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Interventional Cardiology

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News

Research Highlights

Study suggests that age, length of hospitalization and choice of procedure all affect revascularization cost

A recent cost analysis comparing revascularization techniques and patient age groups has found that older age, longer hospital stay and the use of coronary artery bypass grafting (CABG) rather than percutaneous coronary intervention (PCI) are all associated with high hospital expenditure.

The study published in the *American Journal of Cardiology* compared the cost of the two different revascularization procedures across age groups from 40 years to over 80 years of age. There were two key findings from the study. First, older patients undergoing revascularization intervention for stable coronary artery disease present a higher cost than younger patients. Second, CABG is a more expensive option than PCI.

Samir Kapadia and colleagues from the Cleveland Clinic (OH, USA) used data from the year 2006, maintained by the Maryland Health Services Cost Review Commission, MD, USA, in order to examine resource utilization in patients with coronary artery disease who underwent either PCI or CABG interventions. Patients with acute myocardial infarction were excluded from the study.

Length of hospitalization was found to be the strongest predictor of cost. Revascularization type had the strongest influence on length of stay. It was found that patients who underwent CABG stayed in hospital 4.7-times longer than those who underwent PCI. The results suggest that CABG incurs higher costs than PCI.

Data from a total of 13,708 revascularization hospitalizations were studied and split into the age groups of 40 to 50, 50 to 60, 60 to 70, 70 to 80 and 80 years or older.

The highest proportion of PCI procedures (85%) were carried out in patients between 40 and 50 years of age. Length of hospital stay for PCI patients varied with age, from an average of 1.5 days in younger patients aged 40–50 years to 2.1 days in patients aged 80 years or over.

The patient group aged 60–70 years had the highest proportion of CABG procedures (25.9%). Mean length of stay following CABG ranged from 6.3 days in the 40–50 age group to 10.4 days in those patients over 80 years of age.

Cost was found to significantly increase with increasing age in CABG patients, ranging from US$27,580 in the youngest patient group to $42,115 in the oldest patient group. However, the difference in varying age groups of patients who underwent PCI was not significant, ranging from $13,230 to $14,412.

As age increased in patients who underwent CABG, a trend of increasing cost and length of stay was observed. Conversely, in PCI patients, no significant difference in cost between the age groups was observed, except between the 40–50 years of age category and the over 80 years of age category.

Overall, the study suggests that PCI is the more cost-effective strategy in elderly patients needing coronary intervention, although it is worth noting that the study did not look at the cost of long-term follow-up.

Source: Agarwal S, Banerjee S, Murat Tuzcu E, Kapadia SR: Influence of age on revascularization related costs of hospitalization among patients of stable coronary artery disease. Am. J. Cardiol. *DOI:10.1016/j.amjcard.2010.01.012. (2010) (Epub ahead of print).*

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Clinical trial demonstrates promising results for Powerlink® stent system

The Powerlink® stent system, developed by Endologix, Inc. (Irvine, CA, USA), has performed well in recent clinical trials recently conducted by the company, the results of which have been published in the April 2010 issue of the *Journal of Endovascular Therapy*. The trials investigated the efficacy of the stent in abdominal aortic aneurisms (AAAs) using an anatomical fixation technique.

Lead author of the report, Jeffrey Carpenter, from the Robert Wood Johnson Medical School at the University of Medicine and Dentistry New Jersey (NJ, USA) explained, "The current and consolidated results of the anatomical fixation technique using the Powerlink system for the treatment of AAAs provides further compelling evidence to clinically validate this treatment modality. The long-term results of the study, which include no device failures and significant reductions in aneurysm sac volume, compare favorably with existing clinical data using proximal fixation devices. The results are particularly positive considering that 83% of trial patients had hostile aortic neck anatomies, which can increase the risk that the procedure will fail."

The Powerlink stent system has a number of unique features, including a one-piece design of the bifurcated stent. The technique for insertion is unique to Powerlink and involves minimally invasive access to one femoral artery, rather than full exposure of both arteries. It is primarily marketed for the treatment of AAAs.

The recent study reports initial mid-term and available long-term data from 28 US centers. A total of 157 patients were treated, all within the US FDA regulations for such a trial. Powerlink was administered using the anatomical fixation technique that utilizes the patient's own endovascular architecture to naturally support the stent. The results of the trial are promising, demonstrating no aneurysm ruptures, no conversions to open repair, no device migrations, no stent fractures, no graft fatigue, no junctional endoleaks, no transgraft endoleaks and 100% freedom from aneurysm-related mortality for up to 5 years postimplant. Limb occlusion was maintained at a low rate (0.6% of limbs) and aneurysm sacs were stable in 95 and 93% of patients at 1 year and 5 years, respectively.

Sources: Carpenter JP, Garcia MJ, Harlin SA et al.*: Contemporary results of endovascular repair of abdominal aortic aneurysms: effect of anatomical fixation on outcomes.* J. Endovasc. Ther. *17(2) 153–162 (2010); http://investor.endologix.com/releasedetail.cfm?ReleaseID=464547*

Long stents could be a risk factor for late stent thrombosis

Results of a new analysis suggest that the length of the stented segment in patients receiving drug-eluting stents is associated with a 3-year risk of stent thrombosis (ST), death and myocardial infarction.

The study, published in *JACC: Cardiovascular Interventions,* aimed to determine the cutoff value where stent length could be associated with a higher risk of ST. The results suggest that the threshold stent length for predicting ST was 31.5 mm.

Seung-Jung Park and colleagues, from the Asan Medical Center (Seoul, Korea), examined a total of 3145 drug-eluting stent implantation patients (who had 4667 lesions between them). A total of 2478 of these patients (79%) were implanted with sirolimus-eluting stents while the remaining 667 patients (21%) received paclitaxel-eluting stents, between February 2003 and February 2006 at two Korean hospitals. The independent association of stent length with ST and its predictive value were evaluated for a median 29.6 month period.

