Learning from regional heterogeneity in outcomes of patients with acute myocardial infarction

Emil L. Fosbøl¹ and Christopher B. Granger²*

¹Heart Centre, University Hospital of Copenhagen, Rigshospitalet, Denmark; and ²Duke Clinical Research Institute, Durham, NC, USA

Online publish-ahead-of-print 17 September 2013

This editorial refers to ‘International comparison of treatment and long-term outcomes for acute myocardial infarction in the elderly: Minneapolis/St. Paul, MN, USA and Göteborg, Sweden’, by L.G. Smith et al., on page 3191

Myocardial infarction continues to be one of the most common causes of death and disability worldwide—especially in industrialized countries. Although the chance of survival after myocardial infarction has improved substantially over the past decades, the world faces grave challenges for containing a global increase in ischaemic heart disease as low and middle income countries are experiencing a rapid increase in risk factors. Therefore, never has it been more important than now to learn from each other around the globe in order to reduce the burden of ischaemic heart disease. Global benchmarking of processes of care and outcomes in myocardial infarction is such an opportunity that could lead to important insights to improve care. This is even more important in the older demographic of the populations since these patients are at especially high risk.

Gothenburg in Sweden and Minneapolis/St Paul in Minnesota, USA represent cities of two very different, yet similar industrialized nations. Both have been at the forefront of the substantial improvements seen in the treatment of myocardial infarction, including with a focus on improving quality of care. We assume that ischaemic heart disease and the effects of treatments are similar in countries and cities such as these; however, this may not always be the case. The PLATO (Platelet Inhibition and Patient Outcomes) trial found that ticagrelor appeared to be less effective than clopidogrel in reducing cardiovascular events in North America than in the rest of the world. These results generated a lively debate, especially in the USA, and the US Food and Drug Administration asked for additional analyses to shed light on this issue. Although the findings could be due to chance, these analyses found a statistically significant interaction with aspirin dose as a possible explanation for the regional differences. Use of higher dose aspirin in the USA may have modified the effect of ticagrelor. This example underscores the importance of large randomized clinical trials with representation from healthcare systems in which the result will be applied, as well as the need for understanding cultural and country differences in treatment strategies and processes of care in order to improve patient outcomes.

Smith and colleagues now provide the results of a study collecting data on processes of care and long-term outcomes in two well-defined cohorts of older adults with myocardial infarction in Gothenburg and Minneapolis/St Paul. The patient data were collected from 2001 to 2002 by chart abstracting, and only patients over the age of 74 were included, comprising 839 Americans and 564 Swedes. Overall, the US patients had more cardiovascular risk factors and previous coronary interventions [percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG)] compared with the Swedish patients. Significantly more patients from Gothenburg had ST-elevation myocardial infarction. In the overall population, PCI was performed four times as often in Minnesota than in Gothenburg, where only 7% of patients had PCI. Primary PCI rates were similar in the two countries. Subsequent survival at 7.5 years was 27.8% in Minneapolis/St Paul patients and 17.2% in those included from Gothenburg. After adjustment, this difference remained statistically significant.

The study highlights interesting and important issues. First, it is striking that so few patients survived for 8 years, even given that the mean age at baseline was 83 years. The substantial difference in outcomes between these two locations is interesting, although whether this difference is real remains uncertain, as acknowledged by the authors. The difference in how patients with myocardial infarction were identified could have introduced substantial unmeasured confounding. For example, if a modestly larger numbers of patients with cardiac arrest or with cardiogenic shock were included in Sweden, this, rather than differences in revascularization rates, could explain the difference. The two previous similar studies comparing younger patients in Minnesota and Gothenburg with myocardial infarction who had similar outcomes in the USA and Sweden may provide reassurance that there is not a systematic identification of higher risk acute myocardial patients in Sweden. However, in this older cohort, if patients with myocardial infarction and cognitive dysfunction were more likely to be...
identified in Sweden, then this could explain both lower coronary angiography rates and worse outcome. Secondly, these baseline data are from more than a decade ago, and changes in treatment over time may have narrowed any gap in survival. The study by Jernberg et al. from Swedish national data shows an increase in revascularization within 14 days of ST-elevation myocardial infarction from 10% to 84%, from 1996 to 2006, and this and other improvements in care were associated with a 50% decrease in mortality over this 10-year time period. This could be interpreted as consistent with the hypothesis that the difference in PCI rates may be part of the explanation for the survival differences seen in the current study. While randomized clinical trials of invasive strategies in acute coronary syndromes have limitations, particularly regarding the under-represented elderly population, they remain our best unbiased guide to estimating modest treatment effects. The randomized trials support a benefit from invasive strategies, including in the older population, as summarized in guidelines. It would be interesting to see if now, with revascularization rates that are probably more similar than they were in 2001, the mortality difference between Gothenburg and Minneapolis has narrowed.

The study by Smith and colleagues provides another piece to the puzzle of how regional heterogeneity in care may relate to clinical outcomes, and calls for a more contemporary study. Kociol et al. showed that readmission rates after ST-elevation myocardial infarction varied by country in the APEX AMI trial (Assessment of Pexelizumab in Acute Myocardial Infarction), with higher readmission rates in the USA compared with the rest of the world. A study presented at this year’s American College of Cardiology Scientific Sessions examined processes of care and use of evidence-based medications in 137 009, 45 069, and 147 438 patients with myocardial infarction in the United Kingdom, Sweden, and the USA, respectively. The authors concluded that clinicians in the USA and Sweden are more aggressive in performing PCI procedures than clinicians from the UK and that ‘understanding differences in patient characteristics and hospital management are critical preludes to comparing outcomes and identifying areas for improvement in each country.’ A number of countries now have detailed registry information on large numbers of patients with various heart conditions, and the study by Smith et al. underscores the importance of global benchmarking—especially in light of the current pandemic rise in ischaemic heart disease in low and middle income, as well as high income, countries.

Conflict of Interest: C.B.G. has received grants and fees outside the submitted work: from BMS/Pfizer, Astra Zeneca, The Medicines Company, Medtronic Foundation, and Sanofi. E.L.F. has no conflicts to declare.

References