The Problem of Delirium in the Elderly

5

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Key Points
- Delirium in the elderly is common and all elderly people presenting with confusion should be presumed to have delirium until proven otherwise.
- Delirium in older people is multifactorial. Particular attention should be made to identify all precipitating factors, and targeted treatment should be given for reversible causes.
- First-line management for the symptoms of delirium should focus on non-pharmacological strategies.
- Sedative medication should be used as a last resort and reserved for those with severe agitation or distressing symptoms, whose behavioural disturbances may pose a risk to themselves or others.
- Delirium screening and prevention strategies should be maintained throughout the patients' journey to minimize the long-term risks of increased mortality, cognitive and functional decline and the psychological impacts that are associated with an episode of delirium.

Case Study

Mr. R is an 86-year-old gentleman, living in a regional Australian town. He was previously independent with activities of daily living (ADLs), driving a car and caring for his wife who has significant physical disability and not known to have underlying cognitive impairment. He was admitted to a tertiary hospital under the surgical team with scrotal cellulitis, dehydration and mild renal impairment. Staff on the surgical ward initially noticed he was withdrawn and asked repetitive

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questions but put this down to his age and failing memory. One week into his admission, his behaviours escalated. He became agitated and impulsive and fell on the ward. He had complete reversal of his sleep/wake cycle and became intrusive to other patients. At this point the surgical team asked for a geriatrician consult and joint care was organized. Delirium was diagnosed (using the CAM) and staff initiated non-pharmacological management of his delirium. He was moved to a quiet room; a clock and communication board were organized. Extra nursing supervision ensured he was hydrated, with adequate pain control, and nursing staff initiated management of constipation. Unfortunately he continued to be intrusive to other patients and became agitated and distressed when redirected. Therefore his behaviour was mapped so that the geriatrics team were able to initiate low-dose-targeted antipsychotic medication (in this case risperidone). After a few days, his agitation settled, but he continued to have a disturbed sleep pattern and impulsive behaviours and required assistance with ADLs. After discussion with his family, he was discharged into a residential facility with outpatient geriatrician follow-up and a plan to wean him completely from the antipsychotic medication. This was achieved 8 weeks later, and after 3 months his delirium had resolved to a point that he was able to return home.

Delirium is a geriatric syndrome, also known as acute confusional state, organic brain syndrome, postoperative or ICU psychosis and acute brain failure [1]. It is often the first sign of acute illness in the older person and constitutes a medical emergency. Delirium is characterized by acute onset of confusion, over hours or days, with fluctuating levels of consciousness, distractibility and inattention. It has many causes and is potentially reversible with early detection, multicomponent management strategies and direct treatment of underlying causes. Delirium is common, affecting 10–40% of medical inpatients, with increased prevalence in certain populations such as postoperative patients (30–50%), ICU (up to 80% in ventilated patients), oncology and palliative care units [2, 3]. The point prevalence of delirium in the community is 1.1% in those over 55 years, raising to over 14% in the over 85 age group, with a reported incidence in residential aged care facilities to be above 60% [4, 5]. Delayed diagnosis can have serious consequences such as increased length of hospital stays, increased mortality and increased risk of placement into residential care [6]. "The cost to the healthcare system is substantial. Estimated direct healthcare costs in the US are around US$ 150 billion per year (Leslie and Inouye), and in Australia costs exceed AU$ 150 million per year (AIHW)"

(Leslie DL, Inouye SK. The Importance of Delirium: Economic and Societal Costs. J Am Geriatr Soc. 2011; 59(Suppl 2): S241–S243. doi:10.1111/j.1532–5415.2011.03671.x. Australian Institute of Health and Welfare. Dementia in Australia. Canberra: Commonwealth of Australia, 2012).

5.1 Definition, Classification and Clinical Features

The definition of delirium, as described by The American Psychiatric Association in the fifth edition of the *Diagnostic and Statistical Manual*, DSM-V, is as follows [7]:

- A disturbance in attention and awareness. For example, reduced ability to direct, focus, sustain and shift attention.
- The disturbance develops over a short period of time (usually hours to days), represents a change from baseline and tends to fluctuate during the course of the day.
- There is an additional disturbance in cognition. For example, memory deficit, disorientation, language, visuospatial ability or perception.
- The disturbances are not better explained by another pre-existing, evolving or established neurocognitive disorder and do not occur in the context of a severely reduced level of arousal, such as coma.
- *There is evidence from the history, physical examination and laboratory findings that the disturbance is caused by a medical condition, substance intoxication or withdrawal or medication side effect.*

Delirium can be classified according to aetiology; however, it is more useful to classify delirium into three clinical subtypes [8–10]:

Classification according to aetiology:

1. Delirium according to a general medical condition
2. Substance intoxication delirium (drugs of abuse)
3. Substance withdrawal delirium
4. Substance-induced delirium (including prescription medication)
5. Delirium due to multiple aetiologies
6. Delirium not otherwise specified.

Classification according to subtype:

1. Hyperactive delirium (30%): patients present with increased agitation, repetitive behaviours, wandering, hallucinations or aggression. These patients are difficult to manage in the community and often require admission into hospital.
2. Hypoactive delirium (25%): patients present with reduced psychomotor activity, reduced levels or consciousness or appear quiet and withdrawn. Hypoactive delirium is more difficult to detect and are associated with poorer outcomes due to delays in diagnosis.
3. Mixed pattern delirium (45%): this is the most common clinical presentation. Patients present fluctuating behaviours and levels of consciousness, are drowsy and withdrawn at times and hyper alert at others. The hyperactivity often follows a "sun downing" pattern with aggressive behaviours and wandering more common in the later afternoon and evening.

