Cognitive Function

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Cognitive function may be defined as learning, memory, learning and delayed recall, executive functioning (decision making etc) focused attention and psychomotor processing speed.

Post-operative cognitive impairment encompasses both post-operative delirium (POD) and post-operative cognitive decline (POCD). POD is a formal diagnosis that meets criteria of disturbance of consciousness (reduced awareness of environment, attention difficulties), change in cognition (e.g. memory deficit, language or perceptual disturbance, and evidence that disturbance is caused by the physiological sequelae of a general medical condition (American Psychiatric Association 2000). By contrast, POCD does not have a clear definition or presentation and is a decline from baseline cognitive function. Accurate diagnosis of POCD therefore requires a comparison of pre- and post-operative neuropsychological tests. To date, POCD is poorly understood and there is no standard battery of tests for this; however in the main, individual tests of memory and attention are used to assess for cognitive decline (Spiegel and Chen 2012).

POD and POCD have a number of different features outlined in Table 1. Notably POD is more likely to present itself 1-3 days post operation whereas POCD doesn't usually manifest until 5-10 days post operation. Depending on time of discharge, those in the acute setting facilitating the Heart Manual may see cognitive delirium and some cognitive decline among bypass patients in hospital whereas those working in the community setting with individuals post bypass at home will be more likely to see those who are reporting new difficulties associated with POCD.

Previous studies have found little evidence that delirium post operation is long term. Nevertheless Saczynski et al (2012) have found that POD is associated with a significant decline in cognitive ability and much less likely to return to their post-operative level at 6 months than those with POCD without delirium. Those with delirium may find that their cognitive recovery process takes longer. This suggests that rehabilitation post 6 months should still attend to cognitive difficulties as people may be still experiencing these. By one year the difference in cognitive decline between those who had delirium and those who did not is not significant.

Table 1. Features of post operative cognitive decline versus postoperative delirium		
FEATURES	POST-OPERATIVE DELIRIUM (POD)	POST-OPERATIVE COGNITIVE DECLINE (POCD)
Onset	Acute	Subtle
Presentation	Usually post-operative; Days 1-3; Rarely after post-operative day 6	Usually not prior to post-operative day 5-10
Duration	Days to weeks	Weeks to months
Attention	Impaired	Impaired
Orientated	Often disorientated	Normal
Reversible?	Usually	Usually, but can be long-lasting
Formal diagnosis?	Defined in DSM-IV-TR and WHO's classification of diseases	No formal definition; diagnosis requires pre- and post-operative neuropsychological testing
Bedside screening tools?	CAM, CAM ICU	None; commonly tested cognitive domains are memory

CAM: Confusion Assessment Method; ICU: intensive Care Unit; DSM-IV-TR: Diagnositic and Statistical Manual of Mental Disorders, Fourth Edition Text Revision; WHO: World Health Organization
(Spiegal and Chen 2012)

Cognitive decline may be manifested in a number of ways: patients may have increased difficulties with short term memory, concentration and decision making. Visual and verbal response speeds, and numeric ability may be affected. Therefore patients may notice increased difficulties with everyday tasks such as remembering to take medication or discussions with health professionals.

Cognitive decline is not exclusive to heart surgery patients. POCD is also a complication post-hip replacement surgery. It can also occur as a result of coronary heart disease (CHD). Patients with CHD have poorer neuropsychological tests than their non CHD age matched controls (McKhann et al. 2005).

People frequently report cognitive difficulties after CABG (McKhann et al. 2005). There may be a discrepancy between self-reported cognitive decline and results from

more objective measures such as neurological tests. For example, a patient may be describing difficulties without displaying a significant loss of cognitive function according to the results of neurological tests and vice versa.

There is sufficient robust evidence to indicate that cognitive decline is common up to three months post surgery. SIGN guidelines (Scottish Intercollegiate Guidelines Network 2007) suggest that patients going through coronary artery bypass surgery should be advised that cognitive decline is comparatively frequent in the two months immediately post surgery.

Studies indicate that 24% of patients may still have decline at six months post surgery; this figure may increase to 39% among those who had already displayed pre-surgical impairment (Millar et al. 2001; Newman et al. 2001). Another study by Newman et al (2001) reported that cognitive decline was evident in 53% of the patients at discharge; the incidence decreased to 36% at six weeks and 24% at six months. Five years after surgery, the incidence of cognitive decline was 42%. This indicates a pattern of early improvement for those experiencing cognitive deficits at discharge followed by a later decline that can be evident in the long term.

There are a number of proposed causes for the cognitive decline noticeable after bypass surgery, including microembolisation, inflammation or a variation in perfusion flow. Cognitive decline was found among patients after on-pump CABG, leading to the hypothesis that an off-pump approach would avoid this problem. Manipulation of the heart and great vessels together with the clamping of the aorta required in on-pump bypass surgery is considered enough to release microemboli which can induce acute symptoms of inattention, confusion and delirium, depression apathy and inattention (Samuels 2006) However, comparisons in the majority of studies have found no significant differences in the sequelae between on pump and off pump patients (Koroza et al. 2010, Jensen et al. 2006, Lund et al. 2005, van Dijk et al. 2002).

Despite these highlighted risks of surgery, the major prevailing risk factors for POCD are age, hypertension, presence of CVD and cognitive problems predating the operation (Samuels 2006). These factors, such as ageing and the progression of CHD, may explain the 42% prevalence rate of cognitive decline at 5 years post CABG (Selnes et al. 2001).

The post revascularisation complication of cognitive decline may not be restricted to bypass patients. Post-interventional decline has been observed among patients after coronary catheterisation (Schwarz et al. 2011) Cognitive decline post coronary catheterisation appears to be significantly milder than post bypass but, as noted by the authors, 'not negligible' (Schwarz et al. 2011, p. 756). However, earlier studies found no significant differences between CABG and PCI in cognitive decline.

Anxiety and depression have been found to contribute to deteriorated cognitive function. Reports of poor cognitive function may also be an indication that the patient is anxious or depressed.

How can the Heart Manual facilitator help?

At an early stage, patients, family and friends should be advised that there may be some cognitive decline after CABG or MI; therefore patients may need to refer to the manual more often. Ask those who have recently had a bypass if they have had any problems with concentration or memory loss. Reassure them that some deterioration is common and that the cognitive decline seen post surgery normally improves over the coming weeks. Partners and family should be made aware that cognitive decline may undermine the patient's confidence.

As depression and anxiety may also be causing the cognitive difficulties, tools such as the Hospital Anxiety and Depression Scale (HADS, Zigmond and Snaith 1983) and may be used to assess whether either anxiety or depression is present. Interventions for anxiety or depression may also help cognitive function. Relaxation methods described in the Heart Manual to deal with anxiety or depression should also be suggested (see section on Anxiety and Depression). Cognitive difficulties can be frustrating for the both the patient and those that are close to them. Encourage them to try the relaxation CD too.

Cognitive difficulties persisting beyond 2 months should be investigated further. The patient should be referred to a clinical psychologist or other suitable professional. SIGN guidelines recommend that selective cognitive screening should be carried out among those with post arrest or older patients if they are experiencing memory or attention difficulties (Scottish Intercollegiate Guidelines Network 2007).

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