

# Comparison of hospital variation in acute myocardial infarction care and outcome between Sweden and United Kingdom: population based cohort study using nationwide clinical registries

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## Abstract

**Objective** To assess the between hospital variation in use of guideline recommended treatments and clinical outcomes for acute myocardial infarction in Sweden and the United Kingdom.

**Design** Population based longitudinal cohort study using nationwide clinical registries.

**Setting and participants** Nationwide registry data comprising all hospitals providing acute myocardial infarction care in Sweden (SWEDEHEART/RIKS-HIA, n=87; 119 786 patients) and the UK (NICOR/MINAP, n=242; 391 077 patients), 2004-10.

**Main outcome measures** Between hospital variation in 30 day mortality of patients admitted with acute myocardial infarction.

**Results** Case mix standardised 30 day mortality from acute myocardial infarction was lower in Swedish hospitals (8.4%) than in UK hospitals (9.7%), with less variation between hospitals (interquartile range 2.6% v 3.5%). In both countries, hospital level variation and 30 day mortality were inversely associated with provision of guideline recommended care. Compared with the highest quarter, hospitals in the lowest quarter for use of primary percutaneous coronary intervention had higher volume weighted 30 day mortality for ST elevation myocardial infarction (10.7% v 6.6% in Sweden; 12.7% v 5.8% in the UK). The adjusted odds ratio comparing the highest with the lowest quarters for hospitals' use of primary percutaneous coronary intervention was 0.70 (95% confidence interval 0.62 to 0.79) in Sweden and 0.68 (0.60 to 0.76) in the UK. Differences in risk between hospital quarters of treatment for non-ST elevation myocardial infarction and secondary prevention drugs for all discharged acute myocardial infarction patients were smaller than for reperfusion treatment in both countries.

**Conclusion** Between hospital variation in 30 day mortality for acute myocardial infarction was greater in the UK than in Sweden. This was associated with, and may be partly accounted for by, the higher practice variation in acute myocardial infarction guideline recommended treatment in the UK hospitals. High quality healthcare across all hospitals, especially in the UK, with better use of guideline recommended treatment, may not only reduce unacceptable practice variation but also deliver improved clinical outcomes for patients with acute myocardial infarction.

**Clinical trials registration** Clinical trials [NCT01359033](https://www.clinicaltrials.gov/ct2/show/study/NCT01359033).

## Reviewer: 2 - Patient and Public Reviewer

Comments:

Thank you for the opportunity to provide a patient review of this well-written paper. Your study is particularly interesting because, as much as possible, it looks at comparable health care systems, providers, and patient demographics in both Sweden and in the U.K.

The subject of inter-hospital variation in patient care/outcomes is an important one for all heart patients. Indeed, it's an extremely serious issue for both patients and our families because we rarely if ever have any choice in selecting the hospital we trust for our care. And most patients are not even remotely aware of which hospitals are providing AMI guideline-recommended treatments and which are not. We simply show up during an often-terrifying cardiac event wherever the ambulance delivers us, or at the door of the closest hospital, trusting blindly that we will get whatever care we need to get. Sadly, this trust sometimes appears unwarranted.

I find this gap in consistent cardiac care inexcusable, as should all cardiologists – although it's certainly not unique to cardiology. The relevant question I asked in a 2012 blog article I wrote on this subject was: "Why do doctors call it 'practice variation' instead of poor care?"

As a heart attack survivor who was misdiagnosed with GERD during my MI and sent home from the Emergency Department, I'm concerned about all areas of cardiac care (as your paper describes under Policy Implications) "from time of admission through to discharge and beyond" – and not simply whether a patient ends up in the cath lab. (And given the current controversy, particularly in the U.S., around overuse/unnecessary stents, this may or may not be a bad thing).

While reading your paper, I was curious about a possible limitation you mention, namely the fact that you could not evaluate differences in AMI care prior to hospital admission. While you did accept comparable time from symptom onset to hospital admission to explain assumed similarities between the U.K. and Sweden, prior studies have suggested significant variations in routine care provided by ambulance paramedics en route to hospital, particularly to their female heart patients – a discrepancy subsequently linked to poorer outcomes for those patients (Meisel Z et al. Influence of Sex on the Out-of-Hospital Management of Chest Pain. Academic Emergency Medicine Volume 17, Issue 1, 4 JAN 2010). So just measuring response/arrival time may not be adequate to explain differences in care being provided to heart patients riding in the "back of the bus."

Conversely, your paper did not mention if 30-day mortality rates might also be influenced by incomplete discharge instructions – again, significantly low or even non-existent for many heart patients heading home from hospital. The U.S. report, "Snapshot of People's Engagement in Their Health Care" for example, was published by The Center For Advancing Health in 2010. Although an American paper, it certainly rang true here for Canada where I live). It estimated that 91 percent of patients diagnosed with a chronic illness like heart disease did not receive a written plan of care before being discharged from hospital - again, a gap associated with lower compliance/higher hospital re-admission rates.

I have questions about, of course, your comment that the national registries do not capture all patients admitted with AMI. In addition, because you were unable to determine a

number of “unmeasured factors”, the question becomes: how can we reliably evaluate something we can’t measure without resorting to educated guesswork?

I’d also prefer to see your conclusion, which seemed remarkable in its restraint, express boldness. Instead of recommending “more consistent health care” (a rather soft lob, really, given that no physician or hospital administrator anywhere can possibly claim ignorance of the need to treat patients appropriately and according to accepted practice guidelines).

Indeed, the seriousness of your paper’s results (especially hard on the heels of your 2014 Hemmingway/Jernberg paper in The Lancet) warrants an immediate call to action for senior decisionmakers, particularly in the U.K. and in the areas surrounding those higher 30-day mortality rates compared to Sweden. Your team has already had the experience of publishing an earlier paper comparing Sweden and the U.K. on a related issue; I’m also hoping you were able to use resulting media coverage to test the waters in terms of assessing government appetite for concrete action.

Once again, thank you for the chance to provide some feedback for this interesting paper, on behalf of the heart patients you will help.

Additional Questions:

Please enter your name: Carolyn Thomas

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