



Preserving Your Brain Health During Illness or Surgery: GCBH Recommendations to Prevent and Treat Delirium

Global Council on
Brain HealthSM
A COLLABORATIVE FROM AARP

In the summer of 2019, members of the Global Council on Brain Health (GCBH) met in Boston to examine the impact of delirium on brain health in adults age 50 and older. Over the next six months, the GCBH, with the assistance of liaison reviewers, compiled this report, completing it around the time of World Delirium Awareness Day in March 2020. Participants are listed in Appendix 1.

This paper summarizes the consensus reached by the experts and describes the major points of discussion that led to their recommendations for people age 50 and older. It also identifies gaps in our knowledge in the area of delirium research and brain health, lists resources for additional information (Appendix 2), and provides a glossary of terms used in the document (Appendix 3). This paper is not intended to be a systematic, exhaustive review of all pertinent scientific literature on the topic. Rather, the selected references provided at the end of the document give helpful background material and present a sample of the current evidence underpinning the GCBH consensus in this area (Appendix 9).

Delirium and brain health

Delirium, a sudden change in thinking and behavior, is a serious medical condition that harms brain health. It can strike people of any age but happens more commonly as people grow older. The stories in this report illustrate how delirium can occur in all types of settings to all types of people. The case studies are taken from representative patients. The names and circumstances of the stories have been changed to protect people's anonymity.

If you or a loved one is one of the millions admitted to a hospital each year, you are at high risk for this frightening, debilitating condition. While delirium can affect people of all ages, including children, it is most common among older adults, affecting as many as half of all Americans 65 and older following a hospital admission. That is more than 6 million people every year in the United States alone. The condition is shockingly common, but until recently, poorly recognized by medical professionals. And while it is the most common

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6 D's of Delirium

- Distress
- Death
- Duration
- Dollars
- Dementia
- Loss of Dignity

surgical complication for older adults, you likely have never even heard of it. The condition is caused by a change in the way the brain is working and often results in confusion, inattention and sometimes hallucinations. Although many people recover, delirium can sometimes have a lasting impact on the brain, including

longer-term trouble with memory and thinking skills.

Delirium is serious, costly and can be fatal. Patients who develop delirium in an intensive care unit (ICU) have a two to four times increased risk of death both in and out of the hospital. Those who develop delirium on general hospital wards are at a one-and-a-half times increased risk for death in the year following hospitalization; and patients with delirium in the emergency department have approximately a 70 percent increased risk of death during the first six months after the visit.

Although delirium happens in many settings, the onset of delirium is most common in hospitals. In fact, it's the most common surgical complication for people 65 and older and affects 50 percent of those who have had a hip


fracture. According to a study in the United Kingdom, it affects around 20 percent of people in the hospital who need acute care. In the United States, two-thirds of ICU patients develop delirium, and an estimated 75 percent of those in ICUs in England are affected by the condition. It's a global issue, affecting people around the world of all races and ethnicities. Although the condition often improves over time, it is linked to long-term negative health effects, especially in those who have Alzheimer's disease or other forms of dementia. Despite how common the condition is, a 2020 AARP survey of more than 1,000 adults age 50-plus found only a quarter were at least somewhat familiar with delirium. Of those in the survey who had experienced delirium, about 20 percent said they were extremely or very frightened by the experience.¹

Delirium is also a threat to human dignity because of how it affects the brain. In addition to physical harm, mental states can vary widely from extreme apathy to extreme agitation, and it often causes people to feel disoriented, frightened, angry, paranoid and isolated. Experiencing an episode of delirium can lead to long-term psychological effects. As many as half of all falls in hospitals are related to delirium. Friends and families of people with delirium are often afraid and distressed as well, because they see that their loved one just isn't their normal selves after surgery or illness.

Confusion in the Hospital

One evening Harry Fong has severe chest pain and is rushed to the hospital by ambulance. The 74-year-old Boston financial adviser is still working and has been in relatively good health but has a history of diabetes, kidney disease and high blood pressure. In the emergency room, doctors tell him he has had a heart attack and he is admitted to the hospital. He undergoes multiple procedures to evaluate his heart and receives new medications to treat his chest pain, to control his blood pressure and to increase blood flow to his heart muscle. With the noise in the hospital, new medications and the stress of everything happening to him, he sleeps terribly in the hospital and hospital staff keep him in bed. The next day, he refuses to eat lunch, because he says he's not hungry, and he asks the nurse to hold his afternoon medications. His wife tells his nurse that her husband does not seem to be himself. She says he can't remember the date and forgot it was his grandson's birthday. Although he is normally cheerful and funny, he is acting disgruntled and irritable. He refuses to answer any questions the nurse asks him to test his memory and thinking skills. The nurse calls a doctor for an evaluation. The doctor says that the patient is reacting to the news about the heart attack, and that the cognitive changes are "just expected at his age."

That evening, Fong becomes progressively more agitated and disoriented. He tells the hospital staff that he has to leave immediately for an important meeting in Singapore. He begins striking out at nurses and pulling out IV and medication lines. He does not recall that he is in the hospital or why he is there. He is put into restraints and heavily medicated with sedating drugs.



Some people may feel embarrassed by the experience or by witnessing their loved one exhibit challenging behaviors or are intimidated by the health care staff who may treat it as a regular occurrence that “just happens” to older people. Delirium is a serious medical condition and should be recognized as a medical emergency.

In addition to the terrible toll delirium takes on patients and families, the financial costs are staggering. The condition and related complications cost an estimated \$164 billion every year in the United States and \$182 billion a year in 18 European countries combined, by one 2011 estimate. In Australia, total

annual costs of delirium have been estimated to range between \$5.3 billion and \$12.1 billion Australian dollars.

The good news is that delirium is preventable in up to 40 percent of cases. Researchers agree that there are steps that people facing elective surgery or other illnesses, their families, friends and health care providers can take to reduce their risks. And there are steps health care providers and facilities can take to make the condition less severe if it does occur. By implementing relatively simple, cost-effective measures, patients, caregivers and health care providers can help protect people’s brain health and save billions of health care dollars.

CONSENSUS STATEMENTS

These consensus statements are based on the experts' evaluation of the best available evidence from observational studies and randomized controlled trials that examine the impact of delirium factors on cognitive outcomes in older adults. The GCBH's recommendations and practical tips are made based on this evidence and supplemented by the issue experts' opinions based upon their extensive work in the field. The process used to reach this consensus and following recommendations is set forth in Appendix 4.

1. Delirium is a serious and common medical condition.
2. Delirium is bad for your brain health.
3. A person who has delirium will experience a sudden change in thinking and behavior that can come and go.
4. It can show itself in very different ways. Often the person is "just not themselves." Sometimes it may show up as inability to pay attention, excessive sleepiness, drowsiness, being "out of it," or not responding in their normal way. Other times it shows up as restlessness, agitation, seeing or hearing things that aren't there (hallucinations), fearfulness, anger, paranoia, or beliefs that are not real (such as they are under threat from staff or others). Often a person with delirium has a mixture of these symptoms.
5. Delirium symptoms can fluctuate, typically over hours to days.
6. Delirium often goes away within a few days, but in some people, it can last a longer period of time, sometimes over several weeks. Some people never return to their previous level of functioning.
7. Delirium can start anywhere a person lives or receives care, including the home, long-term care settings, surgery center, hospital, or hospice.
8. A person may develop delirium after an injury, an illness, surgery, dehydration, infection and/or changes in medications.
9. Delirium is often overlooked, misdiagnosed, and/or improperly managed.
10. Many healthcare providers are unaware of or fail to recognize the seriousness of delirium.
11. Delirium is often a sign of other health problems the person has, and delirium itself can lead to a number of problems for people who experience it, such as difficulties carrying out their usual everyday activities, falls, prolonged hospital stays, a loss of independent living, increased costs, longer-term declines in thinking, and even death.
12. You are more vulnerable to delirium as you age if you: have a preexisting difficulty in memory or thinking skills, have hearing or vision problems, are frail, have other underlying medical conditions, alcohol and/or drug abuse, or if you have experienced previous episodes of delirium.
13. The longer the delirium continues, the higher the likelihood of harm to the brain.
14. Delirium is not dementia.
15. In those who have dementia, delirium often leads to faster decline.
16. There are steps individuals, caregivers, healthcare providers and health care systems can take to reduce risks of delirium.
17. The best approach to delirium in the hospital or before elective surgery is to try to prevent delirium.
18. Delirium can occur despite the person receiving the best medical care. Health providers can help reduce the duration and severity of delirium through appropriate care.
19. Delirium often involves a lot of suffering for the person experiencing it along with their family members, but some of the suffering can be reduced if it is recognized and managed.

