

Delirium

Presenter: Dr. Milta Little

Disclosure Statement: I have nothing to disclose.

Objectives: By the end of the session, participants will be able to...

- Define delirium and describe its impact on residents of PALTC
- List and describe the validated tools for delirium screening
- List and describe non-Rx and Rx interventions for delirium prevention and treatment

Expected Outcomes (Desired change in practice):

- Regularly screen for delirium using a standardized screening tool
- Work with facility staff to create individualized prevention and treatment plans for acutely ill PALTC residents.

Article for Review: **Iglseder B, et al. Delirium in geriatric patients. Wein Med Wochenschr 2022; Online ahead of print (Open Access)**

Additional article: Davies N. Davies N (2021) Preventing, identifying and managing delirium in nursing homes and acute settings. Nursing Older People. doi: 10.7748/nop.2021.e1259

Outline for Rapid Fire session

1. Case presentation: Delirium

Mr. DL is an 84 y/o cis-gender male with dementia for the past 5 years, who is newly admitted to LTC due to increasing aggressive behaviors and hallucinations over the past few weeks. His spouse reports that his confusion will change throughout the day, seemingly worse in the afternoons and evenings. At times, he appears despondent and tells his spouse that he is worthless and wants to die. At other times, he is very sleepy. He is restless at night and sleeps poorly. He has fallen multiple times in the last year and his spouse is worried for his safety. *What is the underlying cause of his recent condition change?*

2. Definition, impact, and pathogenesis of the delirium syndrome

3. Diagnosis of Delirium

- a. CAM
- b. 4AT
- c. DDT-Pro
- d. RASS

4. Prevention of Delirium

5. Treatment of Delirium

Why you should read this article:

- To enhance your knowledge of how to recognise and manage delirium in older people in nursing homes and acute settings
- To identify strategies to prevent delirium and relapse in older people who are at risk
- To count towards revalidation as part of your 35 hours of CPD, or you may wish to write a reflective account (UK readers)
- To contribute towards your professional development and local registration renewal requirements (non-UK readers)

Preventing, identifying and managing delirium in nursing homes and acute settings

Nicola Davies

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Correspondence

nicola.davies24@gmail.com
@healthpsychuk

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Abstract

Older people, particularly those in nursing homes, are vulnerable to delirium, which is a condition characterised by confusion. This article outlines the risk factors, prevention, identification and management of delirium in older people in nursing homes and acute settings. It uses a case study approach to encourage nurses to consider the challenges faced in these settings and how they could address delirium. The article also details the multicomponent interventions that can be used for prevention, as well as the available delirium assessment tools, with a focus on selecting tools based on the person's health status and the healthcare setting.

Author details

Nicola Davies, senior medical writer, Health Psychology Consultancy Ltd, Stoke-on-Trent, England

Keywords

care homes, clinical, delirium, emergency care, health promotion, mental health, nursing homes, older people, patient assessment, patients, prevention, professional, public health

Aims and intended learning outcomes

The aim of this article is to assist nurses and nursing students to consider the risk factors, prevention, identification and management of delirium in older people in nursing homes and acute settings. After reading this article and completing the time out activities you should be able to:

- » Outline the challenges of identifying delirium in nursing homes compared with acute settings.
- » Discuss the various tools for assessing delirium and which of these to use in different circumstances.
- » Identify the main risk factors for delirium.
- » Describe various strategies that can be used to prevent delirium.
- » Understand the components of a person-centred, multicomponent delirium relapse prevention plan.

Introduction

In 2018 there were almost 12 million individuals aged 65 years and over in the UK, and it is anticipated that more than

one in five people in the UK will be in this age group by 2030 (Age UK 2019). Around 400,000 of these people live in care homes, a number which is also expected to rise in the next decade as individuals live longer (Age UK 2019).

As nurses provide care to an older population, they are increasingly likely to be caring for people experiencing delirium. The definition of delirium varies, but its main characteristic is confusion that can last for hours to months (Mayo Clinic 2020). Delirium is a complex condition and there are various challenges in its diagnosis. Since delirium is often an indication of the onset of acute illness or decline in long-term conditions, it is vital for nurses to ensure that their knowledge of the most effective prevention, identification and management strategies for delirium in older people remains up to date (Morandi et al 2017).

This article uses a case study to illustrate the delirium risk factors, identification, management and relapse prevention required for an older person.

Case study

Matthew is an 88-year-old man who has been living in a nursing home for the past two years. He moved in about a year after his wife died, when he started to develop Alzheimer's disease. On a regular visit a couple of days ago his daughter found him crouched in a corner of his dark bedroom. Matthew said he saw 'monsters' outside his window, where there was also a 'raging storm' that caused him distress. However, it was a bright and sunny day. He was also disoriented as to place, date and time.

Matthew has a history of heart disease and underwent bypass surgery in 2015. He also has hypertension. He is taking multiple medications to manage these conditions and his Alzheimer's disease. Over the past four days he has been experiencing a cold, sore throat, constant cough and headaches, all of which have been symptomatically managed with paracetamol as needed. Matthew typically requires moderate support with activities of daily living.

TIME OUT 1

Spend ten minutes thinking about the risk factors for delirium in older people. Consider pre-existing conditions, changes in health status and the person's environment. What risk factors for delirium can you identify in Matthew's case?

Risk factors

Older people, particularly those living in nursing homes, are vulnerable to delirium due to advanced age, increased prevalence of cognitive impairments, increased risk of serious infections, declining functional status and being in an unfamiliar physical environment (Woodhouse et al 2019). The prevalence of delirium in care homes has been estimated to be around 14%, which increases to 33% among residents living with advanced dementia (Siddiqi et al 2016).

Long-term conditions that are common in older people, particularly those with

cognitive manifestations such as dementia, place them at a high risk of developing delirium. In addition, the risk of delirium increases when individuals are living with frailty and experience stressful events (Woodhouse et al 2019), such as an acute infection or a combination of multiple factors including polypharmacy, infection or the introduction of a new medication.

Box 1 outlines the common risk factors for delirium in long-term care settings. If risk factors are identified, appropriate care plans and nursing interventions can be developed to address them.

The risk factors listed in Box 1 are commonly seen in nursing home residents, so regular assessments are necessary to differentiate between common symptoms of older age and delirium. Individuals who develop delirium in a nursing home are more likely to have a prolonged duration of the condition compared with those who develop it in a hospital setting (Baker et al 2019). This is partly because symptoms of delirium may be confused with other conditions such as dementia and depression (Baker et al 2019).

Prevention

Delirium in older people is often associated with declining health status, co-morbidities, hospitalisations and mortality (Siddiqi et al 2016). Therefore, given the effect on people and their families, as well as the increased associated healthcare costs, delirium prevention is a priority. Taking actions to prevent delirium can significantly reduce its incidence (Woodhouse et al 2019).

During a person's admission to a nursing home, it is essential to identify any risk factors for delirium and to establish their baseline cognitive functioning (Ford 2016). National Institute for Health and Care Excellence (NICE) (2014) guidance suggests that assessing for delirium could be part of the admissions process.

It is important for care plans to include the maintenance of a healthy nutritional status and actions to reduce or eliminate sleep disturbances (Ford 2016). Care plans should also be developed and implemented in collaboration with the older person, their family and the multidisciplinary team (Royal College of Nursing (RCN) 2019). Delirium risk factors should be discussed with families and other care providers if necessary, to ensure they are all vigilant for early signs of the condition (Holle and Rudolph 2018).

Table 1 outlines interventions to prevent delirium.

Box 1. Common risk factors for delirium in long-term care settings

- » Aged 65 years and over
- » Past or existing cognitive impairment
- » Severe, acute illness such as infections
- » Suboptimal nutrition, including inadequate nutritional intake or low fluid intake (risk of dehydration)
- » Inadequate pain management
- » Sleep disturbances
- » Limited mobility or immobilisation
- » Long-term conditions that affect cognitive functioning, for example dementia

(National Institute for Health and Care Excellence 2019, Royal College of Nursing 2019)

Differential diagnosis

The attending nurse at the care home assesses Matthew, recording the following vital signs:

- » Blood pressure: 102/42
- » Heart rate: 122 beats per minute
- » Temperature: 39.5°C
- » Respiratory vitals: oxygen saturation 89%; respiratory rate 23 breaths per minute

These vital signs indicate that Matthew's blood pressure and oxygen saturation levels are low, while his heart rate, respiratory rate and temperature are high. The nurse also finds that Matthew is alert but confused. He responds to voice and pain but has become increasingly agitated. The nurse and carer attempt to orient him by verbally communicating the time and location. The nurse administers a delirium assessment tool, and based on this she determines that Matthew is exhibiting signs of delirium.

Matthew's carer reports that over the past few days he has said that he is not sleeping well, and he requires a lot of encouragement to complete familiar daily activities that he was recently able to complete independently.

Since his cold symptoms developed his food intake has also been inadequate and his fluid intake is less than 500mL per day. In

consultation with Matthew's GP, it is decided that he should be sent to hospital, since attempts to orient him to time and place have been unsuccessful and he has an infection that must be treated. Emergency services are called and Matthew is taken to hospital. His disorientation and abnormal vital signs continue on the way to hospital.

TIME OUT 2

During an older person's admission to a long-term care setting, how would you establish their baseline behaviour and demeanour to compare against when assessing for delirium? Read the case study detailed in this article again. Can you identify any sudden changes in Matthew's behaviour and demeanour?

