Clinical Practice Guidelines for the Management of Delirium in Older People

Developed by the Clinical Epidemiology and Health Service Evaluation Unit, Melbourne Health in collaboration with the Delirium Clinical Guidelines Expert Working Group. Commissioned on behalf of the Australian Health Ministers' Advisory Council (AHMAC), by the AHMAC Health Care of Older Australians Standing Committee (HCOASC).

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Disclaimer

Clinical practice guidelines are just one element of good health care decision making, which also takes into account patient/resident preferences and values, clinician values and experience, and the availability of resources.

These guidelines are not a definitive statement, but rather constitute a general guide to be considered in preventing functional decline in older people. Some flexibility will be required to adapt these guidelines to specific settings, local circumstances and individual patient/ resident needs.

Every attempt was made to ensure the accuracy of the contents of these guidelines at the time of publication. In addition, the authors have made every effort to identify all the current, relevant guidelines, systematic reviews and randomised controlled trials. However, the authors acknowledge they might not have identified some relevant literature.

The Clinical Epidemiology and Health Service Evaluation Unit or any person who has contributed to the guidelines development do not accept liability or responsibility for any loss damage, injury or expense arising from any errors of omission in the contents of these guidelines.

Contents

Glossary of terms

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Clinical Practice Guidelines or Best Practice Guidelines

Systematically developed statements (based on best available evidence) to assist practitioner and client decisions about appropriate healthcare for specific clinical (practice) circumstances [1].

Comprehensive Medical Assessment

An Enhanced Primary Care item allowing a full systems review of aged care residents, including assessment of the resident's health and physical and psychological functioning [2].

Delirium

Disturbance of consciousness, attention, cognition and perception that develops over a short period of time (usually hours or days) and tends to fluctuate during the course of the day.

Enhanced Primary Care

A group of Medicare items for the purposes of developing care plans and conducting health assessments and case conferences in primary care [2].

Health Assessment

Enhanced Primary Care items allowing for an annual assessment of community-dwelling persons' health and physical and psychological functioning (aged 75 and over or Aboriginal and Torres Strait Islander aged 55 and over) [2].

Health care setting

Throughout this document this term refers to the acute-aged care interface, residential care and community based aged care.

Hyperactive delirium

Subtype of delirium described as agitated or hyperalert [3].

Hypoactive delirium

Subtype of delirium described as lethargic or hypoalert [3].

Incidence rate

Number of new cases of delirium during a given time out of the total number of patients who were at risk at the commencement of the study. For studies measuring the incidence of delirium, it does not include the subjects with delirium at the start of the study, but those that develop delirium during the study period.

Incident delirium

This term is used to describe delirium that developed during the course of the study or during the hospital admission, that was not present on admission or when the patient entered the study.

Older person/people

General Australian population aged 65 years and over, and the Aboriginal and Torres Strait Islander population aged 45 years and over.

Patient sitter/support person

A person (volunteer or paid), with training in the care of people with delirium, whose role is to provide information and physical and emotional assistance to people with delirium and their family/carer(s).

Precipitating factors

The acute and noxious insults experienced by an older person such as infection or surgery.

Predisposing factors

The baseline older person vulnerabilities such as pre-existing dementia.

Prevalence rate

Proportion of cases of delirium at a particular point in time. For example number of cases with delirium at admission to hospital.

Prevalent delirium

This term is used to describe delirium cases that are present when the patient is first assessed for eligibility into the study or on admission to hospital.

Psychogeriatrician

Psychiatrist with specialist training and expertise in the care of older people.

Risk prediction model

A standardised way in which to assess and stratify risk of incident delirium. These models may also be used to predict other clinical outcomes such as length of stay.

Subsyndromal delirium

When patients manifest subclinical delirium or prodromal symptoms in the days before the onset of overt delirium [3]; or when patients manifest delirium symptoms but do not meet the Diagnostic Statistical Manual of mental disorders version IV criteria for diagnosis of delirium.

Systematic review

The process of systematically locating, appraising and synthesising evidence for scientific studies in order to obtain a reliable overview [4].

Well conducted study

The study methodology used met all or most of the criteria of the relevant Scottish Intercollegiate Guidelines Network (SIGN) Methodology Checklist. Where the criteria have not been fulfilled the conclusions of the study or review are thought very unlikely to alter [5].

Abbreviations used in the guidelines

ADL	Activities of daily living
AHMAC	Australian Health Ministers' Advisory Council
AGREE	Appraisal of Guidelines for Research and Evaluation
ASGM	Australian Society for Geriatric Medicine
AMT	Abbreviated Mental Test
APA	American Psychiatric Association
ATSI	Aboriginal and Torres Strait Islander
BGS	British Geriatric Society
CABG	Coronary artery bypass graft
CALD	Culturally and linguistically diverse
CAM	Confusion Assessment Method
CAM-ICU	Confusion Assessment Method – Intensive care unit
CMA	Comprehensive Medical Assessment
COAWG	Care of Older Australians Working Group
CT	Computerised tomography
DRS	Delirium Rating Scale
DSI	Delirium Severity Index
DSM-IV	Diagnostic Statistical Manual of mental disorders version IV
ECG	Electrocardiogram
EEG	Electroencephalogram
EPC	Enhanced Primary Care
GP	General practitioner
HCOASC	Health Care of Older Australians Standing Committee
HELP	Hospital Elder Life Program
ICU	Intensive care unit
MMSE	Mini Mental State Examination
MSU	Midstream specimen of urine
NHMRC	National Health and Medical Research Council
OMC	Orientation-Memory-Concentration test
POD	Post operative delirium
RCT	Randomised controlled trial
REVIVE	Recruitment of Volunteers to Improve Vitality in the Elderly
RNAO	Registered Nursing Association of Ontario
SIGN	Scottish Intercollegiate Guidelines Network
SR	Systematic review

Introduction

Introduction

The project to develop *Clinical Practice Guidelines for the Management of Delirium in Older People* was an initiative of the Australian Health Ministers' Advisory Council's (AHMAC) Health Care of Older Australians Standing Committee (HCOASC) (formerly known as Care of Older Australians Working Group, COAWG), and the Australian Department of Health and Ageing. Although delirium guidelines had already been developed in some local health settings (especially hospitals) across Australia, the current project was intended to establish the first set of national clinical practice guidelines for the management of delirium in older people – specifically for the Australian health care environment.

The project developed the following three evidence based documents, which are intended to be used in conjunction with each other:

- Quick reference guide for the delirium guidelines
- Clinical practice guidelines for the management of delirium in older people and
- Consumer brochure for people with delirium, their families and carers.

A *Useful resources* section containing related publications and websites, and consumer information has also been provided in this document.

Purpose of the guidelines

These guidelines were developed to provide a series of recommendations to guide clinical assessment and management of delirium in older Australians in hospital and across health care settings. Throughout these guidelines the term 'health care settings' refers to the acute-aged care interface, residential care and community based aged care. The guidelines focus on preventing delirium in at risk older people and on identifying and defining appropriate health service provision and management options in order to achieve best possible health outcomes.

Target population

The target population is older people receiving care aged 65 years or older, or in the case of Aboriginal and Torres Strait Islander (ATSI) people, 45 years or older.

This includes those receiving care in:

- The hospital setting, both acute and subacute
- The community care setting (people managed by their general practitioner and/or community care programs) and
- The residential care setting.

Guidelines for the management of delirium tremens (alcohol withdrawal delirium) and terminal delirium (delirium in people receiving palliative care) were beyond the scope of the current project. Guidelines exist for the management of these syndromes – refer to the *Useful resources* section of this document for details.

Who these guidelines are intended for

The target audience for the guidelines includes health care workers in the acute, subacute, residential care and community care settings. They are aimed at medical, nursing, allied health, and residential and community care workers across different geographical locations of Australia.

Clinical questions covered by the guidelines

The following questions were used to inform development of guideline recommendations:

Question 1: What are the performance attributes of diagnostic instruments used for diagnosing delirium in older people receiving care?

Question 2: What are the performance attributes of screening instruments used for the monitoring and detection of delirium in older people receiving care?

Question 3: What are the risk factors that contribute to the development of delirium in older people receiving care (in the community, hospital setting and residential care)?

Question 4: What are the performance attributes of risk factor screening or risk factor assessment tools (predictive risk models) that are currently used to identify and/or stratify older people at risk of developing delirium?

Question 5: Are there effective non-pharmacological and pharmacological prevention strategies that reduce the incidence of delirium among older people receiving care?

Question 6: Are there effective non-pharmacological and pharmacological interventions for the treatment and management of older people with delirium receiving care?

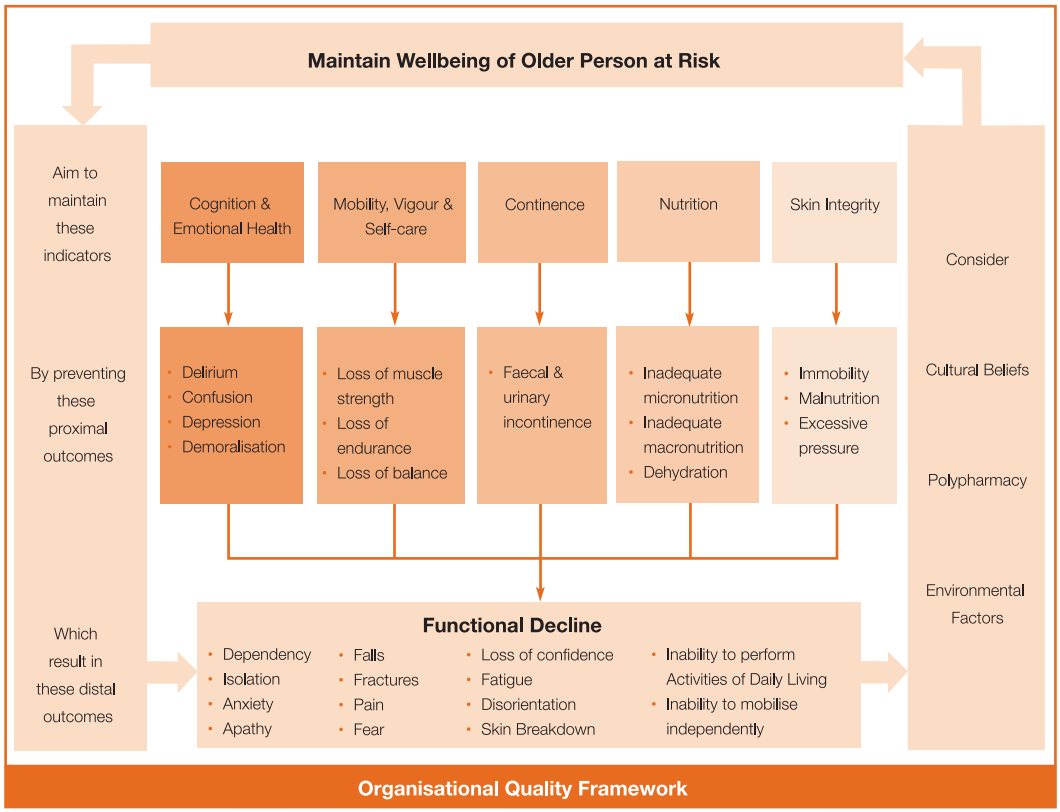
Question 7: Are there effective non-pharmacological and pharmacological interventions that reduce the risk of future episodes in older people who have experienced delirium?

Refer to *Appendix 1* for information on the types of studies, participants, interventions and outcome measures that were included in the literature search and review.

Model of care

These guidelines are intended to be viewed as part of a broader framework of health care for older people in the hospital, residential care and community care settings (see Figure 1). This framework has been described in the *Best practice approaches to minimise functional decline in the older person across the acute, sub-acute and residential aged care settings* [6] and one of its aims was to maintain cognitive and emotional state, and prevent delirium.

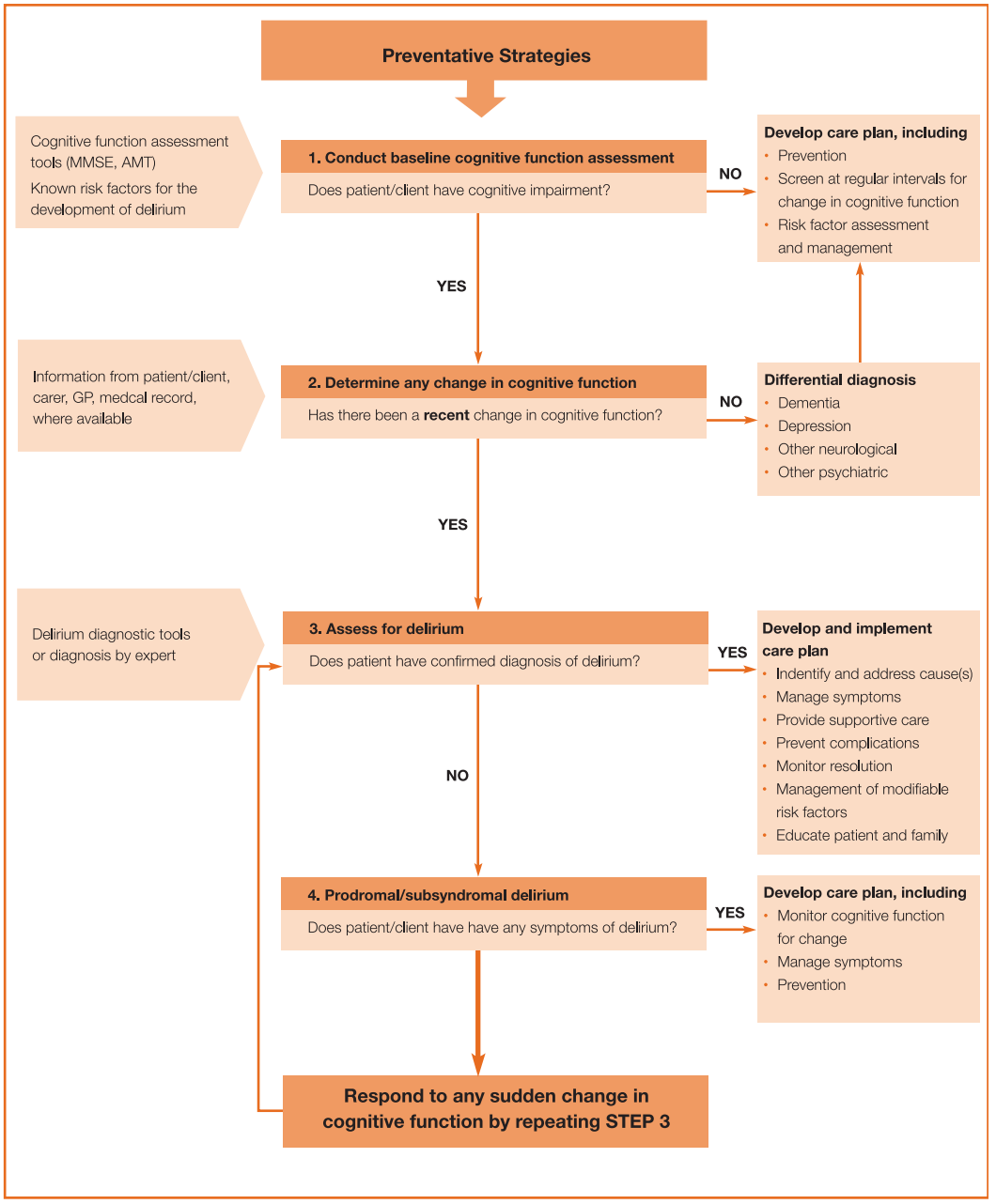
Figure 1 – Framework for the prevention of functional decline[1]



[1] *Reproduced from AHMAC publication Best practice approaches to minimise functional decline in the older person across the acute, sub-acute and residential aged care settings [1].*

The model of care outlined below (Figure 2) was developed to reflect a comprehensive approach to the prevention and management of delirium. The model of care reinforces the importance of the immediate and ongoing need for delirium preventative strategies. All management of the older person should be conducted within a context of delirium prevention.

Figure 2 – Model for the prevention and management of delirium in older people receiving care



Other publications

To date, evidence based guidelines for the management of delirium for older people have not been developed at a national, multidisciplinary level in Australia, and the existing international guidelines do not cover the scope of delirium care covered in these guidelines (that is beyond the acute hospital setting and beyond the management of delirium symptoms). The Australian Society for Geriatric Medicine (ASGM) has published a position statement for 'Delirium in Older People' [7]. Internationally a number of guidelines exist including:

- The British Geriatric Society 'Guidelines for the prevention, diagnosis and management of delirium in older people in hospital' [8]
- The American Psychiatric Association 'Practice Guideline for the Treatment of Patients with Delirium' [3] and
- Cook IA 'Guideline Watch: Practice guideline for the treatment of patients with delirium' [9].

In addition, the following AHMAC (COAWG) publications may be used in conjunction with this document:

- Best practice approaches to minimise functional decline in the older person across the acute, sub-acute and residential aged care settings [6].
- A guide for assessing older people in hospitals [10].

Development of the guidelines

Development of the guidelines was undertaken by a multidisciplinary expert working group of clinicians, academics, and consumer representation (see *Appendix 2* for membership details of the Delirium Clinical Guidelines Expert Working Group). Additional input was provided by the funding-body appointed Steering Group, which was also responsible for the governance of this project (see *Appendix 2* for membership details). *Appendix 1* provides details of the consumer groups and individuals involved in providing input into the development of the guidelines and consumer brochure, including those involved in the external review process.

Research findings and levels of evidence

These guidelines are based on a comprehensive structured review of the evidence to answer the specified clinical questions pertaining to prevention, recognition, diagnosis, treatment and risk factor assessment of delirium in older people (see *Clinical questions covered by the guidelines* in this section). Details of the literature search methods have been provided in *Appendix 1*. Where high-level evidence was not available from the literature, recommendations were established based on the consensus opinion of the expert working group. Consensus expert opinion was reached by an iterative process involving development and review of the draft recommendations using teleconferences, email circulation, and face-to-face meetings.

The literature and recommendations have been summarised using the National Health and Medical Research Council's (NHMRC) additional levels of evidence and grades for recommendations for developers of guidelines (pilot program 2005-2006)[2]. The NHMRC levels of evidence for the following

[2] *NHMRC additional levels of evidence and grades for recommendations for developers of guidelines. Pilot program 2005-2006. Accessed online 22 May 2006 at: www.nhmrc.gov.au/consult/docfeedback.htm*

study types were used: intervention; diagnosis; prediction and aetiology. See Table 1 for level of evidence definitions, and Table 2 and Table 3 for grade of recommendation definitions.

In addition, references have been provided for each recommendation, full details of which can be found in the *References* section at the end of this document.

Table 1 – Designations of levels of evidence according to type of research question

Level	Intervention	Diagnosis	Prediction and prognosis	Aetiology and risk factors
I	A systematic review of Level II studies	A systematic review of Level II studies	A systematic review of Level II studies	A systematic review of Level II studies
II	A randomised controlled trial	A study of test accuracy with: an independent, blinded comparison with a valid reference standard, among consecutive patients with a defined clinical presentation	A prospective cohort study – at study inception the cohort is either non-diseased or all at the same stage of the disease	A prospective cohort study
III-1	A pseudo-randomised controlled trial (ie: alternate allocation or some other method)	A study of test accuracy with: an independent blinded comparison with a valid reference standard, among non-consecutive patients with a defined clinical presentation	All or none of the people with the risk factor(s) experience the outcome	All or none of the people with the risk factor(s) experience the outcome
III-2	A comparative study with concurrent controls • Non-randomised experimental trial • Cohort study • Case-control study • Interrupted time-series with a control group	A comparison with a reference standard that does not meet the criteria for Level II and Level III-1 evidence	Analysis of prognostic factors amongst untreated control patients in a randomised controlled trial	A retrospective cohort study
III-3	A comparative study without concurrent controls • Historical control study • Two or more single arm study • Interrupted time-series without a parallel control group	Study of diagnostic yield (no reference standard)	A retrospective cohort study	A case-control study

IV	Case series with either post test or pre test/ post test outcomes		Case series or cohort studies of patients at different stages of disease	A cross-sectional study

Table 2 – Body of evidence assessment matrix

Component	A[3] Excellent	B[3] Good	C Satisfactory	D Poor
Volume of evidence	Several level I or II studies with low risk of bias	One or two level II studies with low risk of bias or a SR/multiple level III studies with low risk of bias	Level III studies with low risk of bias, or level I or II studies with moderate risk of bias	Level IV studies, or level I to III studies with high risk of bias
Consistency	All studies consistent	Most studies consistent and inconsistency may be explained	Some inconsistency reflecting genuine uncertainty around clinical question	Evidence is inconsistent
Clinical impact	Very large	Substantial	Moderate	Slight or restricted
Generalisability	Population/s studied in body of evidence are the same as the target population for the guideline	Population/s studied in body of evidence are similar to the target population for the guideline	Population/s studied in body of evidence different to target population for guideline but it is clinically sensible to apply this evidence to target population	Population/s studied in body of evidence different to target population for guideline and hard to judge whether it is sensible to generalise to target population
Applicability	Directly applicable to Australian healthcare context	Applicable to Australian healthcare context with few caveats	Probably applicable to Australian healthcare context with some caveats	Not applicable to Australian context

Table 3 – Grade of recommendation

Grade of recommendation	Description
A	Body of evidence can be trusted to guide practice
B	Body of evidence can be trusted to guide practice in most situations
C	Body of evidence provides some support for recommendation(s) but care should be taken in its application
D	Body of evidence is weak and recommendation must be applied with caution

[3] *A recommendation cannot be graded A or B unless the volume and consistency of evidence components are both graded either A or B.*

How to use the guidelines

The guidelines have been set out according to the following four areas of delirium care:

- Detection of delirium
- Risk factors – assessment and prediction of risk for delirium
- Prevention of delirium
- Management of delirium: identifying the cause, managing the symptoms of delirium and preventing complications.