EXPERT RECOMMENDATIONS

RECOMMENDATIONS FOR INDIVIDUALS

1. “Prehab” for any planned hospitalizations. Prepare for your surgery as if you are training for a sports event by building your physical and mental resilience up before you go to the hospital (exercise, diet, and good sleep).
2. When weighing the potential risks and benefits of elective surgery, keep the possibility of delirium in mind; ask your provider to screen you for delirium risks.
3. Before surgery:
 - a. Tell your surgeon, anesthesiologist and nurse if you have experienced a previous episode of delirium.
 - b. Inform your doctor about *all* medications and dietary supplements you are taking.
 - c. Get a geriatrician involved with your care and talk to your primary care provider before surgery.
4. While in the hospital:
 - a. Bring a list of all your medications, including vitamins and other supplements, along with the names and contact information of your doctors and pharmacies.
 - b. Bring hearing aids, prescription glasses, and dentures.
 - c. Ask friends and family to stay with you in shifts the entire time you are in the hospital, even overnight.
 - d. Bring some familiar, comforting objects from home such as a favorite photograph or music you like.
 - e. Try to establish a normal routine by sleeping, eating healthy foods and drinking water as soon as possible.
 - f. Get exposure to sunlight during the day.
 - g. Close the door to your room to cut down on hall noise, use earplugs, and try an eye mask to help you sleep better. A familiar pillow and blanket may improve your sleep.
 - h. Don’t hesitate to ask for help and use the call button for staff assistance – which is especially important for people who don’t have informal caregivers to help out.
5. Get moving as soon as possible after surgery or during hospitalization. Ask the nursing staff for help sitting up, using the bathroom and walking to increase mobility and prevent falls. Ask for and choose to go to age-friendly hospitals and health care systems which have geriatric-trained staff who know how to recognize and deal appropriately with delirium. See Recommendations for Healthcare Systems on the next page.

See also the Practical Tips section.

RECOMMENDATIONS FOR CAREGIVERS

1. Be an advocate for your loved one and trust your instinct when you recognize there is a sudden change in behavior.
2. Report any change in mental status or behavior, and seek help from your health provider.
3. Help your loved one keep as close to their normal routine as possible with meals, sleep, and activity, and help them know their location, the day, time, and what is happening in the hospital to them and others around them.
4. Help your loved one sit up in bed, get up in a chair and walk as soon as possible once cleared by the medical team after surgery or illness.
5. Question the healthcare provider if drugs are used to treat delirium. (See the Discussion for more details.)
6. To avoid transition problems between different health care settings, ensure that patient information provided from hospitals to long term-care facilities or home health care agencies is correct.
7. Recognize that episodes of delirium can persist beyond hospital discharge and symptoms may even show up for the first time once your loved one returns home, so be alert for sudden changes in behavior and let the health providers know if the person just doesn’t seem to be themselves.
8. Be aware that a loved one can have a lasting decline in mental abilities after an episode of delirium and be prepared to assist them even after the person leaves the health care facility.

RECOMMENDATIONS FOR HEALTHCARE PROVIDERS

1. Conduct delirium screenings before elective procedures, encourage patients to “prehab” before planned hospitalizations, and warn of the risks of delirium when you are obtaining consent to conduct a medical procedure.
2. While treating patients, evaluate whether your patient is:
 - a. over-medicated (either inappropriate and/or multiple medication interactions)
 - b. lacking oxygen
 - c. experiencing low blood pressure
 - d. dehydrated
 - e. too cold
 - f. constipated
 - g. lacking food
 - h. lacking sleep
3. Look for infections or underlying medical conditions that may be causing or contributing to the delirium.
4. Always try to manage delirium through non-pharmacological interventions first.
5. Realize that antipsychotic medications used to treat delirium are often ineffective and should be used only where there is a threat of harm to patients or staff and only after all non-pharmacological options have been tried.
6. Try to manage pain with the smallest possible amount of narcotics.
7. Ask yourself if your patient is able to take care of themselves and can understand and follow medical advice. If not, do not discharge from your care unless there is a competent caregiver at home.
8. Be aware that delirium is a medical condition and not a normal side effect of medications.
9. Teach about delirium in the curriculum of medical schools, nursing schools and other types of health care education.

RECOMMENDATIONS FOR HEALTH CARE/HOSPITAL SYSTEMS AND DESIGN

Join the movement to become part of an age-friendly health system and adopt the 4Ms Framework for Age-Friendly Care. You should practice these four essential care elements together:

- **What Matters:** Know and align care with each older adult’s specific health outcome goals and care preferences, including but not limited to end-of-life care and across settings of care.
- **Medication:** If medication is necessary, use age-friendly medications that do not interfere with What

Matters to the older adult, mobility, or mentation across settings of care.

- **Mentation:** Prevent, identify, treat and manage dementia, depression and delirium across care settings.
- **Mobility:** Ensure that older adults move safely every day in order to maintain function and do What Matters.

See: [Age-Friendly Health Systems](#), an initiative of The John A. Hartford Foundation and the Institute for Health Care Improvement. Participating health systems addressing all 4 Ms together have demonstrated significant improvements in the identification and reduction of delirium.

PRACTICAL TIPS

PRACTICAL TIPS TO HELP YOU IMPLEMENT THE RECOMMENDATIONS

Before going to the hospital

1. Prepare for surgery or a hospital stay as you would prepare to compete in a strenuous physical activity or sporting event. Get your mind and body prepared by getting sleep, good nutrition and hydration, and engage in physical exercise to build up both your muscle strength and your cognitive reserve.
2. Quit smoking and drinking alcohol before surgery, and ask your doctor whether you should stop any medications or supplements you are taking.
3. Get your care partners lined up to assist you in and out of the hospital. Think about arranging for respite for caregivers.
4. When you schedule surgery, aim for the first part of the week because often physical therapists and other rehabilitation personnel are not as available on weekends.
5. Prepare a complete list of all your medications (with their dosages), as well as over-the-counter medicines and supplements, to bring with you to the hospital. It may help to bring the medication bottles as well.
6. Prepare a medical information sheet listing all allergies, names and phone numbers of all your health care providers such as therapists, dentists and physicians, the name of your usual pharmacy and all known medical conditions. Also, be sure that all pertinent medical records have been forwarded to the doctors who will be caring for you or your loved one before, during and following surgery.
7. Make sure you take your glasses and hearing aids with fresh batteries and have someone at the hospital take care of them while you are undergoing treatment and give them back to you as soon as possible.
8. Bring in a few familiar objects from home. Things such as family photos, a favorite comforter or blanket for the bed, rosary beads, a beloved book, and relaxing music can be quite comforting.
9. If possible, delay making important financial or other decisions until at least several weeks after planned

hospitalizations so that you give yourself plenty of time to recover, both mentally and physically. Even after recovery, brain fog can continue for a while, so don't rush any serious decisions you need to make around the time of hospitalizations.

10. Ask your provider to conduct a delirium screening before undergoing an elective surgery.

While in the hospital

1. If possible, bring a friend or family member to stay with you during your entire hospitalization. Have your loved ones cover your stay in shifts. Don't worry about imposing, just make sure you repay the favors!
2. Get out of bed and moving as early as you can after surgeries or procedures. Ask for a mobility plan and mobility assistance as needed.
3. To help get moving after surgery or a procedure, start by sitting up, moving to the edge of bed, moving from the bed to a chair, and then gradually start walking as soon as possible. Ask for assistance from staff in walking.
4. Get exposure to daylight during the day.
5. Use things that can help you get better sleep in the hospital. Earplugs and eyeshades may be helpful. Consider using a familiar and comfortable pillow or blanket.
6. Look for a clock and signs that tell you the day and the names of your health care providers.
7. Ask for help from health care providers if your pain seems to be out of control. Around-the-clock scheduled acetaminophen (maximum: 3,000 mgs per day) can help to control pain and reduce the need for opioids.
8. Make an effort to eat and drink enough water in the hospital.
9. Don't hesitate to get assistance with going to the bathroom, particularly if you are having any issues with bladder and bowel function.
10. Call the hospital ombudsman if you have trouble getting the assistance you need.

CARING FOR SOMEONE WITH DELIRIUM

1. Recognize the signs of delirium. People experiencing delirium may:
 - a. Be less aware of their surroundings
 - b. Be unable to speak clearly or follow conversations
 - c. Have dreams which can sometimes be frightening and can carry on when they wake up
 - d. Hear voices or noises which may not be present (auditory hallucinations)
 - e. See objects or people that are not present (visual hallucinations)
 - f. Get upset because they believe other people are trying to harm them
 - g. Be agitated or restless and unable to sit still
 - h. Be sleepy and slow to move and respond
 - i. Be reluctant to eat or drink
 - j. Have a temporary change in personality
 - k. Have some or all of the above symptoms, which rapidly change over time
 - l. Have worse symptoms in the evening or at night
2. Stay with the patient as much as possible. During an acute episode of delirium, you should try to arrange shifts so someone familiar with the patient can be present around the clock.
3. Help orient your loved one during the day. Speak in a calm, reassuring voice. Remind them of the day, time, where they are and why they are there.
4. Don't argue with the person or correct details unnecessarily, which can increase agitation.
5. Try not to overwhelm or overstimulate your loved one. Keep instructions for them very simple and ask them to only do one thing at a time.
6. Have familiar people visit, but not so many or for so long that the patient is exhausted with visitors and can't get adequate sleep.
7. Bring familiar objects such as a picture of loved ones or a blanket from home. A beloved book, favorite music or relaxation tapes can be comforting.
8. Have your loved one's list of medications with you at the hospital.
9. Insist on a 4M assessment by the health care team at least daily and ask how your loved one is progressing on their assessment scores. (See description of the 4 Ms of Age-Friendly Care in the healthcare system recommendation above.)
10. Try giving your loved one a hand or foot massage or a back rub. Light touch and massage can be very comforting.
11. Don't be embarrassed if your loved one experiences delirium. The things people say and do when they are experiencing delirium are beyond their control.

