

# Preventing Delirium among Older Adults with Dementia

*Donna M. Fick, PhD, GCNS-BC, Associate Professor of Nursing, School of Nursing, Pennsylvania State University, University Park, PA, USA.*

*Ann Kolanowski, PhD, RN, FAAN, Elouise Ross Eberly Professor of Nursing, School of Nursing, Pennsylvania State University, University Park, PA, USA.*

*Delirium superimposed on dementia (DSD) is common, is associated with poor clinical and economic outcomes, and occurs across all settings of care. In this article, we briefly review outcomes of DSD, propose the idea of cognitive reserve as a possible mechanism for interventions that prevent and manage DSD, and present the evidence for delirium interventions. We conclude with implications for practice and suggest web-based resources for supporting best practices in the care of persons with DSD.*

*Key words: delirium, dementia, prevention, interventions, cognitive reserve*

## Introduction

Delirium in persons with dementia is common, is associated with poor clinical and economic outcomes, and occurs across all settings of care. Delirium is superimposed on a dementia when an acute change in mental status (characterized by a fluctuating course, inattention, and either disorganized thinking or an altered level of consciousness) occurs in a patient with pre-existing dementia.<sup>1</sup> The pathogenesis of delirium is poorly understood, but is known to share several common features with dementia.<sup>2</sup>

The main risk factor for delirium is dementia. Delirium occurs in over half of hospitalized older adults with dementia and substantially worsens outcomes in a population already burdened with physical and mental losses.<sup>2-4</sup> In this article, we briefly review outcomes of delirium superimposed on dementia (DSD) and present the evidence and mechanisms for interventions to prevent and manage DSD. We conclude with implications for practice and web-based resources for best practices in the care of persons with DSD.

## Outcomes of Delirium Superimposed on Dementia

Delirium often occurs in the hospital setting, but may occur even more frequently in community-living persons with dementia (PWD).<sup>3</sup> The prevalence of DSD ranges from 22 to 89% in both hospital and community settings.<sup>4</sup> Delirium superimposed on dementia accelerates the trajectory of functional decline and results in prolonged hospitalization, rehospitalization, premature placement in long-term care, death, and increased costs.<sup>5-10</sup> A recent US study found that the 1-year health care costs attributable to delirium varied from US\$16,303 to US\$64,421 per patient, with the national burden ranging from US\$38 billion to US\$152 billion each year.<sup>11</sup>

## Cognitive Reserve as a Mechanism for Preventing Delirium Superimposed on Dementia

While it has not yet been fully tested in delirium trials, one possible mechanism for delirium prevention in dementia may

be the enhancement of cognitive reserve. Interventions that have the strongest links to improving cognitive reserve in PWD include physical activity, challenging mental activities, social interaction, and avoidance of anticholinergic and inappropriate medications. Most of the research on cognitive reserve has focused on its association with risk for dementia.<sup>13</sup> Dementia and delirium, however, share common clinical, metabolic, and cellular mechanisms that lead to reduced cognitive reserve, suggesting that they may represent points along a continuum.<sup>2</sup>

The enhancement of cognitive reserve is a mechanism that may modify risk for the clinical expression of brain disease. Cognitive reserve includes both passive and active brain processes that are protective of disease manifestation. Brain size and synapse density prior to disease onset<sup>12</sup> and life-long engagement in mentally stimulating activities such as formal educational and complex occupational and leisure activities<sup>13</sup> may explain why individuals with the same amount of disease pathology have different clinical presentations. It is suggested that persons with less cognitive reserve may be at a greater risk for exhibiting dementia.

## Interventions for Prevention of Delirium Superimposed on Dementia

Despite the high prevalence and poor outcomes associated with DSD, many intervention studies have excluded PWD. Delirium in PWD, however, has been shown to be reversible and preventable.<sup>5</sup> For both preventing and managing DSD, providers first need an instrument for early screening and detection, and a systematic plan for assessment and treatment of the potential causes of delirium (see Table 1).