Each of the sections comprise definitions and key information about that area of delirium care; influence of the health care setting on each area of delirium care; a summary of the literature; evidence based statements and recommendations.

In addition to the above-mentioned sections this document consists of the following sections:

- Glossary of terms
- Abbreviations used in the guidelines
- Quick reference guide
- Consumer brochure
- Summary of the guidelines
- Background information about delirium
- Future directions
- Guideline implementation and
- Useful resources.

Applying the recommendations

Some of the recommendations may require organisational and/or practice change. Health care workers will require additional training and education to apply many of these recommendations. It should be noted there is very little information available regarding the cost of implementation of detection, risk assessment, prevention and intervention techniques. Therefore when applying the recommendations, particularly where there is little high level evidence, the cost implications for organisations will need to be considered. Further information and references regarding guideline implementation can be found in the *Guideline implementation* section.

Management of delirium

A multifaceted approach, consistent with the needs of the setting, needs to be considered for the management of delirium. This approach would include consideration of the following:

- Building a culture of awareness through education and training
- Providing a focus on preventative health care management at a clinical, environmental and organisational level

- Implementing systems to support:
  - Assessment of baseline cognitive function in all older people
  - Early identification of change in cognitive function that might indicate prevalent, incident or incipient delirium
  - Effective diagnostic, investigative, pharmacological and non-pharmacological interventions for delirium and
  - Effective discharge planning, follow up, monitoring and feedback processes for those who have recovered from delirium and those who are at ongoing risk of developing delirium.

External review of the guidelines

An external review of the draft guidelines was conducted during July and August 2006. A full description of the methodology used to conduct the review, a list of external reviewers and their affiliation, and review outcomes is provided in *Appendix 1*.

Updating the guidelines

The literature search was conducted on 21 and 22 February 2006, and 7 March 2006. It is recommended that the guideline be reviewed no less than once every three years, and that they should be considered out of date in five years from the search date. The process for updating the guidelines should include updating the literature review – using the same search strategy – to include articles from 1 January 2006 (due to time lag between article publications and availability on databases).

Disclaimer

The views or interests of the Australian Health Ministers' Advisory Council's HCOASC, and the Australian Department of Health and Ageing have not influenced the final recommendations. Delirium Clinical Guidelines Expert Working Group members were asked to inform the project team of any conflict of interest – none were declared.

Clinical practice guidelines are just one element of good health care decision making, which also takes into account patient/resident preferences and values, clinician values and experience, and the availability of resources. These guidelines are not a definitive statement, but rather constitute a general guide to be considered in the prevention and management of delirium in older people. Some flexibility will be required to adapt these guidelines to specific settings, local circumstances and individual patient/resident needs.

Every attempt was made to ensure the accuracy of the contents of these guidelines at the time of publication. In addition, the authors have made every effort to identify all the current, relevant guidelines, systematic reviews and randomised controlled trials. However, the authors acknowledge they might not have identified some relevant literature.

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Quick guide

Quick guide

Summary of the guidelines

The following tables provide a summary of the main findings according to each area of delirium care as set out in the main section of the guidelines. Please refer to the individual chapters for a more detailed explanation.

Key messages

- Delirium in older people is often overlooked or misdiagnosed.
- Delirium is usually precipitated by an underlying acute health condition, which in most cases can be identified with careful assessment and investigation.
- Increasing old age, dementia, visual impairment and severe medical illness are important risk factors for delirium.
- A structured process for screening and diagnosing delirium should be established in all health care settings.
- Delirium is best managed by clinicians with expertise in delirium management, and in most cases should involve a multidisciplinary team.
- Preventative environmental and clinical practice strategies should be incorporated into the care plan of all older people across all health care settings.
- Non-pharmacological strategies should always be utilised as a first-line measure to manage the symptoms of delirium. These include environmental, behavioural and social strategies.
- Caution should be exercised in prescribing antipsychotic medications to older people with delirium.
- Staff educational strategies aimed at increasing knowledge and awareness about delirium should be considered in all health care settings.
- Information about delirium should be made available to people who have experienced delirium and their family/carers, including the use of a consumer brochure.

1. Detection of delirium

All settings

- A structured process for screening and diagnosis of delirium should be established in all health care settings (expert opinion).
- A formal cognitive function assessment, (which may include the use of a standard cognitive screening tool) should be performed on all older people as part of the routine admission process to all health care settings (expert opinion).
- Each of the tools recommended for screening and diagnosis of delirium require specific training (expert opinion).
- Where cognitive impairment is identified, health care workers should consult with family/carers with regard to whether a person's current cognitive state is a departure from their 'usual' status (expert opinion).

Hospital settings

Repeated cognitive assessment

- Serial MMSE or AMT, administered by a clinician trained in its use, on day 1, 6 and 6 weeks or discharge, can be used on acute geriatric wards to monitor cognitive function (grade C, [79,80]).
- The application of repeated cognitive assessment, with the use of measures such as the MMSE or AMT, should be considered for hospital patients at high risk of developing delirium (for example cardiac and orthopaedic surgery patients). If there is a decline in score of 2 or more points, further assessment for delirium is indicated (expert opinion).
- In hospital services where there is low risk of patients developing delirium, cognitive assessment should be repeated if there is: a sudden change in a person's behaviour or cognition; a deterioration in the patient's condition; or a sudden decline in their ability to perform activities of daily living (ADL).

A decline in MMSE or AMT score of 2 or more points indicates the need for further assessment for delirium and/or further referral for expert consultation (expert opinion).

Delirium diagnosis

- The DSM-IV criteria should be administered by a medical specialist with appropriate training (expert opinion).
- The CAM should be used by nursing and medical staff who have undergone a structured training program in its use (as recommended by the CAM developers) to diagnose delirium (grade B, [11-13]).
- The CAM-ICU should be used by intensive care nursing and medical staff who have undergone a structured training program in the use of the CAM (developed by the CAM authors) to diagnose delirium (grade B, [14, 15]).
- The Delirium Symptom Interview (DSI) can be administered by lay assessors trained in its use, to detect delirium in older medical or surgical ward patients (grade C, [16]).
- The Delirium Rating Scale (DRS) can be used by clinicians trained in its use, to distinguish between delirious and non-delirious inpatients in an old age psychiatry unit (grade D, [17]).

Residential care and Community care settings

Baseline cognitive assessment

- General practitioners should consider conducting a cognitive assessment, using a validated tool (such as the AMT, MMSE or other culturally appropriate tool), as part of an annual Health Assessment for people aged 75 and over, or ATSI patients aged 55 and over, who receive care in the community (expert opinion).
- General practitioners should consider conducting a cognitive assessment, using a validated tool (such as the AMT, MMSE or other culturally appropriate tool), as part of a Comprehensive Medical Assessment[4] for people who are permanent residents of an aged care facility (expert opinion).

Repeated cognitive assessment

- A repeated cognitive assessment, using a validated tool such as the MMSE or AMT, should be considered if: there is a sudden change in a person's behaviour or cognition; there is deterioration in the person's condition; there is a sudden decline in their ability to perform ADLs; or they have recently returned from a hospital admission. A decline in MMSE or AMT score of 2 or more points indicates the need for further assessment for delirium and/or further referral for expert consultation (expert opinion).

Delirium diagnosis

- If staff working in residential care and community care settings notice an abrupt change in the cognition or behaviour of a resident/client, a formal diagnostic process for delirium should be undertaken. This may involve administering a diagnostic tool such as the CAM or contacting a medical practitioner for a consultation (expert opinion).

2. Risk factors for delirium – assessment and prediction

All settings

- Risk for delirium should be assessed in all older persons admitted to a health care setting (expert opinion).
- Staff caring for older persons should be aware of the risk factors for the development of delirium as listed in Table 6 (expert opinion).
- Overall it is difficult to recommend risk prediction models based on the current knowledge. If healthcare settings choose to adopt a risk prediction model it is recommended that evaluation of the performance attributes within that setting be considered part of the implementation and evaluation plan (expert opinion).
- The use of physical restraints, indwelling catheters and multiple medication use have been identified as precipitants for delirium and their usage should be minimised (expert opinion).

[4] *The Comprehensive Medical Assessment is completed within six weeks of admission and repeated annually.*

Hospital settings

- Older people admitted to hospital settings where there is a higher incidence of delirium should be assessed for predisposing risk factors including: age 70 years or over (grade B, [18, 19]); pre-existing cognitive impairment (grade B, [20-25]); severe medical illness (grade C, [24, 25]); depression (grade B, [20, 21]); abnormal sodium (grade B, [20, 21]); and visual impairment (grade B, [20]).
- In addition to the risk factors described in the point above, older people admitted for surgical procedures should be assessed for the following surgery-related precipitating risk factors including: exposure to pethidine (grade B, [26]); exposure to benzodiazepine agents (grade B, [27]); previous history of delirium (grade B, [18]); alcohol related health concerns (grade B, [18]); pre-operative use of narcotic analgesics (grade B, [18]); and admission to neurosurgery (grade B, [18]).
- Risk prediction models have been developed and are available for use in non-cardiac elective surgery, general medical and acute geriatric units. However their utility in the Australian setting and in patient groups other than those listed requires further evaluation. It is recommended that where healthcare organisations choose to apply existing risk models within their setting, they include evaluation of the performance attributes of the model (expert opinion).

3. Prevention of delirium

All settings

- Preventative environmental and clinical practice strategies outlined in Table 7 should be incorporated into the care plan of all older people, across all health care settings, to reduce their risk of developing delirium (expert opinion).

Hospital settings

- Older orthopaedic surgery patients should be reviewed by a geriatrician pre-operatively or within 24 hours after surgery, and then post-operatively on a daily basis for five days (grade B, [28]).
- Where resources are available, older surgical patients should be reviewed by a geriatrician at least pre-operatively and post-operatively (expert opinion).
- Multicomponent delirium prevention strategies targeting (i) cognitive impairment; (ii) sleep deprivation; (iii) immobilisation; (iv) vision impairment; (v) hearing impairment; and (vi) dehydration; as implemented by trained volunteers[5] under the supervision of medical and/or nursing geriatric specialists, may be considered for use in older hospitalised patients (grade C, [29]).
- Training should be provided to assist health care workers, who care for older people, to implement multicomponent delirium prevention strategies targeting (i) cognitive impairment; (ii) sleep deprivation; (iii) immobilisation; (iv) vision impairment; (v) hearing impairment; and (vi) dehydration (expert opinion).

[5] *The use of volunteers requires careful consideration – it is difficult to generalise from the American to the Australian context as available volunteers may differ, supervising a volunteer workforce is resource intensive, and it may be more appropriate to utilise resources to up-skill existing health care workers.*

4. Management of delirium – identification of cause, management of symptoms and prevention of complications

Investigation and treatment of delirium cause

- The underlying cause of delirium should be investigated and precipitating factors treated (expert opinion).

Management of symptoms in all people with delirium

- Non-pharmacological strategies (such as those outlined in Table 7) should be incorporated into the care plan of all older persons with delirium across all health settings; and should always be utilised as a first-line strategy to manage the symptoms of delirium (expert opinion).
- Delirium is best managed by clinicians with expertise in delirium management, and in most cases should involve a multidisciplinary team (expert opinion).

Management of severe behavioural and/or emotional symptoms

- In addition to the non-pharmacological strategies, the following reorientation and reassurance strategies should be considered for people with severe behavioural and/or emotional symptoms: one-on-one nursing or the use of a trained support person; opportunity for family member/carer to remain with the patient at all times (including overnight); consistency of staff members caring for the person; and provision of relaxation strategies to assist with sleep (expert opinion).
- Specialised delirium rooms should be considered for delirium patients with severe behavioural and/or emotional disturbance (expert opinion).
- An expert psychiatric consultation should be considered for people with severe behavioural and/or emotional symptoms (expert opinion).
- The use of antipsychotic medications for the management of delirium in older people should be reserved for those cases where the person experiences severe behavioural and/or emotional disturbance symptoms (expert opinion).
- Caution should be exercised in prescribing antipsychotic medications to older people with delirium (expert opinion).
- When antipsychotic medications are indicated the following processes should be incorporated into the patient care plan:
  - The indication(s) for its use must be documented and reviewed regularly
  - Commencement of the antipsychotic should be accompanied by documented recommendations about: (i) the dosage of medication; (ii) the mode of medication delivery; and (iii) the frequency with which patient status is to be reviewed by a medical physician
  - The frequency of medical review will vary according to patient status. For example a patient with significant agitation may require 4 hourly medical review, and a patient with less significant agitation may require 8 hourly medical review
  - Titrated antipsychotics need to be closely monitored by nursing and medical staff. The dosage and frequency should be titrated carefully against the level of agitation at each review
  - Titration must commence from a low dose typically commencing with the equivalence of 0.25-0.50mg of haloperidol; olanzapine 2.5 mg orally; or risperidone 0.25 mg orally
  - It is important that nursing staff caring for patients on antipsychotic medication are able to consult regularly with medical staff.

Discharge planning and follow up

- Information about delirium should be made available to people who have experienced delirium and their family/carers (expert opinion).
- Discharge planning for people who have experienced delirium should include follow-up, professional monitoring, and treatment (expert opinion).
- Post delirium counselling should be considered for people who have experienced delirium (expert opinion).

Staff education

- Staff education strategies aimed at increasing knowledge and awareness about delirium in older people should be considered in all health care settings (hospital settings – grade D, [30, 31]; all other settings – expert opinion).
- Delirium management should be part of the basic curricula of medical, nursing and allied health university training, and be included in training of other care workers and ongoing professional development programs (expert opinion).
- Implementation of delirium management guidelines – accompanied by education and reinforcement – should be considered in all health care settings (hospital settings – grade D, [32]; all other settings – expert opinion).

Management of Delirium in Older People

Quick Reference Guide

Please refer to the Clinical Practice Guidelines for the Management of Delirium in Older People for further information.

Definition of delirium

Delirium is a transient mental disorder, characterised by impaired cognitive function and reduced ability to focus, sustain or shift attention.

The disturbance develops over a short period of time and generally fluctuates during the course of the day. Delirium usually only lasts for a few days but may persist for weeks or even months.

Causes and risk factors

The aetiology of delirium is complex and multifactorial, involving an interaction between predisposing factors (individual vulnerabilities) and precipitating factors (insults).

Delirium has a large number of possible causes. Some common causes include:

- medication and alcohol use
- general illness and infections
- disorders of metabolism
- central nervous system disorders
- cardiopulmonary disorders.

Risk factors

Of the variety of risk factors that have been studied, the following are based on high level evidence:

- age ≥ 70 years
- pre existing cognitive impairment, including dementia
- visual impairment
- depression
- abnormal serum sodium
- use of indwelling catheter
- use of physical restraint
- addition of 3 or more medications.

Risk Prediction Models

Although models to predict the risk of delirium development exist, the available evidence is limited to distinct groups of hospitalised patients. No model has been tested in Australia.

Epidemiology

Incidence/Prevalence

10-15% of older patients have prevalent delirium on admission to hospital and up to 40% develop delirium during their hospital stay. In residential care 40.5% 14 day period-prevalence has been reported.

Outcomes

Delirium is associated with increased length of hospital stay; higher morbidity and mortality; functional decline; and increased risk of nursing home placement.

Key messages & recommendations

- Delirium in older people is often overlooked or misdiagnosed.
- Delirium is typically precipitated by an underlying acute health condition, which in most (but not all) cases can be identified with careful assessment and investigation.
- Increasing old age, dementia, visual impairment and severe medical illness are important risk factors for delirium.
- A structured process for screening and diagnosing delirium should be established in all health care settings.
- Preventative environmental and clinical practice strategies should be incorporated into the care plan of all older people across all health care settings.
- Non-pharmacological strategies should always be utilised as a first-line measure to manage the symptoms of delirium. These include environmental, behavioural and social strategies.
- Caution should be exercised in prescribing antipsychotic medication to older people with delirium.
- Staff educational strategies aimed at increasing knowledge and awareness about delirium should be considered in all health care settings.
- Information about delirium should be made available to people who have experienced delirium and their family/carers, including the use of the consumer brochure.

Diagnostic criteria

Diagnostic criteria

The DSM-IV criteria is considered the gold standard diagnostic tool for delirium, when administered by a medical specialist with appropriate training such as a geriatrician or psychiatrist.

DSM-IV criteria for delirium (text revised, 2000)

A. Disturbance of consciousness with reduced ability to focus, sustain or shift attention.

B. A change in cognition or the development of a perceptual disturbance that is not better accounted for by a pre-existing, established, or evolving dementia.

C. The disturbance develops over a short period of time and tends to fluctuate during the course of the day.

D. There is evidence from the history, physical examination, or laboratory findings:

- that the disturbance is caused by the direct physiological consequences of a general medical condition; or
- the symptoms of criteria A and B developed during substance intoxication; or
- medication use is aetiologically related to the disturbance; or
- that the delirium has more that one aetiology; or
- a clinical presentation of delirium is suspected due to a general medical condition or substance use but for which there is insufficient evidence to establish a specific aetiology; or
- delirium due to causes not listed (eg sensory deprivation).

Signs and symptoms of delirium

People with delirium may:

- appear confused and forgetful
- be unable to pay attention
- experience disturbance of the sleep-wake cycle
- be very agitated, or quiet and withdrawn, or sleepy
- be disoriented to place or time
- experience emotional disturbances
- see, hear or feel things which are not there.

Prevention of delirium

A number of multifactorial prevention strategies have the potential to reduce the incidence of delirium, the duration of delirium and the severity of delirium.

Environmental and clinical practice strategies should be incorporated into the care plan of all older people across the health care settings. Some examples of these strategies have been listed in middle box.

Detection of delirium

Delirium subtypes

Delirium subtypes have been described and refer to psychomotor activity or level of arousal. They include:

- hyperactive (agitated, hyper-alert)
- hypoactive (lethargic, hypo-alert)
- mixed subtype with alternating features of both forms.

Differential diagnosis

The most common difficulty in the diagnosis of delirium is determining whether the person has dementia or delirium.

Diagnostic tools

A number of tools, such as the Confusion Assessment Method (CAM), have been developed to enable clinicians other than medical specialists to diagnose delirium. The application of diagnostic tools requires training.

Screening of cognitive function

In areas where there is high risk of developing delirium, a formalised process for screening delirium may assist in improving recognition rates and ultimately improving health outcomes. The process may involve: baseline cognitive assessment; regular repeated cognitive assessment; and may be followed by a diagnostic process.

Strategies for prevention & management of delirium

Environmental Strategies

- Lighting appropriate to time of day
- Quiet environment especially at night
- Provision of clock and calendar
- Avoid room changes
- Encourage family and friends to be involved in patient care
- Encourage carers to bring in patient's personal and familiar objects
- Staff caring for people with delirium should establish a communication strategy that incorporates elements of both reality orientation and validation techniques.

Clinical Practice Strategies

- Encourage/assist with eating and drinking to ensure adequate intake
- Ensure that patients who usually wear hearing and visual aids are assisted to use them
- Regulation of bowel function – avoid constipation
- Encourage and assist with regular mobilisation
- Encourage independence in basic ADLs
- Medication review
- Promote relaxation and sufficient sleep
- Manage discomfort or pain
- Provide orienting information including name and role of staff members
- Minimise use of indwelling catheters
- AVOID use of physical restraints
- Avoid psychoactive drugs
- Use interpreters and communications aids for CALD patients
- Use ATSI liaison officer for ATSI patients.

Additional Strategies for Delirium Symptoms

- Use one-on-one nursing or provide a trained sitter
- Allow family members to stay with the patient including overnight
- Endeavour to have the same staff members to care for the patient during and across shifts.

Only if all the above have been addressed do you consider the use of pharmacological interventions.

Management of delirium

In patients with confirmed diagnosis of delirium, or in those for whom there is a high level of clinical suspicion, the following steps are generally required:

- Identify the cause of delirium where possible
  Perform a comprehensive evaluation which includes obtaining a history; physical examination; and investigations.
- Address the cause and any precipitating factors
- Manage the symptoms of delirium
  Start general management with non-pharmacological interventions (see Environmental and Clinical Practice Strategies listed in middle box). In addition, methods for re-orientating and reassuring the patient can be used (see Additional Strategies for delirium symptoms listed in middle box).
  The use of antipsychotic medications for delirium management in older people should be reserved for those cases where the person experiences severe behavioural and/or emotional disturbance symptoms. These medications carry potential side effects and close monitoring of the person and their condition is required. Side effects include extrapyramidal signs and lengthened QT interval (Haloperidol), and increased risk of stroke in older people with dementia (Olanzepine, Risperidone).
  Consider issues of informed consent.
- Provide a supportive care environment
  Provide adequate sensory, physical and psychological support.
- Prevent complications
  Older people with delirium are at increased risk of complications such as falls and pressure ulcers. Strategies that reduce the risk of, or prevent, complications must be incorporated into their care plan.
- Educate the patient and their carers/family
  Information regarding the diagnosis, cause and management plan should be communicated to the patient and their carers.

Staff education

Staff education strategies aimed at increasing knowledge and awareness about delirium in older people should be considered in all health care settings.

How can you help care for someone with delirium?

It is reassuring for people with delirium to see familiar people. Visit as often as you can and try to be available to help with their care. Encourage other family members or friends to help as well.