DISCUSSION

Delirium often causes extreme emotional distress and other changes in a person's mental function. It is a medical condition that occurs because of a change in how the brain is working. The brain goes into dysfunction. It can be compared to turbulence on an airplane. Usually it's a specific response in the brain to something that has happened to the body — some type of trauma caused by, for example, any type of surgery or infection or illness requiring a hospital stay or admission to an ICU. It can also happen, especially in older people, after starting a new medication or moving from one setting to another, e.g. from home to an assisted living facility or to a care home. Delirium has been associated with hospital falls, and it has been linked to dangerous lung infections, dehydration, worsening of dementia and other health problems. Those who become delirious can also suffer from depression, anxiety and post-traumatic stress syndrome.

Scientists aren't exactly sure why the brain goes into the dysfunction that causes delirium, but there are a number of theories. Medical researchers are currently investigating how anesthesia and sedation, the body's reaction to surgery, ventilators, the environment and medications interact with brain function to explore the potential causes. It may be that triggers such as surgery or new medications cause inflammation, which affects a vulnerable brain, or that these so-called brain "insults" cause disturbances in the brain's communication system or an imbalance in important brain hormones that affect thinking and mood. Health care professionals often don't

recognize delirium or fail to take it seriously enough when they do diagnose it. Some doctors and nurses inaccurately consider it a normal reaction to anesthesia. They may tell family members that it will simply go away. In truth, while the acute symptoms will often resolve over time, there are ways of managing delirium that increase the likelihood of a better outcome. It is crucial that families and health care providers become more educated about delirium and understand how to lower risks, recognize the condition and treat it.

There seems to be a puzzling disconnect between what health care providers say they know about delirium and what they tell their patients. A 2020 AARP survey² found that a majority of health care providers said that they are either very or extremely familiar with delirium. Ninety-two percent of healthcare providers said that strategies to prevent delirium should be standard practices in hospitals. Nearly 80% agreed that delirium is a serious complication, and 80% agreed that all patients should be screened for delirium during a hospital stay. About 70% of the health care providers knew that their patients who were hospitalized were not familiar with delirium. Even larger numbers (85%) agreed that delirium should be discussed with patients prior to hospitalization or surgery. Eighty-two percent said that hospitalized patients should be made aware of the symptoms of delirium.

Yet the AARP survey of adults 50 and older conducted at the same time as the provider survey found that only 4 percent

Dementia Complicated By Delirium

Tabatha Geason, 89, lives in a residential home in Brighton, England. She has Alzheimer's disease and was admitted to the home because she was no longer able to manage alone. However, she is still able to wash and dress herself and she participates in the activities in the home, where she has made a number of friends.

One week, however, she suddenly stops washing and dressing herself and develops urinary incontinence. She says she has pain and is running a fever. She becomes very agitated and unwell and is admitted to the hospital. When her daughter visits her in the hospital she is disoriented and agitated and is picking at her bedclothes as if she were trying to get something off of them. She is awake throughout the night in the hospital and calls out for her mother. She is treated with antibiotics for a urinary tract infection and gradually settles over the next few days.

She is sent back to her residential home, but once there she seems to be quiet and withdrawn. She is no longer interested in the home's activities. She needs help with dressing. Her daughter is very concerned about the decline in her abilities and is worried that she may be becoming depressed. She asks the staff whether her mother is likely to improve.

of patients hospitalized at least once since the age of 40 (but who had not experienced delirium) had even been informed about the possibility of delirium. Among those who said their healthcare provider informed them of the possibility, only 8 percent said that their healthcare provider had spoken to them about strategies to prevent delirium. About 34% said that their health care team had **not** made them aware of how to prevent it, and 56% were unsure whether they had been made aware. This indicates a critical gap about the need to educate patients at high risk for delirium and their families. At a minimum, older adult patients, particularly those age 65 and above with underlying health conditions, should ask their providers to screen them for delirium risks before undergoing any elective surgery.

Delirium: It's very distressing and can result in long-lasting consequences

Delirium may be the most common medical complication you never heard of. The 2020 AARP survey on delirium and brain health of adults 50 and older found most (74%) were not familiar with delirium. Seventy percent of adults in the survey have had some form of hospitalization since the age of 40. Among adults who had a hospitalization but did not experience delirium, only 4% said their healthcare provider spoke to them about the possibility of delirium. Only about 25% of adults age 50 and older reported they were at least somewhat familiar with delirium. Seven percent of those adults surveyed said they personally experienced delirium, and 20% of respondents witnessed someone else who had. Most of the people who reported experiencing delirium themselves were not familiar with the condition prior to hospitalization, nor were they aware of strategies to prevent it.

While the numbers of people in the survey who experienced it themselves were relatively small, the experience was clearly very disturbing to them. Among those surveyed who had personally experienced delirium, 44% said they were frightened by the experience, with 19% saying they were very or extremely frightened. They reported difficulty in understanding what was happening around them (45%), said things that did not make sense (43%), became overly sleepy and compliant (37%), became stressed, anxious or hyper (28%), or had hallucinations (16%).

Amongst those who witnessed others' distress with delirium, the most common side effects reported were their loved one saying things that did not make sense (61%), not understanding what was happening around them (47%),

experiencing hallucinations (34%) and becoming stressed, anxious or hyperactive (34%).

Delirium can also increase the length of time people are hospitalized, resulting in greater emotional stress and expenses. Among adults age 50 and older who witnessed their loved one experience delirium, nearly half said the episode lasted longer than a day. Three in 10 said it increased the length of their loved one's hospital stay. Over 4 in 10 (41%) said the length of their loved one's hospital stay was seven days or longer.

Perhaps most shocking, about 40% of those in the survey who personally experienced delirium said they still have lasting effects from the condition. Memory impairment was among the most common long-lasting effect reported, along with depression, lack of motivation, an inability to organize themselves for daily life, panic attacks and ongoing scary dreams that seem too real. Among those who have not experienced it themselves but witnessed a loved one or friend with delirium, 49% reported their loved one had long-lasting effects to their brain health from the delirium. These effects include memory impairment, ongoing confusion and depression.

Delirium, dementia and cognitive impairment

Delirium is often misunderstood to be another word for dementia, but the two conditions are not the same. Delirium is a sudden change in mental status, or sudden confusion, which develops over hours or days. Dementia is a condition that develops over many months and years. Alzheimer's disease is the most common form of dementia; other forms include Lewy body dementia, frontal temporal dementia and vascular contributions to dementia.

Here is a chart that helps distinguish between delirium and dementia:

DIFFERENTIAL DIAGNOSIS: DELIRIUM VS DEMENTIA		
Feature	Delirium	Dementia
Onset	Typically abrupt	Insidious and progressive
Duration	Hours to days	Months to years
Attention	Reduced ability to sustain or shift attention	Normal unless severe
Consciousness	Fluctuating, reduced level of consciousness	Generally intact
Speech	Can be incoherent, disorganized	Ordered, may have aphasia
Psychomotor subtypes	Hyperactive/hypoactive forms often present	Psychomotor changes absent or unpredictable

Dementia, however, does put people at higher risk for delirium, and episodes of delirium have been linked to the onset or progression of dementia. In the hospital, two-thirds of people with delirium have dementia. The longer a person in the hospital suffers from delirium, the worse their dementia will be.

Delirium is also linked with an increased risk of long-term cognitive impairment, which includes difficulty with thinking skills and memory. One 2013 study published in the *New England Journal of Medicine* of more than 800 critically ill patients found that half had cognitive impairment a year after their illness and that an episode of delirium was the strongest predictive factor for that impairment. A third of the patients in that study had problems with memory and thinking skills similar to Alzheimer’s disease, and a third had symptoms similar to someone with a traumatic brain injury. Research has found that the longer a patient is delirious in the hospital, the greater their risk of cognitive impairment. Only about a third of patients who experience delirium after a stay in the ICU fully recover.

It’s unclear whether these episodes of delirium are causing people to have worsening dementia or cognitive impairment or something else happens to their brain that causes both the delirium and the cognitive impairment. More study is needed before researchers can understand this complex relationship. But we know that people who have experienced delirium self-report poorer brain health than those who have not. The 2020 AARP survey found that significantly fewer adults age 50 and older who have experienced delirium report excellent/very good brain health compared to those who have not had delirium (43% compared to 65%).

Predicting delirium

By understanding who is at higher risk for delirium, it’s possible to take steps to help prevent or lessen the severity of the condition. There are many different risk factors linked to delirium.

Who is at highest risk? The 2020 AARP study showed that adults 50 and older who personally experienced delirium reported significantly more hospitalizations since age 40 (3.6 compared to 1.8 overall) and a higher number of health conditions, such as high blood pressure, high cholesterol, diabetes, or heart disease (4.6 compared to

RISK FACTORS FOR DELIRIUM	
Predisposing Factors	Precipitating Factors
Dementia or pre-existing cognitive impairment	Medications: <ul style="list-style-type: none"> • Polypharmacy • Psychoactive medication use • Sedative-hypnotic use
History of delirium	Use of physical restraints
Functional impairment	Use of bladder catheter
Sensory impairment: <ul style="list-style-type: none"> • Vision impairment • Hearing impairment 	Physiologic and metabolic abnormalities: <ul style="list-style-type: none"> • Elevated BUN/creatinine ratio • Abnormal sodium, glucose, or potassium • Metabolic acidosis
Comorbidity/severity of illness	Infection
Depression	Any iatrogenic event
History of transient ischemia/ stroke	Major surgery
Alcohol abuse	Trauma or urgent admission

Ref: Inouye SK et al, Lancet 2014; 383:911-22

A Frightening Experience After Surgery

Sarah MacAusland, 85, lives at home in Aberdeen, Scotland. Although she sometimes worries a bit about her memory, she feels she’s doing pretty well for her age and is proud that she manages cooking, housework and errands on her own.