Delirium can cause changes in a person's physical functioning, social behaviour, orientation, memory, thinking and attention (NICE 2014). Box 2 outlines some of the common indicators of delirium, although the presentation is unique in all individuals.

The most frequent presentations of delirium are (Yang et al 2009, Woodhouse et al 2019):

Key points

- The main characteristic of delirium is confusion that can last for hours to months
- Older people may be vulnerable to delirium due to advanced age, increased prevalence of cognitive impairments, increased risk of serious infections and declining functional status
- Delirium can cause changes in a person's physical functioning, social behaviour, orientation, memory, thinking and attention
- Preventive measures may include: orienting the person to time, place and person; monitoring the person's fluid intake and output closely; monitoring the person closely for infections; minimising sleep disturbances; and regularly reviewing the person's medicines
- Once identified, delirium must be treated as a medical emergency and addressed as soon as possible

Table 1. Interventions to prevent delirium

Risk factor	Interventions
Cognitive impairment or disorientation	<ul style="list-style-type: none"> » Provide an environment with clear signage and tools that can orient the person to time, such as a calendar or clock that is in clear sight » Verbally orient the person to time, place, person and who you are » Encourage visits from the person's family and friends
Suboptimal nutrition	<ul style="list-style-type: none"> » Monitor the person's fluid intake and output closely to prevent dehydration » Work with a nutritionist to increase the person's fluid and food intake if necessary » If possible, provide the person's favourite foods and drinks » If the person uses dentures, ensure they fit well and are well maintained
Risk of infection	<ul style="list-style-type: none"> » Monitor the person closely for infections and treat these promptly
Limited mobility	<ul style="list-style-type: none"> » Encourage the person to undertake range of motion exercises, even if they are unable to walk » Provide the person with appropriate walking and mobilisation aids, if necessary » Post-surgery, encourage mobilisation as soon as possible
Pain	<ul style="list-style-type: none"> » Observe the person for non-verbal signs of pain such as wincing or guarding, so that the pain can be managed as soon as possible » Manage pain using the most appropriate pharmacological and non-pharmacological interventions » Reassess pain regularly and adjust pain management interventions as required
Sleep disturbances	<ul style="list-style-type: none"> » Provide a low-noise environment during sleep periods » Maintain a healthy sleep-wake schedule » Where possible, schedule medication administration and medical procedures at times that do not disrupt the person's sleep-wake schedule
Polypharmacy	<ul style="list-style-type: none"> » Ensure regular reviews of the person's medications by a pharmacist to modify dosages where necessary

(National Institute for Health and Care Excellence 2019)

Box 2. Common indicators of delirium

Physical indicators

- » Reduced mobility
- » Restlessness
- » Agitation
- » Changes in appetite
- » Sleep disturbances

Cognitive indicators

- » Confusion
- » Slow responses
- » Worsened concentration
- » Visual or auditory hallucinations

Behavioural indicators

- » Lack of cooperation with reasonable requests
- » Alterations in mood, communication and/or attitude

(National Institute for Health and Care Excellence 2019, Woodhouse et al 2019)

» Hyperactive, where the person presents with restlessness and agitated behaviour.

» Hypoactive, where the person presents as withdrawn, quiet and sleepy.

» Mixed, which is characterised by phases of hyperactive and hypoactive delirium.

It can be challenging to distinguish the symptoms of delirium from other conditions such as dementia or depression. In nursing homes, delirium, dementia and depression are all more prevalent than in other settings. Furthermore, all three conditions have overlapping symptoms and can occur concurrently (RCN 2019). This may cause challenges in accurately diagnosing each condition and subsequently result in treatment delays. In addition, delirium occurring in people with depression or dementia can cause a worsening of these conditions (Mayo Clinic 2020). Table 2 outlines some of the differences between delirium, dementia and depression.

Delirium in people with dementia is known as ‘delirium superimposed on dementia’, and in these cases the main challenge is distinguishing between the chronic symptoms of dementia and the acute symptoms of delirium. This challenge is exacerbated if the person has dementia with Lewy bodies, where hallucinations, sleep disturbances and inattention occur frequently (Morandi et al 2017).

Nurses should be aware of the differences between dementia, delirium and depression, as well as the subtle changes that indicate the development of delirium. The ‘PINCH ME’ mnemonic (Figure 1) can be used to recognise potential underlying causes of delirium superimposed on dementia, identify elements for assessment in those at risk, and provide considerations for care planning. When providing care, nurses are in an optimal position to identify changes in the person and plan care in relation to the PINCH ME components. Developing a care plan that includes these components assists in ensuring care is holistic (Pryor and Clarke 2017).

TIME OUT 3

Which delirium assessment tool is most used in your area of practice? What is your experience with the tool in terms of its accuracy for identifying delirium? Apply this tool to Matthew’s case. Would it be able to recognise his delirium or would you need to consider using an alternative tool?

Table 2. Differences between delirium, dementia and depression

	Delirium	Dementia	Depression
Onset	Abrupt or subacute, hours to days	Insidious, months to years	Persistent, typically gradual over weeks to months
Course	Fluctuating	Slow progression	Responsive to treatment
Duration	Hours to months	Months to years	Variable, reversible on treatment over weeks to months
Alertness	Abnormally high or low	Typically normal	Typically normal, can be low in severe depression
Sleep-wake cycle	Disrupted	Typically normal	Disrupted, early morning waking common
Attention	Impaired	Relatively normal	Relatively normal, concentration impaired
Orientation	Impaired	Intact in early dementia	Typically normal
Working memory	Impaired	Intact in early dementia	Can be impaired, decision-making slowed
Episodic memory	Impaired	Impaired	Can be impaired
Thought	Disorganised, delusional	Impoverished	Low mood, negative thoughts
Speech	Slow or rapid, incoherent	Word-finding difficulties	Typically normal, can be slowed
Perception	Illusions and/or hallucinations are common	Usually intact in early dementia	Usually intact, but hallucinations can develop
Behaviour	Withdrawn and/or agitated	Varies, but often intact early on	Depressed mood, anhedonia, withdrawn

(Baker et al 2019)

Delirium assessment tools

Several assessment tools are available that can assist nurses in identifying suspected delirium.

An ideal tool should be brief, require little training and be validated for the setting in which it is used (Hendry et al 2016).

The most commonly used delirium assessment tools are the 4 'A's Test (4AT) (Bellelli et al 2014) and the Single Question to identify Delirium (SQiD) (McCleary and Cumming 2015). The 4AT evaluates for alertness, attention, acute change or fluctuating course, and the Abbreviated Mental Test (AMT) 4. It is a two-minute tool that can be used in a variety of clinical settings with no special training required (Scottish Intercollegiate Guidelines Network (SIGN) 2019). The SQiD is the shortest delirium assessment tool available and involves asking a single question: 'Is this patient more confused than before?' (McCleary and Cumming 2015). This tool relies on a nurse's judgement to determine the person's cognitive status, but requires no training.

The Minimum Data Set Cognitive Performance Scale (Morris et al 1994) is often used when older people are first admitted to care homes, to assess their functional capabilities and identify health issues. This tool is administered quarterly or if a change in the person's health status is observed. It establishes a baseline that nurses can compare with subsequent health or mental status assessments and aims to increase the likelihood of delirium being recognised in a timely manner (Forsberg 2017).

While other assessment tools are available to identify delirium, their specificity and sensitivity in long-term care settings have not yet been established. Indeed, few studies have evaluated delirium assessment tools in these settings. Moreover, research has not established who should administer these tools in nursing homes, and there remains a lack of training among healthcare staff on how to use them (Hendry et al 2016).

One challenge with identifying delirium in nursing homes is that assessment tools tend to be designed for those with no cognitive impairments and do not consider pre-existing conditions that affect

cognition, such as dementia. The influence of long-term cognitive symptoms should be considered when assessing for delirium (Morandi et al 2017). It is essential that nurses have in-depth knowledge of the delirium assessment tool they decide to use, particularly its administration and interpretation (SIGN 2019).

Once identified, delirium must be treated as a medical emergency and addressed as soon as possible, because it can lead to permanent brain damage if left untreated (SIGN 2019). The underlying cause of delirium must be identified and treated if patients are to achieve complete recovery.

Acute care

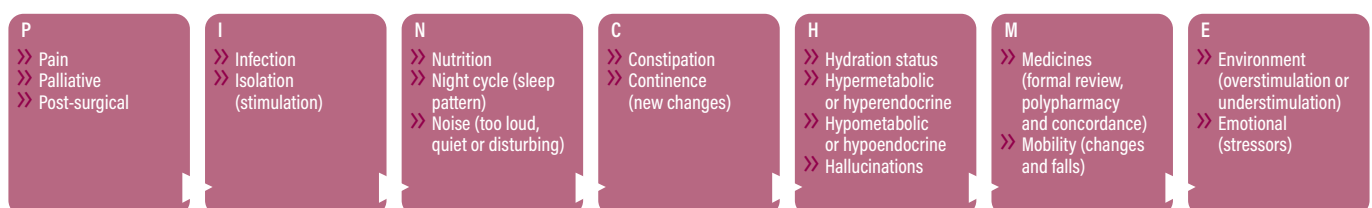
Matthew's vitals on arrival at the emergency department (ED) were:

- » Blood pressure: 110/64
- » Heart rate: 115 beats per minute
- » Temperature: 39°C
- » Respiratory vitals: oxygen saturation 88%; respiratory rate 24 breaths per minute
- » The patient is alert but confused, and he responds to voice and pain.