- Speak slowly in a clear voice when talking to someone who has delirium. Identify both yourself and the person by name.
- Encourage and assist someone with delirium to have adequate food and fluids.
- Knowing the time of day can reduce confusion. Remind them where they are, and what day and time it is. Open the curtains in their room.
- Visual or hearing impairment can make their confusion worse. If someone with delirium usually wears glasses or hearing aids, help them to put them on.
- If someone with delirium is agitated or aggressive, do not try to restrain them. If they want to walk around, let them, but try to make sure that they are safe from falling and that the area is free from hazards.
- Bring personal mementos that help remind the person of home, such as photos, their dressing gown, radio or CD/tape player with favourite music.
- Let staff know any special personal information that may help calm and orient someone with delirium, such as, the names of family and friends, hobbies, significant events, etc.

Contacts

Carers Resource Centres
Ph: 1800 242 636

Aged Care Information Line
Ph: 1800 500 853

National Dementia Helpline
Ph: 1800 100 500

Carers Australia
www.carersaustralia.com.au

Alzheimer's Australia
www.alzheimers.org.au

If you have any concerns or questions about delirium, talk to your doctor.

Adapted with permission from North Coast Area Health Service, NSW.

This brochure provides information for people who have experienced delirium and for their family/carers.

Delirium

Delirium is a common medical problem that is characterised by changes in mental function and occurs more often among older people.

When delirium occurs people are confused and may be either very agitated or quiet and drowsy.

The onset of delirium is always sudden. It usually only lasts for a few days but may persist for longer periods.

It can be a serious condition.

Who is at risk of developing delirium?

People who:

- are very sick
- have dementia
- are 70 years of age or more
- suffer from depression
- have poor eyesight
- are taking multiple medications
- are having a surgical procedure. eg. heart or hip surgery

What are the symptoms of delirium?

People with delirium may:

- appear confused and forgetful
- be unable to pay attention
- be different from their normal selves
- be either very agitated or quiet and withdrawn or sleepy
- be unsure of the time of day or where they are
- have changes to their sleeping habits, such as staying awake at night and being drowsy during the daytime
- feel fearful, upset, irritable, angry or sad
- see things that are not there, but that seem very real to them
- lose control of their bladder or bowels.

How common is delirium?

About one-fifth of older people admitted to hospital, and close to half of the residents in aged care facilities will experience delirium at some stage of their care.

What causes delirium?

Common causes of delirium in older people include:

- infection
- multiple physical illnesses
- constipation
- dehydration/malnutrition
- severe pain
- medications, including 'over-the-counter' medicines
- heavy alcohol consumption
- withdrawal from alcohol or medication, particularly sleeping pills.

How does delirium start?

The symptoms happen very quickly, usually over hours or days. A person's behaviour can also fluctuate during the course of a single day.

Delirium is sometimes mistaken for dementia or depression, so it is important for family/friends to notify medical/nursing staff of any sudden change in a person's mental state.

How long does delirium last?

Delirium usually only lasts for a few days but sometimes it will continue for weeks or even months. If delirium is not resolved quickly, it can lead to serious complications such as falls, pressure ulcers, longer length of stay in hospital, and even death.

Will delirium recur?

People who have experienced delirium do have a higher risk of experiencing delirium again.

How is delirium treated?

Delirium is generally associated with an underlying physical illness. However it is not always possible to identify the cause.

Staff will do a thorough medical assessment to look for and treat the underlying cause of the delirium. Treatment also includes reducing the risk of complications and lessening symptoms.

Role of family and carers

- Family members/carers can provide valuable information to the staff caring for the person with delirium.
- It is important to notify staff of any sudden change in a person's mental or physical condition.

Useful resources

Guidelines and position statements

American Psychiatric Association Practice Guidelines for the Treatment of Patients with Delirium (1999)

American Journal of Psychiatry, 1999 May; 156:5(Supplement), p. 1-20.
Available online at (access date 6/7/2006):

www.psych.org/psych_pract/treatg/pg/pg_delirium.cfm

Guideline Watch: Practice Guidelines for the Treatment of Patients with Delirium (2004)

Cook IA. (2004). Guideline Watch: Practice guidelines for the treatment of patients with delirium. Arlington, VA: American Psychiatric Association.
Available online at (access date 6/7/2006):

www.psych.org/psych_pract/treatg/pg/DelirumWatch_081104.pdf

Management of alcohol withdrawal delirium. An evidence-based practice guideline.

Mayo-Smith MF, Beecher LH, Fischer TL, Gorelick DA, Guillaume JL, Hill A, Jara G, Kasser C, Melbourne J. Management of alcohol withdrawal delirium. An evidence-based practice guideline. Arch Intern Med 2004 Jul 12;164(13):1405-12.
Available online at (access date 6/7/2006):

www.guideline.gov/summary/summary.aspx?doc_id=6543&nbr=004109&string=delirium+AND+tremens

Guidelines for a Palliative Approach in Residential Aged Care (2004)

The National Palliative Care Program, Department of Health and Ageing, Commonwealth of Australia.
Available online at (access date 6/7/2006):

www.health.gov.au/internet/wcms/publishing.nsf/Content/palliativecare-pubs-workf-guide.htm

Australian Society for Geriatric Medicine Position Statement No. 13 Delirium in Older People (September 2005)

Available online at (access date 6/7/2006):

www.asgm.org.au/documents/PositionStatementNo13_001.pdf

RNAO Nursing best practice guidelines: Screening for delirium, dementia and depression in older adults

Available online at (access date 4/8/2006):

www.rnao.org/bestpractices/PDF/BPG_DDD.pdf

British Geriatric Society Guidelines for the prevention, diagnosis and management of delirium in older people in hospital (2006)

Available online at (access date 29/8/2006):

www.bgs.org.uk/Publications/Clinical%20Guidelines/clinical_1-2_fulldelirium.htm

Care of Patients with Dementia in General Practice (September 2003)

Funded by the NSW Department of Health and endorsed by the Royal Australian College of General Practitioners. Available online at (access date 6/7/2006):

www.racgp.org.au/guidelines/dementia/

Related publications & websites

A guide for assessing older people in hospitals (September 2004)

Centre for Applied Gerontology Bundoora Extended Care Centre Northern Health and the Australian Health Ministers' Advisory Council's Care of Older Australian Working Group.
Available online at (access date 6/7/2006):

www.health.vic.gov.au/acute-agedcare/assessing-older-people.pdf

Best practice approaches to minimise functional decline in the older person across the acute, subacute and residential care interface (November 2004)

Clinical Epidemiology and Health Service Evaluation Unit Melbourne Health and the Australian Health Ministers' Advisory Council's Care of Older Australian Working Group.
Available online at (access date 6/7/2006):

www.health.vic.gov.au/acute-agedcare/functional-decline-manual.pdf

Health Assessments for people aged 75 + over (55 + over for Aboriginal and Torres Strait Islander people in recognition of their specific health needs)

Australian Government, Department of Health and Ageing

Available online at (access 6/7/2006):

www.health.gov.au/internet/wcms/publishing.nsf/Content/health-epc-hlthassmnt.htm

Australian medicines handbook drug choice companion: aged care (2003)

Commonwealth Department of Health and Ageing and Commonwealth Department of Veterans' Affairs, Editors S. Rossi and S. Edwards.

Australian Society for Geriatric Medicine Position Statement No. 2 Physical Restraint Use in Older People (Revised 2005)

Available online at (access date 23/8/2006):

www.asgm.org.au/documents/POSITIONSTATEMENTNO2.PhysicialRestraint-Revision.pdf

Decision making tool: Responding to issues of restraint in Aged Care

This document has been developed to assist staff and management in residential aged care facilities to make informed decisions in relation to the use or non-use of restraint, in responding to behaviours of concern.
Available online at (access date 11/8/2006):

www.dhac.gov.au/internet/wcms/publishing.nsf/Content/ageing-decision-restraint.htm

General practice in residential aged care

This website provides resources to assist general practitioners (GPs), staff in Residential Aged Care Facilities (RACF), and other providers of medical care for residents 'round the clock'. Available online at (access date 21/8/2006):

www.nwmdgp.org.au/pages/after_hours/

Consumer information

Alzheimer's Australia

The peak body providing support and advocacy for Australians living with dementia

Further information available by visiting their website at (access date 6/7/2006):

www.alzheimers.org.au/

National telephone service: Dementia National Helpline 1800 100 500

Interpreter Service 131 450.

Carers Australia & Commonwealth Carer Resource Centre

Information available online at (access date 6/7/2006):

www.carersaustralia.com.au/

Phone: 1800 242 636

Hospital Elder Life Program (HELP)

Sharon Inouye and colleagues, Yale University School of Medicine (2005)

General information about the program available online at (access date 6/7/2006):

www.elderlife.med.yale.edu/public/public-main.php

Avoid confusion in the hospital – 10 tips (HELP)

Available online at (access date 6/7/2006):

www.elderlife.med.yale.edu/public/prevention.php

Comprehensive guide

Comprehensive guide

Background information

What is delirium?

Delirium is a transient mental disorder, characterised by impaired cognitive function and reduced ability to focus, sustain or shift attention. The disturbance develops over a short period of time (usually over hours or days), and generally fluctuates during the course of the day [33]. It is associated with a disturbance in the sleep-wake cycle and an increase or decrease in psychomotor activity [34]. Although delirium usually only lasts for a few days, it may persist for weeks or even months [35].

Delirium was first defined by the American Psychiatric Association as a diagnostic category in 1980. However, the terms “acute confusional state”, “acute brain disorder”, and “acute brain syndrome” continue to be used synonymously with delirium. Further information on the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) criteria for delirium can be found in *Section 1.2*.

What are the signs and symptoms of delirium?

It should be noted that symptoms of delirium generally fluctuate throughout the day. Some of the signs and symptoms of delirium include the following:

- Difficulty focusing, sustaining or shifting attention
- Memory impairment, most commonly impaired recent memory
- Disturbance of the sleep-wake cycle, for example drowsy during the day and agitated or restless at night
- Speech or language disturbances, for example rambling speech
- Disorientation to place or time
- Disturbance in psychomotor behaviour, for example agitation with increased psychomotor behaviour and sluggishness with decreased psychomotor behaviour
- Emotional disturbances such as mood swings that may change over the course of a day and
- Misinterpretations, illusions or hallucinations such as seeing, hearing or feeling things that are not there.

What are the causes of delirium?

Delirium has a large number of possible causes. It may result from a general medical condition, substance use or withdrawal (including medications), or can be due to multiple aetiologies. In older hospitalised patients, the latter is often the case [25, 36]. However, there is also a small proportion of delirium cases in which the cause cannot be identified [3].

There are a number of underlying conditions/disorders that are commonly associated with delirium, including:

- general illnesses and infections such as pneumonia or urinary tract infection
- disorders of the central nervous system such as a stroke or subdural haematoma
- disorders of the heart or lungs such as heart or respiratory failure
- medication use (see *Appendix 5*: medications known to cause delirium) and
- disorders of metabolism such as kidney failure or dehydration [3, 8, 37].

Aetiology

Although some of the common causes have been listed above, the aetiology of delirium is thought to be complex and multifactorial, involving an interaction between predisposing patient factors (or vulnerabilities) such as age, and precipitating factors (or insults) such as a general illness [25, 38]. This is discussed further in *Section 2*.

Pathophysiology

The pathophysiology of delirium is not well understood, and is an area of ongoing research [36, 39]. Flacker and Lipsitz (1999) wrote that delirium involves disruptions to neurological pathways and neurotransmitter systems, and should be thought of as a 'syndrome' with a variety of situation-specific neurotransmitter abnormalities [40]. They described a number of potential neural mechanisms of delirium, stating that some may be encountered more commonly than others. For example, medications that interfere with cholinergic neurotransmission may lead to cholinergic inhibition and predispose those people taking them to delirium.

Who is at risk of developing delirium?

Dementia, age over 70 and severe medical illness are among the leading risk factors for the development of delirium. These risk factors are also associated with more general functional decline – falls, immobility, incontinence, and pressure ulcers. Please refer to *Best practice approaches to minimize functional decline in the older person across the acute, sub-acute and residential aged care settings* [6]. Delirium risk factors are discussed more fully in *Section 2*.

What is the epidemiology?

Around 10-15% of older people admitted to hospital are delirious at the time of admission and a further 5%-40% are estimated to develop delirium while in hospital [41].

Studies show that delirium prevalence and incidence varies across patient populations and health care settings. Some of the variation is explained by study methods, such as inclusion of different age groups, whether cognitively impaired patients were included, how long the patients were followed up and how delirium was defined and diagnosed. Table 4 collates some of the available data on delirium incidence and prevalence rates in different settings.

Table 4 – Delirium incidence and prevalence in different patient populations

Patient Group	Delirium incidence or prevalence data and references
Hip surgery (elective and non elective)	• 40.5-55.9% incidence in hip fracture surgery patients 60 years and over [21, 42] • 14.7% incidence in elective hip surgery patients 60 years and over without severe dementia [21]
Cardiac surgery	• 32% incidence in patients, aged 65 years or more, who have undergone CABG surgery [43] • Up to 47% incident delirium in cardiac surgery patients [26]
General medical	• 15-20% prevalence at time of admission to ward [38] • 18% prevalence of patients 65 years and over within 72 hours of admission, and a further 2% incident delirium up to 1 week following [44]
Emergency departments	• 5-10% prevalence rates [38]
Intensive care units	• 83-87% incident delirium in all admitted patients [14, 15] • 70% prevalence of delirium of all patients 65 years or over, during their ICU stay and up to 7 days post discharge [45]
Long term care	• 40.5% 14 day period-prevalence from US state minimum data set [46] • 52.6% of hospital older patients from long term care experienced delirium during their hospital admission [47]
Hospital admission	• 10-15% of older patients had prevalent delirium on hospital admission [41] • 29.7% of hip fracture patients were delirious on admission to hospital or developed delirium pre operatively [48] • 21.6% of hospital older community dwelling patients experienced delirium during their hospital admission [47]

What are the outcomes and cost of delirium to health care?

Delirium in older people is associated with higher mortality and morbidity [49, 50]; increased length of hospital stay [51, 52] and concomitant risk of complications [53]. Those who experience delirium are also at an increased risk of cognitive decline, functional decline, and nursing home placement [36, 54-56]. A number of studies have reported that patients discharged from hospital often have persisting symptoms of delirium [57, 58].

The cost of delirium to the health care system is substantial. Inouye [59] estimated that hospital stays complicated by delirium account for 1.5 million inpatient days each year in the United States (US), and recent statistics have shown that approximately US$6.9 billion in Medicare expenditure is attributable to delirium [60]. Several US studies have suggested that preventing delirium would save on both acute and long term care costs [61, 62]. However no such cost data exists for the Australian health care system [63]. Early diagnosis and management of delirium should prevent complications, morbidity and mortality associated with delirium and therefore reduce the health care costs associated with delirium.

Detection

Detection of delirium 1

1.1 Delirium diagnosis

Delirium in older people is under-recognised and often misdiagnosed by health care workers [64, 65]. There are a variety of issues that impact on delirium detection. It has been argued that patients who are agitated and restless (hyperactive) come to the attention of staff more often than patients who are quiet and withdrawn (hypoactive) [66]. Hypoactivity may also be misdiagnosed as depression, leading to inappropriate management [63, 64]. In addition, some authors have suggested that a lack of awareness or understanding of health and ageing, for example, believing that ageing is associated with inevitable cognitive decline, may interfere with health care workers' ability to recognise delirium [67].

It is therefore important that staff working with older people are knowledgeable about delirium. This will not only increase awareness and detection of delirium, but will increase the likelihood of rapid and appropriate access to treatment – ultimately leading to improved patient outcomes. It is also important that the role of the family in identifying delirium be established. Family members/carers are generally the most knowledgeable about whether a person's current cognitive state is a departure from their 'usual' status.

In settings where delirium is common and there is access to staff experienced in the diagnosis of delirium, such as geriatricians and psychiatrists, formal diagnosis of delirium based on the Diagnostic and Statistical Manual of mental disorders version IV (DSM-IV) criteria may be readily obtained. However this process is not practical in many settings and implementing a process to screen for changes in cognitive function will assist in the detection of delirium. Screening is achieved by establishing baseline cognitive function with a validated cognitive assessment tool and later repeating the assessment with the same tool. A decline in score is a trigger for further assessment, referral and investigation. As a rule of thumb, any sudden change in an older person's cognition or behaviour should be considered to be delirium and possible causes should be investigated.

1.2 DSM-IV criteria for delirium

The definition of delirium and its differentiation from dementia was first outlined by the American Psychiatric Association in 1980 in the third edition of the Diagnostic and Statistical Manual of mental disorders (DSM-III) [68]. The definition provided explicit and standardised criteria for delirium for the first time, and in the research context is considered the 'gold standard' diagnostic tool for delirium, when administered by a medical specialist with appropriate training, such as a geriatrician, psychogeriatrician, or psychiatrist.

The latest edition of the DSM diagnostic criteria for delirium (DSM-IV text revised edition, [69]) is shown in Table 5. Other diagnostic tools are described in section 1.6.

Table 5 – DSM-IV text revised criteria

A. Disturbance of consciousness (i.e. reduced clarity of awareness of the environment) with reduced ability to focus, sustain, or shift attention.

B. A change in cognition (such as memory deficit, disorientation, language disturbance) or the development of a perceptual disturbance that is not better accounted for by a pre-existing, established, or evolving dementia.

C. The disturbance develops over a short period of time (usually hours to days) and tends to fluctuate during the course of the day.

D. There is evidence from the history, physical examination, or laboratory findings that:

- the disturbance is caused by the direct physiological consequences of a general medical condition or
- the symptoms of criteria A and B developed during substance intoxication or
- medication use is aetiologically related to the disturbance or
- the symptoms of criteria A and B developed during, or shortly after, a withdrawal syndrome or
- the delirium has more than one aetiology (eg more that one aetiological general medical condition, a general medical condition plus medication side effect) or
- a clinical presentation of delirium that is suspected to be due to a general medical condition or substance use but for which there is insufficient evidence to establish a specific aetiology or
- delirium due to causes not listed in this section (eg sensory deprivation).

1.3 Delirium presentation

1.3.1 Delirium subtypes

The delirium subtypes were first described by Lipowski (1990) and refer to psychomotor activity, or level of arousal. They include the 'hyperactive' (agitated, hyper-alert) and 'hypoactive' (lethargic, hypo-alert) subtypes and the 'mixed' form which has alternating features of both [34]. A recent study has suggested that people over the age of 65 experience hypoactive delirium at a significantly higher rate than younger people [70]. In fact, none of the older people in this study experienced hyperactive delirium. This last point is particularly salient, given that hypoactive delirium frequently goes undetected [66].

A number of authors have sought to determine whether the subtypes are associated with different symptoms, causes, and/or outcomes [71-73]. However the studies demonstrate significant diversity in their definition of delirium subtypes and the study methods employed. De Rooij (2005), in a recent systematic review of subtype studies, stated that the lack of consensus around delirium subtype classification is a barrier to future research [74].

1.3.2 Subsyndromal delirium

It is recognised that there is a patient group who do not meet the DSM-IV criteria for delirium but nonetheless exhibit some of the symptoms associated with delirium (subsyndromal). A recent study found that people with subsyndromal delirium experienced similar outcomes to those diagnosed with mild delirium. Both groups experienced worse outcomes than patients who had no delirium symptoms [73]. The authors questioned the appropriateness of a dichotomous approach to delirium diagnosis and management and their research suggests that patients with subsyndromal delirium require careful monitoring.

1.3.3 Severity of delirium

Several instruments have been developed to rate the severity of delirium symptoms. Examples include the Memorial Delirium Assessment Scale (MDAS) [75], the Delirium Index [76], the Delirium Assessment Scale (DAS) [77], the Delirium Rating Scale (DRS) [78], and its revised version (DRS-R-98) [79]. These instruments have largely been used in clinical research and demonstrate reasonable validity and reliability. It may be that they may have a role in clinical practice – to monitor resolution of a delirium episode and/or the effect of an intervention – but this has yet to be fully clarified.

1.4 Differential diagnosis

The presenting features of delirium can mimic depression symptoms, such as a decreased level of alertness, emotional lability, and appearing withdrawn and can lead to an incorrect diagnosis of depression [80]. The most common difficulty in diagnosing delirium is determining whether the person has dementia or delirium but there are several clinical features, which are useful for distinguishing between the two. For example: delirium occurs suddenly while dementia onset is gradual; people with dementia are generally alert, whereas delirium is characterised by a disturbance of consciousness; attention is impaired in delirium but not in dementia; cognitive and symptom fluctuation is common in delirium but in dementia these are stable; sleep is usually disturbed in delirium and usually normal in dementia [38, 69]. The distinction between delirium and dementia is less straightforward as dementia progresses and alertness and attention are affected. In these cases, an abrupt deterioration in the person's general function, behaviour, or ability to perform activities of daily living (ADLs) may be the prompt to consider delirium.

1.5 Screening for delirium

Use of a screening tool can allow the early detection of a disease in a group of patients who do not appear to have the disease, or who are as yet asymptomatic of that particular disease [81]. In general terms, for screening to be appropriate the disease should be serious; treatment given before symptoms manifest should be beneficial in terms of reducing mortality and morbidity; and the prevalence of the preclinical disease should be high among the population screened [81]. In the context of these guidelines, any screening process should identify all or most of those who have delirium, be cost effective, ethical, and ideally should be inexpensive, easy to administer and impose minimal discomfort to the patients. The test used must be reliable, valid and reproducible.