Other clinical features associated with delirium can be seen in Table 5.1. Delirium is a clinical diagnosis; there is no single laboratory test or investigation that will confirm the presence of delirium. Careful attention must be given to obtaining a history from carers, family and other medical practitioners who may have been involved in the person's care. Delirium is often preceded by a prodromal illness of 1–3 day duration. Subsyndromal delirium resembles full delirium but with less

Table 5.1 Clinical features of delirium

Essential features	Variable features
Acute onset	Perceptual disturbance
Fluctuating course	Hyper/hypoactive
Inattention	Altered sleep/wake pattern
Disorganised thoughts/speech	Emotional disturbance
Fluctuating consciousness	
Confusion	
Potential examination signs	*Autonomic dysfunction*
Dysarthria	Tachycardia
Dysnomia	Hypertension
Dysgraphia	Sweating
Aphasia	Flushing
Nystagmus	Dilated pupils
Ataxia	
Tremor	
Myoclonus	

Adapted from: Inouye SK. Delirium in Older Persons. N Eng J Med 2006; 354 (11): 1157–1165

severity and has a core feature of inattention [11]. The patient may have subtle changes in personality or mood, become restless or appear anxious, develop urinary incontinence or act out of character (for instance, refuses to seek medical attention). This prodromal illness is often reported in hindsight by family or carers but can be very difficult to detect clinically.

5.2 Causality and Pathophysiology

The pathophysiology of delirium is poorly understood. Proposed mechanisms have included deficiency of acetylcholine, dopamine excess and other neurotransmitter changes, inflammatory processes, metabolic derangement, electrolyte disorders and genetic factors [12]. However, the hypothesis that uncompensated central anticholinergic activity can precipitate delirium is considered the most important. Raised levels of serum anticholinergic activity have been demonstrated in patients with postoperative delirium and are thought to be precipitated in response to acute physiological stress, fever, infection or medication. Patients, who are unable to compensate for the raise in anticholinergic activity in the brain, for example, those with underlying cognitive impairment or dementia, develop the clinical signs of delirium [13]. Reduction in serum anticholinergic activity has been demonstrated with resolving delirium symptoms. Neuroinflammation is also implicated in delirium, with elevated levels of interleukin-1B, and consequently, cortisol, found in the CSF of patient's post-surgery for hip fracture [14]. The inflammatory cascade is thought to disrupt the blood brain barrier, causing cytokine activation and neurotransmitter deregulation. This type of CNS insult may explain why not all episodes of delirium are fully reversible [15].

Delirium in the older person is often multifactorial (see Tables 5.2 and 5.3). A person is at risk when underlying cognitive impairment or dementia is present, or with increasing age, functional dependence, multiple comorbidities or multiple medications. When admitted to a hospital, patients at risk of delirium should be identified and multicomponent prevention strategies should be implemented (see Table 5.4). These strategies should focus particularly on hydration (oral, intravenous or subcutaneous fluids and assisted feeding programmes if necessary), correction of sensory impairment (visual aids, portable amplifying devices, modified equipment such as

Table 5.2 Common risk factors for delirium [16–19]

Non-correctable	Correctable	Potentially correctable
Age	Malnutrition	Uraemia. Blood urea >10
Male	Dehydration	Depression
MCI/Dementia	Low albumin	Acute CVA
Parkinson's disease	Social isolation	Prolonged hospital stay, >9 days
Renal and hepatic disease	Sleep deprivation	Severity of acute illness
History of CVA	Hospital environment	Urinary incontinence
History of falls and poor mobility	Physical restraint	
Previous episode of delirium	Indwelling medical devices (IDCs, cannulas)	
Previous functional dependency	New addition of three or more medications	
	Polypharmacy	
	Sensory impairment	

Table 5.3 Common precipitants of delirium [1, 10]

1. Medications: polypharmacy, addition of new medication, withdrawal of prescription medication, benzodiazepines, anticholinergics, OTC and herbal medications, substances of abuse
2. Alcohol intoxication or withdrawal, nicotine withdrawal [25]
3. Sepsis, systemic illness, hypotension
4. Hypoxia, hypothermia, hypoglycaemia
5. Dehydration, anaemia
6. Electrolyte disturbance (calcium, sodium, phosphate, magnesium)
7. Nutritional deficiencies (thiamine, B12, folate)
8. Acute liver or renal failure. Acute cardiac events have not been shown to be associated with delirium [15]
9. CVA, seizures, vasculitis, encephalitis, meningitis
10. Pain and analgesia
11. Constipation, urinary retention
12. Surgery, especially cardiac and orthopaedic. ICU admission and ventilation
13. Cancer and terminal illness, brain metastasis
14. Exposure to the unfamiliar hospital environment and multiple moves around the hospital [26]

Table 5.4 Prevention strategies [20–24]

