Editorial

The ageing anaesthetist

Our population is ageing. The World Health Organization's *European Health Report 2012* describes a five-year rise in life expectancy between 1980 and 2010, with projections of a life expectancy of nearly 81 years by 2050. At that point, more than a quarter of Europe's population will be over 65 years [1]. In response to these demographic changes, the normal pension age is set to rise in many countries, the UK being no exception. Doctors are not immune; the government intends to increase medical practitioners' normal pension age to 66 by 2020 [2], and to set the normal pension age of public sector workers at 68 years by 2046 [3]. Is this a sensible course of action for anaesthetists? In this editorial, we present an overview of current research on the effects of ageing on cognitive processes, consider the impact this may have on clinical practice and discuss potential roles for the ageing anaesthetist.

A recent University of Bath audit, commissioned by the National Health Service (NHS) Working Longer Review group, summarises current evidence on the impact of working beyond aged 60. It concludes: "*diminished capacity and performance, in terms of cognition (mental ability and agility) is slight for most people in their sixties, and effects are offset by experience and established skills. Older people (in good health, with up-to-date skill sets) perform as well as their younger counterparts… There is a large variation between individuals' age and capacity to work, affected by lifestyle, non-work sources of stress, and the availability of occupational health support. … people are likely to be capable of continuing to work in their existing roles until they reach the new retirement age, but in practice may not be motivated to do so*" [4].

The NHS employs more than 1.7 million people and nearly half are clinically qualified [5]. The spectrum of roles and responsibilities held by individuals nearing retirement is such that a one-size-fits-all approach may be problematic.

Cognitive processes and ageing

Cognitive functioning declines with age. However, this decline is very variable, both in the extent to which any one individual will be affected and the specific cognitive processes involved. Although findings differ in younger adults according to the study design (generating debate as to whether declines are progressive across the lifespan or begin in middle age [6, 7]), there is general agreement that after the age of 60, domains such as processing speed (dealing with incoming information quickly and efficiently), working memory (short-term memory and maintenance of new information) and episodic memory encoding (formation of new memories of specific events or episodes) decline. However, domains such as semantic memory (knowledge) and more routinised behaviours show little change [8]. Hedden and Gabrieli summarise these findings thus: "*One possibility is that older adults use preserved knowledge and experience to form more efficient or effective strategies when performing tasks in which younger adults rely on processing ability*" [8]. In simple terms, experienced practitioners may rely on previous experience, intuitively recognising patterns and making 'routinised' automatic rapid responses to developing situations, without employing conscious analysis and reasoning. In contrast, less experienced practitioners may rely on conscious deliberation (engaging attention, working memory and executive control, underpinned by efficient processing speed) to notice and select the relevant information, then analyse and synthesise this in order to select the best course of action.

In terms of the underlying causes of cognitive decline, there is a strong relationship between brain white-matter integrity and processing speed/attention in older adults

[9]. Lesions in white-matter [10] that slow processing speed [11, 12] may explain age-related changes in broader cognitive functions. Recent work shows that the strongest relationship is with 'cognitive instability' (inconsistency in response reaction-time). Impaired connectivity in white-matter tracts appears to increase 'neural noise' which may cause difficulty in inhibiting irrelevant information, thus reducing the cognitive resources available for relevant processing. This leads to basic processing speed/attentional problems and increased variability in performance [13–15] that may have effects on other processes. Cabeza and colleagues [16] studied the variation between individuals in the impact of ageing on cognitive processes, using positron emission tomography imaging to examine prefrontal cortex activation during a memory task in younger and older adults. The older group separated into those with good or poor performance. Low-performing older adults recruited the same right-sided prefrontal cortex regions as young adults (but did so inefficiently), while high-performing older individuals used both left and right prefrontal cortex regions for a task where young adults used only the right prefrontal cortex. Thus, some older individuals may maintain their high levels of cognitive performance through adaptive changes in cognitive networks (for a review see [17]).

What does this mean for the anaesthetist?