Under-recognition is a major issue in the diagnosis of delirium, and yet there is some evidence to suggest that early detection improves outcomes such as duration of delirium and length of hospital stay [38, 82]. In health care services where there is high risk of developing delirium, a formalised process for the screening of delirium may assist in improving recognition rates and ultimately improvement in health outcomes. Screening is a strategy to support the detection of delirium, and should not be considered a stand-alone diagnostic process. The screening process for delirium involves the use of cognitive function assessment, and may include the following steps:

- Baseline cognitive assessment
- Regular repeated cognitive assessment and
- May be followed by a diagnostic process.

1.5.1 Baseline cognitive function

One of the first steps in diagnosing delirium is determining whether there has been an acute, sudden change from 'usual' cognitive function. Establishing an older person's baseline cognitive function and then reassessing when a change in behaviour or cognition is noted (by staff or family) may assist clinicians to diagnose episodes of delirium that would otherwise go undetected (see Figure 3). The baseline and repeated cognitive assessment may involve the use of a structured cognitive assessment tool such as the MMSE or AMT. However there are limitations around the use of these tools with culturally and linguistically diverse (CALD) groups and more culturally appropriate tools may be used. It is preferable to use a valid and reliable tool, without modifications.

Formal cognitive function assessment, performed as part of the routine admission to a health care setting, will assist in identifying people with cognitive impairment – both pre-existing dementia, and new cases that may be delirium. The baseline cognitive assessment can also be used as part of a risk assessment process, as dementia is one of the main risk factors for the development of delirium (*See Section 2.1 for details of risk factors*).

1.5.2 When to repeat the cognitive function assessment

The frequency of repeating the cognitive function assessment is dependent on factors such as the known prevalence or incidence of delirium in the health care services or settings; the individual risk of developing delirium; and its cost effectiveness. For example, in areas where the known prevalence or incidence of delirium is high, such as after orthopaedic surgery and coronary artery bypass graft (CABG) surgery, the application of regular repeated cognitive assessment might be a cost effective strategy to screen for delirium. In settings or services where the risk of developing delirium is low, the use of repeated cognitive assessment to screen for delirium may not prove cost effective. In these settings, it would be more beneficial to repeat the cognitive assessment when there is:

- An abrupt or sudden change in the person's behaviour or cognition
- A deterioration in the person's general condition or
- A sudden decline in the person's ability to perform ADLs.

The decision to perform a repeat cognitive assessment, in low risk settings, may also be dependent on other factors such as training in the performance of cognitive assessment, familiarity with the person, level of expertise of staff in recognising delirium, and the availability of/access to medical or nursing staff. There are two options, across all health care settings, to address an observed change in cognition or behaviour (observed by staff or family) – repeat the cognitive assessment and/or seek further expertise. The influence of setting on screening for delirium is discussed further in *Section 1.7*.

A decline in cognitive function, as may be indicated by a drop in cognitive assessment score, is a trigger to suspect delirium and commence the processes involved in the formal diagnosis of delirium.

1.5.3 Summary of the literature on cognitive function tests used to screen for delirium

Only two articles of moderate to high quality were identified that used a tool to screen for delirium. Both studies used cognitive assessment tests administered sequentially to monitor for any change in score and both were conducted in the hospital setting, on acute medical wards for older people.

The most well conducted study indicated that serial mini mental state exam (MMSE) has high sensitivity and specificity for the detection of delirium (compared to the use of the CAM as a reference standard) [83]. A reduction of two or more points from the total baseline MMSE score, was considered a decline in cognitive function – 93% sensitivity, 90% specificity, positive likelihood ratio=8.9 (95% confidence interval 0.01 to 15.1). A rise of 3 or more points was the best determinant for detecting resolution of delirium.

The other study, also reasonably well conducted, showed that use of the abbreviated mental test (AMT) where a score of <8 is considered abnormal, has high sensitivity for the detection of delirium (92%), but only moderate specificity (65%) [84]. A change of 2 or more points in the serial measurements of AMT scores discriminated between delirious, demented and cognitively normal patients.

1.6 Diagnostic tools for delirium

A number of tools have also been developed to enable lay people and clinicians other than medical specialists to diagnose delirium. All the tools described below were developed by operationalising the DSM criteria for delirium. However, even with the use of these tools it may still be necessary to arrange for psychiatric consultation, and/or further medical consultation. Four diagnostic tools met the criteria for inclusion into this project's literature review, and a brief summary of each is presented below. There are differences between the tools with regard to who administers the tool and the training required for reliable administration but limited written information is available on specific training requirements. None of the tools have been validated in the Australian setting. Further information on the diagnostic tools is provided in *Appendix 3*.

1.6.1 Brief description of diagnostic tools for delirium

Confusion Assessment Method (CAM)

The CAM is a valid and reliable diagnostic tool for delirium. It was specifically designed for use with the hospitalised older person, to improve delirium identification and recognition. It provides a standardised method to enable non-psychiatric clinicians to detect delirium quickly. The CAM was developed by Inouye et al in 1988-1990 [13] and its performance attributes have been assessed in a number of studies [11-13, 85].

Confusion Assessment Method – Intensive Care Unit (CAM-ICU)

The CAM-ICU is a modified version of the CAM intended for use in intensive care units. CAM-ICU is a delirium assessment instrument for use by nurses and physicians, and comprises standardised non-verbal assessments for mechanically ventilated and non-ventilated ICU patients. It was developed by Ely et al in 1999 and its performance attributes have been assessed by its developers in two studies [14, 15].

Delirium Symptom Interview (DSI)

The DSI is an interview protocol for assessing the seven symptom domains delineated by the DSM-III criteria for delirium. It was developed by Albert et al in 1990-1992 and was designed to be administered (on a daily basis) to hospitalised older people by non-clinicians. The DSI is meant to be used in combination with other data to define cases of delirium and as an alternative to the DSM-III or DSM-III-R diagnostic criteria. Only one study has assessed its performance attributes [16].

Delirium Rating Scale (DRS)

Although, the DRS was originally developed to 'rate the symptoms' of delirium, not as a diagnostic instrument [78], the study by Rosen et al (1994) assessed the DRS for its ability to accurately diagnose delirium when administered by research clinicians [17]. A number of studies have assessed the performance attributes of this instrument when used as originally intended [78, 79].

1.6.2 Summary of the literature on diagnostic tools for delirium

Well-conducted studies show that the CAM, CAM-ICU and DSI have high sensitivity (low number of false negative results) and specificity (low number of false positive results) for the diagnosis of delirium when compared to operationalising the delirium DSM criteria. All these tools require training prior to their use. The studies that assessed these tools took place in an acute hospital setting and most involved small sample sizes. The studies varied with regard to who administered the tests, with the CAM and CAM-ICU being tested for use by both nursing and medical staff, and the DSI being tested for use by lay interviewers. No Australian studies using the instruments were identified. All these factors make it difficult to generalise the results to Australian health care settings, in particular the subacute, residential care and community care settings where these tools have not been evaluated at all.

- The CAM has been assessed in a number of studies, in different hospital settings and with different personnel (medical or nursing) [11-13, 85]. Reported sensitivity and specificity varied across the studies reviewed – 70-100% and 84-100% respectively.
- The CAM-ICU has been assessed in two well conducted studies with both ICU nursing and medical staff using the tool [14, 15]. Sensitivity values of 93-100% and specificity values of 89-100% were reported.
- The DSI is the only tool that has been assessed for administration by a lay interviewer [16]. When compared to a psychiatrist or neurologist diagnosis, the reported sensitivity was 90% and the specificity was 80%.
- Use of the DRS for diagnosing delirium did not perform as consistently as the instruments described above. The one study identified reported sensitivity of 82% and 94%, and specificity of 33% and 99%. Further research, which ensures that assessors are blinded to the results, is required [17].

1.7 Influence of setting on screening for delirium and diagnosing delirium

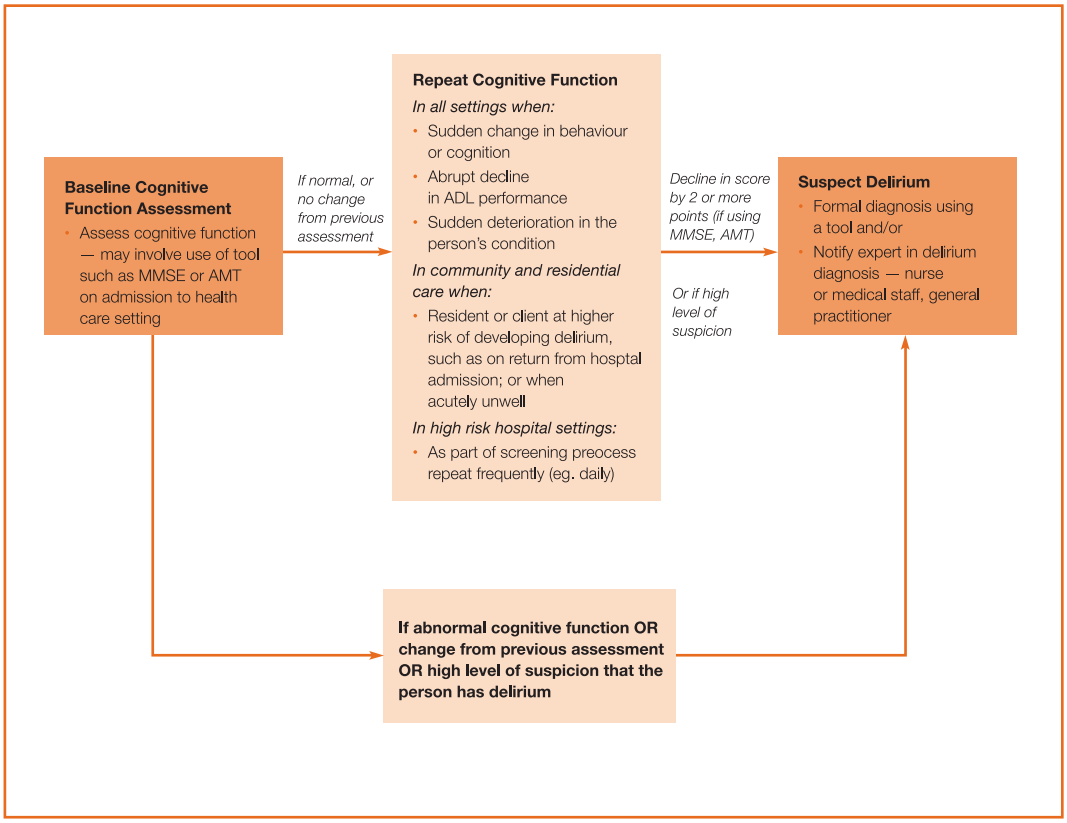
The method by which delirium is diagnosed is likely to be influenced by staffing levels and resources available in a particular health care setting. A formal cognitive assessment already forms part of the admission process for older people in a number of settings. It has been shown that serial or repeated application of cognitive assessment tools (serial AMT or serial MMSE) can be used to monitor cognitive status over time. While these tools are not specifically designed to diagnose delirium a sudden decline in cognitive function, as indicated by a drop in score, is a trigger to use a delirium diagnostic tool or seek further advice (see Figure 3 below). It should be noted there is no information in the literature regarding the cost of implementing delirium screening or diagnostic strategies. In addition, the studies that monitored cognitive status, using serial cognitive assessments, were conducted on acute medical wards in the hospital setting and there is no available literature regarding their use in other health care settings. Despite the lack of evidence, it follows that screening of all older people receiving care would improve delirium recognition and detection – a repeatedly discussed issue in the literature.

Instances when a cognitive assessment tool should be re-administered include:

- When a change is observed in an older person's behaviour or cognition – in all settings (including those seen at home by a GP)
- When a decline is observed in an older person's ability to perform activities of daily living (ADL) – in all settings (including those seen at home by a GP) or
- When an older person returns home (to the community or to residential care) from a hospital admission.

If an older person is showing the signs of delirium, and/or the clinician is highly suspicious that the person has delirium, it is appropriate to proceed to delirium diagnosis (see Figure 3). An MMSE score of <23/30, and AMT score of <8/10 is considered abnormal.

Figure 3 – Screening for delirium: the process involved



1.8 Evidence-based statements and recommendations

Evidence based statements

Screening for delirium

- There is some evidence that serial MMSE (administered on day 1, day 6 and at 6 weeks or discharge) can be used by registrars to screen for changes in the cognitive status of acute geriatric ward patients. A fall of 2 or more points is an indication to test for delirium (level II, [83]).
- There is some evidence that serial AMT (administered on admission, 1 week and at 6 weeks or discharge) can be used to screen for changes in the cognitive status of acute geriatric ward patients. A fall of 2 or more points is an indication to test for delirium (level II, [84]).
- No robust studies were identified that investigated screening for changes in cognitive function in the community or residential care settings.

Delirium diagnosis

- The DSM-IV criteria are considered the 'gold standard' diagnostic tool for delirium, when administered by a medical specialist with appropriate training, such as a geriatrician, psychogeriatrician, or psychiatrist (expert opinion).
- The CAM has been validated for use by geriatricians and nursing staff to detect delirium in older general medical patients, geriatric outpatient clinics and acute geriatric patients (level II, [11-13]).
- The CAM-ICU has been validated for use by ICU nursing staff and intensivists to detect delirium in ICU patients (level II, [14, 15]).
- There is some evidence that DSI can be administered by lay assessors trained in its use, to detect delirium in older medical or surgical ward patients (level II, [16]).
- There is some evidence that DRS can be used by research clinicians to distinguish between delirious and non-delirious inpatients in an old age psychiatry unit (level III-2, [17]).
- There were no robust studies identified that investigated the use of diagnostic tools for diagnosing delirium in community or residential care settings.

Recommendations

All settings

- A structured process for screening and diagnosis of delirium should be established in all health care settings (expert opinion).
- A formal cognitive function assessment (which may include the use of a standard cognitive screening tool) should be performed on all older people as part of the routine admission process to all health care settings (expert opinion).
- Each of the tools recommended for screening and diagnosis of delirium require specific training (expert opinion).
- Where cognitive impairment is identified, health care workers should consult with family/carers with regard to whether a person's current cognitive state is a departure from their 'usual' status (expert opinion).

Hospital settings

Repeated cognitive assessment

- Serial MMSE or AMT, administered by a clinician trained in its use, on day 1, 6 and 6 weeks or discharge, can be used on acute geriatric wards to monitor cognitive function (grade C, [83, 84]).
- The application of repeated cognitive assessment, with the use of measures such as the MMSE or AMT, should be considered for hospital patients at high risk of developing delirium (for example cardiac and orthopaedic surgery patients). If there is a decline in score of 2 or more points, further assessment for delirium is indicated (expert opinion).
- In hospital services where there is low risk of patients developing delirium, cognitive assessment should be repeated if there is: a sudden change in a person's behaviour or cognition; a deterioration in the patient's condition; or a sudden decline in their ability to perform ADLs.

  A decline in MMSE or AMT score of 2 or more points indicates the need for further assessment for delirium and/or further referral for expert consultation (expert opinion).

Delirium diagnosis

- The DSM-IV criteria should be administered by a medical specialist with appropriate training (expert opinion).
- The CAM should be used by nursing and medical staff who have undergone a structured training program in its use (as recommended by the CAM developers) to diagnose delirium (grade B, [11-13]).
- The CAM-ICU should be used by intensive care nursing and medical staff who have undergone a structured training program in the use of the CAM (developed by the CAM authors) to diagnose delirium (grade B, [14, 15]).
- The DSI can be administered by lay assessors trained in its use, to detect delirium in older medical or surgical ward patients (grade C, [16]).
- The DRS can be used by clinicians trained in its use, to distinguish between delirious and non-delirious inpatients in an old age psychiatry unit (grade D, [17]).

Residential care and Community care settings

Baseline cognitive assessment

- General practitioners should consider conducting a cognitive assessment, using a validated tool (such as the AMT, MMSE or other culturally appropriate tool), as part of an annual Health Assessment for people aged 75 and over, or ATSI patients aged 55 and over, who receive care in the community (expert opinion).
- General practitioners should consider conducting a cognitive assessment, using a validated tool (such as the AMT, MMSE or other culturally appropriate tool), as part of a Comprehensive Medical Assessment[6] for people who are permanent residents of an aged care facility (expert opinion).

Repeated cognitive assessment

- A repeated cognitive assessment, using a validated tool such as the MMSE or AMT, should be considered if: there is a sudden change in a person's behaviour or cognition; there is a deterioration in the person's condition; there is a sudden decline in their ability to perform ADLs; or they have recently returned from a hospital admission. A decline in MMSE or AMT score of 2 or more points indicates the need for further assessment for delirium and/or further referral for expert consultation (expert opinion).

Delirium diagnosis

- If staff working in residential care and community care settings notice an abrupt change in the cognition or behaviour of a resident/client, a formal diagnostic process for delirium should be undertaken. This may involve administering a diagnostic tool such as the CAM or contacting a medical practitioner for a consultation (expert opinion).

[6] *The Comprehensive Medical Assessment is completed within six weeks of admission and repeated annually.*

Risk factors

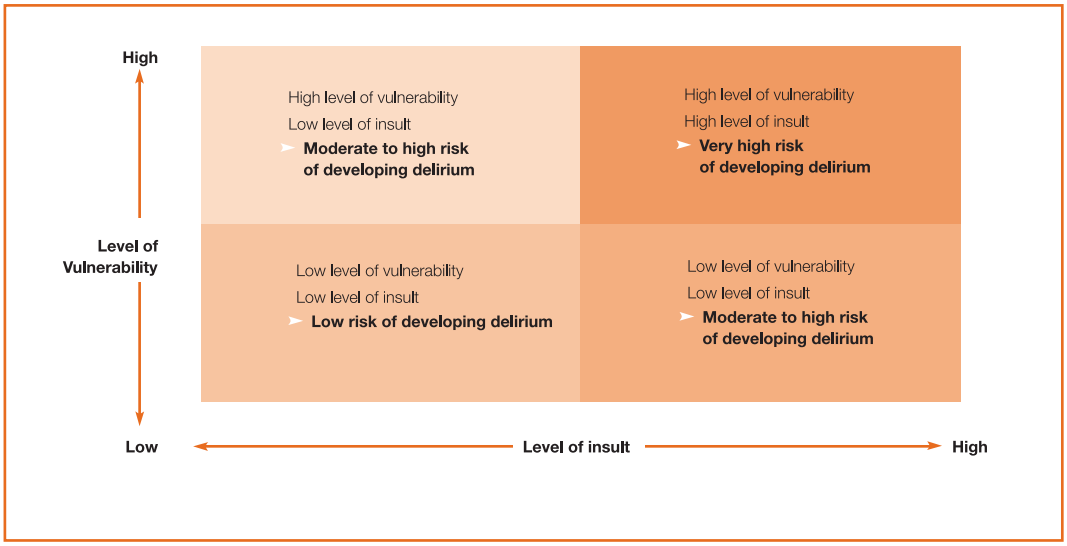
Risk factors for delirium: assessment and prediction 2

Risk factors for delirium may be modifiable (eg number of medications) or non-modifiable (eg age and gender), they may relate to the patient and their condition (eg septicaemia) or to the setting (eg procedural intervention such as catheterisation) and may be present on admission to a setting or develop during the admission. A large variety of risk factors for delirium have been investigated and are summarised in *Appendix 4*. Only those risk factors for which there is moderate to high-level evidence that they contribute to the development of delirium are discussed in this chapter.

2.1 Risk factors for delirium

Inouye (1996) describes delirium as a multifactorial syndrome which involves a complex relationship between two types of risk factors – predisposing factors and precipitating factors. Predisposing factors are the baseline older person vulnerabilities such as pre-existing dementia, and precipitating factors are the acute and noxious insults experienced by an older person such as infection or surgery. The development of delirium results from a complex interrelationship between predisposing and precipitating factors. For example, in very vulnerable older persons, a much smaller insult may be required to produce delirium than in those without pre-existing vulnerabilities [25]. See Figure 4 below.

Figure 4 – The interrelationship between level of vulnerability and level of precipitating insult.



2.1.1 Summary of the literature on risk factors

Most of the literature about risk for delirium is based on hospital studies. Some studies have investigated a general population of admitted older persons whilst others investigated either specific populations, or specific risk factors within general or specific populations. Therefore, it is difficult to generalise findings from one health care setting to another or from one population to another.

- High level evidence suggests that the following risk factors on admission to acute care settings are associated with increased risk of developing delirium in hospitalised older patients:
  - Pre-existing cognitive impairment such as dementia (level I[20]), (level II [18, 21-24])
  - Depression (level I [20]), (level II [21])
  - Abnormal serum sodium (level I [20], (level II [21])
  - Visual impairment (level I [20]) and
  - Age 70 years or more (level II[18, 19]); **or** increasing age (level I [20]), [21, 23]).
- There is relatively strong evidence that the following factors are associated with increased risk of developing post-operative delirium:
- Exposure to pethidine (meperidine) (level NA [26])
- Exposure to benzodiazepine, with long acting benzodiazepines having a stronger association with delirium than short acting preparations (level II [27])
- A previous history of delirium (level II [18])
- Alcohol related health concerns (level II [18])
- Pre-operative use of narcotic analgesics (level II [18]) and
- Admission to neurosurgery (level II [18]).
- In older hospitalised patients, the risk of delirium decreased greatly after day 9 [25].
- In older hip surgical patients, most cases of incident delirium occurred during post operative days 2-5 [21].
- The literature revealed many other potential risk factors for the development of delirium, in studies of intermediate quality [21, 23, 43, 48, 86]. These are included in *Appendix 4*. It may be useful for healthcare organisations to consider these other risk factors in their assessment protocols (as appropriate to their setting, population served and incidence of delirium).