Patient targeted:
• Correction of sensory impairment
• Hydration, nutrition
• Orientation to time, place, person (provide a clock)
• Monitor, investigate and treat pain, including the use of non-pharmacological pain management
• Enablement plans to maintain function and mobility
• Maintain continence with regular toileting, monitor bowels
• Avoid physical restraint and indwelling medical devices such as urinary catheters and intravenous cannulas
• Have awareness and respect for cultural and religious sensitivities
Environmental:
• Orientation to the hospital environment and reduce the number of room moves around the hospital
• Provide personal items (i.e. photographs) familiar to the patient
• Minimize noise
• Maintain sleep/wake cycle
Medication:
• Review medications and de-prescribe if possible
• Identify high-risk medication (such as benzodiazepines, anti-cholinergics)
• Monitor for potential medication withdrawal
Identify and treat reversible medical problems:
• Dehydration, malnutrition
• Electrolyte abnormalities
• Hypoxia, hypotension
• Renal impairment
• Urinary retention, constipation
• Depression, emotional distress
Education:
• Education across all staff to promote awareness and early detection of patients at risk
• Development of local best practice guidelines
• Identify "champions" to lead implementation of prevention strategies

large print information booklets), enablement and mobility, maintenance of the sleep/wake cycle (noise reduction, relaxation techniques), cognitive stimulation (communication boards, reorientation, cognitive stimulating activities such as word games or discussion of current events), medication (avoidance and review) and avoidance of unnecessary indwelling medical devices such as urinary catheters and intravenous cannulas [16]. Multicomponent intervention strategies are effective and have been shown to reduce incident delirium in hospitalized patients by 30% [22, 23], with similar results shown in patients offered with proactive comprehensive geriatric assessment [24].

5.3   Detection

Despite validated tools to detect delirium and more awareness of the syndrome, 30–67% of delirium in medical inpatients remains undetected, leading to potential complications and prolonged inpatient stays [9, 27]. Gold standard for diagnosis would be with comprehensive geriatric assessment and use of the DSM-V diagnostic criteria for delirium. However, this is time-consuming and not always practical in an acute setting. The Australian and New Zealand Society for Geriatric Medicine [28], the American Geriatrics Society [29] and the British Geriatric Society [30] all recommend the confusion assessment method (CAM, see Table 5.5) as a validated screening tool to detect delirium in elderly patients. The CAM, unlike the MMSE or clock-drawing test, was designed specifically to detect delirium and is user friendly but requires initial training. It has a pooled sensitivity of 82% in medical and postsurgical patients and a specificity of 99% [31]. The original CAM has also been adapted into over ten languages and validated for use in other settings [32], such as the CAM-ICU (for ventilated patients), CAM-ED, nursing home CAM and the family CAM for carers of elderly people living in the community [33]. Interestingly, reasonable sensitivity and specificity in detecting delirium have been obtained through simple screening questions aimed at family and carers. The single question in delirium [34], "Do you think [name] has been more confused recently?" demonstrated a sensitivity of 80% and specificity of 71% in small trials of oncology patients. It has potential as an initial screening tool, particularly in "time poor" environments such as the ED or GP surgery, but should be followed up with further screening and assessment if positive.

Table 5.5 Confusion assessment method

1. *Acute and fluctuating course*
• Is there a change in cognition from the baseline?
• Does this fluctuate during the day?
2. *Inattention*
• Does the patient have difficulty focusing attention?
• Do they seem distracted?
• Is concentration poor?
3. *Disorganized thinking*
• Does the patient have disorganized thinking, rambling speech, or are they incoherent?
4. *Altered level of consciousness*
• Is the patient hyperalert? (i.e. wandering, agitated, aggressive)
• Is the patient hypoalert? (i.e. drowsy, lethargic, stupor, coma)

Answer YES to questions 1 and 2, plus either 3 or 4 = indicates delirium
Adapted from: Inouye SK et al. Clarifying the confusion: the Confusion Assessment method. A new method for the detection of delirium. Ann Intern Med 1990; 113: 941

5.4 Differential Diagnosis: Delirium, Dementia and Depression

The clinical overlap between delirium, dementia and depression is complex and can present a diagnostic dilemma to the clinician. Forty-two percent of patients referred to specialist psychiatry services with suspected depression actually have delirium [35], with similar percentages of medical inpatients suffering from depression [36]. Like delirium, depression in the elderly is a common syndrome, with reported point prevalence of major depressive disorder over 9%, increasing to 37% when subthreshold or minor depressive symptoms are included [37]. In a similar way to delirium, risk of depression is increased with multiple comorbidities such as Parkinson's disease, cerebrovascular disease, cognitive impairment and dementia. Conversely, depression in later life doubles the risk of developing dementia [38]. The clinical features of all three overlap considerably, and a careful history must be obtained from family, carers and other medical practitioners to allow accurate diagnosis (see Table 5.6). The range of presenting features for all three conditions can include agitation, depressed mood, cognitive disturbance, anger, euphoria, hallucinations and delusions. In particular hypoactive delirium with psychomotor retardation can be extremely difficult to differentiate from a major depressive disorder. The rate of onset of symptoms and their pattern of fluctuation throughout the day can give a clue to their aetiology, with acute presentations and rapid fluctuations of symptoms more likely to indicate delirium as the primary diagnosis. Disturbances of mood are likely to be more sustained with depression. Once again, sleep disturbance can be a feature of delirium, depression and dementia, but whereas delirium and dementia can cause complete reversal of the sleep/wake cycle, depression tends to precipitate as initial or late-onset insomnia. Characteristics of psychosis also differ between the syndromes. Typical psychosis of delirium features simple delusions, often related to the environment (i.e. belief that nurses are poisoning them or that they are in prison, not hospital), and visual and tactile hallucinations such as insects on the skin. Psychosis in depression is more complex, often with its roots in reality, and featuring themes of guilt and worthlessness. Persistent thoughts of death and self-harm also occur in over 50% of patients with delirium and are not always a defining symptom of depression [35].