Older anaesthetists may be slower at recognising and managing new situations, but are just as quick to respond when they are not tired and are able to draw on previous experience. The potential problem comes when the older anaesthetist does not notice that a situation is changing, misinterprets events, or has no previous experience upon which to draw. A Canadian study found that anaesthetists aged > 65 years had 1.5 times the number of successful claims against them compared with anaesthetists < 51 years, leading to more severe injuries [18, 19], despite the older anaesthetists' being involved in fewer complex cases. Tiredness also has an effect on older doctors' performance and mood. The quality of sleep worsens with age and sleep becomes shorter. As Tucker and Byrne [20] point out: "*cognitive performance of older shift workers may be more impaired during night work but they may be less aware of their degree of impairment than younger shift workers*". Fergusson et al. [21] have shown that being on-call can be highly disruptive of sleep, even when not called out. The impact of shift-work on anaesthesia trainees and specialists has been demonstrated [22] and some studies have described a reduction in the capacity to adapt to shift work with increasing age [23].

Age-related physical health problems may also have an impact on performance. The incidence of many chronic conditions (e.g. musculoskeletal problems) and of acute illness (e.g. ischaemic heart disease) increases with age. Cataracts, glaucoma and age-related macular degeneration are all more common. Even in eyes free from pathology, accommodation (focusing power), contrast sensitivity and visual acuity all decline with age [24, 25]. Hearing becomes progressively less sensitive, with losses being most significant at higher frequencies.

As physicians age, they are more likely to make errors from placing undue weight on first impressions, but their ability to reach a diagnosis when minimal information is available improves with experience (for discussion see [26]). Hence, educational interventions such as peer observation and discussion, that assist in overcoming errors from premature closure, are useful. In reviewing the implications of ageing on the design of continuous professional development (CPD) and physician remediation, Eva points out that traditional, lecture-based CPD may be less useful than group activities in which participants discuss clinical management and receive feedback from peers [27]. Older individuals typically receive less feedback on their performance, but may find it more difficult to recognise when their skills deteriorate because they rely more on non-analytic cognitive processes [27]. It has been reported that older physicians have the lowest 'knowledge scores' but the greatest confidence in their knowledge [28].

What should we do?

It appears that in most circumstances, most older anaesthetists in good health continue to perform well. Equally, there is good neurophysiological evidence that after the age of 60, processing speed, short-term memory, retention of new

information and vigilance all decline. Performance may therefore become more variable. The decision to retire is influenced by personal health, financial status, family commitments, peer-retirement norms, job satisfaction, working hours, employer attitudes/norms, availability of work, and pension arrangements. It is important that these factors are taken into account if we are to retain and make best use of anaesthetists in their later careers. Staff are more likely to continue to work if there is a good fit between the demands of their job, their working environment, their personal circumstances, and their health and capability [4]. The individual anaesthetist, his/her department, the wider organisation and the NHS all have a role to play.

Individuals have a responsibility to demonstrate insight into the potential impacts of ageing, to make plans for the future and to discuss these within their department. This process should include regular health check-ups including eye tests, assessment of fatigue and sleep related issues [28]. The Australasian Anaesthesia Continuing Education Coordinating Committee provides useful guidance for the older professional [29]. Suggestions include occasionally sitting in with colleagues to observe their methods of working, maintaining a commitment to teaching and learning from trainees, participating regularly in CPD activities, and discussing clinical problems with colleagues. There may be a place for simulation-based updates. Commercial airline pilots are subject to a stringent medical every six months, and their competence is checked twice a year in two-day simulator sessions, on an annual supervised 'line' flight and with other training. However, the UK Civil Aviation Authority recognises the impact of fatigue on older pilots; an individual could be physically fit enough to pass the medical and competent enough to pass the simulator checks, but might struggle when faced with night flights and long flights over different time zones (Noughton A, personal communication).