2.2 Risk prediction models

Risk stratification allows identification of at-risk groups and may provide a basis on which to target at-risk older persons for specific interventions to prevent the development of delirium. Risk prediction models offer a standardised way in which to assess and stratify risk of incident delirium. These models may also be used to predict other clinical outcomes such as length of stay or mortality during hospitalisation.

2.2.1 Summary of the literature on risk prediction models

A limited number of studies have attempted to develop risk prediction models for patients admitted to acute geriatric units, general medical units, and elective non-cardiac surgery. The studies vary in the degree to which they assessed prevalent risk on admission and in-hospital risk factors, the latter limiting the utility of the prediction models for admission assessment. All the studies reviewed demonstrated methodological limitations. No risk prediction models have been developed for use in the Australian setting.

- Inouye and Charpentier (1996) developed and validated a prediction model that addressed hospitalisation-related factors – factors such as immobility due to use of physical restraints or a bladder catheter that may lead to a precipitating event such as a chest or urinary tract infection [25]. They described a risk prediction model for persons aged 70 years or more admitted to general medical wards, which included: the use of physical restraints; malnutrition; more than 3 medications added; use of bladder catheter; and any iatrogenic event. This study was well conducted, and the model differs to those described below in that it does not assess 'at-admission' risk factors but rather factors related to hospitalisation.
- Another study by Inouye et al (1993) reported on older persons admitted to general medical units. The risk prediction model of hospital admission predisposing factors included: vision impairment; severe illness; cognitive impairment; and high blood urea nitrogen/creatinine ratio [87]. The model successfully stratified older persons into low, medium and high risk. Study limitations reduce the model's generalisability in practice.
- Eight variables were included in the risk model for persons aged over 50 years, undergoing elective non-cardiac surgery including: age ≥ 70 years; alcohol abuse; impaired cognitive function; impaired physical function; markedly abnormal pre-operative sodium/potassium/glucose; aortic aneurysm surgery; and non-cardiac thoracic surgery [19]. This study included a large number of older persons in derivation and validation cohorts. Stratification of participants into low, medium, and high risk successfully predicted incident delirium.
- In older persons admitted to acute geriatric units [24] the risk prediction model included dementia, severe illness, and elevated serum urea. Although development and validation cohorts performed in a similar manner, the study was limited by the small number of older persons in derivation cohort (n=100), and there was limited information provided about performance attributes of the model.

2.3 Influence of setting on risk factors for delirium

One community based study and two studies in long-term care settings were identified. However, these studies were poorly designed and did not meet the guideline inclusion criteria. Risk factors discussed in these studies are included in Table 5 below which summarises potential risk factors according to the different health care settings.

Whilst there is no information pertaining to settings other than hospitals, it is suggested that the presence of the risk factors summarised in *Section 2.1.1* be considered in all settings, especially in older persons with pre-existing vulnerabilities (predisposing factors). Further, well-designed, risk factor assessment research is required in these settings.

It should also be noted there is no information in the literature regarding the cost to implement strategies to assess risk of delirium.

Table 6 – Risk factors according to the health care setting

Health care setting	Hospital – intensive care units, aged care wards, and neurology wards (based on published high level evidence*)	Hospital – surgical wards in particular orthopaedic, cardiac and neurosurgery wards (based on published high level evidence*)	Residential care and Community care (no published high level evidence)
Risk factors	• Pre-existing cognitive impairment including dementia • Severe medical illness • Age ≥ 70 years • Visual impairment • Depression • Abnormal sodium • Use of indwelling catheter • Use of physical restraints • Adding three or more medications during hospitalisation	• Pre-existing cognitive impairment including dementia • Severe medical illness • Age ≥ 70 years • Visual impairment • Depression • Abnormal sodium • Use of indwelling catheter • Use of physical restraints • Adding three or more medications during hospitalisation • Exposure to pethidine • Exposure to benzodiazepine • History of delirium • Alcohol related health concerns • Exposure to narcotic analgesics preoperatively	• Pre-existing cognitive impairment including dementia • Illness / infection • Age ≥ 70 year • Visual impairment • Depression • Abnormal serum sodium • Use of indwelling catheter • Use of physical restraints • Multiple medication use • Alcohol related health concerns • Exposure to benzodiazepine • Return from hospitalisation • Hearing impairment

* This list of risk factors has been collated from both risk factor and risk prediction model studies

2.4 Recommendations

All settings

- Risk for delirium should be assessed in all older persons admitted to a health care setting (expert opinion).
- Staff caring for older persons should be aware of the risk factors for the development of delirium as listed in Table 6 (expert opinion).
- Overall it is difficult to recommend risk prediction models based on the current knowledge. If healthcare settings choose to adopt a risk prediction model it is recommended that evaluation of the performance attributes within that setting be considered part of the implementation and evaluation plan (expert opinion).
- The use of physical restraints, indwelling catheters and multiple medication use have been identified as precipitants for delirium and their usage should be minimised (expert opinion).

Hospital settings

- Older people admitted to hospital settings where there is a higher incidence of delirium should be assessed for predisposing risk factors including: age 70 years or over (grade B, [18, 19]); pre-existing cognitive impairment (grade B, [20-25]); severe medical illness (grade C, [24, 25]); depression (grade B, [20, 21]); abnormal sodium (grade B, [20, 21]);and visual impairment (grade B, [20]).
- In addition to the risk factors described in the point above, older people admitted for surgical procedures should be assessed for the following surgery-related precipitating risk factors including: exposure to pethidine (grade B, [26]); exposure to benzodiazepine agents (grade B, [27]); previous history of delirium (grade B, [18]); alcohol related health concerns (grade B, [18]); pre-operative use of narcotic analgesics (grade B, [18]); and admission to neurosurgery (grade B, [18]).
- Risk prediction models have been developed and are available for use in non-cardiac elective surgery, general medical and acute geriatric units. However their utility in the Australian setting and in patient groups other than those listed, requires further evaluation. It is recommended that where healthcare organisations choose to apply existing risk models within their setting, they include evaluation of the performance attributes of the model (expert opinion).

Prevention

Prevention of delirium 3

3.1 Prevention strategies

Prevention of delirium refers to strategies that can effectively reduce the incidence of delirium, and ultimately improve health outcomes such as morbidity and mortality in older people at risk of delirium.

A small number of delirium prevention studies have been reported in the literature. The Yale Delirium Prevention Trial (described in detail below) reported the most successful outcomes. The majority of studies reviewed featured a multicomponent approach to delirium prevention; consistent with the aetiology of delirium being complex and multifactorial. The studies have focussed on addressing modifiable risk factors for delirium and were designed to reduce the number and/or the severity of precipitating risk factors. Some examples have been listed in Table 7.

Preventative interventions have been reported to include either: specialist medical or nursing staff consultation and provision of individual patient recommendations targeting multiple components of care; or a system-wide approach in which every patient in the intervention group receives the preventative strategy.

Table 7 – Strategies to prevent delirium

Environmental Strategies	Clinical Practice Strategies
• Lighting appropriate to time of day – windows with a view to outside, curtains and blinds open during the day, and minimal lighting at night may reduce disorientation • Provision of single room – reduces the disturbance caused by staff attending other patients in the same room • Quiet environment especially at rest times – noise reduction strategies (eg: use of vibrating pagers rather than call bells) • Provision of clock and calendar that clients can see • Encourage family and carer involvement – includes encouraging them to visit • Encourage family/carer to bring in client's personal and familiar objects • Avoid room changes – frequent changes may increase disorientation	• Encourage/assist with eating and drinking to ensure adequate intake • Ensure that patients who usually wear hearing and visual aids are assisted to use them • Regulation of bowel function – avoid constipation • Encourage and assist with regular mobilisation • Encourage independence in basic ADLs • Medication review • Promote relaxation and sufficient sleep – can be assisted by regular mobilisation, massage, encouraging wakefulness during the day • Manage discomfort or pain • Provide orienting information including name and role of staff members • Minimise use of indwelling catheters • Avoid use of physical restraints • Avoid psychoactive drugs (*see Appendix 5*) • Use of interpreters and other communication aids for CALD patients/clients • Use of ATSI liaison officer for ATSI populations

3.1.1 The Yale Delirium Trial and Hospitalised Elder Life Program (HELP)

The Yale Delirium Prevention Trial [29] was the first clinical controlled trial to show that delirium can be prevented in older hospitalised people. The intervention consisted of standardised protocols for the management of six delirium risk factors and was compared to usual care. The protocols included: a non-pharmacological regimen to normalise sleep patterns; cognitively stimulating activities provided three times daily; limiting the use of catheters and restraints; encouraging mobilisation and exercises; reorientation of the patient; early intervention to correct dehydration; and use of vision and hearing aids and removal of earwax.

The authors reported a significant reduction in the incidence of delirium ($p=0.02$), the total number of days with delirium ($p=0.02$), and the total number of episodes of delirium ($p=0.03$) in the intervention group compared to the control group. However, the intervention did not affect delirium severity or the recurrence rate once delirium occurred; and the intervention was most effective in the group assessed at intermediate risk for delirium. In the high risk group there was no statistically significant difference in the reduction of incident delirium. Study limitations include that subjects were not randomised into control and intervention groups increasing the risk of confounding. There was also potential for contamination in the usual care group, as some of the same staff treated patients from both groups and there may have been exchange of information (by word of mouth) across the wards.

The intervention was later modified to become what is now known as the Hospital Elder Life Program (HELP) – a model of care designed to prevent functional and cognitive decline in older people during hospitalisation [88]. This program utilises an interdisciplinary team and a highly trained and supervised group of volunteers [64]. It has been implemented in over thirty hospitals worldwide including one in Australia, and involves implementation of interventions that target six core risk factors for delirium (i) cognitive impairment; (ii) sleep deprivation; (iii) immobilisation; (iv) vision impairment; (v) hearing impairment; and (vi) dehydration [88].

3.1.2 Summary of the literature on prevention of delirium

Three systematic reviews of delirium prevention studies were identified [89-91] – two of which also assessed treatment strategies for delirium. All three systematic reviews included randomised controlled trials (RCT), clinical controlled trials and before-after studies. The review methodology varied according to the inclusion criteria used to select studies and the critical appraisal methods employed. The systematic reviews by Cole (1999) and Cole et al (1996) selected studies that included younger patient populations, whereas Milisen et al (2005) only included studies that focussed on older people.

The systematic reviews reported that there was variability in results of the prevention studies reviewed which was possibly due to differences in trial design, type of interventions, patient populations and selection and sample size. These factors made it difficult for the reviewers to generalise findings. Most of the studies that included older people featured an intervention involving patient review by a geriatric specialist nurse or geriatric physician.

An important study to note is the RCT by Marcantonio et al (2001). This was the only well designed level II study included in the systematic reviews. The study reported that patients with hip-fracture who underwent geriatrician review, pre-operatively and then daily during their post-operative hospital stay were less likely to develop delirium than patients who received usual care [28, 90].

In addition to the above mentioned systematic reviews, a further two randomised controlled trials were identified [92, 93]. An Australian study by Caplan et al (2005) assessed whether home-based multidisciplinary geriatric rehabilitation reduced the incidence of delirium when compared to hospital-based multidisciplinary geriatric rehabilitation [92]. The authors reported that there was a significantly lower incidence of delirium in the home-based intervention group during rehabilitation. However, a number of methodological issues in this study limit generalisation of the results. For example the assessors were not blinded to participant group allocation or outcomes which is a potential for bias.

The RCT by Kalisvaart et al (2005) compared the use of haloperidol prophylaxis versus placebo – commenced pre-operatively and continued for up to three days post-operatively – in patients aged 70 years and over admitted for elective or acute hip surgery [93]. There was no significant difference in the incidence of post-operative delirium. However, both the mean delirium severity score during the first 3 post-operative days, and the duration of delirium were significantly lower in the intervention group compared to the control group.

Overall the key findings of the literature review were:

- A number of prevention strategies, involving specialist geriatric nursing/medical intervention, have the potential to reduce the incidence of delirium [28, 29, 92], the duration of delirium [29, 82], and the severity of delirium [28, 29, 82, 90].
- Geriatric consultation with treatment recommendations provided pre- and post-hip surgery reduced the incidence of delirium (level II, [28]).
- Only one study assessed the long-term benefits of a delirium prevention strategy [94]. At 6 months post-discharge from hospital, the researchers found no significant differences between the intervention and control groups for 9 of the 10 outcomes assessed. The only significant difference was that fewer patients in the intervention group were incontinent at 6 months (p=0.02). Other outcomes assessed included further incidence of delirium, cognitive status, functional status and rehospitalisation rates.
- Only the Yale Delirium Prevention Trial by Inouye et al (1999) has undergone a comprehensive cost benefit analysis [62]. The authors reported that the intervention was cost effective for patients at intermediate risk of developing delirium, but that it was not cost effective for patients at high risk of developing delirium.
- Further research is required to comprehensively assess the cost benefits of other prevention strategies.

3.1.3 Additional Australian prevention studies

Delirium prevention studies that have been, or are currently being, conducted in Australia, include:

- Recruitment of Volunteers to Improve Vitality of the Elderly (REVIVE).
  This study tested the strategies used in the Yale Delirium Prevention Trial when applied to an Australian hospital setting [95]. The trial involved a before and after study design set in a geriatric unit of a tertiary referral hospital in New South Wales. It found that when compared to the control group, the intervention group had a significantly lower incidence of delirium; and a significantly reduced severity of delirium.
- Does enhanced exercise and cognitive program reduce incident delirium?
  A randomised controlled trial is currently being undertaken at the Northern Hospital, Melbourne. It commenced in May 2005 and is planned to be completed at the end of 2007. Medical inpatients aged 65 and over, who are delirium-free on assessment, are randomised to the intervention or control group. The intervention is a delirium prevention strategy involving a twice daily (weekdays) physical and cognitive program. Participants are assessed by a physiotherapist who tailors a program to their individual mobility and strength needs. The cognitive intervention is a simple, standardised orientation protocol. Both components of the intervention are delivered by an allied health assistant, while the control group receives usual care. Assessments for incident delirium are performed 48 hourly throughout the participants' hospital admission [96].

3.2 Influence of setting on prevention strategies

Residential care provides greater opportunity for residents' family and friends to assist with providing some care and familiarity for the resident than the hospital setting. There tends to be more flexibility with visiting hours, social activities and assisting with ADLs in residential care facilities than in the hospital setting.

The routine of hospitals also differs from residential care – noise levels are often higher in hospital settings, lighting may be kept on during the night, and sleep disturbances may occur more frequently due to the need for overnight monitoring.

Current hospital environments and practices rarely facilitate the measures outlined in Table 7. In building new facilities, it would be valuable to consider the following modifications:

- Provision of natural lighting
- Placement of utility rooms (eg pan flushers) to reduce the amount of noise that carries into patient rooms
- Floor surfaces – materials that absorb noise
- Additional single rooms with ensuite
- Fewer 4-bed and increased number 2-bed rooms.

Other items that may be able to be addressed without major reconstruction include:

- Provision of fold-out beds to allow family members the option of staying overnight
- Use of vibrating pagers at night rather than call bells.

In addition, for all settings stable staffing affords services with better opportunities for training of staff around delirium and for better supporting of family efforts.

As mentioned above, a number of studies have assessed the use of specialist geriatrician and/or nursing consultation to prevent delirium, and one well designed RCT found that it did reduce the incidence of delirium. It is recognised that not all hospitals/hospital units will have ready access to specialist geriatric nursing or medical staff but these services should be utilised when available. Although not directly related to delirium, risk stratification – based on risk of post-operative complications – may aid in targeting the use of specialist geriatric staff to review older surgical patients pre- and post-operatively.

It should also be noted there is little information in the literature regarding the cost of implementing strategies to prevent delirium. Only the Yale Delirium Prevention Trial has undergone a comprehensive cost analysis.

3.3 Evidence based statements and recommendations

Evidence based statements

Prevention of delirium

- A number of multifactorial prevention strategies, involving specialist geriatric nursing/medical intervention, have the potential to reduce the incidence of delirium (level II, [28]), the duration of delirium (level III-2, [29, 82]), and the severity of delirium (level II, [28]; level III-2, [28, 29, 82, 90]).
- A well designed clinical controlled trial applying multicomponent strategies aimed at addressing: (i) cognitive impairment; (ii) sleep deprivation; (iii) immobilisation; (iv) vision impairment; (v) hearing impairment; and (vi) dehydration; as implemented by trained volunteers under the supervision of medical and/or nursing geriatric specialists, has shown a significant reduction in the incidence of delirium (p=0.02), the duration of delirium (p=0.02) and the total number of episodes of delirium (p=0.03) (level III-2,[29]). It should be noted that the use of volunteers requires careful consideration. It is difficult to generalise from the American to the Australian context as available volunteers may differ. In addition, supervising a volunteer workforce is resource intensive and comprises ethical and occupational health and safety issues, thus it may be more appropriate to utilise resources to up-skill existing health care workers.
- There is some evidence that commencing haloperidol pre-operatively – as a prophylaxis to prevent post-operative – delirium does not reduce the incidence of delirium, but may have an effect on the duration of the episode and length of hospital stay (level II,[93]).
- An Australian study has provided some evidence that rehabilitation in the home reduces the incidence of delirium when compared to hospital-based rehabilitation (level II, [92]).

Recommendations

All settings

- Preventative environmental and clinical practice strategies outlined in Table 7 should be incorporated into the care plan of all older people, across all health care settings, to reduce their risk of developing delirium (expert opinion).

Hospital settings

- Older orthopaedic surgery patients should be reviewed by a geriatrician pre-operatively or within 24 hours after surgery, and then post-operatively on a daily basis for five days (grade B, [28]).
- Where resources are available, older surgical patients should be reviewed by a geriatrician at least pre-operatively and post-operatively (expert opinion).
- Multicomponent delirium prevention strategies targeting: (i) cognitive impairment; (ii) sleep deprivation; (iii) immobilisation; (iv) vision impairment; (v) hearing impairment; and (vi) dehydration; as implemented by trained volunteers under the supervision of medical and/or nursing geriatric specialists, may be considered for use with older hospitalised patients (grade C, [29])[7].
- Training should be provided to assist health care workers, who care for older people, to implement multicomponent delirium prevention strategies targeting (i) cognitive impairment; (ii) sleep deprivation; (iii) immobilisation; (iv) vision impairment; (v) hearing impairment; and (vi) dehydration (expert opinion).

[7] *The use of volunteers requires careful consideration – it is difficult to generalise from the American to the Australian context as available volunteers may differ, supervising a volunteer workforce is resource intensive, and it may be more appropriate to utilise resources to up-skill existing health care workers.*

Management

Management of delirium 4

Management of delirium: identifying the cause, managing the symptoms of delirium and preventing complications

Although prevention of delirium is a major focus of these guidelines, it is accepted that most cases of delirium in the hospital setting are not preventable [97, 98] and therefore effective management of established delirium is crucial. Delirium management requires a multifaceted approach. It necessitates careful attention to the person's pre-morbid health and functional status and an assessment of their current clinical status, as well as an assessment of environmental precipitants. Management entails communication with the person themselves, their carer/family and multiple health professionals. During an episode of delirium people require careful monitoring and review. Education and follow-up is also important to monitor resolution and address modifiable risk for future episodes of delirium.

4.1 Management of delirium

In patients with a confirmed diagnosis of delirium, or in those for whom there is a high level of clinical suspicion, the following steps are generally required:

- Identify the cause of delirium where possible
- Address the cause and any precipitating factors for delirium
- Manage the symptoms of delirium – non-pharmacological and pharmacological interventions;
- Provide a supportive care environment – psychological, physical and sensory support
- Prevent complications and
- Educate the patient/client and their carers/family.

4.2 Identify and address the cause of delirium

In order to identify and address the cause of delirium, a comprehensive initial evaluation should be performed that includes the following components [3, 7]:

(i) Obtain history

- Medication
  - recent changes
  - include prescription and over-the-counter medications
- Dehydration – diuretics use, hot weather
- Falls
- Infection
- Bladder and bowel function
- Premorbid cognitive and functional status
- Alcohol history
- Past medical history and comorbidities
- Social history
- History of dietary and fluid intake
- Sensory impairments

This information can be obtained from a number of sources such as documented in medical record from previous admissions; and consultation with the person with delirium, their general practitioner and/or carer/family members. People with delirium may provide unreliable histories and information should be sought from family members, GP, residential care staff, etc.