The clinical overlap between delirium and depression is unsurprising when you consider the pathophysiological pathways involved. Both delirium and depression are linked with alterations is neurotransmitters, abnormal inflammatory responses (as shown by inflammatory markers in the CSF) and abnormal response to acetylcholine activity [38]. In addition, high levels of plasma cortisol, and the failure of dexamethasone to suppress endogenous cortisol production, occur in delirium, depression and severe dementia [39] and may represent a prolonged stress response in these syndromes.

Of course, these conditions do not occur in isolation, and it is quite likely that a majority of patients are suffering from coexistent conditions. Both delirium and depression are potentially reversible, and some patients may benefit from treatment of both disorders. If pharmacotherapy for mood disorder is required, antidepressants with high anticholinergic burden should be avoided, so as to not exacerbate the symptoms of delirium. Although there are case reports in the literature of ECT use

Table 5.6 Delirium, dementia and depression

	Delirium	Dementia	Depression
Onset	Acute	Insidious	Variable, insidious
Course	Fluctuating	Progressive	Diurnal variation
		Increased agitation in evenings	
		(sundowning)	
Consciousness	Clouded	Clear	Clear
	Lethargic, stupor, coma	May become clouded in later stages	
Attention	Distractibility	Normal	May be poor
	Inattention		
Memory	Poor STM	Poor STM	STM usually normal
		Variable cognitive deficits depending on pathology of dementia	
Thinking	Disorganised, incoherent	Difficulty with abstract thought	Intact
			May have thoughts of low worth, guilt or
			hopelessness
Perception	Misinterpretation	Hallucinations and delusions more	Complex delusion
	Simple hallucination/ delusions	common in later stages, or with	Paranoid psychosis
		Lewy body pathology	
Sleep pattern	Reversal of sleep/ wake cycle	More common in later stages	Initial or late onset insomnia
		reversal of sleep/wake cycle	
Cognitive testing	Distracted	Attempts to comply and find answers	Poor motivation
	Unable to complete MMSE		"I don't know"
Physical symptoms	May indicate underlying cause	Non-specific	Fatigue, poor appetite, weight loss
		In later stages, fatigue, weight loss,	
		anorexia	

Adapted from: Milisen K, Braes T, Fick DM, Foreman MD. Cognitive assessment and differentiating the 3 Ds (dementia, depression, delirium). Nurs Clin North Am 2006; 41: 1–22

in delirium, routine use cannot be recommended due to insufficient evidence. It does, however, remain a treatment option for treatment-resistant depression [40]. Coexistence of delirium and depression has a significant impact on prognosis and care needs, with a fivefold increase in mortality and nursing home placement and a threefold risk of functional decline at 1 month post discharge, when compared to either syndrome in isolation [41].

5.5   Investigation and Non-pharmacological Management

Extra attention should be given to identifying all potential causes of delirium (see Table 5.3), and targeted treatment should be given to any reversible causes. A comprehensive history from family, carers and the general practitioner should be obtained as soon as possible and should include details on the patient's baseline function and cognition, including any previous formal cognitive testing. A full medication review, aimed at rationalization and de-prescribing, should be performed on all patients. Baseline observations, such as pulse, BP, oximetry, BSL, ECG and urinalysis, should also be performed in all patients, with further investigation targeted to any suspected causes. Routine workup also includes full blood count, electrolytes and renal function, calcium, thyroid function, urine culture, liver function tests and chest X-ray (see Fig. 5.1). A CT brain is strongly indicated where there are focal neurological findings, a history of falls, anticoagulation or signs of meningism. Consideration should be given to a subsequent MRI brain in patients with prolonged delirium (and no obvious precipitant), a history of cancer and suspected cerebral metastasis or focal neurological signs [28]. A lumbar puncture is indicated in patients with headache, signs of meningism or pyrexia of unknown origin. It is worth remembering that older people often do not present with the classical symptoms of meningitis or encephalitis, and acute confusion may be the only presenting symptom. Clinicians should weigh up the indications for lumbar puncture, with the risk and benefit to the patient, bearing in mind that delayed investigation will reduce the likelihood of accurate diagnosis [42]. Routine EEGs are not recommended and have a low accuracy for detecting delirium in the elderly but may be useful in diagnosing suspected seizure disorders causing delirium. In the delirious patient, EEGs show non-specific findings of global slowing, loss of posterior background rhythm and intermittent delta activity, particularly in the frontal region. However, these findings may be useful in differentiating patients with delirium superimposed on dementia and those with dementia alone, where positive EEG findings are not seen [43]. It may also assist in differentiating non-convulsive status epilepticus from catatonic depressive episodes, which may clinically resemble hypoactive delirium [44].

First-line treatment of the symptoms of delirium should be with multicomponent management plans (see Fig. 5.2) along similar lines to prevention strategies. Whereas prevention strategies have shown a reduction in delirium incidence in several clinical trials, once delirium develops, intervention programmes are less effective. Study results have been varied. Some have shown improvement in the severity of delirium symptoms after nurse-led comprehensive delirium programmes [45, 46] and a reduction in falls and trend towards a reduced length of stay [47], but others have failed to show a reduction in hospital mortality, 6-month mortality and admission into residential care [48, 49], nor have they shown an impact on the frequency or recurrence of delirium [20, 21]. Positive outcomes and reductions in mortality have been seen, however, in specialized units such as close observation units [50] (designated areas on general medical wards, with increased nurse-to-patient ratios and comprehensive management programmes), orthogeriatric units