One afternoon, MacAusland is carrying in some groceries and falls and can’t get up. Over the next two hours she manages to drag herself to her phone and calls an ambulance.

In the hospital, an X-ray shows a broken hip. She is given intravenous fluids and narcotic pain killers, and undergoes surgery the following morning.

Her son Andrew comes to visit that evening and finds her confused and disoriented — clearly different from her normal self. She is agitated and unable to focus on what he is saying or answer him the way that she normally would. MacAusland tells Andrew that she does not believe that she has a broken hip or that she has had surgery. She tries repeatedly to get out of bed so that she can return home. She tells Andrew that she has been wrongfully arrested and has been locked up in a police station. She begs him to help her escape.

The son and the staff note MacAusland is not only confused about what is happening but that she is also frightened and distressed.

2.2 overall). Adults who reported they have not experienced delirium tended to be younger than those that had. This is consistent with the medical literature. The older you are and the more health conditions you have, the more likely you are to experience delirium following surgery or illness.

People over age 65, especially those on multiple medications, are at higher risk. Delirium is common after surgery, especially hip or heart surgery. People with dementia, Parkinson's disease, cognitive impairment, heart failure and depression have greater chances of getting delirium, as do those who are hearing or visually impaired. Those who are withdrawing from alcohol, nicotine or drug abuse are also at higher risk. Surgery can trigger delirium, as can side effects of new medications or withdrawal from medications. Sepsis, the body's extreme and dangerous response to an infection, can also trigger delirium. Other triggers include dehydration, severe constipation, problems urinating and pain. A previous episode of delirium is also a strong risk factor for future episodes. About two-thirds of patients in ICUs (of all ages) get delirium, and 7 out of 10 patients in the hospital get delirium while they are on a ventilator to help them breathe.

The following are some common causes of delirium in the ICU:

Common Causes of Delirium in the ICU

- Less oxygen to the brain
- The brain's inability to use oxygen
- Chemical changes in the brain
- Certain medicines (e.g. midazolam)
- Infections
- Uncontrolled severe pain
- Medical illnesses (e.g. kidney failure, sepsis)
- Alcohol, sedatives, or pain killers
- Withdrawal from alcohol, nicotine
- Inability to sleep and alarm fatigue

Source: Vanderbilt University, Critical Illness, Brain Dysfunction and Survivorship Center, ICU delirium.org, and NIH.

Intensive Care Unit: A Cry for Help

Stephen Daniels, 73, is a widower and retired mechanical engineer who works crossword puzzles daily and is getting along very well. One spring Saturday in Nashville, Tennessee, he begins to get a sore throat and develops a nasty cough. Later that day he has chills and is shaking in bed. Acetaminophen, other cold medicines and a long night's sleep only leave him feeling worse. His daughter, who comes to pick him up for church, finds her father in bed, complaining of feeling short of breath. She takes him to the emergency room and finds out he has what doctors call a "socked-in pneumonia" in his left lung. They test him for strep and when that test comes back positive they diagnose strep (bacterial) pneumonia. His oxygen levels are low, so Mr. Daniels is admitted to the hospital's intensive care unit (ICU) for antibiotics and treatment. Despite antibiotics and intravenous fluids, he sinks into dangerous septic shock over the next 12 hours. Doctors put him on a mechanical ventilator to help him breathe.

His daughter, Sheryl, notices her father isn't himself. He's distant and won't tell her how he feels. Although he's usually kind and helpful, he refuses to cooperate with nurses and displays complete apathy with the doctor, as if he just doesn't care. The nurses perform a mental test and tell Sheryl that her father has lost his ability to pay attention or organize his thinking. They call this delirium, which they say happens to easily more than half of patients in his situation in the ICU. Over the next few days, he stays in this condition in the ICU, with moments of lucid thinking in between hours of confusion and inability to figure out where he is, even though Sheryl stays by his side and repeatedly tries to reorient him. Sheryl spends hours in the hospital because she notices that when she leaves, he gets paranoid about those caring for him. Daniels writes notes to Sheryl about how the hospital staff is hurting him when she steps out, which she knows is untrue. Once he's off the ventilator and breathing again on his own, it takes another day or so for him to get back to his loving, gentle, inquisitive self. She tells her friends that her father's brain was "off" with this delirium for around four days. Daniels' daughter brings him crossword puzzle books, and he is embarrassed that he can't finish even the moderate-level games because his memory is "off."

Over the next month, his physical strength and mental agility improve, but there is no doubt that he's not quite himself. He has to make multiple trips to stores because he forgets some of his groceries and the things he needs at the hardware store. But what bothers him the most is that he can't remember his friends' names on Sunday when he goes to church. Friends say Daniels appears to be in a kind of fog. For the first time in his life, Daniels starts hyperventilating, panicking and has a sense of doom about his future. What is wrong with him? Why does his life seem so different? What can he do to get his mind back? And why doesn't anyone understand? He whispers to himself, "I need help."

Preventing delirium

As many as 40% of delirium cases can be prevented, according to some estimates. Many of the best methods for preventing delirium are also good practices for treating all people in health care settings and involve preventing or eliminating things that put people at risk. Doctors and health care providers should take special care with those at higher risk of delirium. Pain management is important, especially in the ICU, and needs to balance the negative effects of narcotics with those of uncontrolled pain. Careful use of sedatives and narcotics is also crucial, and they should be avoided whenever possible. Getting patients up and moving as soon as possible after surgery may help prevent delirium. Making sure people are well-hydrated, well-fed and going to the bathroom regularly (if possible) is also important. Caregivers can use all the tips discussed previously to help make hospital or recovery stays as comfortable as possible. These may seem like simple steps, but research has shown that they make a huge difference. Previous work based upon government statistics and highlighted by the *Wall Street Journal* in 2019 estimated that 2.6 million older people a year became delirious in U.S. hospitals. If we can prevent 40% of those cases, we will prevent 1.2 million people every year in just one country alone from suffering delirium-caused trauma to their brain health.

Recognizing delirium

Family members can play a key role in recognition of delirium and bringing it to attention of healthcare professionals. They are often the first to notice subtle changes. One way to help recognize delirium is that it usually presents as a sudden change in behavior that can come and go. Families will note that the person is “not the same as he was yesterday.” The person often cannot think clearly, is having trouble paying attention, is having a hard time understanding what is going on around him or her and may see or hear things that are not there.

Delirium symptoms can vary widely. Some people with delirium are extremely agitated and upset, while others seem sleepy, confused and dazed. One common aspect in people with delirium is that they have trouble paying attention. Delirium symptoms often fluctuate in nature. A person suffering from delirium may seem completely clear in their thinking and within hours seem completely out of it. Therefore, a nurse may report that a patient is fine, but a

short time later a family member may notice their loved one is in an agitated state or even hallucinating. The person’s behavior can vary from minute to minute, hour to hour or day to day. Some people with delirium will experience deep, unusual sleep. Delirium may also cause someone to be awake all night and sleep during the day. It may also cause a disruption in eating habits. The fluctuating, changing nature of delirium can fool even the most seasoned practitioners. For this reason, it is extremely important for family members and caregivers to let nurses and doctors know if they suspect a loved one is suffering from delirium. There are three main types of delirium:

1. **Hypoactive delirium:** dominated by symptoms of drowsiness and inactivity. Researchers say that hypoactive delirium is much more common than hyperactive delirium, can be more difficult to diagnose, and also results in worse outcomes.
2. **Hyperactive delirium:** characterized by restlessness, agitation, mood changes and sometimes hallucinations. Patients may also resist care. This is the most easily recognized type of delirium, but also the least common.
3. **Mixed delirium:** This type includes symptoms of both hypoactive and hyperactive delirium. People can quickly switch back and forth between hypoactive and hyperactive states, alternating between being too sleepy and too aroused at different times of the day.

Information about tools to help health care providers better identify and recognize delirium are described further below.

Treating/helping those with delirium

What caregivers/family members can do

Often doctors and nurses don’t diagnose delirium at first, so it is crucial for family members and caregivers to notify health care providers right away of any suspected change in mental status. The sooner delirium is identified and treatment is implemented, the less severe the symptoms and negative consequences are likely to be. Take comfort in knowing that the condition often improves within a few days. Although helping care for someone with delirium can be frightening and difficult, if a person is experiencing delirium, it’s helpful to have a family member or caregiver be with them as much as possible. Family members and caregivers should ideally stay with loved ones at night if the confusion is severe, as nighttime can be particularly frightening for someone suffering from delirium. Insist on cognitive assessments at least once in every nursing shift when delirium is present. That will help you and the health care providers reliably

Caregivers can help someone with delirium by reassuring and reorienting the patient.

A few suggestions:

- Ensure hearing aids, glasses and dentures are available at all times – and clean.
- Have a gentle and friendly approach, smiling and providing reassurance.
- Talk and keep the patient informed in short, simple sentences.
- Check that the patient has understood you and be prepared to repeat if necessary.
- Familiarity helps, so try to make sure that someone the patient knows well is with them.
- Try not to agree with any incorrect ideas but disagree with tact and change the subject.
- Keep a calendar and/or clock within view and give reminders of the surroundings.
- Bring in some familiar objects from home to the hospital to keep at the bed side.
- Remind the patient to eat and drink and assist if **required**.

