Reviewer's report

Title: Direct hospital costs of chest pain patients attending the emergency department: a retrospective study

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Reviewer: Thomas Allison

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General
This is a retrospective study to document hospital costs in 1000 patients who presented to the emergency department for chest pain at a single hospital in Sweden in 1997. The authors provide little in the way of insight into factors affecting the decision to admit or discharge – and ultimately cost for visit. There is a cost-effectiveness analysis which is based on an assumption with limited documentation that a patient inappropriately discharged from the ED with ACS will experience twice the mortality of a patient with similar characteristics who is admitted to the hospital.

1. Is the question by posed by the authors new and well defined? The aim of the study was purely descriptive – that is, to describe direct hospital costs for unselected patients with chest pain who present to the emergency department (ED). The authors did attempt to answer some implicit questions not stated in the Background including which type of patient accounted for the largest portion of costs and whether or not the (unstated and undefined) strategy used for admission of ED patients with chest pain at this particular hospital was “cost-effective”. The problem of chest pain diagnosis in the ED and the issue of costs associated with this group of patients – and how to appropriately reduce these costs – has been previously well studied both observationally and in randomized clinical trials, so this paper cannot be described as breaking new ground.

2. Are the methods appropriate and well described, and are sufficient details provided to replicate the work? There are several deficiencies in the methods. “Costs” are not precisely defined. It sounds from the description as if these were truly costs of operating the ER and hospital rather than itemized charges to the patient. If so, how were these costs assigned to the chest pain patients – as a simple fraction of the total number of patients using the ED and hospital over the same time period or was there some adjustment for the amount of resources consumed by a chest pain patient versus other types of patients? Another problem with the methods is that we are not told that these were consecutive patients presenting to the ED with chest pain. If so, the authors should state. If not, then the authors should explain how they were selected from all the patients presenting with chest pain during the study period. If there was any selection bias in terms of which patients ended up in the study, then results are really arbitrary and not necessarily representative of the practice being described.

3. Are the data sound and well controlled? The reader must more or less take the cost figures presented on faith. The tables provide unit costs for hospital beds and various tests and procedures, but not ED costs and items such as lab work. We know the mean number of days spent in the hospital, but this is not broken down by ward. It would be difficult (perhaps impossible) to reconstruct the total cost figures given in the Results from data given in Tables 2 and 3 plus information provided in the test. However, the reviewer is not certain that questioning the accuracy of the cost data or being able to reconstruct it is necessary. A mean cost of 3.2 kUSD (currency with which this reviewer is most familiar) seems low, even at 1997 levels, considering that 66% of patients were hospitalized with an average stay of 5.3 days and that numerous cardiac tests and procedures were performed. However, we cannot rule out that this may be due to significant differences in how US and Swedish hospital are managed and how costs are established.

4. Does the data adhere to the relevant standards for reporting and data deposition? Standard
deviations might be included with the means and interquartile ranges with the medians.

5. Are the discussion and conclusions well balanced and adequately supported by the data? Though not stated as an aim in the Background, the authors employ several simplistic assumptions (which are described in the Methods) to come up with a statement that the current practice of admitting 661 of 1000 patients presenting to the ED with chest pain is “cost effective” despite the fact that only 207 of these patients were diagnosed with acute coronary syndrome (ACS) and only 83 patients had some type of cardiac procedure (CABG, PCI, or thrombolysis). The results of the cost-effective analysis depend on the assumption that mortality from ACS would be twice as high if patients were discharged from the ER rather than being admitted. Many factors likely play into that assumption (such as the type of therapy that would be offered in the hospital and characteristics of the patients such as age and sex distribution), and there is little discussion of how this figure of twice the cost was determined. Two (2) references are cited, but these are not primary references that collected the data upon which the assumption of twice the hospitalized mortality was based, but rather they are studies which used the same assumption in their analyses. The original references cited in the 2 papers subsequently referenced in the study under review were published in 1987 and 1993. One study (Lee et al, Am J Cardiol 1987;60:219-224) involved 35 patients with a missed diagnosis of acute MI. Follow-up for mortality was only 72 hours, though one might assume that not getting appropriate care for acute MI might continue to disadvantage a patient beyond 3 days. The second study (McCarthy et al, Ann Emerg Med;1993;22:579-582) on which the assumption of 2-fold mortality was based included 20 patients with missed MI. Their characteristics were slightly different from 1030 patients with acute MI that were admitted, so direct comparisons are difficult. The mortality rate in missed MI was 10%, actually lower than the 15% mortality rate for patients admitted with MI. If this assumed figure of twice the mortality is not accurate and/or not applicable for the time frame of 1997 when the cohort for the study under review was drawn, then all of the cost-effectiveness conclusions of the paper under review are inaccurate.

6. Do the title and abstract accurately convey what has been found? The abstract appears to accurately convey what has been found. The title does not promise a cost-effectively analysis, but that seems to be the principal conclusion of the paper.

7. Is the writing acceptable? The writing style is acceptable, and we do not see frequent typographical errors or misspellings.

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Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)

1. Page 4, Subjects: The paper does not tell us whether these 1000 patients presented consecutively. If so, please state. If not, then the authors should explain how they were selected from all the patients presenting with chest pain during the study period.

2. The cost-effectiveness analysis needs to be more thoughtful, specifically that its assumptions need to be better supported with actual data rather than references which us the same assumptions.

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Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

1. Page 6, Ethical approval and statistics: Some countries (or states in US) require patients to approve use of their clinical data for research; is this true for Sweden? If so, was this considered in the ethical approval? Statistical procedures are described briefly, but nowhere in the paper are actual statistical results described other than to use the terms “higher” or “significantly higher”. In some cases there are more than 2 groups being compared (such as cost differences among CCU, ICW, and GW), so ANOVA rather than t-test should be used.

2. Page 6, Patient characteristics and overall cost: Shouldn’t the costs translated to EUR and USD actually be in kEUR and kUSD?

3. Page 7, Costs I relation to level of care: The authors should define CCU, ICW, and GW, as not all countries use the same designations for various levels of care. For example, does the “I” in ICW
stand for intermediate or intensive?

Discretionary Revisions (which the author can choose to ignore)
1. The paper might benefit from additional information regarding the number of physicians staffing the ED and whether or not there were any differences among physicians in terms of admission practices.
2. A comparison of patient characteristics between admitted and discharged patients would be informative and add to the educational quality of the paper. Similarly, a comparison of patients admitted without a diagnosis of ACS versus those discharged from the ED might provide insight as to the decision processes used by this physician group.
3. Page 9: The authors describe changes in treatment of ACS that have occurred in Sweden between 1997 and 2003, but then dismiss these changes as not affecting the current results since only 21% of patients were ACS. However, those 21% of patients with ACS accounted for 62% of all costs, so changes in care (resulting in increased costs) could significantly affect results. This discussion point should perhaps be re-thought or further supported.
4. Some stratification of these patients by standard criteria according to risk of acute event would be useful. For example, what percentage of these patients presented with atypical chest pain and were at low risk for acute MI versus those at intermediate or high risk. That information would help the reader rate the effectiveness of this hospital’s admission practice.

What next?: Accept after minor essential revisions
Quality of written English: Acceptable
Statistical review: No
Declaration of competing interests:
I declare that I have no competing interests.