Because delirium is often unrecognized, especially among PWD,<sup>14</sup> detection is perhaps the most challenging part of preventing delirium in this vulnerable population. The complexity of DSD, overlap of symptoms with dementia, and difficulty in determining the baseline status make detection of DSD a challenge in

the clinical setting. The presence of dementia, the hypoactive form of delirium, and increased age are all risk factors for poor detection of delirium.<sup>14–16</sup> Most of the current practice models use the Confusion Assessment Method (CAM) to screen for delirium. The CAM has strong reliability and validity, is user friendly, and takes less than 10 minutes to administer.<sup>17,18</sup> The CAM assesses four features of delirium: (1) acute onset and fluctuating course, (2) inattention, (3) disorganized thinking, and (4) altered level of consciousness. For delirium to be present, features 1 and 2 must both be present, and either 3 or 4. The CAM should be administered with other cognitive tests to fully assess the features of delirium (see Table 1).

Delirium in PWD usually has multiple causes. Intervention studies for delirium generally fall into four types of models: geriatric consultation, nurse-led and geriatric resource nurse models of care, interdisciplinary multicomponent models of care, and delirium rooms or units.<sup>19–22</sup> Most of the intervention studies in delirium thus far are based on research that identified causal factors for delirium. These factors have the potential to reduce cognitive reserve. Personal factors include age, dementia stage, vision or hearing impairment, and existing comorbidities and illness. Hospital factors may include an unfamiliar environment, the use of restraints, impaired sleep, the addition of new medications, and infection.<sup>19</sup> Other factors that have been implicated in DSD, but have weaker evidence, include environmental noise, fecal impaction, the recent loss of a loved one, and relocation to another unit or room.<sup>4</sup>

The core interventions for delirium have not changed much in the past decade and are based on a controlled clinical trial by Inouye *et al.* involving 852 participants.<sup>19</sup> That trial also included 253 individuals with dementia and cognitive impairment, and utilized an intervention protocol of orientation strategies and therapeutic activities targeted toward these patients. In this study, 32% (40/125) of PWD developed delirium (i.e., DSD) in the usual care group compared with

**Table 1:** Strategies for Early Detection of Delirium Superimposed on Dementia

Strategy	Tools/Tips
Obtain baseline and family history	Blessed* IQCODE* Call prior living place Talk with family if available Do not assume this is the individual's normal or baseline mental status
Screen for delirium every shift	CAM
Improve shift-to-shift report and provider-to-provider communication about mental status changes	Consider integration of CAM into EHR Make mental status a vital sign Call prior living place
Assess for attention deficits—a hallmark of delirium	CAM Digit span† Spell word backwards
Be vigilant for altered LOC, especially hypoactivity and apathy in persons with dementia	CAM Do not assume this is the individual's normal or baseline status

CAM = Confusion Assessment Method; EHR = electronic health record; LOC = level of consciousness.  
\*IQCODE and Blessed survey caregivers about mental status months to years prior to hospitalization—items such as remembering a short list, recalling recent events, getting lost in familiar places.  
†Ability to repeat seven digits forward and five backward.

only 17% (22/128) of PWD in the intervention group. A randomized controlled trial by Marcantonio *et al.* set out to determine whether geriatrics consultation could reduce delirium in hip fracture patients. This study, of 126 hospitalized patients, found a statistically significant reduction in delirium in the consultation group versus the usual care group (20/62 versus 32/64).<sup>23</sup> Subgroup analyses found that geriatrics consultation appeared most effective in reducing delirium in persons without dementia; however, this was not statistically significant. A matched controlled nurse-led study tested prevention measures that targeted the risk factors of (1) dementia, (2) vision impairment, (3) hearing impairment, and (4) mobility impairment. Delirium declined from 37 to 13% in the pre- and post-intervention analyses.<sup>24</sup> These few studies, however, demonstrate conflicting responses to interventions for persons with dementia and delirium.

Although there are a few studies that have addressed delirium prevention in hospitalized older adults, there are currently no published intervention studies we are aware of that are specific to delirium in PWD.<sup>3,4,25</sup>

The Hospital Elder Life Program (HELP), developed from Inouye's delirium prevention trial, is designed to improve cognitive and physical functioning and prevent delirium in hospitalized older adults. The key features of HELP have been tested in a controlled trial of hospitalized older adults and widely disseminated throughout the US and Canada.<sup>26</sup> The nonpharmacological sleep protocol component of the Inouye trial was most effective in those patients with DSD.