**ELDERLY PATIENTS WITH CONFUSION SHOULD BE PRESUMED TO HAVE
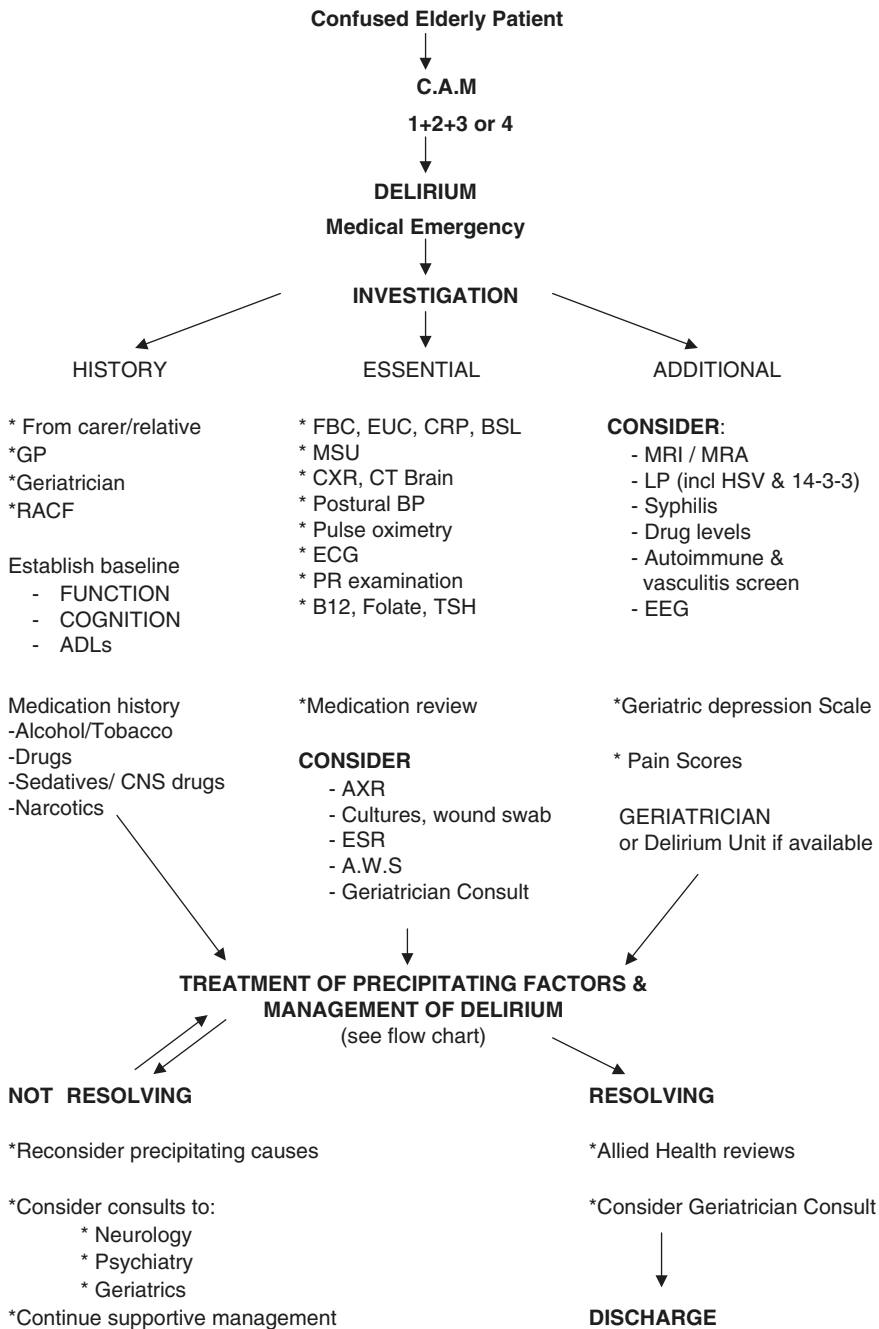DELIRIUM UNTIL PROVEN OTHERWISE**

Confused Elderly Patient

↓

C.A.M

1+2+3 or 4

↓

DELIRIUM

Medical Emergency

↓

INVESTIGATION

↓

HISTORY   ESSENTIAL   ADDITIONAL

* From carer/relative   * FBC, EUC, CRP, BSL   **CONSIDER**:
*GP   * MSU   - MRI / MRA
*Geriatrician   * CXR, CT Brain   - LP (incl HSV & 14-3-3)
*RACF   * Postural BP   - Syphilis
                               * Pulse oximetry   - Drug levels
Establish baseline   * ECG   - Autoimmune &
   - FUNCTION   * PR examination   vasculitis screen
   - COGNITION   * B12, Folate, TSH   - EEG
   - ADLs

Medication history   *Medication review   *Geriatric depression Scale
-Alcohol/Tobacco
-Drugs   **CONSIDER**   * Pain Scores
-Sedatives/ CNS drugs   - AXR
-Narcotics   - Cultures, wound swab   GERIATRICIAN
                                 - ESR   or Delirium Unit if available
                                 - A.W.S
                                 - Geriatrician Consult

**TREATMENT OF PRECIPITATING FACTORS &
MANAGEMENT OF DELIRIUM**
(see flow chart)

NOT RESOLVING   RESOLVING

*Reconsider precipitating causes   *Allied Health reviews

*Consider consults to: *Consider Geriatrician Consult
        * Neurology
        * Psychiatry
        * Geriatrics   ↓
*Continue supportive management   **DISCHARGE**

