Preventing delirium in older people

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Delirium is a common presentation of acute physical illness in older people. When complicating a hospital admission it is an independent predictor of poor outcomes and is poorly detected. Up to 50% of delirium in older people develops after admission to hospital. The factors that predispose to and precipitate these incident cases are now recognized and many are related to the process of care. Controlled studies demonstrate the potential to reduce incident delirium by 30–40%, and these interventions are essentially the provision of high-quality care. The routine use of risk prediction rules for all older people admitted to general hospitals would identify those at greatest risk and allow the implementation of care plans that incorporate strategies for prevention and the detection of early symptoms. There is now sufficient evidence to recommend that this should become routine practice.

Introduction

First use of the term delirium is attributed to Celsus in the first century CE, but clear descriptions of the syndrome appear in the writings of Hippocrates 2500 years ago. Despite its long history, delirium remains a common but misunderstood and largely undetected disorder.

The pathophysiology of delirium is not well understood, but the significance of the disorder is as a sign of acute and often serious physical illness. Not only is it common but it carries a poor prognosis and is costly. Estimates from the United States suggest that delirium will affect more than 2.3 million older people each year, be responsible for more than 17.5 million inpatient days and cost more than $4 billion dollars (1994 dollars) each year.\textsuperscript{1}

Delirium is a particularly common presentation of acute illness among older people admitted to general hospitals\textsuperscript{2–4} (Table 1) when it may be the only sign of acute illness without key localizing symptoms and signs of the underlying pathology. It is much more common in hospital than in the community. The causes of delirium are numerous.\textsuperscript{2}

Even though delirium has been known for centuries it is still poorly detected (non-detection rates of 32–67%)\textsuperscript{5} and is not well understood.
by many general hospital practitioners. For example, a qualitative study revealed that 75% of general nurses interviewed stated that they did not know the difference between delirium and dementia, even though 75% said that they had had formal education on the topic or had been to a conference about confusion in elderly people.6

Up to 50% of delirium affecting older people develops after admission to hospital (incident cases). These cases often result from hospital-related complications or inadequate care. It has been suggested that delirium is a symptom of how hospital care is failing older people and is a window to improve its quality for the elderly.7

Incident delirium is particularly important in general hospitals because it is acquired in hospital and may be preventable. This paper will focus on the prevention of incident delirium.

**Diagnosis**

The *International Classification of Diseases, 10th Revision*8 suggests that for a definite diagnosis of delirium symptoms should be present in each of five areas of mental function (Table 2). The underlying cause need not necessarily be known. However, the symptoms (with the possible exception of impaired consciousness) are not diagnosis specific and the key to diagnosis is abrupt onset, brief history and fluctuating course. Delirium should be suspected in any older person who shows a sudden change or fluctuation of mental state or behaviour.

<table>
<thead>
<tr>
<th>Table 1 Frequency of delirium2-4</th>
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<tbody>
<tr>
<td>Medical</td>
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<tr>
<td>Prevalent</td>
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<td>Incident</td>
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<tr>
<td>General surgical</td>
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<tr>
<td>Cardiac surgery</td>
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<tr>
<td>Elective orthopaedic surgery</td>
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<td>Hip fracture</td>
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<td>Accident and Emergency</td>
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<td>Community</td>
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<tr>
<th>Table 2 ICD-10 diagnosis of delirium</th>
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<tr>
<td>A Impairment of consciousness and attention</td>
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<tr>
<td>B Global disturbance of cognition</td>
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<tr>
<td>C Psychomotor disturbances</td>
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<tr>
<td>D Disturbance of sleep-wake cycle</td>
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<td>E Emotional disturbances</td>
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The term ‘prevalent’ is used to describe delirium present when a person presents for admission to hospital and the term ‘incident’ is used for those cases of delirium that develop during admission.