Avoiding the use of high-risk drugs is another important strategy for preventing delirium in PWD who are vulnerable to central nervous system-active drugs. Several recent studies have effectively used

**Table 2:** Interventions for Delirium Superimposed on Dementia

Intervention Component	Rationale
Standardized screening	Delirium is difficult to detect in persons with dementia
Assessment and treatment of causes of delirium	Delirium often has multiple causes
Providing sensory aids	Vision and hearing impairment are independent risk factors in multiple studies
Enhancing hydration and nutrition	Dehydration and low albumin are risk factors for delirium
Early mobilization and physical exercise	Found to be protective of both delirium and dementia and may decrease delirium complications
Treatment of infection	Cause of delirium, risk factor for DSD
Avoiding fecal impaction and urinary retention	May be both a complication of delirium and a cause of DSD
Pain assessment and treatment	Risk factor for delirium
Sleep hygiene	Sleep-wake cycle often reversed in DSD, and medications to treat insomnia may cause delirium
Noise reduction and environmental adjustments such as using clocks, calendars	Studies have been conflicting, but environment has been associated with delirium and DSD
Communication and orientation using a white board in room	Core intervention in the Inouye delirium trial and HELP*
Falls prevention	May be a complication of delirium
Use of medications such as haloperidol, donepezil prophylactically	Little empirical evidence for use, but increasing studies and used in clinical practice
Cognitive stimulation recreational therapy: leisure activities such as reading books and newspapers, writing for pleasure, doing crosswords and puzzles, playing board games and cards, playing musical instruments	Core intervention in the Inouye delirium trial* and HELP; cognitive stimulation is protective for dementia and may increase cognitive reserve in DSD
Avoiding potentially inappropriate medication use (Beers Criteria), CNS-active and anticholinergic medications	CNS-active medications can both cause DSD and worsen existing delirium
Delirium discharge teaching/planning	Since DSD often presents at admission to hospital, this is a natural target for prevention, but has not been tested alone

CNS = central nervous system; DSD = delirium superimposed on dementia; HELP = Hospital Elder Life Program.

\*See Inouye SK et al., 1999<sup>19</sup> and Inouye SK et al., 2006.<sup>26</sup>

computerized decision support and a sleep protocol to decrease the use of these medications,<sup>27</sup> but have not targeted PWD or examined DSD as an outcome measure. A few studies have tested the use of medications such as haloperidol to prevent delirium and decrease the duration of delirium.<sup>28</sup> These studies suffer from small sample sizes and have reported nonsignif-

icant results.<sup>29</sup> Only a few randomized clinical trials have been conducted to prevent delirium, and none have been specific to DSD. Despite the paucity of data, dementia is the strongest risk factor for delirium, and a recent Cochrane review concluded that there is strong empirical evidence to target this group.<sup>2-4,29</sup>

### Implications for Practice and Research

Tables 2 and 3 include a summary of the interventions for DSD and current web-based resources for its prevention and management. Although they share similar intervention strategies, many of the intervention studies for delirium used different models to deliver the intervention,

**Table 3:** Web Resources for Delirium\*

Resource	Web Address	Description
How To Try This	<a href="http://www.hartfordign.org/trythis">http://www.hartfordign.org/trythis</a>	A John A. Hartford Foundation-funded project with New York University's College of Nursing and American Journal of Nursing; offers evidence-based geriatric assessment tools including a special series on dementia and delirium
Hospital Elder Life Program	<a href="http://elderlife.med.yale.edu/public/interventions.php?pageid=01.03.04">http://elderlife.med.yale.edu/public/interventions.php?pageid=01.03.04</a>	Site for the core interventions to prevent delirium in hospitalized older adults
American Geriatric Society Aging in the Know	<a href="http://www.healthinaging.org/agingintheknow/default.asp">http://www.healthinaging.org/agingintheknow/default.asp</a>	Created by AGS for consumers on health and aging
Healthy Brain Canada	<a href="http://www.alzheimer.ca/english/brain/brain_intro.htm">http://www.alzheimer.ca/english/brain/brain_intro.htm</a>	Official site for the Canadian Alzheimer Society; this website includes practical protection measures for brain health from evidence-based literature
Vancouver Island Health Authority delirium site	<a href="http://www.viha.ca/mhas/resources/delirium/">http://www.viha.ca/mhas/resources/delirium/</a>	This site has consumer and professional tips on delirium including discharge teaching for delirium and videos
Posit Science	<a href="http://www.positscience.com/">http://www.positscience.com/</a>	This corporate site has computer brain fitness programs for sale
Neurobic Exercises	<a href="http://www.neurobics.com/index.html">http://www.neurobics.com/index.html</a>	This site has 83 different brain exercises
Beers Criteria for inappropriate medication use	<a href="http://archinte.ama-assn.org/cgi/reprint/163/22/2716.pdf">http://archinte.ama-assn.org/cgi/reprint/163/22/2716.pdf</a>	A list of medications to avoid in older adults because the risks outweigh the benefits, and safer alternatives exist

