NATIONAL INSTITUTE FOR CLINICAL EXCELLENCE

Health Technology Appraisal

Coronary artery stents for the treatment of ischaemic heart disease (Update to guidance No. 71)

Final scope

Appraisal objective

To update current NICE guidance on the clinical and cost effectiveness of drug eluting coronary artery stents for the primary prevention of restenosis following percutaneous coronary intervention (PCI) in ischaemic heart disease and to provide guidance to the NHS in England and Wales[1].

Current NICE Guidance states that "It is recommended that when considering the use of bare-metal stents (BMS) or a drug-eluting stent (DES) the decision should be based on the anatomy of the target vessel for stenting and the symptoms and mode of presentation of the disease." This update will only consider developments in drug-eluting stents.

Background

Ischaemic heart disease (IHD) (otherwise known as coronary artery disease (CAD)) is caused by an insufficient supply of oxygen to the heart muscle, due to narrowing (occlusion) of the arteries by atheromatous plaques, a process known as stenosis. CAD can be 'silent' or can present as angina, unstable angina, myocardial infarction or sudden death. CAD may affect one or more arteries, which may be of different calibres. Occlusion may be partial or total.

CAD causes about 2100 deaths annually per million of the population in England and Wales (about 110,000 deaths in total) and is also the cause of considerable morbidity and loss of ability to lead a normal life. Approximately 1.4 million people in England and Wales suffer from angina, the most common form of such morbidity.

The symptoms and health risks that are associated with a stenosed artery may be treated either by modification of risk factors (for example, smoking cessation and diet) and/or by drug treatment (for example, beta-adrenergic blockers, nitrates, calcium channel blockers, antiplatelet agents and statins).

If these treatments do not adequately control the symptoms of CAD or are inappropriate, two invasive therapies are available. The first, coronary artery bypass grafting (CABG), involves major cardiac surgery. The second, known as balloon angioplasty, or PCI, involves a nonsurgical widening from within

[1]The Department of Health and Welsh Assembly government remit to the Institute (20.05.02): "As part of the planned review of guidance on coronary artery stents, to appraise the clinical and cost effectiveness of drug eluting stents compared with conventional stents for the primary prevention of restenosis following PTCA".

the artery using a balloon catheter. When inflated, the balloon increases the calibre of the artery.

The major problem with PCI is restenosis (re-narrowing) of the artery. This may occur acutely, requiring emergency CABG to prevent MI in a small proportion of cases, or subsequently during the first 6 months, requiring a repeat procedure in some cases. The rate of angiographic restenosis is much higher for arteries with small diameters, saphenous vein grafts, long lesions, total occlusions and in people with diabetes.

The technology

Stents are thin wire-mesh structures that act as permanent prosthetic artery linings to keep the artery inflated and maintain its patency. The aim of using a stent following PCI is to reduce the likelihood of restenosis. In 2001, 86% of PCIs undertaken in England and Wales were carried out using a stent.

Two broad categories of stent are pertinent to this appraisal – bare-metal stents (BMS) and drug-eluting stents (DES), which are coated with a drug that is slowly released. The drug is held in place either with a polymer applied to the bare metal, or with some other technique.

A number of drugs have been tested in the context of DES, but at the time of the last review in October 2003, only three DES had been granted a CE (Conformite Europeene) marking. These were:

- Cypher (manufactured by Cordis) which elutes sirolimus (formerly known as rapamycin), an immunosuppressive agent that reduces inflammation.
- Taxus (manufactured by Boston Scientific) which elutes paclitaxel, a cell division inhibitor
- BiodivYsio stent (manufactured by Abbott/Biocompatibles) which elutes dexamethasone, a synthetic adrenocortical steroid that reduces inflammation.

Since the publication of technology appraisal number 71 the following developments have occurred in DES:

- The structure of the Cypher stent has been changed and the new version of this stent is known as Cypher Select. The Cypher stent is no-longer marketed.
- Boston Scientific are about to release their Taxus stent on the Liberte platform.
- The dexamethasone eluting BiodivYsio stent has been launched by Abbott Vascular Devices as Dexamet.
- Translumina (represented in the UK by Kiwimed) has received CE marking for the Magic Box system for coating Yukon stents.
- Sorin has received a CE marking for Janis, a tacrolimus-eluting stent.

- Biotronik is to seek CE marking for its paclitaxel-eluting Costar stent.
- Medtronic expects to receive CE marking for Endevor, which elutes the sirolimus analogue abt-578.
- Guidant is to seek CE marking for the everolimus-eluting stent Xience V.

Intervention(s)	Drug-eluting stents
Population(s)	People with coronary artery disease requiring PCI,
Standard comparators	(1) Non drug-eluting stents (2) DES
Outcomes	The outcome measures to be considered include: • major adverse cardiac events (MACE), including MI and the need for further revascularisation procedures • health-related quality of life • overall survival • adverse effects of treatment (for example those associated with either the polymer coating or the eluted drug, and other stent-related events such as thrombosis (AMI, SAT, LT), mal-absorption, 'incomplete stent apposition' and device failures/defects)
Economic analysis	Ideally, the cost effectiveness of treatments should be expressed in terms of incremental cost per quality-adjusted life year. Costs should be considered from an NHS and Personal Social Services perspective.

Other considerations	• Evidence pertaining to original designs of a specific DES will only be accepted in support of modified designs providing equivalence has been adequately demonstrated. • The role of concurrent therapies (e.g. antiplatelets) will be explored where the evidence permits. • Where the evidence allows, sub-groups such as those involving narrow arteries, long lesions, complicated lesions (such as bifurcation lesions), saphenous vein grafts, partial versus total occlusion, and people with diabetes or acute myocardial infarction) should be investigated. • The different types of DES should be compared with each other where evidence permits. • Consideration will also be given to relevant non-RCT data. • Guidance will only be issued for DES that have been awarded an appropriate CE mark by September 30th 2005, and for which data have been supplied by 8th June 2005. • In-stent restenosis is outside the scope of this update and will not be examined. • Care should be taken to distinguish MACE definitions that involve all-cause mortality from cardiac death, and target vessel revascularisation from target lesion revascularisation.
Related NICE recommendations	Related Technology Appraisals: • Acute coronary syndromes - clopidogrel (No. 80), July 2004 • Acute coronary syndromes - glycoprotein IIb/IIIa inhibitors (review) (No. 47) Sept 2002 • Angina and myocardial infarction - myocardial perfusion scintigraphy (No. 73) Nov 2003 • Ischaemic heart disease -coronary artery stents (No. 71) Oct 2003 • Myocardial infarction - thrombolysis (No. 52) Oct 2002