"The main finding of the study was that longer stent lengths were significantly associated with a higher risk of ST and major coronary events (i.e., cardiac death and MI) over nearly 3 years' follow-up", explained Park.

At 3 years, stent lengths equal to or longer than 31.5 mm were associated with higher rates of ST (4.0 vs 0.7%, $p < 0.001$), death (5.2 vs 3.0%, $p = 0.005$) and myocardial infarction (2.4% versus 0.7%, $p = 0.001$) when compared with stent lengths shorter than the threshold 31.5 mm.

Overall, 1761 patients (56%) had stents equal to or exceeding the 31.5 mm threshold. The cumulative 3-year incidence of ST within this group was significantly higher than those with stents shorter than 31.5 mm (4.0 vs 0.7%; $p < 0.001$). The results suggest a nearly eightfold higher risk of ST for patients fitted with stents longer than 31.5 mm.

The authors note that the findings of their study are in line with those of the Arterial Revascularization Therapies Study Part II, which also found an association between total stent length and 3-year ST risk.

"Based on the result from this study, we are willing to point out that concern for the modifiable risk factor such as stent length among the various risk factors for ST can reduce the incidence of ST," Park told *Interventional Cardiology*. "Although consideration of stents longer than 31.5 mm for percutaneous coronary intervention (PCI) is needed, intravascular ultrasound-guided PCI can help optimize location, expansion, and length of stents in patients who receive drug-eluting stent implantation."

Source: Suh J, Park DW, Lee JY et al.*: The relationship and threshold of stent length with regard to risk of stent thrombosis after drug-eluting stent implantation.* JACC Cardiovasc. Interv. *3 (4) 383–389 (2010).*

Optimal coherence tomography imaging suggests that transradial coronary intervention damages radial arteries

An investigation into the acute and chronic effects of transradial coronary intervention (TRI) on the radial artery (RA) has used optimal coherence tomography to demonstrate both significant acute injuries and chronic intimal thickening.

The study, published in the *European Heart Journal*, found that the acute injuries and chronic intimal thickening caused by TRI rendered the RA unusable as a conduit for coronary artery bypass grafting.

The researchers, led by Taishi Yonetsu of Tsuchiura Kyodo Hospital (Tsuchiura, Japan), examined 73 RAs in 69 patients using optimal coherence tomography imaging. All of the patients had received TRI between March and September 2009.

Out of all the RAs studied, 35.6% showed medical dissection, most often found in the distal and proximal portions. Intimal tears were observed in 27.1% of the RAs examined. These tears were found to be more common in the distal RA than in the proximal RA.

Radial arteries that had undergone single TRI were compared with those that had undergone repeated TRI. The study found that acute injury was significantly highly in repeat TRI RAs, with intimal tears almost twice as common (44.1 vs 23.0%) and medial dissections almost three times as common (24.7 vs 9.5%) than in RAs that had undergone a single TRI.

"Efforts should be made to reduce these injuries by further miniaturization and sophistication of the devices and technical improvements or potential pharmacological interventions," Yonetsu and colleagues explain in the paper.

James Tift Mann III, of Wake Heart and Vascular Associates (NC, USA), also commented on the paper, saying "I think the most important take away message is we probably do more damage to the vessel than we thought we did."

"It's a rare situation where the need to use the same radial artery would be present," Mann explained. "This study just reinforces what we've said for years, which is that a radial artery that has had a previous cath should not be used for bypass."

Source: Yonetsu T, Kakuta T, Lee T et al.*: Assessment of acute injuries and chronic intimal thickening of the radial artery after transradial coronary intervention by optical coherence tomography.* Eur. Heart J. *DOI: 10.1093/eurheartj/ehq102 (2010) (Epub ahead of print); http://www.tctmd.com/show.aspx?id=89756*

Rehospitalization risk increases for combined PPI and clopidogrel treatment, study suggests

A recent retrospective cohort study found that patients receiving clopidogrel plus a proton pump inhibitor (PPI) had a significantly higher risk of rehospitalization for myocardial infarction (MI) or coronary stent placements than did patients only receiving clopidogrel.

The study, published in *Archives of Internal Medicine* evaluated adverse clinical outcomes in 1033 patients discharged following MI or coronary stent placement. Those patients who were taking clopidogrel were compared with patients taking clopidogrel plus a PPI.

Rehospitalization rates were observed for up to 360 days. It was found that patients who received the combination treatment had a 93% higher risk of rehospitalization for MI than the patient group who received clopidogrel alone. The patients who were taking both clopidogrel and a PPI also had a 64% higher risk for either MI or coronary stent placement.

A substudy looked specifically at patients receiving clopidogrel plus pantoprazole sodium, currently the most frequently prescribed PPI. This study also found an increased risk of rehospitalization despite previous studies suggest the adverse interaction between PPIs and clopidogrel was limited to omeprazole alone.

"This study adds to the literature because we used a more representative population (including women and patients older than 65 years) and we matched PPI users with patients with similar demographic and cardiovascular risk histories who were not taking a PPI," writes lead author Karen Stockl from Prescription Solutions (Irvine, CA, USA).

The authors of the study caution that in order to thoroughly evaluate the potential impact of PPIs on clopidogrel efficacy further prospective clinical trials and analyses of biochemical interactions are required. Until this time, they recommend that the US FDA should discourage concomitant use of PPIs and clopidogrel unless absolutely necessary.

Source: Stockl KM, Le L, Zakharvan A et al.*: Risk of rehospitalization for patients using clopidogrel with a proton pump inhibitor.* Arch. Intern. Med. *170(8) 704–710 (2010).*