\*All Internet sites accessed on January 9, 2009.

targeted specialized populations (orthopedic or hip fracture patients), and had varying levels of compliance to the protocols. All the models took place in hospitals or postacute care facilities. In health care facilities, these strategies can be implemented by nursing assistants or trained volunteers, as in the Inouye HELP model. Family members or paid caregivers may also be recruited to assist with delirium prevention. A major challenge is translating these interventions into community settings. Although only a few models have addressed discharge teaching, this may be the most effective strategy to prevent delirium in persons with dementia as many of these patients present to the hospital with prevalent delirium.

The main goals and strategies for the management of DSD overlap with those for prevention of DSD and include early detection, treatment of the causes of delirium (often multiple), and prevention and

management of the complications of delirium. Lastly, attempts should be

made to restore physical and mental functioning to baseline status.

### Key Points

Delirium in persons with dementia is common, is associated with poor clinical and economic outcomes, and occurs across all settings of care.

Delirium is superimposed on a dementia when an acute change in mental status occurs in a patient with pre-existing dementia.

The complexity of delirium superimposed on dementia (DSD), overlap of symptoms with dementia, and difficulty in determining the baseline status, make detection of DSD a challenge in the clinical setting; thus, while patients are hospitalized, delirium should be screened for on every shift with a validated instrument.

While it has not yet been fully tested in delirium trials, one possible mechanism for delirium prevention in dementia is the enhancement of cognitive reserve.

Strategies for the prevention of DSD include sensory aids, proper hydration, sleep enhancement with nonpharmacological treatments, early mobilization, avoidance of central nervous system-active medications, environmental modifications, and cognitive stimulation.

Clinical Pearls

Use an objective tool to assess for delirium every shift.

Carefully review all medications (old and new) and other possible causes for delirium (infection, dehydration, etc.) when an older adult with dementia has an acute change in mental status or altered level of consciousness.

Consider the diagnosis of hypoactive delirium in an older adult with dementia who is suddenly more quiet than usual, eating less, or sleeping more.

One resource that focuses on best practices for DSD is the How To Try This (HTTT) series (see Table 3), which provides an algorithm for assessing both delirium and dementia. The HTTT series is free to the public and includes articles with companion videos involving real patients and staff demonstrating assessments and interventions. A 2008 HTTT focus on DSD uses a case study and algorithm for DSD.<sup>30</sup>

Conclusion

Much of what is currently known about preventing and managing DSD is derived from studies on delirium alone, as many of these studies have excluded PWD. These strategies include simple and multicomponent interventions such as providing sensory aids, ensuring proper hydration, enhancing sleep with nonpharmacological treatments, using early mobilization, avoiding central nervous system-active medications, making environmental modifications, and providing cognitive stimulation. These interventions are thought to enhance cognitive reserve. Future studies should test delirium interventions specific to PWD and methods to prevent DSD in the home and community setting before the older adult presents to the emergency room or acute hospital setting.



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References

1. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, 4th edition—Text Revision. Arlington (VA): The Association; 2000.
2. Inouye SK. Delirium in older persons. *N Engl J Med* 2006;354:1157–65.