Outcomes

What makes delirium so important is that it carries such a poor prognosis. It is now clear that delirium itself is an independent predictor of poor outcome in terms of increased mortality and length of hospital stay, loss of independent function and a greater likelihood of transfer to long-term institutional care.² It is also associated with increased risk of hospital-acquired complications including pressure sores, incontinence and falls.⁹

Furthermore, this adverse effect on outcome is still evident for some time after discharge from hospital. For example, delirium independently predicts increased mortality, particularly in people without dementia, and sustained poor cognitive and functional status 12 months after a medical admission.¹⁰,¹¹ Rockwood et al.¹² followed elderly patients after a medical admission for a median 32 months and found that 79% of those with delirium at index admission died compared with 49% of those without delirium. Excluding those with an initial diagnosis of dementia, the delirious were more likely to acquire a diagnosis of dementia during that period (adjusted odds ratio, 5.97).

Delirium occurring during admission with hip fracture is associated with increased mortality 2 years after discharge.¹³ Persistent symptoms are common up to 12 months after discharge, with one study finding 14.8% of patients without dementia still meeting the criteria for delirium.¹⁴ A similar study reported 83% of patients still showing symptoms of delirium 6 months after discharge, and 31% of incident cases were still suffering from delirium.¹⁵

Subsyndromal delirium, i.e. symptoms insufficient to satisfy the syndrome definition, also has an adverse prognostic effect on a continuum between no symptoms and severe delirium.¹⁶,¹⁷

Treatment

Celsus stated 2000 years ago that treatment was that of the underlying condition (then usually febrile illness) and this has not changed. Consensus guidelines advise on the principles of management,¹⁸ although the evidence base is poor. Prompt and optimal treatment of the underlying condition remains the cornerstone of management.

There is some evidence for modest benefits in cognitive and functional status from systematic detection and management of putative causal...
factors among older surgical patients with delirium. The greater benefit with surgical populations may be related to putative causal factors, such as postoperative hypoxia, being more specific and more easily treated. However, a recent randomized controlled trial of systematic detection and treatment of medically ill older people with delirium by a specialist multidisciplinary team suggests that this is no better than the usual care. No difference was found on a range of outcome measures including mortality, length of stay, discharge to admission address or loss of independence.

At present, improving outcome by different or novel approaches to treatment of established delirium (with the possible exception of some surgical populations) has provided limited opportunity to improve the outcome. Would paying more attention to prevention offer better prospects?

## Risk factors

There is now an extensive body of knowledge describing the factors that place older people at risk of developing delirium during hospital admission and those most likely to precipitate an episode. Separating these into predisposing and precipitating factors helps focus attention on the steps to prevention. Predisposing factors are characteristics of patients identifiable at the time of admission, i.e. before delirium develops, and they indicate level of risk. Precipitating factors are causally connected events that immediately precede an episode.

Predisposing and precipitating factors are highly interrelated and contribute to the development of delirium in independent, substantive and cumulative ways. In the majority of older patients delirium is a multifactorial condition resulting from an interaction between predisposing and precipitating factors. In general, the greater the loading of predisposing factors the less noxious is the stimulus required to precipitate delirium. Patients with many predisposing factors may develop delirium easily and frequently. Conversely, low-risk patients would be relatively resistant and a major medical insult would be required to precipitate delirium. This information should help focus attention on higher-risk categories.

In prospective studies of older patients admitted to medical wards, Inouye et al. identified four factors that independently predicted the development of incident delirium: vision impairment, severity of illness, cognitive impairment, and high ratio of blood urea to creatinine. Rates of delirium for low-risk (no factors), intermediate-risk (one or two factors) and high-risk (three or four factors) groups were 9%, 23% and 83%, respectively. When this risk profile was applied to a separate
validation cohort the rates were 3%, 16% and 32%, respectively. The relative risk of developing delirium in high-risk patients was 9.5 times that in the low-risk group.

The importance of this information is the potential to identify at-risk patients on admission and focus prevention on those with greater risk. However, clinical prediction rules of this sort will differ between patient populations. For example, a study of postoperative delirium for elective non-cardiac surgery identified seven factors: age >69 years, alcohol abuse, cognitive status, severity of physical impairment, abnormal electrolyte or glucose levels, aortic aneurysm and non-cardiac thoracic surgery. When an eight-point score (one point per factor and two points for aortic aneurysm) were applied to a separate validation cohort only 2% with no factors developed delirium while 50% of those with scores ≥3 developed postoperative delirium. A simple, although unvalidated, risk assessment for elective knee and hip replacement surgery proposes a combination of male gender and impaired preoperative performance on the clock drawing test (a screening instrument to detect cognitive impairment).