Clinical directors and departments that take a strategic approach, with effective job planning and appropriate involvement of human resources and occupational physicians, are likely to get the most from their older workforce. Good job planning might include daytime weekend work instead of overnight on-call, flexible working, shorter hours, less isolated working and less demanding or less stressful lists. A change of role might be appropriate for some, perhaps involving pre-operative assessment clinic work, undergraduate or postgraduate education, clinical governance or other non-clinical roles. Although consultants have no right to drop on-call duties at a set age, the Association of Anaesthetists of Great Britain & Ireland (AAGBI) recommends that clinical directors review on-call responsibilities for anaesthetists over 55 years of age [30]. However, the needs of older colleagues have to balance with the demands of service delivery and of younger colleagues. Older anaesthetists are not the only people whose performance might be affected by tiredness; those with young children can also suffer chronic sleep deprivation [31].

Returning to work after illness/surgery is described as very tiring at any age, and many people who do so describe feeling less confident. Departments that offer a sensibly paced return to work with good support from colleagues and a gradual increase in responsibilities are more likely to retain staff. Regular review with the clinical director allows the returning anaesthetist to reassess his/her capability and stamina as he/she appreciates the effects of a chronic health condition or long-term treatment on performance. The consultant occupational physician [32] may provide useful advice on the impact of health on work, and of work on health.

There should also be a focus on the working environment [33], with workplace assessment of the individual's specific needs (e.g. provision of appropriate seating in theatre) and equipment that is easy to see and hear. Visual and auditory factors should be taken into account when reviewing the workplace. For example, drug labels and monitor displays are easier to read if they are high-contrast and in larger print [34]. Different font styles vary in legibility, sans serif being easier to read than serif fonts [35, 36]. Beeps and alarms should be sufficiently flexible to cater for normal hearing loss. Background noise (music, loud conversation) could also be problematic. Colleagues should bear this in mind during interactions, particularly in emergency situations. As older adults are known to find it easier to take notes than to remember auditory information, particu-

larly when doing tasks that require simultaneous storing and processing of information [27], they may prefer to have visually presented information (e.g. written notes) and may be slower at performing the early steps of complex tasks.

Organisational and departmental culture has a key influence, and the clinical director and wider department should create a good working environment. Older anaesthetists who feel that their contribution is valued and their health needs are catered for are more likely to remain motivated and to continue to contribute. Job retention is influenced more by the features of the job, and the attitude of the organisation to older employees, than the individual's capabilities; where the fit is poor this tends to encourage retirement [4]. Culture begins 'at home'; good colleagues who are quick to come and help an older clinician, good trainees who are not afraid to speak out, and nurses and operating department practitioners who feel genuinely part of the team, make the biggest difference. We also cannot ignore the 'human factor' – it is easier to support those who demonstrate humility. The older clinician should seek help from, listen to and take advice from colleagues, which may not always be easy if used to the role of senior leader.

The wider NHS can influence working arrangements so that these meet the preferences and capabilities of an ageing workforce, pension entitlements and attitudes to older doctors. Pension arrangements should be such that those who struggle do not continue working because of financial pressures. Workers in some 'protected occupations' (e.g. fire-fighters, members of the armed forces) are exempt from having a normal pension age above 60 years. The Civil Aviation Authority restricts the validity of pilots' licences to 65. Commercial pilots can only fly single-pilot until 60 and then multi-pilot up to the age of 65 (as long as the other crew member is under 60). It is interesting to speculate as to why anaesthetists working for the NHS and pilots working for commercial passenger flying airlines – both safety-critical disciplines – are managed differently. This may just be custom and practice. However, it may be that commercial airlines have reached different conclusions about the potential for avoidable error from an older pilot's misinterpreting a situation, or responding more slowly to a fast-changing problem.

As the population ages, its need for healthcare intervention escalates [37].* We are more likely to meet this need if older anaesthetists continue to contribute. This must be done safely, recognising the effects of ageing on our ability to perform a job that requires constant vigilance and can sometimes require rapid processing of new information and quick decision-making.

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