Institution: University of Sheffield

Unit of Assessment: 2 - Public Health, Health Services and Primary Care

Title of case study: Improving treatment for heart attack patients

1. Summary of the impact

Between 2006 and 2008 an evaluation carried out by the University of Sheffield of the National Infarct Angioplasty Pilot showed that primary angioplasty for ST-elevation myocardial infarction (heart attack) is feasible, cost-effective and acceptable to patients and carers. As a direct result, a new national strategy using primary angioplasty was published in the National Service Framework for Coronary Heart Disease. National audit data has since shown the proportion of patients receiving primary angioplasty increasing from 42% to 73% and mortality falling from 10.6% to 8.7%. An impact assessment based on our economic analysis estimated a £294 million net benefit to the NHS.

2. Underpinning research

Prior to research carried out at the School of Health and Related Research (ScHARR) at the University of Sheffield, the standard treatment for acute ST-elevation myocardial infarction (MI) was intravenous thrombolysis. Randomised controlled trials undertaken in a number of international centres showed that primary angioplasty could produce better outcomes than intravenous thrombolysis, provided reperfusion with angioplasty was achieved within 90 minutes of when it could have been achieved by thrombolysis. However, research was necessary to determine whether primary angioplasty could be delivered in an acceptable, effective and cost-effective manner.

The National Infarct Angioplasty Pilot was funded by the Department of Health to test the feasibility of implementing primary angioplasty for acute ST-elevation MI at ten pilot hospitals in the UK. The National Institute for Health Research funded Professor Steve Goodacre (ScHARR since 1999) and colleagues from ScHARR between 2006 and 2008 to undertake [R1]:

1. Descriptive analysis of the data from these pilot sites
2. Cost-effectiveness modelling using data from the ten pilot sites and four control sites
3. Exploration of patient and carer perspectives.

ScHARR researchers also collaborated with researchers from the Institute of Work Psychology at the University of Sheffield to assess organisational and workforce issues. Fiona Sampson (ScHARR, since 1996) undertook the descriptive analysis and showed that primary angioplasty was provided in a timely manner when patients were transported directly to the catheter laboratory of a specialist hospital, but not when transported via other hospitals or departments [R2].

Professor Allan Wailoo (ScHARR, since 2000) undertook the economic analysis and showed that primary angioplasty-based care was more expensive than thrombolysis-based care, but at £4,520 per quality-adjusted life year gained would be considered cost-effective by the NHS [R3]. Cost-effectiveness of angioplasty was only assured if direct transport to a specialist hospital catheter laboratory was used.

Fiona Sampson and Professor Alicia O'Cathain (ScHARR, since 1997) undertook analysis of patient and carer satisfaction, and showed high overall levels of satisfaction with primary angioplasty and thromoblysis-based care [R4]. Patients at pilot sites reported higher levels of

satisfaction than control sites with the time waited (80% v 67% rated excellent, p<0.001) and the efficiency of treatment (83% v 74%, p=0.009), whereas satisfaction with information given on how to manage the condition in the future was lower in pilot sites than control sites (38% v 46%, p=0.049). Interviews undertaken by Sampson identified important issues for patients and carers, and provided insights into their perceptions of primary angioplasty [R5].

The organisational study undertaken in collaboration with Dr Angela Carter from the Institute of Work Psychology [R6] showed that establishing the full 24-hour primary angioplasty service from the start appeared to work better than incremental expansion, identified requirements for staff working patterns, training, pay and conditions, identified potential knock-on effects and highlighted the importance of on-going audit.

Our studies showed that primary angioplasty could be implemented successfully with acceptable time delays, was likely to be cost-effective in most circumstances, was acceptable to patients and carers, and identified key workforce and organisational issues that need to be addressed during implementation.

3. References to the research

R1. Evaluation of the National Infarct Angioplasty project. HS&DR Project 08/1604/120. National Institute for Health Research, http://www.netscc.ac.uk/hsdr/projdetails.php?ref=08-1604-120

R2. Goodacre S, Sampson F, Carter A, Wailoo A, O'Cathain A, Wood S, Capewell S, Campbell S. Evaluation of the National Infarct Angioplasty Project: Report for the National Co-ordinating Centre for NHS Service Delivery and Organisation R&D (NCCSDO), 2008.

R3. Wailoo A, Goodacre S, Sampson F, Hernandez M, Asseburg C, Palmer SJ, Sculpher M, Abrams K, de Belder MA, Gray H. Primary angioplasty versus thrombolysis for acute ST-elevation myocardial infarction: an economic analysis of the National Infarct Angioplasty Project. Heart 2010;96:668-672. doi: 10.1136/hrt.2009.167130

R4. Sampson FC, O'Cathain A, Goodacre S. Is primary angioplasty an acceptable alternative to thrombolysis? Quantitative and qualitative study of patient and carer satisfaction. Health Expectations 2010;13:350-358. doi: 10.1111/j.1369-7625.2009.00589.x

R5. Sampson FC, O'Cathain A, Goodacre S. Feeling fixed and its contribution to patient satisfaction with primary angioplasty: a qualitative study. Eur J Cardiovasc Nurs 2009;8:85-90. doi: 10.1016/j.ejcnurse.2008.07.003

R6. Carter AJ, Wood S, Goodacre S, Sampson F, Stables RH. Evaluation of the workforce and organisational issues in establishing primary angioplasty in the National Infarct Angioplasty Project. J Health Serv Res Policy 2010;15:6-13. doi: 10.1258/jhsrp.2009.009019

4. Details of the impact

Our research led to a substantial change in the treatment of acute ST-elevation MI in the NHS. Primary angioplasty has replaced thrombolysis as the standard treatment. This has resulted in improved outcomes for people with ST-elevation MI.