The diagnosis of suspected delirium was made, with the underlying cause being infection. Matthew was still disoriented, extremely lethargic and had limited responses to questions asked. Intravenous fluids were commenced at 100mL per hour and oxygen was initiated at 2L per minute. Blood tests were undertaken to determine the severity of his infection.

Recognising delirium in an acute setting, particularly in an ED, can be challenging. One reason for this is that staff in these settings will not have the baseline behavioural information and patient familiarity that nursing home staff often have, so it is challenging for them to assess a patient in the context of their usual behaviour. Furthermore, delirium can often be mistaken for other conditions such as depression and dementia. Indeed, delirium assessment tools may prove ineffective in accurately establishing the presence of delirium if dementia is present. In addition, delirium

Figure 1. 'PINCH ME' mnemonic



(Pryor and Clarke 2017)

could indicate the onset or worsening of dementia (Jackson et al 2017). NICE (2019) guidelines recommend that, if there is uncertainty about a person’s diagnosis, they should be treated for delirium first, then assessed for possible dementia if their symptoms do not resolve.

Several delirium assessment tools have been evaluated and validated for use in acute settings. Table 3 shows those tools that are brief and require no additional training for nurses to use.

Even if an older person is assessed as not having delirium during their admission to an acute setting, they remain at risk of delirium and need to be reassessed at regular intervals. The results of one assessment should not determine the presence or absence of delirium, because the condition tends to fluctuate (SIGN 2019).

TIME OUT 4

Which of the delirium assessment tools in Table 3 would you use to assess Matthew while he is in the ED? Consider factors such as:

- » Previous delirium assessments undertaken.
- » Matthew’s physical and mental health.
- » Matthew’s ability to answer questions.
- » Any carers attending the hospital with Matthew.
- » The level of treatment urgency.

Discuss this exercise with a colleague and compare your decisions and the rationale for them

Management

When a patient is experiencing delirium, one of the main goals of care is to orient them to time, place and person. Admitting a person to hospital to treat delirium can sometimes be counterintuitive to the goal of providing the patient with a familiar environment.

Table 3. Validated delirium assessment tools

Tool	Brief description and settings where the tool is used	Analysis
4 A's Test (4AT) (Bellelli et al 2014)	<ul style="list-style-type: none"> » A combination of patient-reported and caregiver-observed measures of alertness, attention, acute change or fluctuating course, and the Abbreviated Mental Test (AMT) 4 » Validated for use by NHS Scotland in all non-intensive care unit settings » No training required 	<ul style="list-style-type: none"> » The 4AT has high sensitivity and specificity in all patients; its specificity is higher in patients without dementia, while its sensitivity is higher in those with dementia » Can be used in routine nursing practice to assess for delirium and potentially to determine its severity
AMT (Mansutti et al 2019)	<ul style="list-style-type: none"> » AMT 10 and its abbreviated form AMT 4 involve a patient-reported series of cognitive status tests » Validated for acute settings » No training required 	<ul style="list-style-type: none"> » AMT 10 and AMT 4 have similar levels of sensitivity and specificity » AMT 4 is quicker to administer
Months of the Year Backwards (MOTYB) (Hendry et al 2016)	<ul style="list-style-type: none"> » Cognitive test that requires a patient to list the months of the year backwards » Validated for use in multiple settings » No training required 	<ul style="list-style-type: none"> » MOTYB is a simple screening tool that can be easily integrated into any clinical setting » It cannot be used as a stand-alone delirium assessment or diagnostic tool and there are no clear instructions on what to do in case of errors (Ryan et al 2018) » Consider using with caution in patients whose first language is not English
Recognising Acute Delirium as Part of your Routine (RADAR) (Voyer et al 2015)	<ul style="list-style-type: none"> » Three observational items: 'When you gave the patient his/her medication: <ul style="list-style-type: none"> — Was the patient drowsy? — Did the patient have trouble following your instructions? — Were the patient's movements slowed down?' » Validated for use in multiple settings » No training required 	<ul style="list-style-type: none"> » RADAR requires only seven seconds to administer, making it one of the shortest delirium assessment tools » It requires daily or regular administration, but nurses report this has a minimal effect on their workload due to its short administration time » It has moderate specificity and sensitivity
Single Question to identify Delirium (SQiD) (McCleary and Cumming 2015)	<ul style="list-style-type: none"> » Single question administered by the person responsible for the patient's care: 'Is this patient more confused than before?' » Approved for use in multiple clinical settings » No training required 	<ul style="list-style-type: none"> » The SQiD is brief, informant-based and with high sensitivity and good negative predictive value (Hendry et al 2016) » The informant should regularly provide care for the patient if they are to accurately report changes

(Adapted from Scottish Intercollegiate Guidelines Network 2019)

Transport to a hospital and the ED setting may aggravate delirium by introducing a new environment, new carers and the need to adjust to these at a time when they are already experiencing confusion. Therefore, although caring for a person with delirium in the nursing home setting may be challenging and not all resources may be available, in some circumstances it can be in the person's best interests to be treated in familiar surroundings (Forsberg 2017).

Considering the busy nature of acute settings, particularly EDs, it can be challenging to recognise and manage delirium in a timely manner. In LaMantia et al's (2017) study, emergency nurses cited the need for a reliable assessment tool and further training to identify the signs of delirium accurately, indicating just how challenging it can be to recognise the condition in this setting. Once delirium has been identified, ward managers must be prepared to spend additional time and resources on the patient, because they are at high risk of adverse outcomes such as falls, pressure ulcers and malnutrition (Dharmarajan et al 2017).

Patients, families and healthcare staff may experience a variety of additional burdens in relation to delirium. The primary burden of delirium management is managing the symptom burden, which includes managing emerging symptoms related to delirium as well as those from pre-existing conditions. Another burden is the uncertainty of symptom duration. Additional stressors include emotional burden and the negative emotions associated with managing delirium, both of which can lead to caregiver burnout (Schmitt et al 2019).

Nurses also need to consider the emotional burden of the situation and the external stressors that can affect the management of delirium, for example the workload associated with the care of other patients. One of the reasons for the high levels of emotional burden for nurses is the lack of available knowledge, training and tools for delirium. Therefore, increasing access to resources and knowledge could alleviate this burden (Mossello et al 2020).

One of the main benefits of care in acute settings is the presence of multidisciplinary professionals. In these settings it is easier to engage other healthcare professionals such as occupational therapists to optimise the patient's mobility, pharmacists for medication reviews, nutritionists to maintain nutrition, and nurse specialists (Holle and Rudolph 2018). Multidisciplinary care in the management of delirium can ensure patients

achieve optimal clinical outcomes in a safe environment that can address their multiple complex needs (Schwartz et al 2016).

TIME OUT 5

What delirium relapse prevention measures are commonly used in your area of practice? Are any precautions implemented for patients who have previously experienced delirium? Is there any further training you may require, and if so, who can you discuss these training needs with?

Relapse prevention

After a three-day hospital stay, during which Matthew's infection was treated with antibiotics, he was discharged back to the nursing home. He appeared to be calmer and understood what had happened. He was also keen to return to his familiar surroundings.

During his discharge from hospital, the acute care nurse emphasised the need to monitor Matthew closely for a relapse of delirium. In addition, after using the PINCH ME mnemonic, a preventive care plan was developed for Matthew that identified his risk factors for delirium, such as his suboptimal nutritional status. Suggestions for preventive actions were provided that were appropriate for his health status and lifestyle, for example it was advised that he consume more fruit and vegetables, and increase his daily fluid intake.

Individuals who have a history of delirium are at increased risk of experiencing it again in the future, particularly if their recovery from the condition took longer than two weeks (Forsberg 2017). Maintaining the person's optimal health status can assist in preventing relapse, while other preventive strategies include: effective pain management; ensuring adequate nutrition; promoting healthy sleep habits; and reviewing the person's medications to ensure they are not contributing to the risk of delirium (NICE 2014). Many of these preventive strategies are best practice for all patients, regardless of their delirium relapse risk.

In the nursing home setting, re-establishing a baseline for the person's health status and monitoring them closely for changes in their cognition and behaviour after their recovery from delirium can assist in preventing relapse. Daily checks, using brief assessment tools such as Recognising Acute Delirium as Part of your Routine (RADAR) (Voyer et al 2015) or the SQiD (McCleary and Cumming 2015), can support the early recognition of delirium. These tools can be easily integrated into nurses' everyday interactions with patients (Boockvar et al 2016).

Developing a relapse prevention plan that is person-centred and focuses on non-pharmacological interventions is vital (SIGN 2019). The most effective prevention plans will be multicomponent and based on the person's health status. Indeed, multicomponent interventions – that is, a combination of the interventions detailed in Table 1 – can reduce the length of hospital stays and the duration of delirium (Ford 2016). Multicomponent interventions are particularly effective when implemented by a multidisciplinary team (Marcantonio et al 2017). It is also important to provide the person with access to activities that can stimulate their mind, such as puzzles and group activities (Holle and Rudolph 2018).

