding unnecessary hospitalization and further cardiac testing in acute chest pain patients with a CACS of zero.

Ann Emerg Med. 2016;68(6):659-70. doi: 10.1016/j.annemergmed.2016.07.020. PubMed PMID: 27765299.

Grade B; Quality Good; Recommendation – No, focuses on imaging.

Low-risk chest pain patients younger than 40 years do not benefit from admission and stress testing.

Napoli AM, Tran S, Wang J.

Critical pathways in cardiology. 2013;12(4):201-3. Epub 2013/11/19. doi: 10.1097/HPC.0b013e3182a75e3f. PubMed PMID: 24240550.

This was a prospective, observational study of consecutive patients admitted to the CPU in a large-volume academic urban emergency department. In 384 patients they found that patients with age <40, a normal ECG, and normal first biomarker have a <1% risk of ACS or 30-day MACE.

Grade C; Quality Good; Recommendation- No, informs our question, but single center, too few patients.

Modified TIMI risk score cannot be used to identify low-risk chest pain in the emergency department: a multicentre validation study.

Macdonald SP, Nagree Y, Fatovich DM, Brown SG.

Emergency medicine journal : EMJ. 2014;31(4):281-5. Epub 2013/04/12. doi: 10.1136/emermed-2012-201323. PubMed PMID: 23576231.

This is a multicentre prospective observational study to evaluate the effectiveness of TIMI and mTIMI scores for patients undergoing assessment for possible ACS. They found mTIMI score performs better than standard TIMI score for ED risk stratification of chest pain, but neither is sufficiently sensitive at scores >0 to allow safe and early discharge without further investigation or follow-up.

Grade C; Quality Good; Adequate, Recommendation- No, but informs the question.

Identification of very low risk chest pain using clinical data in the emergency department.

Sanchis J, Bodi V, Nunez J, Nunez E, Bosch X, Pellicer M, et al.

This is a Spanish prospective consecutive case series of 772 patients with low-risk chest pain. Patients presenting to the emergency department with chest pain of uncertain origin and without prior ischemic heart disease, very low risk patients

can be identified using clinical data. These patients could be quickly discharged without further non-invasive stress testing.

Int J Cardiol. 2011;150(3):260-3. Epub 2010/05/11. doi: 10.1016/j.ijcard.2010.04.017. PubMed PMID: 20451271.

Grade E; Quality Adequate; Recommendation – Single center, but informs our question.

Best Clinical Practice: Current Controversies in Evaluation of Low-Risk Chest Pain-Part 1.

Long B, Koyfman A.

This is a literature review surrounding controversies in low-risk chest pain evaluation, including risk of missed ACS, stress test, and coronary computed tomography angiography (CCTA). The authors conclude that in patients with a nonischemic ECG and negative cardiac biomarker, the risk of ACS approaches < 1%.

J Emerg Med. 2016;51(6):668-76. Epub 2016/10/04. doi: 10.1016/j.jemermed.2016.07.103. PubMed PMID: 27693075.

Grade E; Quality Good; Recommendation – Informs our question, but inadequate grade (not a systematic review).

Best Clinical Practice: Current Controversies in the Evaluation of Low-Risk Chest Pain with Risk Stratification Aids. Part 2.

J Emerg Med. 2017 Jan;52(1):43-51. doi: 10.1016/j.jemermed.2016.07.004.

Long B, Koyfman A.

The authors investigated controversies in the evaluation of patients with low-risk chest pain, including clinical scores, decision pathways, and shared decision-making. They evaluated several decision-making tools and decided the HEART pathway may the best for the ED.

Grade E; Quality Good; Recommendation – Informs our question, but inadequate grade (not a systematic review).

Ward MJ, Eckman MH, Schauer DP, Raja AS, Collins S.

Cost-effectiveness of telemetry for hospitalized patients with low-risk chest pain.

Acad Emerg Med. 2011;18(3):279-86. Epub 2011/03/16. doi: 10.1111/j.1553-2712.2011.01008.x. PubMed PMID: 21401791; PubMed Central PMCID: PMCPMC4726979.

The authors concluded telemetry may be a "cost-effective" use of health care resources for chest pain patients when patients have a probability of ACS above 3% or for patients with a minimal delay and cost associated with obtaining a monitored bed.

Grade E; Quality Good, Recommendation – No, Grade E.