Fig. 5.1   Delirium investigation flow chart

**ELDERLY PATIENTS WITH CONFUSION SHOULD BE PRESUMED TO HAVE
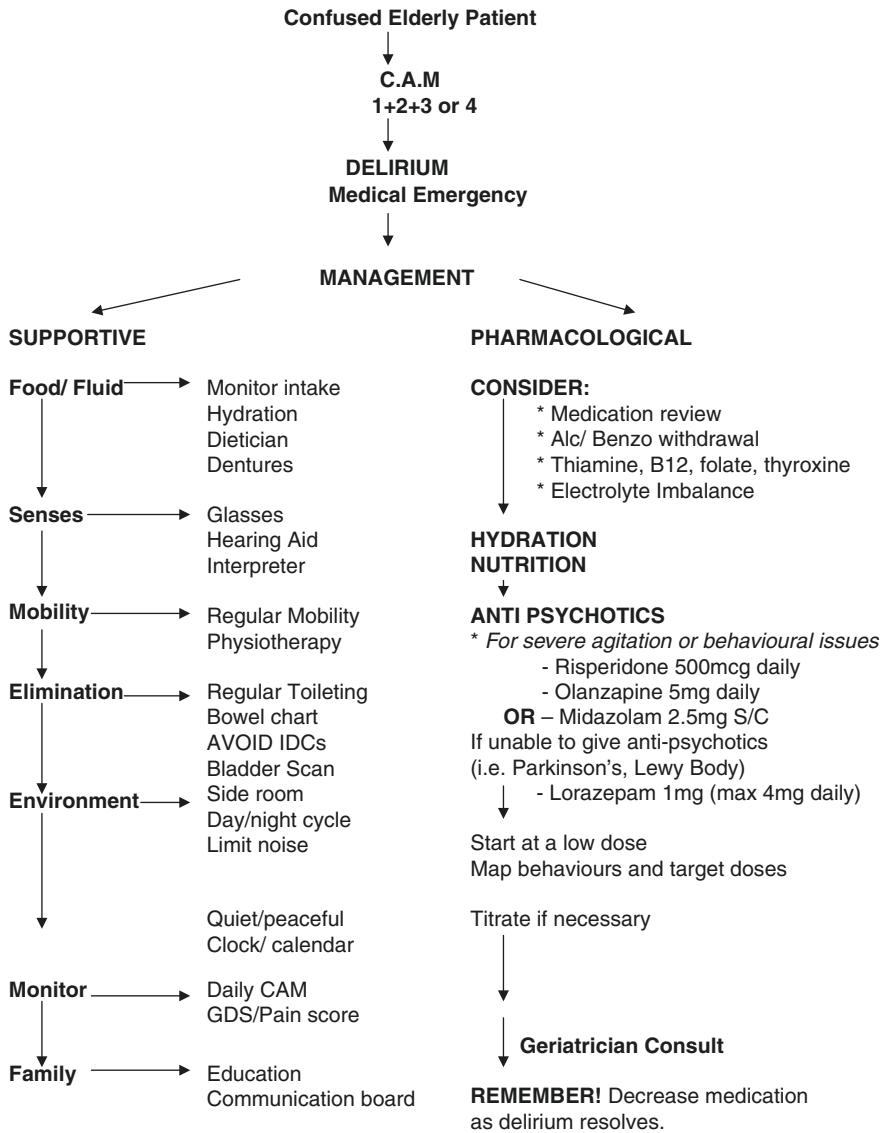DELIRIUM UNTIL PROVEN OTHERWISE**

Confused Elderly Patient

↓

**C.A.M
1+2+3 or 4**

↓

**DELIRIUM
Medical Emergency**

↓

MANAGEMENT

SUPPORTIVE   **PHARMACOLOGICAL**

Food/ Fluid → Monitor intake   **CONSIDER:**
Hydration   * Medication review
Dietician   * Alc/ Benzo withdrawal
Dentures   * Thiamine, B12, folate, thyroxine
                                                           * Electrolyte Imbalance

Senses → Glasses   **HYDRATION**
Hearing Aid   **NUTRITION**
Interpreter   ↓

Mobility → Regular Mobility   **ANTI PSYCHOTICS**
Physiotherapy   * *For severe agitation or behavioural issues*
                                                                - Risperidone 500mcg daily
Elimination → Regular Toileting   - Olanzapine 5mg daily
Bowel chart   **OR** – Midazolam 2.5mg S/C
AVOID IDCs   If unable to give anti-psychotics
Bladder Scan   (i.e. Parkinson's, Lewy Body)
Environment → Side room   - Lorazepam 1mg (max 4mg daily)
Day/night cycle
Limit noise   Start at a low dose
                                                        Map behaviours and target doses

Quiet/peaceful   Titrate if necessary
Clock/ calendar

Monitor → Daily CAM
GDS/Pain score

Family → Education   **Geriatrician Consult**
Communication board
                                                        REMEMBER! Decrease medication
                                                        as delirium resolves.

Fig. 5.2 Delirium management flow chart

and joint medical and mental health units [51]. Despite a need for investment to
develop such units, they have been shown to be cost-effective and have significant
impact on improving patient experience, carer satisfaction and improving staff atti-
tudes [52].

