

Peter Cram, Amitava Banerjee, and Bruce Landon: Harmonizing insurance data to compare
healthcare across high income countries

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Our recent research study, published in *The BMJ*, found substantial differences in care for patients hospitalized for myocardial infarction across six high income countries. This was despite there being established international consensus on diagnosis and treatment. We first had the idea for research in this area when one of the researchers (PC) realised that many of the problems related to access to high quality healthcare and disparities in care that he had observed when living in the US seemed to also be present in Canada, despite “universal” health insurance. We became interested in trying to isolate the impact of the healthcare system on outcomes, as distinct from the larger effects of, for instance, societal inequities and the “social safety net” in each country. As with all research, we faced challenges in securing grant funding, obtaining ethical approval, and data access in our six participating countries. Single country grant funding mechanisms are not designed to support international collaborations, yet it also is difficult to obtain supplemental funding to support the activities of investigators in the individual countries. Nonetheless, the biggest challenge for our research collaborative (IHSRC) (<https://projects.iq.harvard.edu/ihsrc>) has been methodological—specifically, the difficulties in harmonizing administrative data across countries. In the case of our research project, we needed to be confident that we could identify patients experiencing acute myocardial infarction (AMI) in all six countries that we were studying and stratify those patients into ST-elevation and non-ST-elevation myocardial infarction (STEMI and NSTEMI). We needed to be able to identify patients who underwent percutaneous coronary interventions and coronary artery bypass grafting in each country. This work was made more challenging because some countries used ICD-9, others ICD-10, and one (the US) changed from ICD-9 to ICD-10 in the middle of the study period.

What makes our difficulties surprising is that there are few diseases or conditions that have been as well studied as AMI over the past 30-years, though the very definition of AMI continues to evolve over time. The coding algorithms used to identify STEMI, NSTEMI, PCI, and CABG are well established and there has been robust research of AMI conducted independently in each of our IHSRC countries. Yet, as we began to conduct our research, we gained a deep appreciation for the nuanced and highly variable methods that have been used to identify AMI in each country. We realised that small differences in coding can have profound implications for our research.

The first thing we were surprised to learn was how cautious we needed to be about data comparability across countries. We were pretty quickly able to see that basic patient demographic characteristics such as age, sex, date of hospital admission, date of hospital discharge, and death were pretty well captured in all countries. However, even for a condition as common and well studied as AMI, there are small and subtle coding differences between countries that we needed to consider. Moreover, while ICD9 and ICD10 coding is typically viewed as having international standards, the reality is that many countries modify these codes in subtle ways. The situation became even more confusing when we tried to identify and adjust for comorbid conditions; we found implausibly large differences in rates of common comorbidities even when we used identical coding schemes in all countries. Ultimately, we came to the conclusion that adjusting for comorbid conditions was neither feasible nor necessary for the type of analyses we were performing.

We gained a true appreciation for how important it was to have local investigative teams in each country who truly understood their local data. Our local investigators also provided a crucial understanding of the clinical, economic, and political context in their jurisdiction. Research is often portrayed as a solitary pursuit carried out by introverted geniuses; to the contrary, our IHSRC is a team of delightful people from around the world. It is impossible to over-emphasize that this research was an international team effort in every possible way. We think that several of our findings were really exciting and should challenge what we (the research community) think we know.

From a US perspective, our finding of extremely high 1-year mortality relative to other countries should be deeply concerning. The US has spent much of its time and energy focusing AMI care on timely delivery of PCI, reducing hospital length-of-stay, and reducing readmissions. The US is doing well on these measures. But the high mortality in the US is troubling and suggests that we may have missed the mark in ways that we have not fully appreciated until now.

Alternatively, the extremely low rates of PCI in England and Netherlands for STEMI should be alarming to physicians, researchers, and policy makers in those countries since timely PCI for STEMI is one of our best studies and often life-saving intervention for patients with AMI. Our finding of large differences between countries in the proportion of AMI patients who were women (a higher proportion in the US than in all other countries) raises significant questions that need to be answered.

The major advantage of IHSRC is that our methods are transferable to other conditions and procedures and generalizable to other countries. Once we can confidently identify cohorts of similar patients in each country, we can modify our work to address other questions.