Source: [Scottish Intercollegiate Guidelines Network](#).

follow your loved one's progress. If the health care providers do not appear to be doing this, refer your nurse or doctor to the Age Friendly health system, Nurses Improving Care for the Health Systems Elders program (NICHE) or Hospital Elder Life Program (HELP) protocols.

Consider making and using of an "all about me" board or poster to tell staff and other caregivers about the person, for example, what makes them feel calm and happy, and who are important people in their lives.

What healthcare providers can do

The mainstay of delirium treatment is to take action to limit delirium and its consequences. Healthcare professionals can use good care to identify the underlying cause, manage patients, make them more comfortable and possibly shorten the length of a delirium episode. If you are a health care provider in the United States, work with the Geriatrics Workforce Enhancement Program (GWEP) in your area, funded by the Health Resources and Services Administration (HRSA), to ensure that approaches like the age-friendly health

Delirium at Home, Successfully Managed

Reina Sanchez, 79, lives alone in her home after being widowed several years ago. She has congestive heart failure and has had several urinary tract infections that have been successfully treated with antibiotics. While she does not get out as much as she used to, she does the crossword puzzle in the newspaper every day and has several television programs that she watches. Her daughter lives in the adjacent town and visits her regularly, but she is a single parent of two teenage children whose lives are busy with extracurricular school and sports activities. Sanchez's daughter Maya sometimes does not get to see her mother as much as she would like, but she describes her mother as "sharp as a tack."

Sanchez has a home health aide who visits for two hours, three times per week, to help with personal care, meal preparation and some light housekeeping. The aide also provides company for Sanchez, who sometimes does not have visitors for more than a week at a time. Sanchez began experiencing painful urination and an overall feeling of being ill about a week before the home health aide noticed changes in her behavior. Sanchez ate and drank much less because, she said, "it hurt to pee." The aide also noticed that the crossword puzzles were not done, and Sanchez could not remember what television shows she used to watch. She became confused and did not recognize the aide when she arrived. She spent most of the time her aide was in the home pacing the halls and moving items from one place to another and back again. Clearly, she was not herself. The aide called the home care nurse, who made a home visit that same day.

The home care nurse found that Mrs. Sanchez was obviously confused, agitated and dehydrated. When the nurse performed a common test for delirium, she found that Sanchez was experiencing the condition. She notified Maya and called an ambulance to transport to the hospital. The home care nurse asked Sanchez's daughter to stop by the patient's house to pick up a few items that would be comforting for her mother while she was in the hospital. In addition, the daughter was asked to bring her mother's eyeglasses, as well as a complete list of her current medications.

Once in the emergency room, hospital staff determined that Sanchez was severely dehydrated with an untreated urinary tract infection and hyperactive delirium. Sanchez's daughter was encouraged to stay with her mother to provide support and reassurance. Doctors started Sanchez on antibiotics and intravenous fluids. Soon after, she was transferred to the medical unit. In the medical unit, her urinary tract infection was successfully treated and she became less confused and agitated. Maya said she was willing to stay with her mother around the clock to help her while in the hospital. During her hospital stay, she needed frequent reminders of the day, date and time. The reason for the hospitalization and treatment also had to be explained repeatedly. After five days in the hospital, Sanchez was sent home with a home care referral for both skilled nursing for cognitive assessment and monitoring of her physical wellbeing. Sanchez continues to have some memory lapses and slight confusion, but she seems to be improving every week with the support of her family and her aide.

system 4Ms mentioned above (what matters, medication, mentation and mobility) is embedded in practice.

➤ Screen, and Be Alert to High Risks

Patients scheduled for elective surgery should undergo cognitive screening before their operation. Patients with cognitive impairment, even very subtle impairment, are at a much greater risk of suffering delirium after surgery than those with normal preoperative cognition. Anesthesiologists and surgeons should be aware of drugs to avoid (e.g. anticholinergics, benzodiazepines, meperidine antipsychotics). The relationship between depth of anesthesia and delirium is controversial and still unresolved.

➤ Use Validated Tools to Help Recognize Delirium

Several tools have been developed for helping doctors and other healthcare providers improve their recognition of delirium. The Confusion Assessment Method (CAM) is a standardized evidence-based tool that is the most widely used method to detect delirium worldwide. It has been translated into several languages and can be quickly and accurately used in both clinical and research settings. Healthcare professionals use it to screen for sudden onset, inattention, disorganized thinking and an altered level of consciousness. See HospitalElderLifeProgram.org/delirium-instruments.

The 4AT Rapid Clinical Test for Delirium is a quick assessment tool designed for use in clinical practice. The four A's stand for: arousal, attention, abbreviated mental test 4, acute change. See <https://www.the4at.com>. Detailed information on 31 delirium tools can be found at: <https://deliriumnetwork.org/measurement/delirium-info-cards/>.

Patients and caregivers can be very frightened by delirium. Explain to patients and caregivers that delirium is a change in mental state that usually improves when the underlying physical condition improves. Look for potential causes such as medications that increase delirium risk or acute illness/infection, which are the most common contributors. Consider acute, life-threatening causes, including low oxygen levels, low blood pressure, low glucose levels and drug intoxication or withdrawal. Remember that sometimes there can be more or one causes and that the cause is not always clear.

➤ Effectively Manage Pain; but Be Aware Drugs Can Make It Worse

Because severe pain can result in delirium, make sure to assess and manage pain. The key is to manage pain with as little narcotics as possible. Consider implementing regional nerve blocks for surgical pain. Around-the-clock scheduled acetaminophen (maximum 3,000 mgs each 24 hours) can be very effective to help treat pain. Note that multiple causes of delirium are common. Optimize patient environment to promote brain recovery. This includes reducing noise, helping patients sleep and encouraging family members to stay with patients as much as possible. Detect, assess and treat distress, with non-pharmacological means if possible. The 2020 AARP healthcare provider survey found that 82% believed that antipsychotic medications are at least somewhat effective at preventing or treating delirium, and 32% think they are extremely or very effective. However, the evidence doesn't support the use of antipsychotic medications. (See section below.) Benzodiazepines and narcotics that are often used to treat the "confusion" of delirium may worsen cognition and exacerbate the problem. Work to prevent common complications of delirium that can include immobility, falls, pressure sores, dehydration, malnutrition and isolation. Be aware that older people may have a preexisting cognitive impairment, which may be exacerbated by delirium. A specialist referral (e.g., geriatrics, geriatric psychiatry or neurology) should be made if the patient is not recovering. Make sure that delirium is noted in discharge letter and recommend that patients or caregivers tell their primary care providers.

Here are three common mnemonics used to help manage delirium: PINCHME, DR. DRE and DELIRIUM. They share common elements, but are tailored to help people remember what to look for in different settings.

'PINCH ME' mnemonic (in hospital or long term care setting):

P for Pain (and unable to sleep or move around)

IN for Infection (chest, urine, skin etc.)

C for Constipation (or unable to pass stool or urine properly)

H for Hydration (dehydration and malnutrition)

M for Medication (sudden stopping or starting drugs)

E for Environment (being in an unfamiliar place)

Dr. DRE Mnemonic (for the intensive care unit):

These are the things health care providers should consider when they recognize delirium is present in the ICU.

Dr. for Disease Remediation of the most common disease complications to watch out for (Sepsis, Chronic Obstructive Pulmonary Disease (COPD), Chronic Heart Failure (CHF))

DR for Drug Removal (Perform spontaneous awakening trials (SATs) and stopping benzodiazepines/narcotics)

E for Environmental Modifications (Immobilization, sleep and day/night, hearing aids, glasses)

Source: *Critical Illness, Brain Dysfunction and Survivorship (CIBS) Center at Vanderbilt University, icudelirium.org*

DELIRIUM Mnemonic (for all health care settings):

D - Drugs, dehydration, discomfort

E - Electrolytes

L - Lungs (hypoxia), liver disease

I - Infection

R - Restraints, restricted movement, renal failure

I - Injury, impaired sensory input

U - Urinary tract infection (UTI)

M - Metabolic abnormalities (glucose, thyroid)

Medications that increase risk for delirium

A number of common medications increase risk of delirium. With any medication, patients and family members need to work with their doctors and pharmacists to understand the complicated relationship between risks and benefits. It's important to consult with pharmacists and doctors to evaluate the types and doses of medications older people are taking. Health problems can often arise from multiple medications.

The American Geriatrics Society has created guidance called the Beers Criteria for Potentially Inappropriate Medication Use in Older Adults, available at <http://www.healthinaging.org/medications-older-adults/>. The Beers Criteria identify potentially inappropriate medications for people 65 and older — such as benzodiazepines, anticholinergics, hypnotics, barbiturates, antipsychotics, and some of the antidepressants — that can harm sleep over time and increase confusion and mental decline and even cause delirium. Many health care providers do not realize anti-psychotic medications

are *not* effective at preventing or treating delirium. Before such medications are prescribed and taken, providers and consumers should take great care to evaluate that the risks do not outweigh the benefits. Furthermore, people should conduct a re-evaluation of existing medications and possible interactions whenever adding or being prescribed a new medication, or when preparing for surgery.