Where possible, involving the person's family members and nursing home staff in the development and implementation of prevention plans can improve their effectiveness (Barry and Edgman-Levitan 2012). They will often be more aware of the person's baseline behaviour and what changes may indicate deteriorating health compared with ED staff or people caring for them for the first time. Family members will also be able to report any risks they identify during their visits, providing crucial information that can be used together with nursing assessments.

TIME OUT 6

Using Box 1 to reassess Matthew's risk of delirium and Table 1 to identify potential interventions, develop a multicomponent relapse prevention plan that considers the following areas:

- » What cognitive and physical activities could you introduce to Matthew's day?
- » What dietary changes could you make?
- » How could you assist him to achieve adequate sleep?
- » How often would you assess him for risk of delirium

and which assessment tools would you use?

- » Who else needs to be involved in implementing this plan?
- » How might you involve his family?

Conclusion

Delirium is prevalent in people aged 65 years and over. Prevention is the most important step towards reducing delirium in this vulnerable population, and can be achieved if nurses are aware of the risk factors for the condition and the interventions that can be used to address them. Validated assessment tools can be invaluable for nurses to identify delirium, and the most appropriate tool to use may vary depending on the person's health status and the healthcare setting.

Following a person's recovery from an episode of delirium, relapse prevention can be enhanced by using person-centred, multicomponent interventions that are implemented by a multidisciplinary team. Where possible, involving their family members and nursing home staff in the development and implementation of relapse prevention plans can improve patient outcomes.

TIME OUT 7

Consider how preventing, identifying and managing delirium in nursing homes and acute settings relates to The Code: Professional Standards of Practice and Behaviour for Nurses, Midwives and Nursing Associates (Nursing and Midwifery Council 2018), or, for non-UK readers, the requirements of your regulatory body

TIME OUT 8

Now that you have completed the article, reflect on your practice in this area and consider writing a reflective account. See this link: [rcni.com/reflective-account](https://www.rcni.com/reflective-account)

References

- Age UK (2019) Later Life in the United Kingdom. www.housinglin.org.uk/_assets/Resources/Housing/OtherOrganisation/Later-Life-in-the-United-Kingdom-2019.pdf (Last accessed: 14 December 2020.)
- Baker J, Savage S, Zeman A (2019) Cognitive assessment. In Butler R, Katona C (Eds) *Seminars in Old Age Psychiatry* (College Seminars Series). Second edition. Cambridge University Press, Cambridge, 27-40.
- Barry MJ, Edgman-Levitan S (2012) Shared decision making – the pinnacle of patient-centered care. *New England Journal of Medicine*. 366, 9, 780-781. doi: 10.1056/NEJMp1109283
- Bellelli G, Morandi A, Davis DHJ et al (2014) Validation of the 4AT, a new instrument for rapid delirium screening: a study in 234 hospitalised older people. *Age and Ageing*. 43, 4, 496-502. doi: 10.1093/ageing/afu021
- Boockvar K, Teresi JA, Inouye SK (2016) Preliminary data: an adapted hospital elder life program to prevent delirium and reduce complications of acute illness in long-term care delivered by certified nursing assistants. *Journal of the American Geriatrics Society*. 64, 5, 1108-1113. doi: 10.1111/jgs.14091
- Dharmarajan K, Swami S, Gou Y et al (2017) Pathway from delirium to death: potential in-hospital mediators of excess mortality. *Journal of the American Geriatrics Society*. 65, 5, 1026-1033. doi: 10.1111/jgs.14743
- Ford AH (2016) Preventing delirium in dementia: managing risk factors. *Maturitas*. 92, 35-40. doi: 10.1016/j.maturitas.2016.07.007
- Forsberg MM (2017) Delirium update for postacute care and long-term care settings: a narrative review. *Journal of the American Osteopathic Association*. 117, 1, 32-38. doi: 10.7556/jaoa.2017.005
- Hendry K, Quinn TJ, Evans J et al (2016) Evaluation of delirium screening tools in geriatric medical inpatients: a diagnostic test accuracy study. *Age and Ageing*. 45, 6, 832-837. doi: 10.1093/ageing/afw130
- Holle CL, Rudolph JL (2018) Management of delirium across an integrated health system. *Nursing Management*. 49, 3, 24-34. doi: 10.1097/01.NUMA.0000530420.86700.48
- Jackson TA, Gladman JRF, Harwood RH et al (2017) Challenges and opportunities in understanding dementia and delirium in the acute hospital. *PLoS Medicine*. 14, 3, e1002247. doi: 10.1371/journal.pmed.1002247
- LaMantia MA, Messina FC, Jhanji S et al (2017) Emergency medical service, nursing, and physician providers' perspectives on delirium identification and management. *Dementia*. 16, 3, 329-343. doi: 10.1177/1471301215591896
- Mansutti I, Saiani L, Palese A (2019) Detecting delirium in patients with acute stroke: a systematic review of test accuracy. *BMC Neurology*. 19, 310. doi: 10.1186/s12883-019-1547-4
- Marcantonio AJ, Pace M, Brabec D et al (2017) Team approach: management of postoperative delirium in

- the elderly patient with femoral-neck fracture. *JBJS Reviews*. 5, 10, e8. doi: 10.2106/JBJS.RVW.17.00026
- Mayo Clinic (2020) Delirium. www.mayoclinic.org/diseases-conditions/delirium/symptoms-causes/syc-20371386 (Last accessed: 14 December 2020.)
- McCleary E, Cumming P (2015) Improving early recognition of delirium using SQiD (Single Question to identify Delirium): a hospital based quality improvement project. *BMJ Open Quality*. 4, u206598. w2653. doi: 10.1136/bmjquality.u206598.w2653
- Morandi A, Davis D, Bellelli G et al (2017) The diagnosis of delirium superimposed on dementia: an emerging challenge. *Journal of the American Medical Directors Association*. 18, 1, 12-18. doi: 10.1016/j.jamda.2016.07.014
- Morris JN, Fries BE, Mehr DR et al (1994) MDS Cognitive Performance Scale. *Journal of Gerontology*. 49, 4, M174-M182. doi: 10.1093/geronj/49.4.M174
- Mossello E, Lucchini F, Tesi F et al (2020) Family and healthcare staff's perception of delirium. *European Geriatric Medicine*. 11, 95-103. doi: 10.1007/s41999-019-00284-z
- National Institute for Health and Care Excellence (2014) Delirium in Adults. Quality standard No. 63. NICE, London.
- National Institute for Health and Care Excellence (2019) Delirium: Prevention, Diagnosis and Management. Clinical guideline No. 103. NICE, London.
- Nursing and Midwifery Council (2018) The Code: Professional Standards of Practice and Behaviour for Nurses, Midwives and Nursing Associates. NMC, London.
- Pryor C, Clarke A (2017) Nursing care for people with delirium superimposed on dementia. *Nursing Older People*. 29, 3, 18-21. doi: 10.7748/nop.2017.e887
- Royal College of Nursing (2019) Commitment to Care of People Living with Dementia: SPACE Principles. RCN, London.
- Ryan S, Hayes D, Creedon B (2018) Use of "Months of the Year Backwards" (MOTYB) as a screening tool for delirium in palliative care patients in the acute hospital setting. *Irish Medical Journal*. 111, 8, 801.
- Schmitt EM, Gallagher J, Albuquerque A et al (2019) Perspectives on the delirium experience and its burden: common themes among older patients, their family caregivers, and nurses. *Gerontologist*. 59, 2, 327-337. doi: 10.1093/geront/gnx153
- Schwartz AC, Fisher TJ, Greenspan HN et al (2016) Pharmacologic and nonpharmacologic approaches to the prevention and management of delirium. *International Journal of Psychiatry in Medicine*. 51, 2, 160-170. doi: 10.1177/0091217416636578
- Scottish Intercollegiate Guidelines Network (2019) Risk Reduction and Management of Delirium. SIGN guideline No. 157. SIGN, Edinburgh.
- Siddiqi N, Cheater F, Collinson M et al (2016) The PITSTOP study: a feasibility cluster randomized trial of delirium prevention in care homes for older people. *Age and Ageing*. 45, 5, 652-661. doi: 10.1093/ageing/afw091
- Voyer P, Champoux N, Desrosiers J et al (2015) Recognizing acute delirium as part of your routine [RADAR]: a validation study. *BMC Nursing*. 14, 1, 19. doi: 10.1186/s12912-015-0070-1
- Woodhouse R, Burton JK, Rana N et al (2019) Interventions for preventing delirium in older people in institutional long-term care. *Cochrane Database of Systematic Reviews*. Issue 4. CD009537. doi: 10.1002/14651858.CD009537.pub3
- Yang FM, Marcantonio ER, Inouye SK et al (2009) Phenomenological subtypes of delirium in older persons: patterns, prevalence, and prognosis. *Psychosomatics*. 50, 3, 248-254. doi: 10.1176/appi.psy.50.3.248

Preventing, identifying and managing delirium

TEST YOUR KNOWLEDGE BY COMPLETING THIS MULTIPLE-CHOICE QUIZ

1. What is the main characteristic of delirium?

- a) Anxiety that resolves within 72 hours
- b) Confusion that can last for hours or months
- c) Anhedonia that is often lifelong
- d) Sleep disturbances that can last several years