5.6   **Pharmacological Management** (See Fig. 5.2)

Pharmacological management of the symptoms of delirium is a controversial but widely adopted practice. Sedative medication, such as benzodiazepines and antipsychotics, are the most commonly prescribed medication and are associated with significant risk to the older person. There are no medications licensed specifically for use in delirium, and none have been shown to reduce the severity, length or recurrence of delirium. Sedative medication should be reserved for patients with severe agitation or aggression, distressing hallucinations or delusions or whose behavioural disturbances pose a risk to themselves or others. Patients with hypoactive delirium should not be prescribed sedative or antipsychotic medication. Traditionally haloperidol has been the agent of choice [53], based on the lack of alternative trial data with second-generation antipsychotics (such as quetiapine, olanzapine or risperidone), rather than a substantial base of evidence supporting its efficacy. Haloperidol has poor sedative properties at low doses, and a previous publication from the *Cochrane Database for Systematic Reviews* found that higher doses of haloperidol are associated with higher risk of extrapyramidal side effects when compared to olanzapine and risperidone [54] and found there was a lack of robust trial data to support its use. A more recent meta-analysis [55] supported these findings, showing that second-generation antipsychotics are associated with a shorter time to respond and a lower incidence of extrapyramidal side effects when compared to haloperidol. Current clinical guidelines *do not* recommend the use of haloperidol for either prevention or management of delirium in the older person [56]. What's more, the use of haloperidol has been associated with a 5% increase in risk of developing delirium in ICU patients [57]. However, second-generation antipsychotics are not without their risks and poor prescribing can lead to over-sedation, falls, urinary incontinence and hospital-acquired pneumonia and is associated with an increased mortality in patients with underlying dementia [58].

Shorter-acting benzodiazepines, such as lorazepam, oxazepam or midazolam, are proven treatments for alcohol withdrawal delirium [59] and may have a role for patients in whom antipsychotic medication is contraindicated (e.g. Parkinson's disease and Lewy body dementia). Once again utmost caution should be taken when prescribing benzodiazepines as risks include severe sedation, falls, urinary incontinence, hospital-acquired pneumonia and worsening delirium [60]. Despite the theory that there is disruption of cholinergic activity in the brain during delirium, there is no evidence that acetylcholinesterase inhibitors have any role in the treatment of delirium, and their use cannot be supported [61, 62]. Other therapeutics which have failed to show convincing results in small population (<100 participants) clinical trials include melatonin agonists [63] and mood stabilizers [64], and their use cannot be recommended in delirium.

When choosing to use pharmacological treatments for delirium, the following prescribing principles should be considered:

- Reserve sedative and antipsychotic medication for patients with severe agitation, aggression or severe behavioural disturbance causing a risk to themselves or others.
- Start with a low dose of the appropriate medication and titrate as necessary.
- Do not use multiple agents; this increases the patient's risk of over-sedation and associated complications.

- Map the patient's behaviour and response to medication using a behavioural mapping tool. Time medication to target increases in behaviours such as sundowning.
- Medications are best used in supervised environments such as acute care, residential facilities or with carer supervision in the community.
- Reduce and stop the medication as soon as possible. Over 60% of elderly patients with delirium are inappropriately continued on antipsychotic medication after a period of in-hospital delirium [65].

5.7 Special Circumstances

5.7.1 Postoperative Delirium

Postoperative delirium is the most common postoperative complication affecting older people, with detection rates up to 50% [66]. Risk factors for postoperative delirium include advancing age, past history of delirium, cognitive decline or dementia, sensory impairment, lower perioperative haemoglobin, open surgery (versus laparoscopic procedures), emergency procedures (versus planned procedures), longer times under anaesthetic and preoperative use of benzodiazepines [67–69]. Postoperative delirium is associated with increased stay in the ICU (2 days longer) and length of stay in the hospital (7.7 days longer) [67]. There is also an association between postoperative delirium and in-hospital falls, increased need for physiotherapy and functional decline resulting in discharge into residential facilities or discharge with home care services [70, 71]. Once again, postoperative delirium is preventable. Risk screening should occur at perioperative assessment if possible, with baseline cognitive screening and use of validated screening tools. Multicomponent prevention and management strategies should be in place on the surgical wards as previously documented. Reducing the depth of anaesthesia may reduce the risk of postoperative delirium, as demonstrated in three small, nonrandomized clinical trials [72–74], but evidence is not robust enough for the American Geriatrics Society to recommend this as routine practice [75]. Adequate postoperative analgesia, including the use of regional anaesthesia for certain procedures such as knee replacement surgery [76], has been shown to reduce the incidence of delirium. As with other clinical settings, sedative medication and antipsychotics should be used with extreme caution and reserved for patients with severe and distressing agitation. There is insufficient evidence to recommend the routine use of antipsychotics to prevent postoperative delirium [75, 77, 78].

5.7.2 The Intensive Care Unit

Delirium is endemic in the ICU, occurring in 30–60% of patients with critical illness, with up to 80% of mechanically ventilated patients experiencing one episode of delirium during their stay [79]. The CAM-ICU was adapted to detect delirium specifically in ICU patients and has a sensitivity of 95% and specificity of 89%,

making it as validated tool for delirium detection in the ICU [80]. Adaption of multicomponent delirium prevention strategies can be difficult in the ICU environment; however basic steps can be implemented and have been shown to reduce the incidence of ICU delirium. Strategies include structured education to improve detection [81], early mobilization, reorientation, communication boards, exposure to natural light and medication de-prescribing [82–84]. More recent studies have found prophylactic use of dexmedetomidine is associated with a reduction in delirium prevalence and severity [85]. Dexmedetomidine is a sedative with analgesic and anxiolytic properties and a short half-life (<2 h) that allows mild sedation with less risk of respiratory depression when compared with benzodiazepines. Prevention of delirium in the ICU is critical, as its presence is associated with increased length of stay in the unit and is an independent risk factor for in-hospital mortality and mortality at 6 months, even after controlling for the severity of illness precipitating the delirium [86–88].