Review all medications—including supplements and over-the-counter-medications—with a surgeon and anesthesiologist a few weeks before a planned surgery because withdrawal of some medications can cause patients to have delirium. **Those who are at risk for delirium when they go to the hospital should not be put on medications for delirium, because there is no evidence that any medications prevent delirium.** Families should ask about solutions that do not involve medications before drugs are prescribed for delirium. If a doctor is giving medication to calm a loved one down, it's worth asking why. Caregivers and family members can and should question rapid increases or high doses of certain medications. Ask if there is a clinical pharmacist available to review the medications. Finally, realize a medication given in the hospital may cause higher risks for problems with patients at home with less intense supervision.

• Benzodiazepines

Benzodiazepines are a group of medications that are often used for sleeplessness, agitation and anxiety. However, studies have found that they increase risk of delirium. While they may seem to make patients less anxious and help them sleep, they seem to disturb a type of deep sleep called slow-wave sleep. Good sleep is important for everyone, but it is especially important for patients in the hospital. The loss of slow-wave sleep has been found to increase the need for further sedation, increase anxiety, impair recovery and increase risk of delirium. Non-pharmacological approaches to enhance sleep are encouraged for every older person in the hospital (See <https://www.hospitalelderlifeprogram.org>). See [The Brain Sleep Connection: GCBH Recommendations on Sleep and Brain Health](#).

• Opioids

Opioids, which are often used for pain, are linked to delirium, especially when given at high doses. Studies have linked meperidine and pentazocine to higher risk of delirium, especially in older people and those who have never had opioid medications in the past. Use of morphine, one of the

most common opioids, has been linked to increased risk of delirium in some studies but decreased delirium risk in trauma patients in the ICU. Increasing opioid doses quickly has also been associated with delirium. Because severe pain is also linked to delirium, pain needs to be treated. Opioids are effective at treating pain, but the dose and duration need to be carefully managed so as not to cause other issues. Opioid dosage can be decreased when coupled with acetaminophen (scheduled around-the-clock) and other non-opioid drugs to decrease pain.

• **Drugs that affect the central nervous system: anticholinergics**

These common medications known as anticholinergics block an important chemical in the brain — a neurotransmitter called acetylcholine — that is involved in many of the functions of the nervous system, including muscle movement, heart rate and breathing, as well as learning and memory. This broad group of drugs includes some antihistamines, antidepressants, and medications for gastrointestinal and bladder disorders. They are found in many drugs frequently prescribed and purchased over-the-counter to help with sleep and allergies, such as Tylenol PM and Benadryl (diphenhydramine).

Research has shown that anticholinergic drugs increase the risk of delirium, especially in older people. Any drug that affects the central nervous system may trigger delirium, especially in patients already at higher risk. One study found that the more this neurotransmitter is blocked, the higher the severity of delirium. In addition to creating a higher risk for delirium, long-term use of anticholinergic medications has also been associated with dementia. For example, a 2019 study published in *JAMA Internal Medicine* found that using these types of medications for three years or longer in middle aged and older people significantly increased the risk of dementia.

Antipsychotics and delirium

For more than four decades, antipsychotic medications have been used to treat delirium in intensive care units, hospital wards, emergency rooms and long-term care facilities. By some estimates, up to 70 percent of patients in intensive care units received antipsychotic medications such as haloperidol (brand name Haldol). Worldwide, millions get these medications to treat delirium.

But recent studies have found that these drugs, which can have serious side effects, do not improve outcomes. In a 2018 study

published in the *New England Journal of Medicine*, researchers at 16 medical centers divided nearly 600 patients who were suffering from delirium into three groups. One group got haloperidol, a powerful antipsychotic. Another group got ziprasidone, which is from a class of drugs called “atypical antipsychotics” and a third group got a placebo medication. The researchers found no material difference in the outcomes among the three groups. There was no change in the length of the delirium or the number of days without a coma. They stayed in the ICU the same length of time, they stayed on ventilators as long and they didn’t get out of the hospital any sooner. The study found that antipsychotics can help calm patients down and it may still be valuable for doctors to use them for that purpose where safety is an issue. Other studies and reviews of studies have found similar results.

Families and caregivers should question whether an antipsychotic medication is necessary for patients suffering from delirium. Methods discussed earlier in this report — such as getting patients up and moving, reviewing their medications, making sure they are eating and drinking and making their surroundings comfortable — may work just as well.

A more complete list of drugs associated with delirium was compiled by the pharmacist Sue Fosnight and is reproduced in Appendix 6.

Delirium in children

Just like the oldest adults, younger children at the other extreme of age show high vulnerability to delirium, and they experience similar kinds of variable symptoms ranging from hyper to hypoactive described above. Estimates for the number of pediatric cases of delirium range from 10 percent to 30 percent of critically ill children. The factors that appear to increase risk for children are age less than 2 years old, the presence of developmental delay, underlying disease, and factors that require prolonged pediatric intensive care unit stays resulting in immobility, use of ventilators, sedatives and other medications. An infant’s brain goes through various stages of development, which reflect the immaturity of its central nervous system. It is possible that younger, developing brains are more sensitive to illness and acute stress similar to vulnerable, older brains. Children with developmental delays may develop delirium in a manner comparable to older people with dementia. A recent study (by Morandi *et al.*) found similarities in the profile of delirium symptoms in a cohort of elderly patients with dementia and delirium, and infants and preschool children with delirium. These

preliminary findings may be informative for designing future studies adapting assessments of delirium used in infants and preschoolers to patients with dementia, especially in the moderate to the severe stages. The standard for treatment

of delirium in children is very similar to that of older adults, which is to always try non-pharmacological approaches like those recommended above first.

KNOWLEDGE GAPS

Although much progress has been made in the past two decades studying prevention, causes, mechanism, risks and treatments of delirium, there is still much work to be done in all areas of delirium research. We still do not fully understand the underlying causes of delirium, and more research is needed to translate findings from animals to humans. For example, we do not yet understand what parts of the brain are affected by delirium.

We need more understanding into why certain factors increase delirium risk and whether there is a way to prevent delirium in those who are at high risk. To better understand its prevalence and clinical consequences, we need updated, national cost estimates drawn from large, diverse patient populations across multiple health care settings including analysis of the cost benefits of prevention and better management.

We need clinical trials and comparative effectiveness research on what works to prevent delirium and what can be done to lessen its severity and duration. We also need to evaluate whether screening for delirium improves outcomes. These types of studies should be carried out in homes, hospitals and care centers/assisted living centers. In particular, it would be helpful to evaluate the benefits or harms of instituting cognitive screening prior to surgery for all people but particularly those who are at higher risk because they are older or have existing cognitive impairment. There is much research to be done as well as to which treatments are most effective in alleviating symptoms and shortening the length of delirium episodes.

There is also a need for more randomized controlled trials to identify medications that increase the risk for delirium as well as those medications that may alleviate symptoms. We need additional research on the use of sedatives and antipsychotic drugs for those suffering from delirium. There is a need as well for randomized controlled trials on the effectiveness of anesthesia monitoring in reducing postoperative delirium.

We need more research studying why some people don't recover from delirium, and why delirium is associated with an increased risk of cognitive impairment and Alzheimer's disease and other causes of dementia. We don't yet know whether delirium causes cognitive decline and worsening dementia or whether it exacerbates another underlying condition.

We should evaluate the impact of follow-up clinics and community mental health support for people who have experienced delirium to see if interventions designed to ameliorate the impact of delirium can improve the very high first-year mortality rates.

Finally, we should explore the role of biological aging as a modifiable driver of accelerated brain aging and neurodegeneration, and investigate whether emerging therapies to slow neurodegeneration may represent important steps in reducing vulnerability to delirium.

CONCLUSION

Although there is still much to learn about how to better prevent and treat delirium, there is much we already do know and steps we can implement today to improve this common condition amongst older adults. This work to reduce the risks to older people's brain health posed by delirium cannot come too soon. By the year 2030, an estimated 17 percent of the people in the United States will be over the age of 65 and over half of those over 65 will need surgery at least once during the remainder of their lives.³ We have a tremendous opportunity to help protect these people from the debilitating, frightening effects of a delirium episode. We can use the methods we do have to help prevent, recognize and alleviate the symptoms of delirium. We have good tools to identify delirium and evidenced-based methods we can use to help the suffering of those with delirium. Many health care workers, however, do not know how to identify the condition or treat the symptoms. More education within hospitals, assisted living facilities, care homes and other settings is both valuable and sorely needed. Families and caregivers also play a crucial

role in both recognizing delirium and helping their loved ones when they contend with a delirium episode, so it's important we educate the general public as well.

There is a great opportunity to help older people if we use the knowledge we have to prevent and aid those with delirium. Just driving awareness about what it is can help prepare the 73% of adults 50 and older who have never experienced or witnessed delirium to take steps when they can to better prepare for surgery in order to reduce their risks. Indeed, among the adults in the 2020 AARP survey who reported experiencing delirium, over 40% said they were in the hospital for elective surgery. It's also crucial that we continue to research the conditions to get answers to the myriad unanswered questions about the condition. If we can learn to prevent or at least ward off the negative effects of delirium — and ideally fully understand the causes — we may be able to alleviate the suffering of millions of people around the world, help protect them from serious and sometimes long-lasting harm, and save billions of healthcare dollars.