Impact on policy

In 2008 the National Service Framework for Coronary Heart Disease (CHD) was updated to set out the new national strategy using primary angioplasty instead of thrombolysis [S1]. We reported our research directly to the Department of Health CHD Policy Team and as a result the update cited our independent research (pages 10-11) that concluded that national roll-out of primary angioplasty was feasible and likely to be cost-effective. NHS Improvement was then tasked with facilitating the national roll-out of primary angioplasty for patients with ST-elevation MI [S2].

Impact on practice

1. Treatments provided: National audit data show that following our research, primary angioplasty replaced thrombolysis as the standard NHS treatment for people with ST-elevation MI. The Myocardial Infarction National Audit Project (MINAP) is a national audit of management of MI in England, Wales and Northern Ireland [S3]. According to the Tenth MINAP Public Report published in 2011 [S4], 82% of patients in England who received any reperfusion treatment between April 2010 and March 2011 received primary angioplasty compared to 63% in 2009/10. Increases were also seen in Wales (22% to 30%) and Belfast (59% to 99%). An interim report on the national roll-out of primary angioplasty published by NHS Improvement in 2010 [S5] and based on MINAP data showed that between 2008 and 2010 the proportion of patients in England receiving any reperfusion treatment who were treated with primary angioplasty increased from 42% to 73%.

2. Patient management pathways: In accordance with findings from our economic analysis the model for providing primary angioplasty proposed by the National Service Framework and promoted by NHS Improvement involved direct transfer of patients to the catheter laboratory of specialist hospitals. This represents a substantial change from previous practice of taking all patients with MI to the nearest hospital emergency department. According to the MINAP report [S4] 75% of patients that were treated with primary angioplasty in 2010-11 were admitted directly to a specialist hospital with a catheter laboratory in England, 79% in Wales and 60% in Belfast.

3. Achieving time targets: In 2010-11 90% of eligible patients in England, 68% in Wales and 87% in Belfast were treated with primary angioplasty within the target of 90 minutes of arrival at the heart attack centre [S4]. Furthermore, 81% of eligible patients in England, 75% in Wales and 90% in Belfast were treated with primary angioplasty within 150 minutes of calling for professional help. The findings of the organisational evaluation assisted the process of implementation and helped to ensure that time targets for providing primary angioplasty were achieved.

Impact on patient outcomes

After our findings were reported and implemented through the National Infarct Angioplasty Pilot in 2007, mortality from ST-elevation MI in the NHS fell from 10.6% in 2006-2007 to 8.7% in 2010-11 [S4]. Randomised trials have shown that primary angioplasty reduces mortality compared to thrombolysis, so although other factors may have contributed to this improvement, it is reasonable to attribute some of the improvement to increased use of primary angioplasty.

Economic impact

An impact assessment based on our cost-effectiveness analysis was undertaken by the Department of Health in 2008 [S7] and estimated that over three years the policy would cost £44.4 million and would yield £337.9 million in benefits, measured as discounted quality-adjusted life years (QALYs) to patients and monetised on the basis of an estimate of social value of a QALY at £40,000.

Impact on older patients

Primary angioplasty has not been restricted on the basis of age and reductions in mortality have been seen in older people with ST-elevation MI. In-hospital mortality reduced from 30.1% in 2003 to 19.4% in 2010 in those aged 85 or more (relative risk = 0.54, 95% CI: 0.38–0.75, P< 0.001) [S6].

Impact on the wider clinical community

Although implementation of primary angioplasty is driven by national policy, we believe that it is important to engage the clinical community. Thus, in addition to publications in clinical journals outlined above, we have produced an overview of our findings for ambulance paramedics [S8] and

have engaged directly with clinicians through presenting our findings at clinical conferences, such as the College of Emergency Medicine Annual Scientific Meeting [S9,S10].

5. Sources to corroborate the impact

S1. Department of Health Coronary Heart Disease Policy Team. The Coronary Heart Disease National Service Framework: Building on excellence, maintaining progress. Progress report for 2008. Our independent evaluation is cited on page 10 and our findings cited on page 11.

S2. NHS Improvement. A Guide to Implementing Primary Angioplasty (2008).

S3. The Myocardial Ischaemia National Audit Project (MINAP). Herrett E, Smeeth L, Walker L, Weston C, on behalf of the MINAP Academic Group. Heart 2010;96:1264-1267 doi:10.1136/hrt.2009.192328.

S4. How the NHS cares for patients with heart attack: The Myocardial Ischaemia National Audit Project (MINAP) Tenth Annual Public Report. University College London, 2011. www.ucl.ac.uk/nicor/audits/minap

S5. NHS Improvement. National roll-out of Primary PCI for patients with ST segment elevation myocardial infarction: An interim report (2010).

S6. Gale CP, Cattle BA, Woolston A et al Resolving inequalities in care? Reduced mortality in the elderly after acute coronary syndromes. The Myocardial Ischaemia National Audit Project 2003–2010 Eur Heart J first published online October 18, 2011 doi:10.1093/eurheartj/ehr381.

S7. Department of Health. Impact Assessment of Treatment of Heart Attacks - National Guidance (2008).

S8. Sampson F, Goodacre S, Carter A, Wailoo A. Improving call-to-balloon times for ST-elevation myocardial infarction. Journal of Paramedic Practice 2011:3:625-631.

S9. Carter A, Wood S, Goodacre S, Sampson F. Emergency medicine and primary angioplasty: Organisational analysis. Emerg Med J 2008;25:A19.

S10. Sampson F, O'Cathain A, Goodacre S. Is primary angioplasty an acceptable treatment for patients with ST-elevation myocardial infarction? Emerg Med J 2008;25:A19.