Extending their work on predisposing factors, Inouye et al. identified five independent precipitating factors for older medical patients: use of physical restraints, malnutrition, use of bladder catheter, adding more than three medications and adverse outcome from iatrogenic events. The rates for delirium were 3%, 20% and 59% for low-risk (no factors), intermediate-risk (one or two factors) and high-risk (three or more factors) groups, respectively. Rates of delirium in the validation cohort were 4%, 20% and 35%, respectively. The relative risk for developing delirium for high-risk compared with low-risk patients was 22.5 and 8.9 in the development and validation cohorts, respectively.

**Preventative interventions**

Reviewing 13 trials of preventative intervention, Cole concluded that a broad spectrum of interventions may be modestly effective in preventing delirium among surgical patients. These included education, support, reorientation, anxiety reduction and preoperative medical assessment. Interventions administered by a nurse or physician appeared to be equally effective. The absolute risk reduction was in the range –13% to 19% (median 13%).

Perhaps the most notable of these studies was a randomized controlled trial of patient controlled analgesia where self-administered postoperative analgesia was associated with a dramatic reduction of delirium. Narcotic, psychotropic and anticholinergic drugs are amongst the most commonly reported causes of drug-induced delirium. An independent
association between exposure to anticholinergic drugs and severity of delirium has been reported.\textsuperscript{26} This is significant because increasing severity of delirium is related to greater mortality.\textsuperscript{10} Careful prescribing could contribute to reducing incidence and severity.

There is less evidence that different operative or anaesthetic approaches alter the incidence of postoperative delirium, although meticulous attention to pre-, peri- and postoperative care has been shown to reduce the incidence of postoperative delirium following hip fracture surgery.\textsuperscript{27}

These studies demonstrate modest benefits in the main and have methodological limitations. Two large and more robust studies provide better evidence that delirium can be prevented. Using the information about predisposing and precipitating factors, Inouye et al.\textsuperscript{28} employed a preventative intervention protocol for use in a clinically controlled trial involving 852 patients aged >69 years admitted to medical wards. This multicomponent intervention strategy, called the Elder Life Program, was delivered by a specialist multidisciplinary team to prospectively identified intermediate- and high-risk patients. It involved a standardized intervention protocol covering six domains of care (cognitive impairment, sleep deprivation, immobility, visual impairment, hearing impairment and dehydration) and outcome was compared with a group receiving usual care. Interventions included daily orientation to surroundings, cognitively stimulating activities such as word games, non-pharmacological sleep enhancers such as relaxation tapes, early ambulation and motion exercises, sensory aids and careful fluid balance. Delirium developed in 9.9\% of the intervention group and in 15\% of the usual care group, a 34\% reduction of incident cases. The intervention was associated with a significant reduction in total days with delirium, total number of episodes, improved cognitive function in those cognitively impaired at admission and reduced use of sleep medications. However, this effect was only significant for the intermediate-risk group. The non-significant benefit for the high-risk group (27\% reduction with wide confidence intervals) might be explained by the small sample size.

This intervention might be described simply as high-quality care. A cost analysis concluded that the intervention was cost effective for the intermediate risk-group (72\% of the total) with intervention costs offset by savings accrued from treatment intensity (daily costs) including nursing costs and diagnostic procedures. The intervention was not cost effective for the high-risk group (28\% of the total), probably because the intervention failed to produce a statistically significant effect. The authors concluded that the intervention should be targeted at intermediate-risk patients.\textsuperscript{1}

A randomized trial of 126 older people aged >64 admitted to hospital with hip fracture employed proactive geriatric consultation as the
preventative intervention. The study had 80% power to detect a one-third reduction of delirium in the intervention group compared with the group receiving usual care. A geriatrician visited patients daily throughout the period of hospitalization making targeted recommendations based on a 10-module structured protocol in which each module containing two to five specific recommendations. These included attention to oxygenation, fluid balance and electrolyte disturbance, pain relief, bladder and bowel function, avoidance of unnecessary drugs, nutrition, environmental stimuli, early mobilization, detection of postoperative complications and early symptoms. Again, this could be described as nothing more than high-quality care. Delirium occurred in 32% of the intervention group and 50% of the control group, representing an incidence reduction of 36%. One case of delirium was prevented for every 5.6 patients in the intervention group. There was a 58% reduction in severe cases of delirium in the intervention group (incidence of 12% compared with 29% in the usual care group). The intervention proved most effective in patients without prefracture cognitive impairment or impaired activities of daily living.