A Doctor Suffers Through Unrecognized Delirium

One of our own issue experts experienced delirium in the hospital. A 54-year-old professor of psychiatry was admitted to a university hospital with a bleeding ulcer and had surgery to treat the ulcer. While he was in the intensive care unit following the procedure, he received a blood transfusion and a drug to control nausea. Hours later, he had many of the classic symptoms and signs of delirium. He was confused and hallucinating. He was sometimes extremely agitated and sometimes lethargic. During his episode of delirium, he had many visitors and there was a great deal of noise and activity in the room. He could not even carry on a conversation.

The experience lasted several hours and clearly constituted an episode of delirium, although neither he nor the healthcare professionals around him recognized it as such at the time. He and his health care team later realized that he had both low blood count and a bad reaction to the drug given for nausea, but they never considered that he had delirium. This shows that even those who receive high-quality care and are knowledgeable about delirium may not realize that they are suffering from the condition. With time the negative effects of drug subsided, and he now recognizes that he is allergic to the drug.

The operating room nurse gave him fluids and helped him to get out of bed. Once he got up and started moving around he felt oriented and more like himself. After he left the hospital, however, he still felt a bit foggy. He delayed making important financial and administrative decisions for several weeks until he was well recovered.

He wishes his health care team and family had known about delirium and had taken more care with medications that were administered. He also believes it would have helped to have a calmer environment in the hospital. Years later, he still recognizes his experience as a frightening, confusing time.

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APPENDIX 1: GCBH PARTICIPANTS AND BACKGROUND

The Global Council on Brain Health (GCBH) is an independent collaborative of scientists, health professionals, scholars, and policy experts from around the world who are working in areas of brain health related to human cognition. The GCBH focuses on brain health relating to people's ability to think and reason as they age, including aspects of memory, perception and judgment. The GCBH is convened by AARP to offer the best possible advice about what older adults can do to maintain and improve their brain health. GCBH members gather to discuss specific lifestyle issue areas that may impact people's brain health as they age, with the goal of providing evidence-based recommendations for people to consider incorporating into their lives.

We know many people across the globe are interested in learning that it is possible to influence their own brain health and in finding out what can be done to maintain their brain health as they age. We aim to be a trustworthy source of information, basing recommendations on current evidence supplemented by a consensus of experts from a broad array of disciplines and perspectives.

The issue specialists and governance committee members formulated these recommendations, and the governance committee approved them. The liaisons provided very helpful review and input. Appendix 4 provides an explanation of the process followed in formulating this report.

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*Participation in this activity by these individuals does not necessarily represent the official viewpoint of the U.S. Department of Health and Human Services.

APPENDIX 2: LIST OF ADDITIONAL RESOURCES

The American Geriatrics Society

- Beers Criteria for Potentially Inappropriate Medication Use in Older Adults: <https://geriatricscareonline.org/ProductAbstract/american-geriatrics-society-updated-beers-criteria-for-potentially-inappropriate-medication-use-in-older-adults/CL001>
- Clinical Practice Guideline for Postoperative Delirium in Older Adults: <https://geriatricscareonline.org/ProductAbstract/american-geriatrics-society-clinical-practice-guideline-for-postoperative-delirium-in-older-adults/CL018>

American Society of Anesthesiologists

- Perioperative Brain Health Initiative: <https://www.asahq.org/brainhealthinitiative>

Australian Commission on Safety and Quality in Health Care

- Delirium Clinical Care Standard: <https://www.safetyandquality.gov.au/publications-and-resources/resource-library/delirium-clinical-care-standard>

European Society of Anaesthesiology

- Guideline on Post Operative Delirium: https://journals.lww.com/ejanaesthesiology/Fulltext/2017/04000/European_Society_of_Anaesthesiology_evidence_based.3.aspx

Hospital Elder Life Program (HELP) for Prevention of Delirium

- Ten Tips to Avoid Confusion in the Hospital: https://www.hospitalelderlifeprogram.org/uploads/delirium/Delirium_Brochure.pdf
- What Family Members Can Do: <https://www.hospitalelderlifeprogram.org/for-family-members/what-you-can-do/>
- Find out more here: <https://www.hospitalelderlifeprogram.org/>

Institute for Healthcare Improvement

- What is an Age-Friendly Health System? <http://www.ihl.org/Engage/Initiatives/Age-Friendly-Health-Systems/Pages/default.aspx>
- Age-Friendly Health Systems: Guide to Using the 4Ms in the Care of Older Adults http://www.ihl.org/Engage/Initiatives/Age-Friendly-Health-Systems/Documents/IHIAgeFriendlyHealthSystems_GuidetoUsing4MsCare.pdf
- To join the Age Friendly Hospital movement and find other freely available resources: <https://ihl.org/agefriendly>

Lown Institute

- <https://lowninstitute.org/projects/medication-overload-how-the-drive-to-prescribe-is-harming-older-americans/>

Network for Investigation of Delirium: Unifying Scientists

- Find out more here: <https://deliriumnetwork.org/>

Scottish Intercollegiate Guidelines Network

- Risk Reduction and Management of Delirium: <https://www.sign.ac.uk/sign-157-delirium.html>

The 4AT Rapid Clinical Test for Delirium

- Find out more here: <https://www.the4at.com/>

UK National Institute for Health and Care Excellence (NICE)

- Guideline on prevention, diagnosis and management of delirium: <https://www.nice.org.uk/guidance/cg103>

- Caregivers ABCDE: https://uploads-ssl.webflow.com/5bo849daec50243a0a1e5e0c/5bb3ef1b8f245ba1c8825d1c_Caregiver-ABCDE.pdf
- Is Your Loved One Confused? (printable brochure for families and caregivers): https://uploads-ssl.webflow.com/5bo849daec50243a0a1e5e0c/5bb3ef69aa273f53c285bae3_Confused-DeliriumFamilyBrochure.pdf
- Delirium Education Brochure (printable brochure explaining delirium for patients and families): https://uploads-ssl.webflow.com/5bo849daec50243a0a1e5e0c/5bb3862be59e345993off11b_delirium_education_brochure.pdf
- Find more patient and family resources here: ICUdelirium.org

APPENDIX 3: GLOSSARY

Anticholinergic medications. A class of medications that oppose or block the physiologic action of acetylcholine. They are used for a broad range of conditions, including overactive bladder and to help with sleep and allergies.

Antipsychotics. Drugs used to treat symptoms of psychosis such as hallucinations, paranoia, and severe anxiety.

Anxiety. Apprehensive uneasiness or nervousness.

Attention. The concentration of awareness in a focal and perceptive way.

Benzodiazepines. A class of drugs primarily used for treating anxiety disorders.

Blood pressure. The force of blood pushing against the walls of arteries. A blood pressure number of 120/80 mm Hg is generally considered ideal.

Brain health. A state of having good underlying neural mechanisms to support high functioning mental processes of cognition that support well-being.

Cognitive decline. In 2015, the Institutes of Medicine (IOM) defined a similar term, cognitive aging, as the lifelong process of gradual and ongoing, yet highly variable, change in cognitive functions that occur as people get older. Cognitive decline is a term used by experts to describe losing cognitive abilities over time as people age, absent a specific disease or condition.

Cognitive impairment. The stage between the expected cognitive decline of normal aging and the more serious decline of dementia. It can involve problems with memory, language, thinking and judgment that are greater than normal age-related changes (*Mayo Clinic*).

Cognitive reserve. Individual differences in the resilience or adaptability of cognitive processes, such as memory,

reasoning and attention, that together help explain why some people are more susceptible than others to age- or disease-related brain changes.

Dehydration. Occurs when the body doesn't have enough water and other fluids to carry out its normal functions.

Delirium. A serious medical condition in which a person experiences a sudden change in thinking and behavior that can come and go. There are three main types of delirium: hypoactive, hyperactive and mixed delirium.

Dementia. Dementia isn't a specific disease. Instead, dementia describes a group of symptoms related to memory, thinking and social abilities and affecting them severely enough to interfere with independent daily functioning. Though dementia generally involves memory loss, memory loss has many different causes. Alzheimer's disease is the most common cause of a dementia in older adults, but there are a number of types of dementia. Depending on the cause and type of dementia, some dementia symptoms can be reversed.

Depression. A common but serious mood disorder where one feels severe sadness and dejection.

Epidemiological studies. In these studies, which are observational in nature, scientists try to establish a link between lifestyle activities over time (e.g., education) and long-term outcomes (e.g., brain health with aging). They can be cross-sectional or longitudinal.

Frailty. A clinical state of increased vulnerability resulting from aging-associated decline in reserve and function across multiple physiologic systems such that the ability to cope with everyday or acute stressors is compromised.

Geriatrics. A branch of medicine that focuses on the health issues and treatment of elderly people. A geriatrician is a medical doctor who is specially trained in the aging process.

Hallucination. A sensory experience of something that does not exist outside the mind; the most common types of hallucinations are visual (seeing) and auditory (hearing).

Intervention. Action taken to improve a situation, especially a medical disorder.

Mental. Relating to the mind, including reasoning, thinking, mood, attention, feelings, emotion and interest in activities.

Observational studies. In observational research, scientists observe groups of people to identify characteristics, such as traits and choices, that are associated with disease or health.

Opioids. A class of drugs that includes pain relievers available legally by prescription, the illegal drug heroin, and synthetic opioids such as fentanyl.

Paranoia. A thought process that causes irrational suspicions or mistrust of others.