(ii) Examination

- Obtain vital signs – temperature, pulse, respirations, blood pressure (lying and standing), and oxygen saturation
- Mental state examination
  - Decreased arousal
  - Decreased attention
  - Disorientation
- Neurological examination
  - New signs
- Chest
  - Auscultation
  - Cough

- Abdomen
  - Palpable faeces/faecal impaction
  - Palpable bladder/urinary retention
- Skin
  - Lesions
  - Signs of dehydration

(iii) Investigations

The following investigations are used to screen for common causes of delirium:

- Urinalysis and MSU (if urinalysis abnormal)
- Full blood examination
- Urea and electrolytes
- Glucose
- Calcium
- Liver function tests
- Chest x-ray
- Cardiac enzymes
- ECG

Further investigations will be dependant upon clinical features and expert consultant advice, and may include:

- Specific cultures eg blood and sputum (if fever present, cough and/or abnormal chest radiograph)
- Arterial blood gases (if short of breath, cough and/or abnormal chest radiograph)
- CT brain (if history of falls, patient/client on anticoagulant therapy or focal neurological signs present)
- Lumbar puncture (if headache and fever and meningism present)
- EEG (may assist in determining aetiology eg non-convulsive status epilepticus)
- Thyroid function tests
- B12 and folate

4.2.1 Tips for identifying the cause of delirium

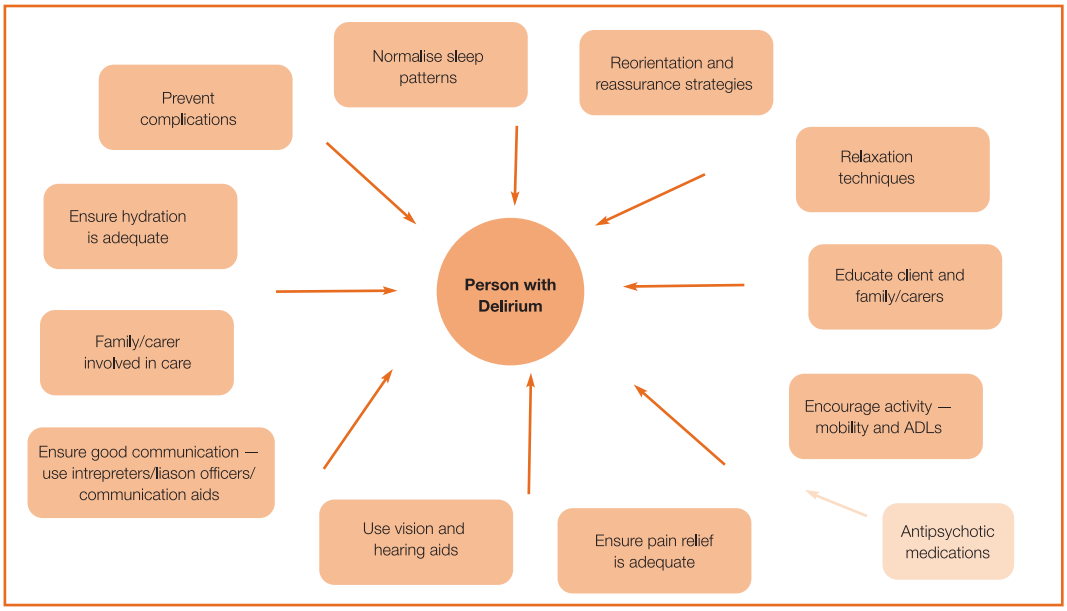
Start with critical management issues

- Has hypoxia been ruled out?
- Has hypotension been ruled out?
- Has hypoglycaemia been ruled out?
- Has major electrolyte disturbance been ruled out?
- Has a history regarding all the medications currently taken been obtained?
- Has an infection been ruled out?
- Has urinary retention been ruled out?
- Has constipation and faecal impaction been ruled out?
- If person agitated/distressed; have pain, thirst, and hunger been ruled out?
- Is an alcohol withdrawal syndrome possible? If yes, refer to the Management of alcohol withdrawal delirium guidelines (see *Useful resources* section).

4.3 Management of symptoms

The main approach to management of the delirious patient is nursing care based. Various non-pharmacological and pharmacological interventions have been designed to treat the symptoms of delirium (see Figure 5 below).

Figure 5 – Multicomponent management of delirium symptoms



Many of the non-pharmacological strategies to manage delirium symptoms are the same as those used to prevent delirium (see Table 7). In addition to the prevention strategies the following measures aimed at reorientating and reassuring the person with delirium may be considered (described further in *Section 4.4*):

- the use of a support person who has been trained in how to care for people with delirium
- one-on-one nursing – by staff with training in delirium care
- employing validation and reality orientation strategies
- allowing family members to stay with the patient/client including overnight
- endeavouring for the same staff members to care for the patient during and across shifts and
- providing relaxation strategies to assist with sleep.

Antipsychotic medication is indicated to treat behavioural disturbance (eg severe agitation) and/or emotional disturbance (eg severe anxiety) in delirium when: it is causing significant distress to the patient; it is placing them or others at risk; it is preventing essential investigations or treatment; and the symptoms cannot be managed using non-pharmacological methods [7, 60]. Antipsychotic medications can help relieve the anxiety, fear and hallucinations associated with delirium and produce a sedative effect, allowing the person to rest and be receptive to care giving. However, the over use of antipsychotic medication has the potential to be a perpetuating factor in the course of delirium through a reduction in ambulation, reduced oral intake and impaired communication.

There are obvious difficulties in obtaining informed consent from people with delirium, especially if they have a pre-existing dementia. It is imperative that family/carers are involved in decisions about treatment and management of symptoms.

4.3.1 Summary of the literature on non-pharmacological interventions to treat delirium symptoms

There is limited evidence regarding non-pharmacological interventions for the treatment of delirium. Three systematic reviews were identified [41, 89, 90], two of which also evaluated delirium prevention strategies. Also identified were a number of descriptive articles, outlining models of care for the management of delirium [97, 99]. The systematic reviews varied in their study inclusion criteria: the reviews by Milisen et al (2005) and Cole (1999) included both randomised and non-randomised controlled trials, whereas the review by Britton and Russell (2005) included only RCTs. Cole (1999) also included studies with younger patient populations and studies that assessed the effectiveness of strategies to improve delirium detection. There was some overlap across the systematic reviews, with the same studies being reviewed by each author. For example, Milisen et al (2005) and Britton and Russell (2005) both review the study by Cole et al (2002) [100]; and Milisen et al (2005) and Cole (1999) both review an earlier study by Cole et al (1994) [53].

Overall, the systematic reviews reported that most of the study interventions were aimed at the management of possible causes and precipitating factors of delirium, and involved specialist geriatric care staff (physician or nurse) providing recommendations for management (for example changes in medications and investigations to be carried out). In the well designed RCT by Cole et al (2002) [100], the intervention included daily visits to the patients by the study nurse (5 days a week)

to ensure that consultant recommendations and the nursing intervention protocol (involving environment, orientation, familiarity, communication and other activities) had been implemented. There was a non-significant trend toward a shorter time to improvement in the intervention group. This study was unable to demonstrate a significant difference between the two groups in time to improvement, rate of improvement, level of function, length of hospital stay, rate of discharge to the community or mortality rates. The authors suggested that the lack of differences observed between the intervention and control group may have been a result of a cross contamination effect (as patients from both groups were managed by the same staff). They also noted that the general standard of care (control group) was high; and the study was underpowered.

Articles reporting on clinical trials

The main finding from the systematic reviews described above and from an additional search and review of the literature included the following:

- Only two RCTs were identified in the literature: The intervention group in both studies received a consultation by a geriatrician/geriatric psychiatrist and treatment recommendations for the probable cause of delirium. To ensure the intervention protocol was being met, daily visits by a liaison nurse were also instituted. Both studies reported that the systematic detection and multidisciplinary care of delirium did not appear to be more beneficial than usual care for older patients admitted to medical services. The intervention had no significant effect on the time to improvement, or rate to improvement of delirium when compared to usual care [53, 100]. The limitations of these studies include the possibility of a contamination effect, as patients from the intervention and control groups were managed on the same units by the same staff.
- Three before-after designed studies were identified. One which involved the set-up of a unit that specialised in caring for cognitively impaired and delirious older people; one that provided medical staff with education about delirium; and one that provided continuous support and counselling by a nurse specialist plus periods in a rehabilitation centre to people who had experienced delirium. However the low quality of these studies precluded making any conclusions about the effectiveness of the interventions [32, 82, 101].
- There have not been any studies conducted that assess the long-term outcomes of delirium treatment interventions.
- No Australian based studies were identified.

Descriptive articles

Few models exist for the management of established delirium and those described in the literature, although currently in practice, are yet to have clinical outcomes and cost of implementation evaluated.

- The Delirium Abatement Protocol is a standardised approach to the management of delirium in older people admitted, from hospital, to post-acute facilities [97]. The protocol was developed following a systematic review of the delirium management literature during 1999-2000. It is a nurse-led intervention comprising use of a delirium symptom checklist on admission, assessment and treatment of possible causes of delirium, and strategies to prevent and manage

complications, and improve cognitive and ADL function. A multidisciplinary care plan is developed for each patient, based on his or her assessed needs.

- Wards with specially developed delirium rooms have been described in the literature. The key elements of the delirium room [99] include: the provision of 24-hour intensive nursing care for close observation; use of geriatric principles of care with a multidisciplinary team model; and a physical restraint free environment.

4.3.2 Tips for the management of delirium in patients with behavioural disturbances and/or emotional disturbances using non-pharmacological measures

Start general management with non-pharmacological measures.

- Has one-on-one nursing/support person – with training in delirium care – been arranged?
- Has the environment been modified to provide orienting information (dim lights at night time, bright light during the day, silence at night, calendar, clock etc)?
- Has assistance with orientation been sought from friends or relatives?
- Has the environment been modified to minimise risk of injury (nursed in a low bed in the lowest position, with cot sides down, bed against the wall, potential hazards such as bedside tables removed)? NO PHYSICAL RESTRAINTS
- Has routine mobilisation with physical assistance of one or two staff members been instituted?
- Have relaxation strategies to assist with sleep been instituted?
- ONLY ONCE THIS HAS ALL BEEN DONE, then consider pharmacological therapy.

4.3.3 Summary of the literature on pharmacological interventions to treat delirium symptoms

The current accepted professional standards for pharmacological management of delirium are the recommendations in the American Psychiatric Association (APA) guidelines [3, 9]. These were last updated in 2004. A further nine articles describing pharmacological interventions and published since 2004 were identified in the literature search for these guidelines; none were RCT identified and three were pseudo-randomised trials. Each study demonstrated a number of methodological limitations.

Summary of the APA guidelines

- Antipsychotic medications have been considered the medication of choice for the treatment of delirium for some time. However evidence for their efficacy has come from uncontrolled trials and numerous case reports. A series of controlled trials in geriatric and medically ill patient populations have been conducted but these studies failed to clearly define delirium.
- The use of first-generation antipsychotic medications (such as haloperidol) can be associated with neurological side effects and have occasionally been found to lengthen the QT interval (on ECG).

- Low doses of haloperidol (0.25-0.50 mg every 4 hours as needed) have been suggested for older people. Severely agitated patients may require titration to higher doses.
- A number of case and case series reports, and a limited number of open-label trials supporting the use of second-generation antipsychotic medications such as olanzapine, risperidone, ziprasidone and quetiapine have been reported. There is a clear need for prospective RCTs of these medications in the management of delirium.
- Geriatric patient populations are at greater risk of developing complications from benzodiazepine use. Long acting benzodiazepines, in particular, have been shown to increase the risk of delirium [102]. For this reason, avoidance of benzodiazepines is recommended except for particular indications (eg alcohol withdrawal delirium and delirium related to seizures).
- Cholinergic medications have limited use, almost exclusively in cases of delirium caused by anticholinergic medications.

From the literature review

- There is some low level evidence that donepezil may benefit older elective orthopaedic surgery patients with post-operative delirium (level III-1,[103]).
- There is some low level evidence that both olanzapine and haloperidol are effective in treating delirium in critical care patients. However, this study (comprising 12 patients) reported that use of haloperidol was more likely to lead to the development of extrapyramidal signs – significance levels not reported (level III-2,[104]).
- There is some evidence that there are no significant differences in the efficacy or response rate between haloperidol and risperidone in the treatment of delirium (level III-1,[105]).
- Three low level studies (observational or case reports) reported that risperidone may improve symptoms in patients with delirium [106-108].
- A case report found that donepezil improved severe delirium [109].

4.3.4 Pharmacological management of delirious patients with severe behavioural disturbance and/or severe emotional disturbance

Pharmacological therapy should only be considered in the delirious person with severe behavioural disturbance and/or severe emotional disturbance where their behaviour threatens their own safety or the safety of others, is likely to interfere with essential medical or nursing care, or where the disturbance is causing significant distress [110].

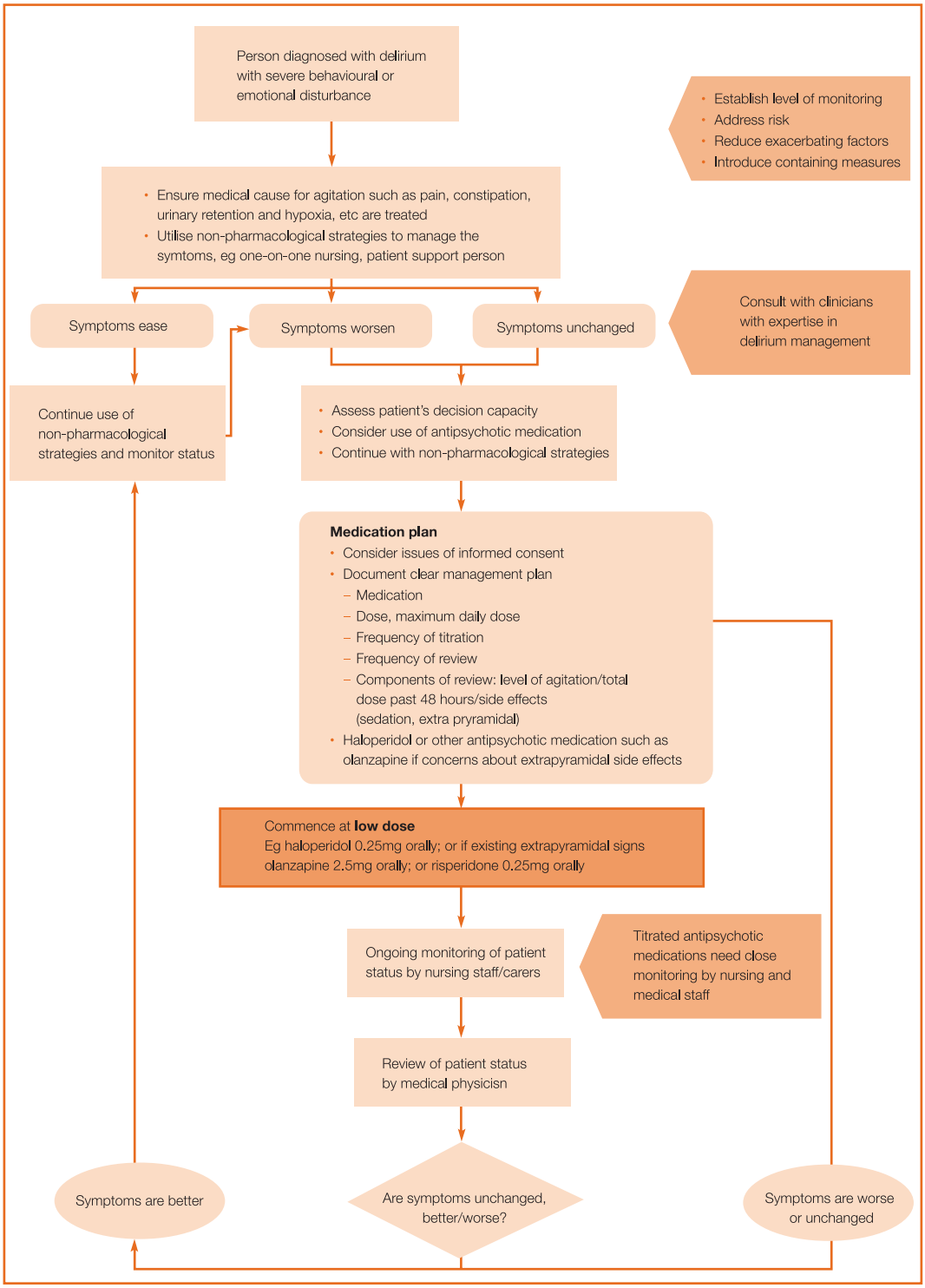
Pharmacological therapy should only be instituted after other (non-pharmacological) measures have failed to ease a person's symptoms. As with all people with delirium, management of those with severe disturbance will involve a multifaceted approach. That is, one which involves identification and treatment of the cause of delirium as well as treating the symptoms and preventing complications.

Figure 6 provides details of pharmacological management for people in whom other measures have failed. There is a role for first-generation antipsychotics such as haloperidol, and second-generation antipsychotics such as olanzapine and risperidone.

Important note – associated adverse drug reactions

Both first-generation and second-generation antipsychotic medications have potential side effects associated with their use, and close monitoring of the person and their condition is required. First generation antipsychotic medications have been associated with extrapyramidal side effects and a lengthened QT interval on ECG [3, 9]. Therefore, the use of second-generation antipsychotic medications should be considered for patients with existing extrapyramidal signs, such as those with Parkinson's disease or Lewy body dementia, to avoid worsening of their symptoms. It should also be noted that second generation antipsychotic medications have been associated with an increased risk of stroke in older patients with dementia [111].

Figure 6 – Pharmacological management of the delirious patient with severe behavioural or emotional disturbance



4.3.5 Tips for pharmacological management of severe behavioural and/or emotional disturbance related to delirium

Antipsychotic medication should only be used for the treatment of severe behavioural disturbance and/or severe emotional disturbances and when there is a clear intent for its use, for example severe agitation interfering with the sleep-wake cycle.

When used:

- The indication(s) for its use must be documented and reviewed regularly.
- Commencement of the antipsychotic should be accompanied by documented recommendations about: (i) the dosage of medication; (ii) the mode of medication delivery; and (iii) the frequency with which patient status is to be reviewed by a medical physician.
- The frequency of medical review will vary according to patient status. For example a patient with significant agitation may require 4 hourly medical review, and a patient with less significant agitation may require 8 hourly medical review.
- Titrated antipsychotics need to be closely monitored by nursing and medical staff. The dosage and frequency should be titrated carefully against the level of agitation at each review.
- Titration must commence from a low dose typically commencing with the equivalence of 0.25-0.50mg of haloperidol; olanzapine 2.5 mg orally; or risperidone 0.25 mg orally.
- It is important that nursing staff caring for patients on antipsychotic medication are able to consult regularly with medical staff.

4.4 Provide a supportive care environment; prevent complications; and educate client and their carers/family

In keeping with principles for the prevention of delirium, the provision of a supportive care environment for people with delirium is reported to be an essential component of their management. This includes providing adequate sensory, physical and psychological support [60]. It also includes being sensitive to the needs of ATSI and CALD older persons, which may involve the use of liaison officers, interpreters, use of communication aids, and greater involvement and communication with the family/carers.

Older people with delirium are at increased risk of complications and adverse outcomes such as falls and pressure ulcers [112]. For example, judgement and safety awareness may be impaired placing people with delirium at increased risk of falling or injuring themselves. Despite the increased risk of falls, physical restraint should be avoided as it has been shown to contribute to delirium [25] (refer to *Useful resources* section for *ASGM position statement 2 – Physical Restraint Use in Older People, and Decision making tool: Responding to issues of restraint in Aged Care*). In the hospital and residential care environment, immobility may result from the use of physical restraint and bed rails. In turn these factors may prevent the delirious person from not only ambulating, but also from eating and drinking without assistance; further complicating their condition. Strategies that reduce the risk of, or prevent, the complications associated with delirium should be incorporated into the person's care plan.

Provision of education to the person with delirium and their family/carer(s) is also an important component of care. Information regarding the diagnosis of delirium, cause (if available) and management plan should be communicated. Family involvement in care-giving can be comforting to the person with delirium and carers/family members should be informed about and encouraged to assist with physical care to their own level of comfort. For example: reorienting the person with delirium; encouraging or assisting them with meals and fluid intake; and ensuring that any visual or hearing aids are utilised (refer to the *Consumer brochure* section).

A recent discussion paper outlines the potential use of "delirium doulas" [113]. The term refers to a trained support person who provides information and physical and emotional assistance to women during childbirth and the authors propose that a similar role be implemented in the care of older hospitalised people experiencing delirium. They suggest that, among other things, trained support persons could provide stimulation and companionship, assist with dietary and fluid intake, encourage mobilisation, communicate the person's needs to staff, and reduce the need for restraint by providing reassurance, distraction, and reorientation. They could also provide emotional support and information about delirium to family and carers. Balas et al (2004) contend that, with appropriate training, volunteers would be able to take on the support person role; and suggest medical and nursing students as a potential source of volunteers [113].

In the hospital setting, care must be taken to ensure delirium has been properly investigated and treated before discharge [8]. The person who has experienced delirium and their family/carer(s) should be involved in the discharge planning process where possible and the person's GP should receive full details of their discharge status and planned services. Appropriate community supports and referral to follow-up services may be required. It is quite common for patients to be discharged from hospital settings without full resolution of delirium symptoms [57, 58]. In this situation, it is essential that the person's family, GP and other relevant service providers are informed of their status and ongoing professional monitoring, treatment and support is scheduled. In addition, it may be necessary to refer the person for a full cognitive assessment to determine whether they have dementia.

Two qualitative studies have shown that, not only can the experience of delirium be very unpleasant but people can often recall the episode in great detail and tend to be aware of their confusion at the time that it is happening [114, 115]. Respondents reported on aspects of care that they found helpful, during their episode of delirium. These included: having a relative with them; staff being reassuring and using short simple explanations and instructions; and being able to see a clock or watch (for orientation). The researchers suggested that staff caring for people with delirium should establish a communication strategy that incorporates elements of both reality orientation – reminding the person of their location and time of day, etc – and validation – responding to the person's feelings of anxiety, fear, etc. In both studies, participants showed great willingness to discuss their experiences and seemed much relieved by having the opportunity to do so, which led the researchers to suggest that post-delirium counselling be considered for all people who have experienced delirium [114, 115].

4.5 Staff educational strategies

As previously discussed, under-recognition of delirium, especially in older people, is common. Several studies have investigated the effects of staff education on outcomes such as recognition and documentation of delirium.