A less scientifically rigorous but more naturalistic study suggests that these research findings are transferable to clinical practice. A multifactorial targeted process of care employing training that incorporated audit and feedback, and a simple assessment and treatment protocol was used with a before-and-after design. The study population were patients aged >74 years with cognitive impairment or delirium admitted to medical wards. During the 9-month period after the initial education phase there was a sustained reduction in the prevalence of delirium and reduced length of stay. The authors suggest that each case of delirium prevented saved a mean 3.42 hospital days. This study shows that research findings can be adapted to clinical practice. It employed information from the Elder Life Program simplified and adapted to local conditions and used trained clinical staff rather than specially trained research workers.

Environmental factors

Traditionally, environmental factors have been considered important in both the genesis and management of delirium. While there is no empirical evidence that the environment alone can cause delirium, certain environmental conditions may exacerbate it. In general, attention to sensory input (addressing causes of sensory impairment and maintaining optimal sensory stimulation), providing orientation aids and reassuring human contact are considered helpful strategies for reducing the manifestations or severity of delirium.
In terms of prevention, environmental factors have rarely been the subject of rigorous systematic study. A recent prospective observational study of putative deliriogenic environmental factors reported several associations with the severity of delirium. After controlling for some variables known to affect the severity of delirium (initial severity of delirium, age, length of stay, comorbidity, dementia, hearing and visual impairment), it was found that multiple room changes, care in intensive care or long-term care units, use of medical or physical restraints, absence of a clock, watch or reading glasses, and presence of a family member were associated with greater severity of delirium. However, these are only associations (and some appear likely to be a consequence rather than a cause of delirium severity) and not necessarily causal connections.

There is a need for further research to determine whether modifying environmental factors could limit severity of delirium or improve outcome.

**Education**

Intuitively, one might expect that improved education would lead to better detection, prevention and outcome. Studies to date have demonstrated limited effects, but the methodology is often poor. Rockwood provides a critique of educational interventions in delirium and suggests that future studies need improved methodological rigour and should incorporate principles of adult learning, in particular, making the education relevant to the perceived needs of participants, using teaching methods that emphasize integration of new information into existing knowledge and providing non-judgemental feedback.

**Conclusion**

Preventing incident delirium in older people has implications for better patient outcomes, efficient use of hospital resources, the performance of acute hospitals and the cost of health care. Incident delirium is common, often iatrogenic and closely linked to processes of care. On present evidence, as many as 30–40% of cases may be preventable. It is a cause of death, disability, loss of independence and increased costs. Delirium affecting older people is a serious public health issue for general hospitals.

In the present state of knowledge it is possible to identify populations of patients at particular risk of developing delirium at the time they are admitted to hospital. Care plans for these individuals could pay particular attention to the recognized precipitants of delirium and aspects of care...
that can reduce risk and ameliorate deliriogenic factors. Early identification and prompt and optimal management with attention to medical and environmental factors would contribute to secondary prevention by reducing the severity of delirium and increasing the speed of recovery as both effects improve outcome.\(^{10,14,16}\) A prevention approach is summarized in Table 3.

Hospitals and health care professionals will need to take a proactive approach to improving awareness, understanding, detection and clinical expertise if these improved outcomes are to be realized. There is probably enough evidence now available to recommend implementation of detection and prevention programmes in acute care hospitals.\(^2\) In many regards the key to tackling this problem is high-quality care, and, while delirium may now be a sign of how acute hospitals are failing older people, low incidence may become an indicator of the quality of care that an acute hospital provides.

### References