2. Which statement is false?

- a) Older people, particularly those in nursing homes, are vulnerable to delirium
- b) Delirium is often an indication of the onset of acute illness or decline in long-term conditions
- c) The risk of delirium increases when individuals are living with frailty and experience stressful events
- d) Individuals who develop delirium in a nursing home rather than a hospital setting are more likely to have a shorter duration of the condition

3. To prevent delirium in a person with cognitive impairment or disorientation, healthcare professionals should:

- a) Provide an environment with clear signage and tools that orient the person to time, such as a calendar or clock that is in clear sight
- b) Verbally orient the person to time, place, person and who you are
- c) Encourage visits from the person's family and friends
- d) All of the above

4. Which of the following is not a physical indicator of delirium?

- a) Increased mobility
- b) Restlessness
- c) Changes in appetite
- d) Agitation

5. Hypoactive delirium is:

- a) Where the person presents with restlessness and agitated behaviour
- b) Characterised by phases of hyperactive and hypoactive delirium
- c) Where the person presents as withdrawn, quiet and sleepy
- d) Characterised by delirium superimposed on dementia

6. What is one of the differences between delirium, dementia and depression?

- a) A person's alertness is typically normal in delirium and depression, but abnormally high or low in dementia
- b) The course of the condition is fluctuating in delirium, responsive to treatment in depression, and has a slow progression in dementia
- c) A person's sleep-wake cycle is typically normal in delirium or depression, but disrupted in dementia
- d) The onset is abrupt or subacute in dementia, insidious in depression, and persistent in delirium

7. In the 'PINCH ME' mnemonic, the 'N' does not include:

- a) Nutrition
- b) Noise
- c) National Early Warning Score
- d) Night pattern

8. The Single Question to identify Delirium (SQiD) involves asking:

- a) Is this patient more confused than before?
- b) Has this patient frequently been low in mood over the past month?
- c) Can this patient state the months of the year backwards?
- d) Does this patient have a Glasgow Coma Scale score of less than 15?

9. When a patient is experiencing delirium, what is one of the main goals of care?

- a) To introduce them to a new environment
- b) To orient them to time, place and person
- c) To increase the dose of any medications they are taking
- d) To restrain them to reduce the risk of harm to themselves or others

10. Delirium relapse prevention should include:

- a) Re-establishing a baseline for the person's health status
- b) Monitoring the person closely for changes in their cognition and behaviour after their recovery from delirium
- c) Developing a relapse prevention plan that is person-centred and focuses on non-pharmacological interventions
- d) All of the above

How to complete this assessment

This multiple-choice quiz will help you test your knowledge. It comprises ten multiple choice questions broadly linked to the previous article. There is one correct answer to each question.

You can read the article before answering the questions or attempt the questions first, then read the article and see if you would answer them differently.

When you have completed the quiz, cut out this page and add it to your professional portfolio. You can record the amount of time it has taken you to complete it.

You may want to write a reflective account. Visit rcni.com/reflective-account

Go online to complete this multiple-choice quiz and you can save it to your RCNi portfolio to help meet your revalidation requirements. Go to rcni.com/cpd/test-your-knowledge

This multiple-choice quiz was compiled by **Alex Bainbridge**

The answers to this quiz are:

1 b 2 d 3 c 4 a 5 c 6 b
7 c 8 a 9 b 10 d

This activity has taken me ___ minutes/hours to complete. Now that I have read this article and completed this assessment, I think my knowledge is:

Excellent Good Satisfactory Unsatisfactory Poor

As a result of this I intend to: _____

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Delirium in geriatric patients

Bernhard Iglseder · Thomas Frühwald · Christian Jagsch

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Summary Delirium is the most common acute disorder of cognitive function in older patients. Delirium is life threatening, often under-recognized, serious, and costly. The causes are multifactorial, with old age and neurocognitive disorders as the main risk factors. Etiologies are various and multifactorial, and often related to acute medical illness, adverse drug reactions, or medical complications. To date, diagnosis is clinically based, depending on the presence or absence of certain features. In view of the multifactorial etiology, multicomponent approaches seem most promising for facing patients' needs. Pharmacological intervention, neither for prevention nor for treatment, has been proven effective unanimously. This article reviews the current clinical practice for delirium in geriatric patients, including etiology, pathophysiology, diagnosis, prognosis, treatment, prevention, and outcomes.

Keywords Cognitive disorders · Acute confusional state · Prevention · Encephalopathy · Older people

Delir bei geriatrischen Patienten

Zusammenfassung Das Delir ist die häufigste akute Störung von kognitiven Funktion bei alten Patienten. Ein Delir ist lebensbedrohlich, wird häufig nicht erkannt und ist ebenso schwerwiegend wie kostspielig. Die Ursachen sind multifaktoriell, wobei das Alter und neurokognitive Erkrankungen die Hauptrisikofaktoren darstellen. Ätiologisch besteht häufig ein Zusammenhang mit akuten Erkrankungen, unerwünschten Arzneimittelwirkungen oder medizinischen Komplikationen. Die Diagnose wird klinisch gestellt und hängt vom Vorhandensein oder Fehlen bestimmter Merkmale ab. Angesichts der multifaktoriellen Ätiologie scheinen Multikomponenten-Ansätze am vielversprechendsten, um den Bedürfnissen der Betroffenen gerecht zu werden. Pharmakologische Interventionen haben sich weder zur Prävention noch zur Behandlung als klar wirksam erwiesen. Dieser Artikel gibt einen Überblick über das aktuelle klinische Wissens, einschließlich Ätiologie, Pathophysiologie, Diagnose, Prognose, Behandlung, Prävention und Verlauf.

Schlüsselwörter Kognitive Störung · Akute Verwirrtheit · Prävention · Encephalopathie · Alte Menschen

Introduction

The term delirium is derived from the Latin “de lira ire = to go off the rails” and was coined by Aulus Cornelius Celsus around 100 AD. As early as 500 years earlier, the *Corpus Hippocraticum* contained a description of two mental disorders that occur with high fever and severe physical illness: “phrenitis” (agitation) and “lethargy” (lethargy).

B. Iglseder (✉)
 Department of Geriatric Medicine, Salzburg University
 Hospital—Campus Christian-Doppler-Klinik,
 and Paracelsus Medical University,
 Ignaz-Harrer-Straße 79, 5020 Salzburg, Austria
 b.iglseder@salk.at

T. Frühwald
 Specialist in Internal and Geriatric Medicine, Vienna, Austria
 fruehwald@netway.at

C. Jagsch
 Department of Geriatric Psychiatry and Geriatric
 Psychotherapy, State Hospital II, Graz, Austria
 christian.jagsch@kages.at

The term delirium is sometimes replaced in clinical practice by synonymous terms: organic brain syndrome or acute confusional state.

Delirium, defined as acute deterioration of cognitive function and attention, is a common mental disorder in geriatric patients, affecting up to 42% of those hospitalized [1]. Delirium determines dramatic consequences for geriatric patients: longer length of hospital stay, increased mortality, functional and cognitive deterioration, and increased need for institutional care [2].

Symptomatology and epidemiology

Core symptoms include impairment of cognition and consciousness. Diagnostically groundbreaking are the inability to direct attention, limited perception of environmental stimuli, and inadequate reaction to the same. Amongst cognitive symptoms, perceptual and memory disorders are in the foreground, along with situational disorientation. Perceptual disturbances include misperceptions and visual, occasionally also scenic, hallucinations and paranoid symptoms. Psychomotor symptoms are often dominated by restlessness, but there may also be a pronounced hypoactivity, whereby a change between these manifestations is frequent. Based on the expression of psychomotor activity, hyperactive delirium contrasts with hypoactive delirium, in which the hypoactive variants are often misrecognized [3]. Up to 40% of affected patients show a mixed picture.

Delirium symptoms usually fluctuate over time and often aggravate in the early evening hours. In addition, there is often a considerably increased startle response, especially in connection with medical or nursing interventions.

By definition, the onset of delirium is acute to subacute (hours to days) and is often associated with the onset of physical illness. Duration is highly variable, ranging from a few hours to months, with a maximum total duration of 6 months by definition. Most often, delirious states resolve within 1–2 weeks.

According to Diagnostic and Statistical Manual of Mental Disorders (DSM 5), delirium is defined as follows [4]:

- A. Disturbance of attention (i.e., reduced ability to direct, focus, sustain, and shift attention) and consciousness (reduced environmental orientation).
- B. The disturbance develops within a short period of time (usually within hours to a few days), involves a change in the usual level of attention and consciousness, and tends to fluctuate in severity throughout the day.
- C. In addition, there may be other cognitive symptoms (e.g., memory disturbance, disorientation, speech disturbance, disturbances in visuospatial abilities, or perception).

Table 1 Predisposing factors (A) and triggering agents (B) of delirium

<i>A: Predisposing factors defining vulnerability include</i>
Advanced age
Neurocognitive deficit (dementia), delirium in the medical history
Frailty (gerastenia)
Multimorbidity
Sensory disorders
Anemia
Malnutrition
Substance abuse
Depression
Social isolation
<i>B: Triggering (noxious) agents include</i>
Surgical interventions
Anticholinergic drugs
Psychoactive drugs (including antipsychotics, antidepressants, tranquilizers)
Intensive care unit
Re-surgery
Acute blood loss
Acute infections
Disturbances of electrolyte and water balance (i.e., hyponatremia, exsiccosis)
Sleep deprivation
Immobilization
Coercive measures, mechanical restraints
Withdrawal (drugs, alcohol)
Urinary catheter
Foreign environment

- D. The disturbances in criteria A and C cannot be better explained by other preexisting or developing neurocognitive disorders (dementia); there is no context of a severe reduction in activity level, as in coma.
- E. There is evidence from history, clinical examination, or laboratory findings that the disorder is a direct result of somatic disease, substance intoxication or withdrawal (e.g., addictive substances or medications), toxin exposure, or is a result of multiple etiologies.