5.7.3   The Emergency Department

Delirium is evident in up to 17% of older people upon presentation to the ED [89]. Given the dramatic increase in delirium (up to 50% of patients) on medical and surgical wards, it seems prudent to begin delirium screening and prevention in the emergency department in an attempt to reduce overall hospital incidence. Delirium is missed by ED physicians in over 80% of cases [90], and many patients with undiagnosed delirium are discharged from the ED leading to a threefold increase in mortality at 3 months [91]. All elderly patients presenting to ED should be screened for delirium and potential risk factors, using a validated tool such as the ED-CAM. Prevention strategies should focus on orientation, sensory improvement, pain control, mobilization, avoidance of indwelling devices such as urinary catheters and cannulas, rehydration, avoidance of physical restraints, de-prescribing and avoidance of medication that may precipitate delirium [92]. Environmental strategies may be useful to reduce the noisy, crowded and often threatening emergency department environment. Although they are often perceived as too difficult to implement in the ED, simple environmental strategies can reduce the poor outcomes associated with persistent delirium during hospitalization [93].

5.7.4   Palliative Care

Delirium is highly prevalent in palliative care settings, with up to 88% of patients experiencing delirium in the last few days or hours of their life [94]. Symptoms, particularly those of hyperactive delirium, can be distressing for not only the patients but their family, carers and healthcare staff, who are attempting to facilitate end-of-life comfort care [95]. Up to 50% of delirium episodes in palliative care settings are reversible [96]; however the decision whether to investigate and treat precipitating causes will depend on the patient's prognosis and goals of care. Drug-induced

delirium is common due to the increased use of opiates, benzodiazepines, anticholinergics, corticosteroids and antipsychotic medication and may be easily reversible with medication rationalization and opioid rotation for pain relief; however sedation is frequently required for distressing symptoms in the terminal stages [97]. As with other clinical settings, non-pharmacological multicomponent prevention and management strategies remain first-line management but are often underutilized [98].

5.8 The Community and Residential Facilities

Few rigorous studies exist that examine delirium in the community and the potential impact of multicomponent prevention strategies in these settings. Population studies estimate that up to 20% of older people over 85 years will have delirium at any one time, with the prevalence increasing with age [99], and in patients with coexistent vascular dementia or Lewy body dementia [100]. Residents of long-term care facilities are at significant risk of developing delirium due to the high frequency of comorbid conditions and coexistent dementia seen in this population, and they are also at risk of inappropriate prescribing of sedative and antipsychotic medication. Multicomponent prevention and management strategies, in particular medication rationalization and environmental modification, have been shown to reduce delirium severity and decrease the risk of hospitalization in small studies, but further research is needed [101, 102]. Further evaluation is also required to investigate the role of the hospital in the home programmes and the community geriatrician in the management of delirium in these settings.

Conclusion

Delirium has serious consequences for the patient, carers, family and to the healthcare system. Not only are there ongoing physical manifestations in terms of cognitive and functional decline and increased mortality, as described in the chapter, the psychological impacts of delirium are increasingly recognized. It is reported that up to 50% of patients remember their confusion and feelings of fear, anxiety and distress experienced during a delirium episode [103] and that postoperative delirium is an independent risk factor for post-traumatic stress disorder 3 months after surgery [104]. Family, carers and staff experience levels of stress and anxiety when caring for patients with delirium, particularly in palliative care settings. Clinicians should continue to strive for best practice care in their clinical setting including establishing staff education programmes and implementing multicomponent prevention and management strategies such as the Agency for Clinical Innovation Confused Hospitalised Older Persons (CHOPS) programme [105]. With the take home message that "Prevention is better than cure", delirium screening and prevention strategies need to start at the front door of the hospital, be present throughout the patient's journey and continued in the community.

5.9   The Case Follow-Up

Unfortunately 12 months later, he remains cognitively impaired, scoring 22/30 in his MMSE and 65/100 in his Addenbrooke's Cognitive Examination, leading to an underlying diagnosis of Alzheimer's dementia and a trial of cholinesterase inhibitors.

This case highlights how delirium could have been prevented on an acute surgical ward. Mr. R showed clear signs of subsyndromal delirium, but this was not detected by the clinical staff. Nor was appropriate delirium risk screening in place on his admission through the emergency department. Fortunately Mr. R responded well to pharmacological and non-pharmacological management, many of the strategies were nurse initiated, and ward staff were able to individualize the management plan to Mr. R's needs. However, this episode of delirium left him and his family, with the psychological distress of his delirium and placement into a residential facility. The effects were persistent at 12 months, and although he could return home, he was no longer able to drive and the family required extra assistance from home care providers.

Glossary

ADLs	Activities of daily living
BP	Blood pressure
BSL	Blood sugar level
CAM	Confusion assessment method
CNS	Central nervous system
CRP	C-reactive protein
CT	Computerized tomography
CVA	Cerebrovascular accident
CXR	Chest X-ray
ECG	Electrocardiogram
ECT	Electroconvulsive therapy
ED	Emergency department
EEG	Electroencephalogram
EUC	Electrolytes, urea and creatinine
FBC	Full blood count
GP	General practitioner
ICU	Intensive care unit
IDC	Indwelling catheter
LFT	Liver function tests
LP	Lumbar puncture
MCI	Mild cognitive impairment
MMSE	Mini Mental State Examination

MRI   Magnetic resonance imaging
OTC   Over the counter
STM   Short-term memory
TSH   Thyroid stimulating hormone

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