4.5.1 Summary of the literature – staff educational strategies

A before-after study by Tabet et al (2005) provided medical staff on the intervention ward with written management guidelines, a one-hour formal presentation and group discussion. Follow-up sessions were held to test staff knowledge and reinforce earlier learning. The study found that doctors on the intervention ward recognised and documented significantly more cases of delirium than those on the control ward [30].

Similarly Webster et al (1999) made management guidelines available to physicians caring for potentially delirious patients and, in a second phase, provided the treating physician with additional specialist geriatric physician/nurse consultation. It was only in Phase II that documentation of delirium improved on the intervention unit. Neurology and psychiatry consultations also decreased during that period. The authors reported that guidelines alone do not improve practice and that implementation needs to be accompanied by education and reinforcement of guideline aims [32].

Lacko et al (1999) utilised a standardised protocol for improving nurses' detection of delirium in a before-after study. The protocol comprised daily administration of the Orientation-Memory-Concentration (OMC) test, followed up by CAM administration to patients with OMC scores above a predetermined level (indicating confusion). Nurses on the intervention unit received training on how to follow the protocol and their recognition of delirium significantly improved during the study. In fact nursing staff chose to continue using the protocol after the study was completed [31].

4.6 Influence of settings on management of delirium

As with prevention strategies, the ability to implement some management strategies is likely to be easier in residential care, simply because there is greater flexibility in routines. Staff caring for the resident/client are also generally familiar to them and family and friends of residents are encouraged to assist with the provision of care.

The other main difference, between hospital and residential care settings, is that hospitals are noisy places and sleep disturbance is common. It is important that noise is kept to a minimum when caring for people with delirium, particularly overnight.

Mild behavioural or emotional disturbance in delirium can often be managed in community and residential care settings, and is usually jointly managed by the general practitioner and nursing staff. When the symptoms are more severe, referral to hospital is often required.

It should be noted there is no information in the literature regarding the cost to implement delirium management strategies.

4.7 Evidence based statements and recommendations

Evidence based statements

Management of symptoms

- No robust studies were identified that investigated pharmacological strategies for treatment of delirium.
- There is no strong evidence that antipsychotic medications are of benefit in the treatment of delirium symptoms. However, there is also no strong evidence that antipsychotics are not of benefit in the treatment of delirium symptoms.
- There is a role for first-generation (level III-3 and level IV, [3]; level III-2, [104]) and second-generation antipsychotics (level III-1 [103, 105]; level III-2 [104]; case reports [106-108]) in the treatment of severe behavioural and/or emotional disturbance symptoms in older people with delirium. There is a clear need for prospective RCTs of these medications in the management of delirium.
- There are potentially serious adverse effects associated with the use of first generation (lengthened QT interval) and second generation antipsychotic medications (stroke) [3, 9, 111].
- Older patient populations are at greater risk of developing complications from benzodiazepine use [3], and long acting benzodiazepines have been shown to increase risk of delirium in older people (level II, [102]). Benzodiazepines should be avoided, apart from particular indications (alcohol withdrawal delirium and delirium related to seizures) [3].
- A limited number of robust studies, investigating non-pharmacological strategies for treatment of delirium, were identified.
- Two RCTs assessing the effect of a multicomponent non-pharmacological intervention were unable to demonstrate a significant difference between the intervention and control groups in time to improvement, rate of improvement, level of function, length of hospital stay, rate of discharge to the community or mortality rates. The lack of differences observed between the intervention and control group may have been a result of a cross contamination effect (as patients from both groups were managed by the same staff), because the general standard of care (control group) was high, and because the study was underpowered (level II, [53, 100]).
- There is some low level evidence to support the use of non-pharmacological strategies to treat delirium symptoms (level III-3, [32, 82, 101]).
- Two qualitative studies examining patients' experience of delirium, found that communication strategies involving reorientation and reassurance were beneficial to people during the delirium episode. These studies indicated that people valued the opportunity to talk through their experiences and findings suggest that counselling may be of benefit to people who have experienced delirium (no applicable level of evidence, [104, 115]).

Staff education

- There is some evidence to show that educational strategies, aimed at increasing knowledge and awareness of delirium, can improve hospital staff recognition and documentation of delirium (level III-2 [30, 31]).
- Hospital-based delirium management guidelines, accompanied by education and reinforcement during their implementation, can improve recognition of delirium (level III-2 [32]).

Recommendations

Investigation and treatment of delirium cause

- The underlying cause of delirium should be investigated and precipitating factors treated (expert opinion).

Management of symptoms in all people with delirium

- Non-pharmacological strategies (such as those outlined in Table 7) should be incorporated into the care plan of all older persons with delirium across all health settings; and should always be utilised as a first-line strategy to manage the symptoms of delirium (expert opinion).
- Delirium is best managed by clinicians with expertise in delirium management, and in most cases should involve a multidisciplinary team (expert opinion).

Management of severe behavioural and/or emotional symptoms

- In addition to the non-pharmacological strategies, the following reorientation and reassurance strategies should be considered for people with severe behavioural and/or emotional symptoms: one-on-one nursing or the use of a trained support person; opportunity for family member/carer to remain with the patient at all times (including overnight); consistency of staff members caring for the person; and provision of relaxation strategies to assist with sleep (expert opinion).
- Specialised delirium rooms should be considered for delirium patients with severe behavioural and/or emotional disturbance (expert opinion).
- An expert psychiatric consultation should be considered for people with severe behavioural and/or emotional symptoms (expert opinion).
- The use of antipsychotic medications for the management of delirium in older people should be reserved for those cases where the person experiences severe behavioural and/or emotional disturbance symptoms (expert opinion).
- Caution should be exercised in prescribing antipsychotic medications to older people with delirium (expert opinion).
- When antipsychotic medications are indicated the following processes should be incorporated into the patient care plan:
- The indication(s) for its use must be documented and reviewed regularly
- Commencement of the antipsychotic should be accompanied by documented recommendations about: (i) the dosage of medication; (ii) the mode of medication delivery; and (iii) the frequency with which patient status is to be reviewed by a medical physician
- The frequency of medical review will vary according to patient status. For example a patient with significant agitation may require 4 hourly medical review, and a patient with less significant agitation may require 8 hourly medical review
- Titrated antipsychotics need to be closely monitored by nursing and medical staff. The dosage and frequency should be titrated carefully against the level of agitation at each review
- Titration must commence from a low dose typically commencing with the equivalence of 0.25-0.50mg of haloperidol; olanzapine 2.5 mg orally; or risperidone 0.25 mg orally
- It is important that nursing staff caring for patients on antipsychotic medication are able to consult regularly with medical staff.

Discharge planning and follow up

- Information about delirium should be made available to people who have experienced delirium and their family/carers (expert opinion).
- Discharge planning for people who have experienced delirium should include follow-up, professional monitoring, and treatment (expert opinion).
- Post delirium counselling should be considered for people who have experienced delirium (expert opinion).

Staff education

- Staff education strategies aimed at increasing knowledge and awareness about delirium in older people should be considered in all health care settings (hospital settings – grade D, [30, 31]; all other settings – expert opinion).
- Delirium management should be part of the basic curricula of medical, nursing and allied health university training, and be included in training of other care workers and ongoing professional development programs (expert opinion).
- Implementation of delirium management guidelines – accompanied by education and reinforcement – should be considered in all health care settings (hospital settings – grade D, [32]; all other settings – expert opinion).

Future directions

Future directions

Implications for research

These guidelines reflect the current available evidence base and its limitations. This document highlights the lack of research in delirium care, particularly in the areas of screening for delirium and symptom management. It also highlights a lack of research, including epidemiological research, in the Australian setting; of well designed research that focuses on the needs of the ATSI population; and well designed research in residential care and in community care settings.

There is a need for:

- Further epidemiological research pertaining to the Australian context.
- Research that involves ATSI subjects, both epidemiological and research that assesses the specific care needs in all areas of delirium management.
- Well designed studies that test the application of diagnostic tools across different health care settings, in particular in subacute, residential and community care; and different groups of health care workers.
- The development of a delirium screening tool that can be applied quickly and on a repeated basis. This tool must be culturally appropriate and applicable across the acute-aged care interface as well as in the community setting.
- Prevention and management studies in residential and community care settings.
- Further investigation of delirium risk factors in studies and settings outside those already described.
- Further assessment of existing risk prediction models and, in particular, regarding their applicability in the Australian setting.
- Studies that assess the costs and benefits of implementing the strategies for detection, risk assessment, prevention and treatment of delirium in older people in Australia across the varying health care settings are required. The Yale Delirium Prevention Trial is the only study that has undergone a comprehensive cost analysis.
- Review of DRG weighting for delirium as a principal diagnosis and as a complication, in terms of how these weightings reflect the cost of providing delirium care.
- Further research investigating the role of delirium severity scales in clinical practice.
- Research that investigates the implementation of educational strategies for staff working with older people other than hospital-based medical and nursing staff.
- Additional work about the different subtypes and severity of delirium, and the impact these have on outcomes.

Health care setting design

Environmental strategies that assist in preventing delirium should be considered in the design of new health care facilities, or redevelopment of existing facilities.

Education

Undergraduate curricula for medical, nursing and allied health professionals should comprise a program on delirium management in older people. Education programs for all community care and residential care workers should incorporate education appropriate to these roles about delirium management.

Delirium management should also be incorporated into ongoing professional development across disciplines and health care sectors. There is a need for team training in delirium management in all health care settings. Strategies for preventing, detecting and treating delirium should be built into usual clinical practice when caring for older people.

Guideline implementation

This document provides guidelines to assist in the care of older people with delirium and at risk of developing delirium. It does not provide strategies on how to implement the guideline recommendations, as the development of a toolkit for implementation was beyond the scope of the project. However, implementation planning specific to the needs of the setting is essential for effective uptake of guidelines recommendations, and the following should be considered.

Implementation planning requires:

- Establishment of an Implementation Team that includes a senior organisational sponsor and stakeholders in the management of delirium (including consumer/carer representatives)
- Consideration of prioritising recommendations to meet identified gaps within individual settings
- Mapping of barriers to implementation and planning strategies to address identified barriers
- Integrating implementation with existing organisational quality and safety framework, such as performance monitoring and accreditation, to ensure sustainability
- Planning evaluation early, including data to be collected, management, and feedback
- Tools and resources that may be required to support guideline implementation include:
  - Education and training for staff – a guideline teaching package
  - Electronic access to guidelines and teaching package and
  - Audit tool for monitoring key review criteria (for evaluation purposes).

The Registered Nursing Association of Ontario (RNAO) has published implementation tips, and organisation and policy recommendations for the implementation of *Screening for Delirium, Dementia and Depression in Older Adults* a nursing best practice guideline (see *Useful resources* for reference).

Appendices and references

Appendices and references

Appendices

Appendix 1: Process report

Appendix 2: Membership of the expert working group and steering group

Appendix 3: Summary of diagnostic tools

Appendix 4: Risk factors from the literature review

Appendix 5: Medications known to cause delirium

Appendix 1: Process report

A1.1 Development of the guidelines

The *Clinical Practice Guidelines for the Management of Delirium in Older People* have been developed under the direction of a multidisciplinary expert working group (the Delirium Clinical Guidelines Expert Working Group) and a steering committee (the Delirium Consultancy Steering Committee). See *Appendix 2* for details of membership.

A1.2 Consumer involvement

Two members of the expert working group represented consumers and were involved throughout the guideline development process. In addition, carers from Alzheimer's Australia (Victoria), some of whom had relatives who had previously experienced delirium; a representative of the Health Issues Centre La Trobe University; and consultation with the Onemda VicHealth Koori Health Unit, University of Melbourne and the Victorian Aboriginal Community Controlled Health Organisation were involved in reviewing the consumer brochure.

A1.3 Comprehensive searches and literature review

The methods used for the identification of relevant literature are described below. The process was guided by the National Health and Medical Research Council's Handbook series on preparing clinical practice guidelines[8].

Types of studies

All available systematic reviews, meta analyses, intervention studies and observational studies (cohort and case control studies) were considered for inclusion. Non-systematic reviews, comments, letters, case reports and editorials were excluded.

Types of participants

The studies considered for inclusion must comprise of older subjects, 65 years or older in the general population, and 45 years plus for the Aboriginal and Torres Strait Islander population, receiving care in the community, hospital or residential care settings. Delirium includes those with either prevalent or incident delirium. It excludes delirium tremens and terminal delirium.

[8] *National Health and Medical Research Council 'How to review the evidence: systematic identification and review of the scientific literature.' Commonwealth of Australia. Canberra, 2000.*

Types of interventions

- Risk factors of delirium - predisposing and precipitating factors
- Risk screening and risk assessment tools (predictive risk models) for delirium
- Diagnostic tools for delirium
- Screening tools for detection of delirium
- Non-pharmacological and pharmacological interventions for the treatment of symptoms and management of patients with delirium and
- Prevention strategies for those at risk of developing delirium.

Types of outcome measures

The outcomes measured will vary according to the type of interventions:

- Risk factors of delirium, risk screening and risk assessment tools (predictive risk models) for delirium - the outcome is the occurrence of delirium
- Diagnostic tools for delirium and screening tools for detection of delirium - the outcome are the performance characteristics of the test, and improved early recognition and diagnosis of delirium
- Non-pharmacological and pharmacological interventions for the treatment of symptoms and management of patients with delirium - the outcomes of interest include reduced morbidity and mortality, reduced hospital length of stay and readmission rates, reduce severity of delirium symptoms and
- Prevention strategies for those at risk of developing delirium - the outcomes are reduced incidence of delirium, and reduced rates of delirium recurrence.

Search databases

Searches were conducted using Ovid MEDLINE, Ovid CINAHL, Ovid PsychInfo and Cochrane systematic review and DARE databases. Searches were conducted on 21 and 22 February 2006 and 7 March 2006.

Search terms

Delirium as a medical subject heading (MeSH) was used for searching the Ovid databases, and as a keyword for searching the other databases.

Limits on search

The search was limited to English language and age group ≥ 65 years. Limits were placed on the year of publication from 1980-2006, as 1980 was the year that delirium was first defined as a diagnostic category in the Diagnostic Statistical Manual of Mental Disorders (DSM-III), American Psychiatric Association.

Other sources

Additional articles were identified by searching the reference lists of relevant studies. Subscription to "What's new for 'delirium' in PubMed" was also carried out, and involved monthly emails with updates on any new articles on delirium being sent to project staff. Grey literature and further references were also obtained by searching the web including the following websites:

- Australian Society for Geriatric Medicine
- American Geriatrics Society
- British Geriatrics Society
- American Psychiatric Association
- Hospital Elder Life Program (HELP)
- US National Guideline Clearinghouse

Methods of review, identification and selection of studies

A series of steps were taken to establish whether an article would be included or excluded in the literature review.

1. Review of title

The first stage of the article selection was performed by reviewing the title of the paper.

Inclusion criteria for title review:

To meet this stage of selection the title of the article must include one of the following words: "delirium" or "confusion" or "cognitive dysfunction/impairment" or "mental status dysfunction/impairment" or "acute organic brain syndrome".

2. Review of abstract

The second stage of the article selection was performed by reviewing the article abstract. Where abstracts were not available, the article was reviewed using the same inclusion and exclusion criteria as was used for the abstracts.

Inclusion criteria for abstract review:

To meet this stage of selection, the primary or secondary purpose of the study must be about one of the following areas:

- Risk factors of delirium
- Risk screening and risk assessment tools for delirium
- Diagnostic tools for delirium
- Screening tools for delirium
- Non-pharmacological and pharmacological (see information below) interventions for the treatment of symptoms and management of patients with delirium and
- Prevention strategies for those at risk of developing delirium.

Pharmacological studies:

The American Psychiatric Association's (APA) Practice Guidelines for the Treatment of Patients with Delirium[3] were developed in 1999 and updated in 2004 by Guideline Watch [9] using rigorous and systematic methodology. The expert working group recognised that the APA guidelines and the updated version included information from studies that met high and low levels of evidence, that is, it included randomised controlled trials, clinical controlled trials, case series and case reports. This information was used for descriptive purposes. However, the major recommendations about therapeutic efficacy were based on the results of high level evidence from randomised controlled trials. The Delirium Clinical Guidelines Working Group agreed that the pharmacological intervention recommendations of the APA guidelines would be appropriate for use in the delirium guidelines but that a systematic review of more recent evidence would be performed to include high level evidence obtained from articles written after 2004. As change in pharmacological efficacy recommendations would only be based on evidence from meta-analyses, systematic reviews or randomised controlled trials, a decision was made to perform critical appraisal only on high level evidence studies but to review other published lower level evidence for information pertaining to potential harm from pharmacological therapies.

In addition, a review of abstracts of articles published prior to 2004 was conducted to check all relevant articles had been included in the APA guidelines 2004 update. No articles were identified that had not been included in the update.

Other studies:

In general, these articles must also be one of the following study designs (*see Section 2.1 to 2.6 below for specific details of inclusion and exclusion criteria according to the area of delirium care*):

- Systematic reviews
- Meta analyses
- Intervention studies or
- Observational studies (cohort, cross section or case control studies)

Exclude studies with the following study design:

- Case reports
- Case series
- Comment
- Letters
- Editorials
- News
- Non systematic reviews (these are literature reviews that do not use systematic methodology)
- Discussion papers

Exclude papers on the following:

- Pathophysiology of delirium
- Neural or neurotransmitter mechanisms of delirium and
- Outcomes of delirium.

Where high quality guidelines, systematic reviews or meta analyses were identified, articles written prior to the date of that review's search strategy were excluded. For each area of delirium care, more detailed inclusion and exclusion criteria needed to be met. *See below.*

Risk factors

Question: What are the risk factors (see definition below) that contribute to the development of delirium in older people receiving care (in the community, hospital setting and residential care)?

Objectives: To determine the risk factors (see definition below) that contribute to delirium in the older population receiving care in the community, or hospital or residential care setting.

Definitions: Risk factors include predisposing factors and precipitating factors that increase risk of, or contribute to, the development of delirium.

Summary of inclusion/exclusion criteria for *retrieval of papers* relating to risk factors

	Include	Exclude
Types of studies	• Systematic review • Meta analysis • Clinical trials • Cohort • Case-control • Cross sectional	• Comments • Letters • Editorial • News • Case series • Non systematic review • Discussion papers
Primary or secondary objective of the study	• To assess predisposing factors of delirium and/or • To assess precipitating factors of delirium	• Incidence or prevalence of delirium only or • Outcomes of delirium only or • Pathophysiology of delirium or • Neurotransmitter/neurological mechanisms of delirium

Risk Screening and Risk Assessment

Questions: What are the performance attributes of risk screening or risk assessment tools (predictive risk models) that are currently used to identify and/or stratify older people at risk of developing delirium?

Definitions: Tools used to measure the level of risk (often low to high) an individual is at, of developing delirium and includes predictive risk models.

Summary of inclusion/exclusion criteria for *retrieval of papers* relating to risk screening and assessment tools

Types of studies	Include	Exclude
	• Systematic review • Meta analysis • Clinical trials • Cohort • Case-control • Cross sectional • Validation studies	• Comments • Letters • Editorial • News • Case series • Non systematic review • Discussion papers
Primary or secondary objective of the study	Include	Exclude
	• Risk assessment tools/strategies that identify those at risk of developing delirium or • Tools used for screening for risk factors to identify those at risk of developing delirium or • Tools that assess the level of risk of developing delirium	• Studies that do not use a tool/test/ predictive model

Diagnosis of delirium

Question: What are the performance attributes of diagnostic instruments used for diagnosing delirium in older people receiving care in the hospital, community and residential care setting?

Objectives: To determine what diagnostic tests will most accurately identify delirium in older people receiving care (in the community, hospital setting and residential care).

Definitions: Diagnostic instruments include instruments that address diagnosis of delirium and diagnostic tools that differentially diagnose other syndromes from delirium. Some examples include the CAM and DRS.

Summary of inclusion/exclusion criteria for *retrieval of papers* relating to diagnostic instruments

	Include	Exclude
Types of studies	• Systematic review • Meta analysis • Cross sectional • Cohort (includes validation studies)	• Comments • Letters • Editorial • News • Non systematic review • Discussion papers
Primary or secondary objective of the study	• To assess the diagnostic attributes of an instrument/tool compared to a gold standard diagnostic tool. The gold standard diagnostic tool is defined as the use of DSM IV criteria for delirium (or DSM III or DSM III-R depending on year study was conducted) by a clinical expert (psychiatrist, geriatrician or neurologist); OR clinical judgement and diagnosis by a clinical expert (psychiatrist, psychogeriatrician, geriatrician or neurologist).	• Incidence or prevalence of delirium only OR • Outcomes of delirium only OR • Pathophysiology of delirium OR • Neurotransmitter/neurological mechanisms of delirium
Other criteria	• The test of interest is compared to the gold standard defined above.	• Studies that do not compare to the gold standard test

Screening for delirium

Question: What are the performance attributes of screening instruments used for the monitoring of delirium in older people receiving care in the hospital, community and residential care setting?

Objectives: To determine what screening tools will most accurately monitor or screen for delirium in older people receiving care (as above).

Definition: Screening instruments include the use of instruments to monitor the cognitive status in those patients at risk of developing delirium. Some examples include the MMSE, AMTS, Clock drawing test.