Randomized controlled trial (RCT). In a typical randomized controlled trial, people are randomly selected to receive either the intervention or a control condition. In a double-blind trial, both the participants and the researchers are unaware of (or “blinded” to) which person received the intervention until after the results are analyzed.

Risk. Risk is the chance or probability of a particular event happening in a group of people with similar characteristics or traits, compared with those not having that characteristic

or trait. Making up an individual’s overall risk of having a condition is the cumulative effects of factors that increase the chance of developing the condition (risk factors) as well as factors that decrease the chance of developing the same condition (protective factors).

Risk reduction. Reducing risks for cognitive decline or impairment in the abilities to think, reason, and remember means lowering your chances of experiencing loss in those abilities. A person’s overall risk may also be reduced by increasing factors that protect against cognitive decline or dementia. Dementia (due to Alzheimer’s disease or another related disorder) is one condition, and cognitive decline (the slowing of thinking and memory in the absence of a major brain disease) is another condition. When scientists study risk reduction strategies for cognitive decline, they are looking for factors that can reduce the risk of impairment to cognitive functions in the population in general. Therefore, some activity or intervention that reduces risk for a particular condition or disease means that a smaller proportion of people who engage in that activity are likely to have the condition or disease. However, risk reduction strategies are not the same as preventing any one individual from getting the condition or suffering from disease. For example, research has long shown that wearing a seatbelt reduces – but does not eliminate —the chance of injuries among people who are involved in automobile accidents and we nevertheless now recommend people wear seatbelts while they are driving.

APPENDIX 4: PROCESS USED TO PRODUCE THE CONSENSUS AND RECOMMENDATIONS

Interdisciplinary issue specialists from around the world with diverse backgrounds were selected to participate on the GCBH panel on delirium and brain health. These experts have conducted research that has significantly contributed to the body of evidence that examines the impact of delirium on brain health in older adults. Their diverse areas of expertise represent perspectives from disciplines including anesthesiology, critical care medicine, emergency medicine, epidemiology, geriatric medicine, geriatric psychiatry, internal medicine, nursing, neurology, neuroscience, physiology, public health and social work.

Fourteen issue specialists from four continents were asked to critically examine the state of the science as of August 2019. They discussed findings from observational studies as well as randomized controlled trials. The experts considered the cumulative body of evidence to determine whether it is sufficient to issue recommendations for individuals to maintain and improve brain health in the context of acute medical events. The issue specialists considered 16 different questions as a framework to guide their deliberations. The complete list of questions is available in Appendix 5.

After an in-depth moderated discussion, several follow-up conference calls and an exchange and refinement of drafts, the issue specialists arrived at 19 consensus statements to summarize the impact of the risk of delirium on brain health. Based on their consensus, they made numerous specific recommendations to individuals, caregivers, health care providers, and health care systems to reduce the risks and costs of delirium in order to promote adults' brain health

and prevent or reduce cognitive decline. Further, they agreed on numerous practical tips for people before going to the hospital, while in the hospital and for caregivers aimed at helping people around the world adopt behaviors to improve their brain health when facing surgery or illness.

Liaisons from academic, civic and non-profit organizations with relevant expertise in brain health and health care were invited to provide input and technical feedback during the refinement of the draft recommendations.

Seven Governance Committee members attended the meeting in Boston, Massachusetts. The entire Governance Committee reviewed and finalized the document during subsequent conference calls and emails between August 2019 and March 2020. The Governance Committee members issuing the recommendations are independent health professionals representing diverse expertise across four continents in epidemiology, psychology, public health, neurology, psychiatry, geriatrics, cognitive neuroscience, neuropsychology, pharmacology, medical ethics, health policy and neurodegeneration.

The Governance Committee applied their expertise to determine whether they concurred with the statements and to evaluate the objectivity and feasibility of the proposed recommendations. The GCBH Governance Committee reviewed this summary document to decide whether it accurately reflected the expert opinions expressed and the current state of science in the field. The Governance Committee approved the document on March 17, 2020.

APPENDIX 5: DISCUSSION QUESTIONS FRAMING THE DELIBERATIONS

1. What is delirium?
2. How common is delirium?
3. What are the causes of delirium?
 - a. What can trigger delirium?
 - b. What are the long-term risk factors for impacted individuals that are associated with delirium?
4. What steps can individuals take to try and prevent delirium?
5. Are some people more likely to experience delirium than others?
6. What are the typical signs and symptoms at onset? How can the condition evolve over time?
 - a. Reduced awareness of the environment
 - b. Reduced awareness function
 - c. Behavioral signs
7. Recovering from delirium
8. Is cognitive decline following delirium reversible?
9. Is post-operative cognitive decline reversible?
10. How long does it typically take to recover after an episode of delirium (following a surgical event or an acute medical illness)?
11. To what extent does recovery following an episode of delirium depend on the state of brain health prior to the onset of delirium?
12. What can be the consequences of a delirium episode on long-term brain health? Do some people experience brain fog? If they do, for how long?
13. Risk reduction
 - a. What can an individual do to minimize their risk of delirium?
 - b. Similarly, what can an individual do to reduce the risk of delirium on long-term brain health?
14. Delirium and dementia can both cause disorientation to time and place. What are the key differences?
15. Can certain medications cause delirium?
16. Do some individuals experience delirium without any cognitive decline and what do we know about this?

APPENDIX 6: COMMONLY USED DRUGS ASSOCIATED WITH DELIRIUM

Agents with Significant Anticholinergic Effects

Amitriptyline
Belladonna alkaloids
Chlorpromazine
Cyproheptadine
Cyclobenzaprine
Dicyclomine
Diphenhydramine
Doxepin
Flavoxate
Hyoscyamine
Hydroxyzine
Imipramine
Meclizine
Orphenadrine
Prochlorperazine
Promethazine
Thioridazine
Trimethobenzamide

Benzodiazepines

Alprazolam
Chlordiazepoxide
Clonazepam
Chlorazepate
Diazepam
Flurazepam
Lorazepam
Oxazepam
Temazepam

Muscle Relaxants

Carisoprodol
Chlorzoxazone
Cyclobenzaprine
Metaxalone
Methocarbamol
Orphenadrine
Tizanidine

Opioids

Fentanyl patches in opioid naïve
Hydromorphone doses greater than 0.5 mg intravenously every 3 hours or 2 mg orally every 4 hours in opioid naïve
Morphine in doses greater than 4 mg intravenously every 3 hours or 10 mg every 4 hours in opioid naïve (5 mg orally every 4 hours in frail elderly)
Meperidine
Pentazocine

Other

Corticosteroids
Metoclopramide in doses >5 mg before meals and at bedtime in patients with moderate to severe renal impairment

Source: Fosnight, S. "Delirium in the elderly." *PSAP-VII Geriatrics-book 7* (2011): 73-96. <https://www.accp.com/docs/bookstore/psap/p7bo7.sample02.pdf>

APPENDIX 7: DISCLOSURE STATEMENT OF POTENTIAL CONFLICTS OF INTEREST

Twenty-seven of the GCBH experts – all of the issue specialists and governance committee members — participating in the formulation of this report were asked to disclose potential conflicts of interest. Twenty-four attested they had no conflicts of interest. Dr. Boustani disclosed an equity interest in two health management companies. Dr. Petersen disclosed consulting with several pharmaceutical companies. Dr. Yaffe disclosed serving on a data and safety monitoring board for a pharmaceutical company. The authors are unaware of any affiliation of the experts that affected the objectivity of this paper and its recommendations. These disclosures are available upon request by contacting staff of the Global Council on Brain Health.

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APPENDIX 10: LIST AND LINKS TO OTHER REPORTS

All reports are available for download at GlobalCouncilonBrainHealth.org.

- [“The Brain-Body Connection: GCBH Recommendations on Physical Activity and Brain Health”](#)
- [“The Brain Sleep Connection: GCBH Recommendations on Sleep and Brain Health”](#)
- [“The Brain and Social Connectedness: Recommendations on Social Engagement and Brain Health”](#)
- [“Engage Your Brain: GCBH Recommendations on Cognitively Stimulating Activities”](#)
- [“Brain Food: GCBH Recommendations on Nourishing Your Brain Health”](#)
- [“Brain Health and Mental Well-Being: GCBH Recommendations on Feeling Good and Functioning Well”](#)
- [“The Brain-Heart Connection: GCBH Recommendations to Manage Cardiovascular Risks to Brain Health”](#)

ENDNOTES

1. 2020 AARP Delirium and Brain Health Survey: Adults Age 50 and Older. Fielded Nov. 17-23, 2019, from a nationally representative sample that included 1,015 adults age 50 and older. The margin of error is +/- 3.3 percentage points. <https://doi.org/10.26419/res.00376.001>
2. 2020 AARP Delirium and Brain Health Survey: Healthcare Providers, fielded Nov. 14-27, 2019, and includes both a nationally representative sample and an opt-in sample for a total of 556 healthcare providers. The margin of error is +/- 5.5 percentage points. At least 70 percent of the respondents' time is spent providing direct patient care, with at least 25 percent of their patients being age 50-plus. <https://doi.org/10.26419/res.00376.002>
3. The AARP survey found that 70 percent of people age 50-plus in the U.S. have had at least one hospitalization since age 40. The numbers of hospitalizations for the 50-plus by percentages:
 - None - 30 percent
 - One - 20 percent
 - Two - 17 percent
 - Three - 13 percent
 - Four - 7 percent
 - Five or more - 13 percent



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