3. Fick D, Kolanowski A, Waller JL, et al. Delirium superimposed on dementia in a community-living managed care population: a three year retrospective study of prevalence, costs, and utilization. *J Gerontol B Psychol Sci Soc Sci* 2005;60A:748–53.
4. Fick D, Agostini JV, Inouye SK. Delirium superimposed on dementia: a systematic review. *J Am Geriatr Soc* 2002;50:1723–32.
5. Fick D, Foreman M. Consequences of not recognizing delirium superimposed on dementia in hospitalized elderly individuals. *J Gerontol Nurs* 2000;26:30–40.
6. Inouye SK, Rushing JT, Foreman MD, et al. Does delirium contribute to poor hospital outcomes? A three-site epidemiologic study. *J Gen Intern Med* 1998;13:234–42.
7. Marcantonio ER, Kiely DK, Simon SE, et al. Outcomes of older people admitted to postacute facilities with delirium. *J Am Geriatr Soc* 2005;53:963–9.
8. McCusker J, Cole M, Abrahamowicz M, et al. Delirium predicts 12-month mortality. *Arch Intern Med* 2002;162:457–63.
9. Olofsson B, Lundstrom M, Borreson B, et al. Delirium is associated with poor rehabilitation outcome in elderly patients treated for femoral neck fractures. *Scand J Caring Sci* 2005;19:119–27.
10. Rockwood K. Acute confusion in elderly medical patients. *J Am Geriatr Soc* 1989;37:150–4.
11. Leslie DL, Marcantonio ER, Zhang Y, et al. One-year healthcare costs associated with delirium in the elderly population. *Arch Intern Med* 2008;168:27–32.
12. Stern Y. What is cognitive reserve? Theory and research application of the reserve concept. *J Int Neuropsychol Soc* 2002;8:448–60.
13. Valenzuela MJ, Sachdev P. Cognitive leisure activities, but not watching TV, for future brain benefits. *Neurology* 2006;67:729.
14. Fick DM, Hodo DH, Lawrence, F, et al. Recognizing delirium superimposed on dementia: assessing nurses' knowledge using case vignettes. *J Gerontol Nurs* 2007;33:40–7.
15. Inouye SK, Leo-Summers L, Zhang Y, et al. A chart-based method for identification of delirium: validation compared with interviewer ratings using the confusion assessment method. *J Am Geriatr Soc*

- 2005;53:312–8.
16. Voyer P, Richard S, Doucet L, et al. Detection of delirium by nurses among long-term care residents with dementia. *BMC Nurs* 2008;7:4.
17. Inouye SK, van Dyck CH, Alessi CA, et al. Clarifying confusion: the confusion assessment method. A new method for detection of delirium. *Ann Intern Med* 1990;113:941–8.
18. Wei LA, Fearing MA, Sternberg EJ, et al. The Confusion Assessment Method: a systematic review of current usage. *J Am Geriatr Soc* 2008;56:823–30.
19. Inouye SK, Bogardus ST Jr., Charpentier PA, et al. A multicomponent intervention to prevent delirium in hospitalized older patients. *N Engl J Med* 1999;340:669–76.
20. McCusker J, Cole M, Abrahamowicz M, et al. Environmental risk factors for delirium in hospitalized older people. *J Am Geriatr Soc* 2001;49:1327–34.
21. Milisen K, Lemiengre J, Braes T, et al. Multicomponent intervention strategies for managing delirium in hospitalized older people: systematic review. *J Adv Nurs* 2005;52:79–90.
22. Pitkälä KH, Laurila VJ, Strandberg TE, et al. Multicomponent geriatric intervention for elderly inpatients with delirium: a randomized, controlled trial. *J Gerontol Med Sci* 2006;61:176–81.
23. Marcantonio ER, Flacker JM, Wright RJ, et al. Reducing delirium after hip fracture: a randomized trial. *J Am Geriatr Soc* 2001;49:516–22.
24. Robinson S, Rich C, Weitzel T, et al. Delirium prevention for cognitive, sensory, and mobility impairments. *Res Theory Nurs Pract Int J* 2008;22:103–13.
25. Britton A, Russell R. Multidisciplinary team interventions for delirium in patients with chronic cognitive impairment. *Cochrane Database Syst Rev* 2004;2:CD000395.
26. Inouye SK, Baker DI, Fugal P, et al. Dissemination of the hospital elder life program: implementation, adaptation, and successes. *J Am Geriatr Soc* 2006;54:1492–9.
27. Agostini JV, Zhang Y, Inouye SK. Use of a computer-based reminder to improve sedative-hypnotic prescribing in older hospitalized patients. *J Am Geriatr Soc* 2007;55:43–8.
28. Kalisvaart KJ, de Jonghe JF, Bogardus MJ, et al. Haloperidol prophylaxis for elderly hip fracture patients at risk for delirium: a randomized placebo-controlled study. *J Am Geriatr Soc* 2005;53:1658–66.
29. Siddiqi N, Stockdale R, Britton AM, et al. Interventions for preventing delirium in hospitalized patients: *Cochrane Database Syst Rev* 2007;2:CD005563.
30. Fick DM, Mion LC. How to try this: delirium superimposed on dementia. *Am J Nurs* 2008;108:52–60.