Summary of inclusion/exclusion criteria for *retrieval of papers* relating to screening instruments

Types of studies	**Include**	**Exclude**
	• Systematic review • Meta analysis • Cross sectional • Cohort (includes validation studies)	• Comments • Letters • Editorial • News • Non systematic review • Discussion papers
Primary or secondary objective of the study	**Include**	**Exclude**
	• To assess the screening attributes of an instrument/tool compared to a gold standard (defined in 2.3 Diagnosis) or reference standard diagnostic tool defined as the Confusion Assessment Method (CAM) a widely used and accepted diagnostic tool.	• Incidence or prevalence of delirium only OR • Outcomes of delirium only OR • Pathophysiology of delirium OR • Neurotransmitter/neurological mechanisms of delirium
Other criteria	**Include**	**Exclude**
	• The test of interest is compared to the gold standard test or reference test as defined above.	• Studies that do not compare to the gold standard test or the reference test

Interventions for delirium

Questions: Are there effective pharmacological and non-pharmacological interventions for the treatment and management of older people with delirium receiving care (in the community, hospital setting and residential care)?

Objectives: To determine the effectiveness of interventions, both pharmacological and non-pharmacological, for the management of older patients with delirium in the hospital, community and residential care settings.

Definitions: Interventions include non-pharmacological and pharmacological interventions. Some examples of non-pharmacological interventions include staff interventions, orienting to time and place, education and family involvement in care. Pharmacological interventions include the use of first and second generation antipsychotic medications, and other medications for the treatment of symptoms that may result from delirium.

Summary of inclusion/exclusion criteria for *retrieval of papers* relating to pharmacological interventions:

Types of studies	Include Dates > 2004^	Exclude
	• Systematic review • Meta analysis • RCT	• Observational studies • Non randomised clinical trials • Non systematic reviews • Comments, letters etc
Primary or secondary objective of the study	**Include**	**Exclude**
	• To assess the effectiveness of a pharmacological intervention used to treat delirium	

^Articles published after 2004, as the APA guidelines were updated in 2004 (see details of Pharmacological studies).

Summary of inclusion/exclusion criteria for *retrieval of papers* relating to non-pharmacological interventions:

Types of studies	Include	Exclude
	• Systematic review • Meta analysis • Intervention studies – includes non randomised clinical trials, and those not blinded	• Comments, letters etc • Case reports • Case studies • Observational studies (will retrieve if no clinical trials found)
Primary or secondary objective of the study	Include	Exclude
	• To assess the effectiveness of the intervention(s) used to treat the symptoms of delirium • To assess the effectiveness of the intervention(s) used to manage the precipitating factor(s) of delirium and • To assess the effectiveness of intervention(s) for the early recognition of delirium by staff.	

Prevention of delirium

Question: Are there effective prevention strategies that reduce the incidence of delirium among the older people receiving care (in the community, hospital or residential care setting)?

Study population: Older persons at risk of delirium.

Objectives: To determine the effectiveness of interventions, both pharmacological and non-pharmacological, for the prevention of delirium in the older people receiving care (hospital, community and residential care settings).

Summary of inclusion/exclusion criteria for *retrieval of papers* relating to prevention of delirium

Types of studies	Include	Exclude
	• Systematic review • Meta analysis • Intervention studies – includes non randomised clinical trials	• Comments, letters etc • Case reports • Case studies • Observational studies (will retrieve if no clinical trials found)
Primary or secondary objective of the study	Include	Exclude
	• To assess the effectiveness of the intervention(s) used to prevent delirium. (The intervention may be a pharmacological or a non-pharmacological intervention.)	

3. Review of methods section of article

The final stage of article selection was performed by reviewing each article's methods section. A checklist was used to assess whether the inclusion criteria were met.

Inclusion criteria for all articles:

- All articles required to define delirium with the use of one of the following criteria:
  - the American Psychiatric Association's DSM-IV; DSM-III-R or DSM-III criteria or
  - with the use of the Confusion Assessment Method or
  - based on an assessment by a clinical expert (psychiatrist/psychogeriatrician/ geriatrician).
- The study population must be older patients, aged ≥65 years in the general population or ≥45 years in the Aboriginal and Torres Strait Islander population.

Articles that did not meet either of these criteria were excluded.

4. Critical appraisal of study

Articles that met the inclusion criteria or the methods section review then underwent a critical appraisal. The Scottish Intercollegiate Guidelines Network (SIGN) Methodology Checklists 1-5[9] were used for the critical appraisal. Each checklist includes an assessment of the methodological quality; summary of the key points about the study; and the study's applicability to the patient group targeted by the guidelines.

In addition, the National Health and Medical Research Council's additional levels of evidence and grades for recommendations for developers of guidelines[10] (Pilot Program 2005-2006) were used to rate each articles level of evidence.

A1.4 External review of the draft documents

External review was sought to include experts in the acute, subacute, residential care and community care settings as well as health care workers from medical, nursing, and allied health. Consumer groups were also invited to participate.

The external review involved two processes:

1. A structured written feedback document. The written feedback document was developed by the project team and was based on the Appraisal of Guidelines for Research and Evaluation (AGREE) instrument. Both general feedback on the guidelines and specific feedback on each of the chapters of the guidelines was sought.
2. Group teleconferences were held with a selection of external reviewers. Guideline implementation issues were discussed in particular issues in the different clinical settings, geographical settings, cost implications and organisational barriers.

The list of external reviewers, both national and international is below.

[9] *The Scottish Intercollegiate Guidelines Network (SIGN) Methodology Checklists 1-5 accessed online 21 March 2006: www.sign.ac.uk/methodology/checklists.html*

[10] *National Health and Medical Research Council additional levels of evidence and grades for recommendations for developers of guidelines, Pilot Program 2005-2006 accessed online 22 May 2006: www.nhmrc.gov.au/publications/_files/levels_grades05.pdf*

External reviewers

National

A/Prof Gideon Caplan	Geriatrician, Associate Professor (Conjoint), Department of Medicine, Prince of Wales Clinical School; Associate Professor (Conjoint), School of Public Health and Community Medicine, University of New South Wales, NSW.
Mr Stephen Harding	Clinical Nurse Consultant, Mental Health, RDNS, SA.
A/Prof Richard Harvey	Consultant Psychiatrist, Aged Care Psychiatry Service, Barwon Health, Corio Community Health Centre, VIC.
A/Prof Peter Hunter	President, Australian Society for Geriatric Medicine & Director of Aged Care Services, Bayside Health, VIC.
Ms Wendy Hubbard	Executive Director of Allied Health, Ballarat Health Services, VIC.
Ms Diane Jurd	Deputy Director of Care, Mountain View Aged Care Facility, Narrabundah, ACT.
Dr Sean Maher	Geriatrician, Department of Geriatric Medicine, Royal Perth Hospital WA.
Ms Anne Moehead	Dementia Care Clinical Nurse Consultant, North Coast Area Health Service, NSW.
Dr Christine Neville	Senior lecturer & Clinical School Coordinator, Department of Nursing and Midwifery, University of Southern Queensland, QLD.
Prof Daniel O'Connor	Clinical Director of Aged Persons Mental Health for Southern Health, VIC.
Prof Dimity Pond	General Practitioner, Discipline of General Practice, School of Medicine and Public Health, University of Newcastle, NSW.
Ms Julia Poole	Clinical Nurse Consultant in Aged Care, Department of Aged Care & Rehabilitation Medicine, Royal North Shore Hospital, NSW.
Ms Liz Rand	Occupational Therapist & Coordinator, Cognitive Dementia and Memory Service (CDAMS), Caulfield General Medical Centre, VIC.
Ms Judy Ratajec	Coordinator, Dementia Psycho-geriatric Care Unit, Uniting Church Frontier Services, Darwin, NT.
Mr Stewart Reed	Team Leader, Psychogeriatric Services, Mental Health South, Roy Fagan Centre, TAS.
Ms Carolyn Robinson	Dementia Assessor, Aged Care Assessment Team, Hobart, TAS.
Ms Debra Rowett	Pharmacist and Director, Drug & Therapeutic Information Service, Repatriation General Hospital SA.
Ms Jenny Stevens	Manager, Kimberley Aged and Community Services, WA.
Ms Marie Talbot	Social Worker, Metropolitan Domiciliary Care – Western Region, Woodville, SA.
Dr Mark Yates	Clinical Director, Sub-acute Medicine, Ballarat Health Services, VIC.

International

Dr Shaun O'Keeffe	Geriatrician, Department of Geriatric Medicine, Galway Regional Hospitals, Galway, Ireland.
Prof Martin Cole	Professor of Psychiatry, Department of Epidemiology and Biostatistics, McGill University & Department of Psychiatry, St. Mary's Hospital, Montreal, Quebec, Canada.

Discussion and feedback from the external review process included:

- Limitation of many of the recommendations due to lack of evidence
- Clarifying what was meant by gold standard diagnostic tool
- Amendments to proposed screening processes
- Lack of information around cost of implementing recommendations
- Need for audit tool development
- Concerns regarding access to MMSE because of copyright
- A number of suggested implementation strategies were identified including importance of educating staff as part of guideline implementation; and ensuring availability of recommended tools
- Two articles not identified in the original search, were brought to the attention of the project team – subsequent review determined that they did not meet inclusion criteria for critical appraisal and
- Suggestions for including further information on patient experiences of delirium, family involvement and CALD clients.

Appendix 2: Membership of the expert working group and steering group

Delirium Clinical Guidelines Expert Working Group

Members of the expert working group responsible for the development of these guidelines include:

Project Directors

Dr Caroline Brand	Director, Clinical Epidemiology and Health Service Evaluation Unit Melbourne Health, Victoria
Dr Tony Snell	Divisional Director of Medicine and Director of Aged Care Melbourne Health, Victoria
Professor Len Gray	Professor of Geriatric Medicine Australasian Centre on Ageing University of Queensland, Queensland

Project Technical Staff

Ms Jo Slee	Project Officer, Clinical Epidemiology and Health Service Evaluation Unit Melbourne Health, Victoria
Ms Jo Tropea	Project Officer & Physiotherapist,Clinical Epidemiology and Health Service Evaluation Unit Melbourne Health, Victoria

Project Expert Working Group

Ms Angela Crombie	Registered Nurse and Senior Research Officer, Bendigo Health Care Group, Victoria
Ms Dawn Kroemer	HCOASC Clinical Reference Group Representative, Senior Manager Transition Care Program Fullarton, South Australia
Associate Professor Peteris Darzins	Geriatrician and Epidemiologist Monash Ageing Research Centre, Victoria
Dr Dina LoGiudice	Geriatrician Melbourne Health, Victoria
Ms Nicole Doran	Senior Project Officer, Metropolitan Health and Aged Care Services Division, Victorian Department of Human Services; and Member of the Delirium Consultancy Steering Group
Dr Robert Malon	Divisional Medical Director Barwon Health, Victoria
Ms Diana Frew	Consumer representative from Melbourne Health Consumer Panel, Victoria
Associate Professor David Russell	Director of Department of General Medicine Melbourne Health, Victoria
Dr Alex Holmes	Psychiatrist Melbourne Health, Victoria

Ms Debra Parnell	Policy Officer Alzheimer's Australia (Victoria)
Dr Brendan Kay	HCOASC Clinical Reference Group Representative, General Practitioner Jamieson Street Medical Clinic Warrnambool, Victoria
Dr Mark Santini	General Practitioner and Director Ardmillan House Moonee Ponds, Victoria
Dr Jonathon Knott	Emergency Medicine Physician Melbourne Health, Victoria
Dr Vijaya Sundararajan	Senior Epidemiologist Clinical Epidemiology and Health Service Evaluation Unit Melbourne Health, Victoria

The role of the expert advisory working group was to assist the project directors and technical team in guideline scoping, content development and formatting of the product as well as advising on recommendations for implementation and evaluation.

This role involved:

- Preparatory reading and attendance at teleconferences
- Preparatory reading and attendance at face-to-face meetings
- Providing ad hoc expert input as required eg via email, telephone
- Reviewing draft documents/project outputs
- Advising on the key organisations and persons that may provide input into the project outputs including potential external reviewers
- Advising on peer reviewed and grey literature pertaining to their area of expertise

Delirium Consultancy Steering Group

Overall governance of the project was the responsibility of the HCOASC appointed steering group.

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Appendix 3: Summary of delirium diagnostic tools

Information is provided below on delirium specific tools. Similar information on the MMSE and AMT can be found in A guide for assessing older people in hospitals [6].

A3.1 Confusion Assessment Method (CAM)

Description and Purpose

CAM was specifically designed for use with older people, to improve the identification and recognition of delirium. It provides a standardised method to enable non-psychiatric clinicians to detect delirium quickly in high-risk settings. It was developed by Inouye, van Dyck, Alessi, et al in 1988-1990 and is now the most widely used instrument for detection in delirium worldwide.

Domains and items

The CAM involves a structured interview process and includes the use of the MMSE and Digit Span Test. It is based on the clinician's observations before, during or after the interview. It is not limited to the interview period alone.

It consists of a questionnaire that covers 10 areas: acute onset; inattention; disorganised thinking; altered level of consciousness; disorientation; memory impairment; perceptual disturbances; psychomotor agitation; psychomotor retardation; and altered sleep-wake cycle.

There is a shortened version worksheet which assesses 4 areas – acute onset and fluctuating course; inattention; disorganised thinking; and altered level of consciousness.

Administration

A training manual and coding guide is available [116], but additional training by an expert in delirium is strongly recommended. The rating takes 5-10 minutes, however this does not include the administration time for the structured cognitive assessment.

Psychometric properties

It has been validated in a number of studies. When the CAM was administered by geriatricians, and compared to the DSM-III-R criteria assessed by a psychiatrist, the sensitivity was 94-100%; and specificity was 90-95% [13]. This study also reported high inter rater reliability for assessing presence or absence of delirium k=1.00; and for assessing the four CAM features k=0.93.

Other studies have compared the CAM administered by nurse clinicians or by an investigator [11, 12, 85] to DSM criteria administered by a psychiatrist or geriatrician, and reported mixed results of sensitivity, with one study reporting only 13% sensitivity and the other two reporting high values

of 81% and 89%. Specificity values ranged from 84 to 100%. However, the study that reported the much lower sensitivity value was a poorly conducted study.

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A3.2 Confusion Assessment Method – Intensive Care Unit (CAM-ICU)

Description and Purpose

The CAM-ICU is a modified version of the CAM for use in intensive care. It incorporates non-verbal, objective assessment instruments, and was developed by Ely, Margolin, Francis, et al in 1999. CAM-ICU is a delirium assessment instrument for use by nurses and physicians, and uses standardised non-verbal assessments for mechanically ventilated and non-ventilated ICU patients. The features and descriptions of delirium are the same as the CAM.

Domains and items

Like the CAM it uses a structured approach – it incorporates clinician observations of the abilities of the patient and knowledge of the patient's former level of functioning. It involves a bedside evaluation and screening for cognitive and attention deficits with the use of the Attention Screening Examinations (ASE), the Cognitive Test for Delirium, and those with history of visual impairment also receive the Vigilance A Random Letter Test.

Administration

A CAM training manual and coding guide is available [116], but additional training by an expert in delirium is strongly recommended.

The rating takes 5-10 minutes, however this does not include the administration time for the structured cognitive assessments mentioned above.

Psychometric properties

There have been two studies conducted that have looked at the psychometric properties of the CAM-ICU. These studies assessed the CAM-ICU administered by nurses and intensivists, and compared it to the DSM-IV criteria administered by delirium experts (psychiatrist/geriatrician/neuropsychologist). It has high sensitivity 93-100% and high specificity 89-100%; as well as high inter rater reliability k=0.79-0.96 [14, 15].

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A3.3 Delirium Symptom Interview

Description and Purpose

An interview protocol for assessing the seven symptom domains delineated by the DSM-III criteria for delirium. It was developed by Albert, Levkoff, Reilly, et al. in 1990-1992, to be used in combination with other data to define cases of delirium and as an alternative to the DSM-III or DSM-III-R criteria for diagnosing delirium.

Domains and items

Composed of 33 questions that address the domains of: disorientation; disturbance of sleep; perceptual disturbance; incoherent speech; level of psychomotor activity; general behaviour observations. Each question is coded, and each domain is given an overall rating of not present or present according to the responses from the related questions.

Administration

The DSI is designed to be administered on a daily basis to hospitalised older patients, and by non-clinicians.

Takes approximately 15 minutes to complete and requires training. Detailed documentation and scoring manual available.

Psychometric properties

The psychometric properties of DSI have been assessed in one study. When administered by a lay interviewer who has undergone training in its use, the DSI has high sensitivity 90%, and high specificity 80%, when compared to assessments by a neurologist or psychiatrist. The inter rater reliability of two lay interviewers with one observing and one administering for the detection of major symptoms of delirium was k=0.90; and the kappa values for agreement between the DSI and the physicians' consensus for the specific domains ranged between 0.31 and 1.0.

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A3.4 Delirium Rating Scale (DRS)

Description and Purpose

The original article by Trzepacz, Baker, and Greenhouse in 1988, was not included in the critical appraisal as it was not developed to diagnose delirium but to rate the symptoms of delirium.

However, Rosen, Sweet, Mulsant, et al. (1994) assessed the DRS for its ability to accurately diagnose delirium and was included in the critical appraisal. They found that using a DRS threshold score of ≥ 10 correctly identified delirious patients with high sensitivity and specificity.

Domains and items

The DRS consists of 10 items with a total score range of 0-40. It is based on the DSM-III-R criteria for delirium and covers perceptual disturbance, temporal onset, psychomotor behaviour, sleep wake disturbance, lability of mood and variability of symptoms

Administration

Takes approximately 5 minutes to administer. Those administering the DRS were research clinicians who underwent training – however details of this training were not reported.

Psychometric properties

A DRS threshold score of ≥ 10 correctly identified delirious patients with high sensitivity 94% and specificity 82%, when administered by research clinicians compared to the gold standard diagnosis. Intraclass correlation coefficients measuring the inter rater reliability of all the instruments used in the study (includes DRS, MMSE, BPRS) 0.69-0.99 during the study period were reported, however inter rater reliability of the DRS was not given separately.

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Appendix 4: Risk factors from the literature review

A4.1 Risk factors studied in the literature

Risk factors – hospitalised patients	
• Age • Gender • Cognitive impairment includes pre-existing dementia • Comorbidities • Length of stay • Comorbid psychiatric illness • Functional status – physical • Depression (existing or history of) • Dehydration (urea nitrogen/creatinine ratio) • Potassium levels • Sodium levels • Blood glucose levels • White cell count • History of delirium • Alcohol abuse • Hypo-albuminaemia • Number of medications	• Selective drug exposure • Visual impairment • Hearing impairment • Number of in hospital medications • Low education level • Illness severity • Intercurrent illnesses (complications) • Residency before admission (eg nursing home) • Past stroke • Decompensated hypo/hyperthyroidism • Fever • Malnutrition (serum albumin level <30g/L) • Volume overload • Intravenous catheter complications • Transfusion reaction • Any iatrogenic event • New pressure ulcer

Other risk factors specific to surgical patients	
• Fall in blood pressure (perioperative) • History of cardiac disease • Depressed mood post-operative • Use of narcotic/opioid meds • Heart dysfunction • Duration of cardiopulmonary bypass • Type of anaesthetic • Duration of anaesthesia • Low cardiac output	• Pain levels • Type of surgery • Intraoperative bradycardia • Post operative low levels haemocrit • Complications of surgery • Slow recovery • Post op infection • Neuropsychiatric diagnosis

Process of care variables	
• Use of physical restraints	• Use of immobilising device
• Number of room changes	• Out of bed less than 1/day
• Invasive procedures	• Prolonged emergency department stay (>12/24)
• Use of bladder catheter	• Unintentional injury

Social variables	
• Social contact	• Number of social supports

A4.2 Risk factors from intermediate quality studies

Studies of intermediate quality also showed the following risk factors were associated with developing delirium including post- operative delirium (POD):

- Peri operative blood pressure falls (POD)
- Male gender (POD)
- Number of hospital medications
- Surgery
- Number of procedures to day 4 of hospital stay
- ICU admission
- Elementary level education
- History of cardiovascular disease (POD)
- Past stroke (POD)
- Cardiopulmonary bypass duration (POD - CABGs)

Appendix 5: Medications known to cause delirium

Prescription drugs [110, 117]

- Anticholinergic agents – drugs with anticholinergic effects can cause the following adverse effects: confusion; delirium; constipation; dry mouth and eyes; urinary retention; tachycardia
- Analgesics:
  - Narcotics (NB. pethidine (meperidine)*)
  - Non-steroidal anti-inflammatory drugs*
  - Antihistamines (first generation—for example, hydroxyzine)
- Antinauseants:
  - Scopolamine
  - Dimenhydrinate
- Antibiotics:
  - Fluoroquinolones*
- Central acting agents:
  - Sedative hypnotics (for example, benzodiazepines)
  - Anticonvulsants (for example, barbiturates)
  - Antiparkinsonian agents (for example madopar, sinemet)
- Cardiac medications:
  - Antiarrhythmics
  - Digitalis*
  - Antihypertensives (b-blockers, methyldopa)
- Gastrointestinal agents:
  - Antispasmodics
  - H2-blockers*
- Psychotropic medications:
  - Tricyclic antidepressants
  - Lithium*
- Miscellaneous:
  - Skeletal muscle relaxants
  - Steroids

Over the counter medications and complementary/alternative medications

- Antihistamines (NB. first generation – for example, diphenhydramine, chlorpheniramine)
- Antinauseants (for example, dimenhydrinate, scopolamine)
- Liquid medications containing alcohol
- Mandrake
- Henbane
- Jimson weed
- Atropa belladonna extract

* Requires adjustment in renal impairment.

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