Pathogenesis and etiology

Delirium is a nonspecific acute brain failure with effects on psychopathology and behavior as a result of exogenous or endogenous factors. The widely accepted threshold concept of deliriogenesis postulates that the relationship between vulnerability and noxious agent plays the core role in development of delirium (Table 1). If vulnerability is high, a minor noxious agent is sufficient to trigger delirium and vice versa [5].

The relationship between delirium and advanced age has been demonstrated in numerous studies. Aging is characterized by the progressive loss of resources and adaptability, including brain function. However, it is unclear to what extent age per se is

a risk factor or whether other factors associated with age, such as reduced health status, sensory impairment, multimorbidity, neurocognitive deficits, and polypharmacy, define the increased risk. Chronic renal, hepatic, cardiac, pulmonary, and central nervous system diseases play a significant role as risk factors in the context of multimorbidity [6]. Psychosocial stress can be of considerable importance; abrupt changes such as admission to a hospital or a nursing home can trigger delirium, as can lacking devotion, unprofessional caregiving, stimulus deprivation, stressful visitors, room changes, and the stress of examinations [7].

Numerous mechanisms have been hypothesized to contribute to the pathophysiology of delirium, including neurotransmitters, inflammation, electrolyte disorders, metabolic disturbances, physiologic stressors, and genetic factors [2].

In delirium in higher age, the search for a common terminal pathway often remains inconclusive due to complex multifactorial etiology. The systems' integration failure hypothesis [8] integrates published concepts by describing the various results from each into an intricate network, thus emphasizing areas of similarities and intersections. The variable impact of these factors contributes to the development of the cognitive and behavioral symptoms of delirium.

At the neurotransmitter level, the *cholinergic system* appears to play a central role in the pathogenesis of delirium [9], and anticholinergic drugs therefore increase the risk of incident delirium. Serum levels of anticholinergic drugs have been shown to correlate with the extent of cognitive deficits, but an independent relationship of serum anticholinergic activity to the presence of delirium is questionable [10]. Anticholinergic delirium usually presents with motor hyperactivity, cognitive, and psychotic symptoms, and is associated with electroencephalogram (EEG) slowing. In addition, metabolic changes can affect cholinergic activity: hypoxic or hypoglycemic metabolic states increase the propensity to develop delirium, as does thiamine deficiency [9].

Anticholinergic agents include atropine, scopolamine, oxybutynin, tricyclic antidepressants, and benzodiazepines; opiates and nonsteroidal anti-inflammatory drugs (especially indomethacin) also bear an anticholinergic risk. Beta-lactam antibiotics, lithium, histamine H₂ antagonists, diuretics, beta-blockers, antipsychotics, and quinolones have been reported to possess anticholinergic properties, as have theophylline and cardiac glycosides, with a pronounced dose-dependent effect for the latter.

The *dopaminergic system* also plays an essential role; agonists at D₁ and D₂ receptors increase the risk of delirium [11]. Dopaminergic substances such as L-dopa, dopa agonists, and also bupropion and cocaine can therefore induce delirium. Dopaminergic mechanisms of action are also discussed for opiates and H₂ antagonists.

In addition, there are interactions between cholinergic and dopaminergic transmission: anatomical and functional overlaps between these transmitters have also been shown within the cerebral cortex, so a subtle balance between these systems is prerequisite for intact cognitive performance. Moreover, the cholinergic system is also influenced by the activity of monoamines: dopamine, norepinephrine, and serotonin modulate both the sleep–wake cycle and the response to external stimuli [11].

Another relevant transmitter is *serotonin*. For different serotonin receptors and different brain regions, cholinergic deficits could be associated with both serotonergic deficits and serotonergic excess. In addition, serotonin can also inhibit cholinergic transmission via dopaminergic activation. Clinically significant is the *serotonin syndrome*, which occurs in association with the administration of selective serotonin reuptake inhibitors (SSRIs). Symptoms include tremor, hyperreflexia, spontaneous clonus, muscle rigidity, ocular clonus, agitation, and fever. Tricyclic antidepressants, opiates, antibiotics, fluconazole, antiemetics, triptans, dextromethorphan, and monoamine oxidase (MAO) inhibitors serve as aggravating co-medications [12].

Further neurotransmitters potentially involved in the pathogenesis of delirium include *glutamate* and *gamma-aminobutyric acid (GABA)*. A decrease in GABAergic stimulation is likely to be the central mechanism of delirium after benzodiazepine withdrawal.

It should be emphasized that the individual transmitters unfold multiple interactions at different cortical and subcortical levels, with cholinergic deficit and dopaminergic excess considered as major common end routes.

The pathogenetic role of endogenous hormones and neuromodulators is of increasing interest [13, 14], offering new therapeutic options.

The release of norepinephrine via the sympathetic nervous system is common in the stress response, causing increased release of glucocorticoids via the hypothalamic–pituitary–adrenocortical axis, thus also contributing to glial cell activation and neuronal damage [15].

In addition to neurotransmitters, inflammatory processes play a central role in the development of delirium. Disorders occurring outside the brain, such as inflammation, trauma, or surgery, can therefore also trigger delirium. In the context of a systemic inflammatory reaction, cytokines are released, which cross the blood–brain barrier and, by activating microglial cells releasing proinflammatory cytokines, cause an inflammatory reaction in the brain with damage to neurons. In addition to this direct neurotoxic effect, cytokines can also cause disruption of neurotransmitter synthesis and release [16].

Due to frequent polypharmacy in the elderly, medications play a major role as triggers: 12–39% of all

delirium cases in the elderly may be classified as pharmacogenic [17]. In general, polypharmacy, i.e., taking five or more medications, should be considered a relevant risk factor for delirium. Age-related changes important for adverse drug effects include the reduced elimination capacity of kidneys and liver, the decrease of water, lean body mass and albumin, and the increase of body fat percentage.

A number of substances with central nervous effects (antidepressants, antipsychotics, antiepileptics) are known to lead to retention of free water via an antidiuretic hormone (ADH) effect and thus to *hyponatremia*, which is often a cofactor of delirious syndromes; antidiabetic drugs may contribute by inducing hypoglycemia.

Diagnosis

The diagnosis of delirium is primarily by clinical means: detailed exploration and observation as well as physical examination are indispensable.

Diagnostic clues are:

- Inability to focus attention.
- Loss of the ability to think with the usual clarity and coherence.
- Limited perception of environmental stimuli and inadequate response to them.
- Cognitive disturbances such as perceptual and memory disturbances, often striking situational disorientation.

Attention can be tested simply by asking the patient to enumerate the months backward beginning with December (reaching July should at least be possible correctly), or to spell the word “radio” backward.

In the context of acute hospital admission, a standardized delirium screening, e.g., with the validated *Delirium Observatie Screening Schaal* (DOS scale), should be performed for all patients who are over 70 years of age [18]. Screening with a validated instrument allows the detection of incident delirium with high sensitivity and specificity and should be performed by the nursing staff once per shift to detect fluctuations and acute changes [19].

Those identified as positive in the screening should be rapidly referred to a definitive diagnosis. The criteria according to DSM 5 or International Statistical Classification of Diseases and Related Health Problems (ICD-10) are suitable for this purpose; the Confusion Assessment Method (CAM), which is also recommended for emergency situations, is widely used as an assessment tool. It includes the relevant features 1) acute onset, 2) fluctuating course, 3) disturbance of attention, 4) distracted thinking, and 5) disturbance of consciousness. A diagnosis should be made if features 1–3 and additionally either 4 or 5 are present. Sensitivity and specificity are both very high at 95% [20].

To detect patients at risk, besides medical history, multivariable prediction models may be engaged to calculate risk estimates from data from previous hospital stays and the current admission [21].

If the cause of delirium is unclear, a somatic cause must be clarified as soon as possible. This is also necessary if, for example, delirium occurs after a clear interval in the first days after a surgical intervention. (Third party) medical, medication, and drug history are of importance; special attention should be paid to central nervous system (CNS)-active substances and alcohol. Physical examination includes somatic and neuropsychological status; lab values include blood glucose, electrolytes, liver and kidney function, blood count, cardiac enzymes, urinary status, thyroid hormones, and inflammatory parameters. Examination of abdomen (urinary retention, ileus) and of bones and joints is mandatory, since pain due to fractures may be causative. Radiographs and ultrasound may complement the physical exam, electroencephalography (EEG) serves to rule out a nonconvulsive status epilepticus, and cerebrospinal fluid (CSF) is analyzed if an infection of the central nervous system is suspected. Examinations that do not promise any therapeutic consequences should be avoided, as they may cause additional stress for the patients.

