

## Geriatric Emergency Medicine Fellowship Journal Club: Operational Changes for Recognizing Prevalent Delirium and Preventing Incident Delirium

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### INTRODUCTION

Delirium is an acute fluctuating condition characterized by an alteration in the level of consciousness associated with inattention and disorganized thinking. Delirium is known to cause increased morbidity and mortality in older adults. It has been associated with prolonged hospitalizations,<sup>1</sup> functional decline,<sup>2</sup> and cognitive decline.<sup>3</sup> Delirium can either be present on arrival to the ED, early during the ED course (prevalent delirium), or develop during hospitalization in a patient who was initially not delirious in the ED (incident delirium). Delirium is missed in >50% of cases when screening is not performed.<sup>4-5</sup> In addition, approximately 25% of older adults with delirium are discharged from the ED.<sup>6</sup> Therefore, delirium screening, as well as mitigation of ED risk factors, are imperative to patient care. For this installment of the Geriatric Emergency Medicine Fellowship Journal Club, we reviewed two articles related to delirium risk to understand which patients are at risk of developing delirium after arriving in the ED and what strategies could be considered in the ED to prevent the development of incident delirium.

### CASE

An 85-year-old woman with history of dementia and hearing impairment presents to the emergency department (ED) from a skilled nursing facility for altered mental status. The patient is unable to provide any history. The skilled nursing facility told Emergency Medical Services (EMS) the patient has not been eating recently and EMS cannot provide additional information. The patient was not screened for delirium on arrival. On exam, she is ill-appearing. She grimaces when the suprapubic abdomen is palpated. A urinary catheter is placed and a urinalysis shows evidence of urinary tract infection. After the appropriate ED work-up and treatment, an inpatient bed is ordered. Due to boarding, the patient remains in the ED for 10 hours. During this boarding period, the patient becomes combative and tries to pull her foley out. Subsequently restraints and sedation are used. The patient develops bradypnea and requires intubation for airway protection.

<b>Article 1</b>
Oliveira J. e Silva L, Berning MJ, Stanich JA, et al. Risk Factors for Delirium in Older Adults in the Emergency Department: A Systematic Review and Meta-Analysis. <i>Annals of Emergency Medicine</i> . Published online 2021:S0196064421001943. doi:10.1016/j.annemergmed.2021.03.005
<b>Presenters</b>
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<b>What Question Did this Investigation Aim to Answer?</b>
What are the risk factors for prevalent delirium (delirium present at the time of ED presentation or diagnosed early during the ED encounter)? What characteristics of ED care are risk factors for incident delirium (delirium that develops during hospitalization in patients who are non-delirious on presentation)?
<b>What Study Design Did the Authors Choose?</b>
<p>The authors performed a systemic review and meta-analysis of observational studies that evaluated potential risk factors for either prevalent or incident delirium in patients <math>\geq 60</math> years old who presented to the ED. Case reports, narrative reviews, and opinion articles were not included. Delirium was measured by using previously validated tools or criteria from the diagnostic and statistical manual of mental disorders (DSM). International classification of disease (ICD) codes were not used due to the very low sensitivity of this method.</p> <p>To assess prevalent delirium, studies were included only if delirium was assessed during the ED clinical course. Exclusion criteria included studies with measurement of blood biomarkers uncommonly used in practice (for example tumor necrosis factor-alpha) and studies with information available close to disposition (for example diagnosis or imaging results).</p> <p>To assess incident delirium, studies were included if older adults were free of delirium on presentation, developed delirium during hospitalization, and there was an evaluation of <math>\geq 1</math> ED-based modifiable risk factor for developing delirium later during hospitalization.</p> <p>The certainty of evidence for each risk factor identified during the review was evaluated using the grading of recommendations assessment, development, and evaluation (GRADE) method. Pooled odds ratios were calculated for each risk factor with 95% confidence intervals (CI).</p> <p><b><i>Readers are encouraged to see the original paper and appendix for further details on the selection of studies, data extraction, and data synthesis.</i></b></p>
<b>How did the Authors Interpret the Results?</b>
<p>27 studies that spanned 13,412 older patients were analyzed to determine risk factors for prevalent delirium. The prevalence of ED delirium was determined to be 7-34.7%. Risk factors with strong association and high GRADE certainty were nursing home residence (OR 3.45; 95%CI 2.17-5.48), cognitive impairment (OR 4.46; 95CI 3.38-5.89), hearing impairment (OR 2.57; 95%CI 1.03-6.41), and history of stroke (OR 3.20; 95%CI 1.17-8.15). Other risk factors with strong association but lower GRADE certainties included malnutrition (OR 7.94; 95%CI 2.86-22.08), frailty (OR 8.92; 95%CI 1.34-59.4), the chief complaint of altered mental status (OR 13.33; 95%CI 6.29-28.23), and severity of illness (OR 2.22; 95%CI 1.30-3.77).</p> <p>Seven studies that spanned 2, 238 older patients were reviewed to determine ED risk factors associated with incident delirium. The incidence of ED delirium was reported as 11-27%. Risk factors for the development of incident delirium with strong association and high GRADE certainty were ED length of stay (LOS) <math>&gt;10</math> hours (OR 2.23; 95%CI 1.16-5.24) and severe pain (OR 3.28; CI 1.38-7.88). Risk factors with strong association and moderate GRADE certainty were ED LOS <math>&gt;12</math> hours (OR 2.46; 95%CI 1.16-5.24) and urinary catheterization (OR 2.53; 95%CI 1.31-4.88).</p>
<b>Discussion / How Might this Study Affect your Clinical Practice in the Emergency Department?</b>
<p>This study assessed multiple risk factors in the ED setting that are associated with prevalent delirium and contribute to incident delirium. Screening every older adult who presents to the ED may not be feasible in most EDs. Therefore, identifying patients at higher risk for prevalent delirium and screening these patients may yield better outcomes. Given the results of this study, EDs may want to preferentially screen patients arriving from a nursing home, patients with a history of dementia and other types of cognitive impairment, patients with a history of hearing impairment, and patients with a history of stroke. To decrease the development of incident delirium, clinicians should minimize unnecessary urinary catheterization and treat pain in older adults. Given the association between ED LOS and incident delirium, health systems should consider limiting boarding of admitted older adults in the ED.</p>