Prevention

Because of its deleterious consequences, prevention of delirium is of paramount importance. Consistent nonpharmacological multicomponent management according to a protocol that controls risk factors such as sleep deprivation, immobility, sensory deficits, pharmacotherapy, and dehydration has been shown to reduce the delirium risk by up to 30%, and early transfer to outpatient rehabilitation can also significantly reduce delirium incidence [22]. Treatment in a specialized geriatric unit reduces the absolute risk by 20% and shortens the average duration of delirium by 5 days. In the surgical setting, proactive geriatric consultation was shown to reduce the incidence of delirium from 50% to 28% after hip fractures in a randomized controlled trial. Recommendations included adequate oxygenation, correction of fluid and electrolyte imbalances, treatment of pain, discontinuation of unnecessary medications, early removal of bladder catheters, adequate caloric intake, early mobilization and rehabilitation, early recognition and treatment of postoperative complications, avoidance of sensory overstimulation, and pharmacological treatment for hyperactive delirium [23]. Isolated prodromal syndromes occur in hip fractures up to 4 days before full-blown delirium and allow adequate intervention if identified in a timely manner [24]. Dementia patients who are particularly at risk of delirium should be offered constant accompaniment by their family or other close caregivers. This requirement means that older, multimorbid, cognitively impaired people

Table 2 Recommendations for the prevention of delirium

Prevention of delirium
Avoid causal factors: unnecessary hospitalization, polypharmacy
Timely recognition of prodromal symptoms: agitation, vivid dreams, insomnia, hallucinations
If inpatient admission is necessary, the patient should receive qualified geriatric care right from the start, i.e., in perioperative management
Dementia patients should be offered constant accompaniment by their family or other close caregivers (“sitters”)
Consistent delirium screening, assessment of dementia, depression, anxiety disorders, addictive disorders (alcohol, benzodiazepines, nicotine), identification of history of delirium, geriatric consultation, and medication review are recommended
Minimizing stress, giving time for questions, and optimal pain management are also recommended for the perioperative setting

should be provided with a contact person (“sitter”) from admission to discharge, who accompanies them through all examinations and transfers ([25]; Table 2).

Medication for prevention?

Against the background of the abovementioned multitude of risk factors (predisposition of the patient, variety of delirium-inducing noxae), the complexity of delirium development becomes clear. A valid recommendation for pharmacological prevention cannot be given at present, even before elective surgical interventions. This underlines the high importance of nonpharmacological intervention.

Pharmacologically, the nightly administration of melatonin showed preventive effects in older—predominantly internal medicine—patients, whereas a high-quality study in 459 patients showed no effect on the incidence of delirium after near-hip fracture [26]. A recent meta-analysis concludes that perioperative melatonin and melatonergic agents may have no effect on the prevention of postoperative delirium [27]. Cholinergics such as donepezil (more side effects than placebo) and rivastigmine (no effect in cardiac surgery patient group) were also disappointing; data on antipsychotics (haloperidol, olanzapine, risperidone) are also inconsistent. Low-dose haloperidol prophylaxis should be considered at the most in individual cases in patients at a high risk of delirium [28], but general pharmacologic prevention is not recommended [29].

Treatment

The basis of treatment is observation, reassurance, and attendance; a sitting or walking guard is in any case preferable to restraint.

Identification and treatment of underlying diseases and discontinuation of high-risk medications is imperative. Appropriate laboratory diagnosis for fluid and electrolyte balancing, antibiotic therapy in cases of suspected infection, therapeutic nursing orientation support, adequate lighting, explanation of diag-

nostic and therapeutic steps, as well as avoidance of transfers, unnecessary noise, and visual overstimulation are the measures of choice [30]. Distracting is better than confronting; continence management, prevention of pressure ulcers and falls, and early mobilization are of proven benefit [2, 31]. Restraints should be avoided, as they can promote agitation, oversedation is also fraught with complications (falls, pneumonia).

Pharmacological therapy

Pharmacological treatment is necessary in cases of hyperactive delirium, anxiety, and agitation. The pharmacological treatment should be based on the cluster of symptoms presented and comorbidities.

Antipsychotics (neuroleptics): Interestingly, despite the significant incidence of delirium in hospitalized patients, there is no uniformly accepted drug intervention. No significant difference in efficacy and safety was shown between typical and atypical antipsychotics. The authors of a comprehensive analysis concluded that current evidence does not support the superiority of atypical antipsychotics over haloperidol [32, 33]. Low-dose haloperidol (0.5–3.0 mg per day, maximum 3–5 days) as well as atypical antipsychotics resulted in a reduction in delirium scores without significant differences between the agents. Low-dose haloperidol did not show a higher incidence of side effects, while dosages of >4.5 mg/d caused more frequent extrapyramidal side effects compared to atypical antipsychotics. Risperidone (0.5–3 mg/d) is also widely used—especially for delirium in the context of Alzheimer’s. Quetiapine (25–300 mg/d) is recommended for delirium and hallucinosis in the context of Parkinson’s disease due to the low incidence of extrapyramidal side effects.

When using antipsychotics, potential side effects on the cardiovascular system (QTc time), glucose metabolism, risk of falls, and extrapyramidal motor function must be taken into account. In addition, increased mortality rates have been reported with antipsychotics, especially in dementia patients [34]. Consistent weighing of the potential risk/benefit ratio and monitoring (i.e., ECG) are obligatory. For intravenously administered haloperidol (off-label!), the U.S. Food and Drug Administration (FDA) has issued a “warning” because of the risk of QTc prolongation and development of torsades de pointes.

Benzodiazepines: Short-acting benzodiazepines such as lorazepam 3 × 0.5 to 3 × 1 mg are widely used in the treatment of delirium, but the evidence is based on only a few adequate-quality studies, mainly in delirium associated with substance abuse and withdrawal. The authors of a Cochrane review note that increased and protracted sedation may actually worsen the condition of delirious patients when

treated with lorazepam [35]. An increased risk of falls is also associated with benzodiazepine administration. Furthermore, benzodiazepines can transform hyperactive delirium into hypoactive delirium. Benzodiazepines (BZD) are chosen in hyperactive delirium associated with alcohol or drug withdrawal, severe cardiac failure, or Parkinson's disease.

Trazodone: A retrospective medical chart review showed similar results for trazodone and quetiapine in terms of improvement of delirium symptoms [36]. In a prospective study in palliative cancer patients, low-dose trazodone proved generally safe and reduced delirium severity [37].

The occurrence of delirium in the palliative situation is common, accompanying anxiety can be treated with BZD or pregabalin. The antiepileptic *pregabalin* ameliorates neuropathic pain and anxiety and was shown to reduce postoperative opioid consumption and the incidence of confusion after heart surgery in elderly patients [38]. However, high-quality evidence to confirm these results is lacking.

As soon as the causal therapeutic measures have taken effect, antipsychotic or sedative treatment should be discontinued. Target symptoms of psychopharmacotherapy, lack of efficiency of initially implemented nonpharmacological measures, clinical course, and dose reduction attempts must be recorded.

Delirium in the intensive care unit

The care of delirious patients is common in intensive care units (ICUs), occurring in up to 80% of patients [39]. Delirium is either triggered by the acute illness itself or by the intensive care environmental conditions. A meta-analysis of data from more than 16,000 patients underscores the high relevance of intensive care delirium: the risk of mortality during hospitalization and afterwards is more than doubled, the length of stay in the intensive care unit and in the normal ward is prolonged, as is the duration of ventilation. Cognitive impairment is found more frequently in affected patients both 3 and 6 months after hospitalization [40]. Validated scales are available for delirium screening and monitoring in the ICU, the version of the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) being most broadly established, which can be performed in intubated patients [41]. Without standardized screening, more than 70% of affected delirious patients are not recognized as such; at the same time, monitoring with a validated instrument is associated with improved outcome in geriatric patients. In summary, regular evaluation of sedation depth, analgesics, and delirium results in fewer nosocomial infections, shortened duration of ventilation and intensive care, and reduced mortality [42]. A recent systematic review and network meta-analysis showed superiority for dexmedetomidine com-

pared to placebo and antipsychotics with respect to the occurrence of delirium and the length of ICU stay [43].

Prognosis

Delirium may recover completely, but also with a defective state, depending on the underlying disease. The mortality of 25–33% in the acute phase is similar to that of acute myocardial infarction or sepsis [44]; 25% of all older hospitalized delirious patients die within 3 to 4 months of diagnosis, although only part of this excess mortality can be explained by the underlying diseases [45]. Delirium causes an increased risk of falls and infection and often leads to a permanent deterioration in everyday competence and neurocognitive performance: 38 months after delirium, 53.8% of those affected showed cognitive deficits [44]. The more severe and prolonged the delirium, the more frequent and severe the sequelae—it is therefore essential to detect and treat delirium early.

Delirium due to metabolic and toxic causes is prognostically more favorable than delirium in dementia: many of these patients are hospitalized longer, suffer more complications, and are more likely to be admitted to a nursing home.

In addition, the relationship with frailty should be noted. Delirium is a risk factor for frailty (gerastenia), and those who are frail are at high risk of experiencing delirium [2]. Frailty and delirium share many similarities, so prevention of delirium can also be seen as prevention of progression to frailty. Both lead to deterioration in general condition, daily living skills, and cognitive function. Both entities have identical predisposing factors such as malnutrition, sarcopenia, systemic inflammation, neuroendocrine dysregulation, oxidative stress, or mobility limitations, and are prototypical of multidimensional geriatric syndromes [46]. The increased risk of experiencing delirium in older age and frailty was also demonstrated during the COVID-19 pandemic, as was the dramatic impact of delirium on mortality [47].

Conclusion

Delirium is a common and serious condition in geriatric patients. Early detection is crucial for adequate therapy, with nonpharmacologic management and treatment of triggering conditions as cornerstones, whereas pharmacologic treatment remains controversial.

Prevention of this potentially life-threatening problem includes recognition of patients at risk, avoidance of causal factors, and timely response to prodromal symptoms. Current knowledge does not support pharmacological measures for prevention.

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Conflict of interest B. Iglseider, T. Frühwald, and C. Jagsch declare that they have no competing interests.

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References

- Siddiqi N, House AO, Holmes JD. Occurrence and outcome of delirium in medical in-patients: a systematic literature review. *Age Ageing*. 2006;35:350–64.
- Inouye SK, Westendorp RG, Saczynski JS. Delirium in elderly people. *Lancet*. 2014;383:911–22.
- O’Keeffe ST. Clinical subtypes of delirium in the elderly. *Dement Geriatr Cogn Disord*. 1999;10:380–5.
- American Psychiatric Association. *DSM 5-diagnostic and statistical manual of mental disorders*. 5th ed. Arlington VA: American Psychiatric Publishing; 2013.
- Inouye SK. Delirium in older persons. *N Engl J Med*. 2006;354:1157–65.
- Ahmed S, Leurent B, Sampson EL. Risk factors for incident delirium among older people in acute hospital medical units: a systematic review and meta-analysis. *Age Ageing*. 2014;43:326–33.
- McCusker J, Cole M, Abrahamowicz M, et al. Environmental risk factors for delirium in hospitalized older people. *J Am Geriatr Soc*. 2001;49:1327–34.
- Maldonado JR. Delirium pathophysiology: an updated hypothesis of the etiology of acute brain failure. *Int J Geriatr Psychiatry*. 2018;33:1428–57.
- Hsieh TT, Fong TG, Marcantonio ER, et al. Cholinergic deficiency hypothesis in delirium: a synthesis of current evidence. *J Gerontol A Biol Sci Med Sci*. 2008;63:764–72.
- van Munster BC, Thomas C, Kreisel SH, et al. Longitudinal assessment of serum anticholinergic activity in delirium of the elderly. *J Psychiatr Res*. 2012;46:1339–45.
- Trzepacz PT. Update on the neuropathogenesis of delirium. *Dement Geriatr Cogn Disord*. 1999;10:330–4.
- Boyer EW, Shannon M. The serotonin syndrome. *N Engl J Med*. 2005;352:1112–20.
- Hill AR, Spencer-Segal JL. Glucocorticoids and the brain after critical illness. *Endocrinology*. 2021;162(3):bqaa242. <https://doi.org/10.1210/endo/bqaa242>.
- Khaing K, Nair BR. Melatonin for delirium prevention in hospitalized patients: a systematic review and meta-analysis. *J Psychiatr Res*. 2021;133:181–90.
- Morita T, Tei Y, Tsunoda J, et al. Underlying pathologies and their associations with clinical features in terminal delirium of cancer patients. *J Pain Symptom Manage*. 2001;22:997–1006.
- Cerejeira J, Firmino H, Vaz-Serra A, et al. The neuroinflammatory hypothesis of delirium. *Acta Neuropathol*. 2010;119:737–54.
- Alagiakrishnan K, Wiens CA. An approach to drug induced delirium in the elderly. *Postgrad Med J*. 2004;80:388–93.
- Schuermans MJ, Shorridge-Baggett LM, Duursma SA. The delirium observation screening scale: a screening instrument for delirium. *Res Theory Nurs Pract*. 2003;17:31–50.
- Gavinski K, Carnahan R, Weckmann M. Validation of the delirium observation screening scale in a hospitalized older population. *J Hosp Med*. 2016;11:494–7.
- Inouye SK, van Dyck CH, Alessi CA, et al. Clarifying confusion: the confusion assessment method. A new method for detection of delirium. *Ann Intern Med*. 1990;113:941–8.
- Kramer D, Veeranki S, Hayn D, et al. Development and validation of a multivariable prediction model for the occurrence of delirium in hospitalized gerontopsychiatry and internal medicine patients. *Stud Health Technol Inform*. 2017;236:32–9.
- Caplan GA, Coconis J, Board N, et al. Does home treatment affect delirium? A randomised controlled trial of rehabilitation of elderly and care at home or usual treatment (The REACH-OUT trial). *Age Ageing*. 2006;35:53–60.
- Marcantonio ER, Flacker JM, Wright RJ, et al. Reducing delirium after hip fracture: a randomized trial. *J Am Geriatr Soc*. 2001;49:516–22.
- Lee HJ, Hwang DS, Wang SK, et al. Early assessment of delirium in elderly patients after hip surgery. *Psychiatry Investig*. 2011;8:340–7.
- Carr FM. The role of sitters in delirium: an update. *Can Geriatr J*. 2013;16:22–36.
- de Rooij SE, van Munster BC. Melatonin deficiency hypothesis in delirium: a synthesis of current evidence. *Rejuvenation Res*. 2013;16:273–8.
- Wang CM, Zhou LY. Melatonin and melatonergic agents for the prevention of postoperative delirium: a meta-analysis of randomized placebo-controlled trials. *Asian J Surg*. 2021; <https://doi.org/10.1016/j.asjsur.2021.04.041>.
- van den Boogaard M, Schoonhoven L, van Achterberg T, et al. Haloperidol prophylaxis in critically ill patients with a high risk for delirium. *Crit Care*. 2013;17(1):R9. <https://doi.org/10.1186/cc11933>.
- American Geriatrics Society Expert Panel on Postoperative Delirium in Older Adults. Postoperative delirium in older adults: best practice statement from the American geriatrics society. *J Am Coll Surg*. 2015;220:136–48.
- NICE. Delirium: prevention, diagnosis and management. 2010.
- Hasemann W, Kressig RW, Ermini-Fünfschilling D, et al. Screening, Assessment und Diagnostik von Delirien. 2007.
- Campbell N, Boustani MA, Ayub A, et al. Pharmacological management of delirium in hospitalized adults—a systematic evidence review. *J Gen Intern Med*. 2009;24:848–53.
- Lonergan E, Britton AM, Luxenberg J, et al. Antipsychotics for delirium. *Cochrane Database Syst Rev*. 2007;2:CD5594.
- Jeste DV, Blazer D, Casey D, et al. ACNP white paper: update on use of antipsychotic drugs in elderly persons with dementia. *Neuropsychopharmacology*. 2008;33:957–70.
- Lonergan E, Luxenberg J, Areosa SA, et al. Benzodiazepines for delirium. *Cochrane Database Syst Rev*. 2009;4:CD6379.
- Wada K, Morita Y, Iwamoto T, et al. First- and second-line pharmacological treatment for delirium in general hospital setting-retrospective analysis. *Asian J Psychiatry*. 2018;32:50–3.
- Maeda I, Inoue S, Uemura K, et al. Low-dose trazodone for delirium in patients with cancer who received specialist palliative care: a multicenter prospective study. *J Palliat Med*. 2021;24:914–8.
- Pesonen A, Suojaranta-Ylinen R, Hammaren E, et al. Pregabalin has an opioid-sparing effect in elderly patients after cardiac surgery: a randomized placebo-controlled trial. *Br J Anaesth*. 2011;106:873–81.

39. Ely EW, Shintani A, Truman B, et al. Delirium as a predictor of mortality in mechanically ventilated patients in the intensive care unit. *JAMA*. 2004;291:1753–62.
40. Salluh JJ, Wang H, Schneider EB, et al. Outcome of delirium in critically ill patients: systematic review and meta-analysis. *BMJ*. 2015;350:h2538.
41. Guenther U, Popp J, Koecher L, et al. Validity and reliability of the CAM-ICU flowsheet to diagnose delirium in surgical ICU patients. *J Crit Care*. 2010;25:144–51.
42. Balas MC, Burke WJ, Gannon D, et al. Implementing the awakening and breathing coordination, delirium monitoring/management, and early exercise/mobility bundle into everyday care: opportunities, challenges, and lessons learned for implementing the ICU pain, agitation, and delirium guidelines. *Crit Care Med*. 2013;41:S116–S27.
43. Burry LD, Cheng W, Williamson DR, et al. Pharmacological and non-pharmacological interventions to prevent delirium in critically ill patients: a systematic review and network meta-analysis. *Intensive Care Med*. 2021; <https://doi.org/10.1007/s00134-021-06490-3>.
44. Bickel H, Grading R, Kochs E, et al. High risk of cognitive and functional decline after postoperative delirium. A three-year prospective study. *Dement Geriatr Cogn Disord*. 2008;26:26–31.
45. Black DW, Warrack G, Winokur G. The Iowa record-linkage study. II. Excess mortality among patients with organic mental disorders. *Arch Gen Psychiatry*. 1985;42:78–81.
46. Quinlan N, Marcantonio ER, Inouye SK, et al. Vulnerability: the crossroads of frailty and delirium. *J Am Geriatr Soc*. 2011;59(2):S262–S8.
47. Kotfis K, Witkiewicz W, Szylińska A, et al. Delirium severely worsens outcome in patients with COVID-19- a retrospective cohort study from temporary critical care hospitals. *J Clin Med*. 2021;10(13):2974. <https://doi.org/10.3390/jcm10132974>.

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