<b>Article 2</b>
van Loveren K, Singla A, Sinvani L, et al. Increased Emergency Department Hallway Length of Stay is Associated with Development of Delirium. <i>West J Emerg Med.</i> 2021;22(3):726-735. doi:10.5811/westjem.2021.1.49320
<b>Presenters</b>
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<b>What Question Did this Investigation Aim to Answer?</b>
Is having a longer emergency department hallway time associated with the development of delirium? Where in the hospital does delirium develop?
<b>What Study Design Did the Authors Choose?</b>
<p>This single-center, retrospective chart review included patients ≥18 years old admitted to the hospital after presenting, without baseline cognitive impairment, to the ED in 2018. Surrogate markers for delirium included keywords describing delirium, orders for psychotropics, special observation, use of restraints, or documented positive Confusion Assessment Method (CAM) screen. The control group included patients not meeting delirium criteria. Data extracted included patient demographics, timestamps from ED arrival to inpatient discharge, ED bed locations with timestamps, Charlson Comorbidity Index, chief complaint, and admission and discharge diagnoses. To determine at which point delirium developed, the authors reviewed timestamps for medications and observations as well as for documentation of positive CAM screening. A multivariable logistic regression model was used to assess the independent association between ED hallway time and the development of delirium.</p> <p>The authors cross-referenced the time of delirium identification with the patient’s location in the hospital as documented in the EHR. Time of delirium identification was based on the first documented order time for medications, order time for observation/restraint, or screening CAM positive.</p>
<b>How did the Authors Interpret the Results?</b>
<p>A total of 25,156 patients met inclusion criteria with 1,920 (7.6%) meeting delirium criteria. The median age of both the delirium and control groups were 70 and 71 years old, respectively. Patients who had delirium had a longer median hospital stay and increased morbidity and mortality. Patients who screened positive for delirium spent a greater percentage of time in the ED hallway (median 50.5% vs 10.8%, <math>P&lt;0.001</math>); had longer ED LOS (median 11.94 vs 8.12 hours, <math>P&lt;0.001</math>); had more ED room transfers (median 5 vs 4, <math>P&lt;0.001</math>); and had longer hospital LOS (median 5.0 vs 4.6 days, <math>P&lt;0.001</math>). Patients more frequently developed delirium in the ED (77.5%) than in inpatient units (22.5%). The relative odds of a patient developing delirium after being moved to a hallway bed increased by 3.31 times for each percent increase in ED hallway time (95% confidence interval, 2.85, 3.83). Of the patients in the delirium group, 1,515 (78.9%) received at least one pharmacologic agent, the most frequently ordered medications being lorazepam (<math>n = 907</math>, 47.2%) and quetiapine (<math>n = 322</math>, 16.8%). The least frequently used measure of identifying or beginning treatment for delirium was the inpatient CAM screening tool, as only eight (0.4%) patients in the delirium group received this assessment.</p>
<b>Discussion/How Might this Study Affect your Clinical Practice in the Emergency Department?</b>
<p>Addressing delirium prevention is more challenging in the ED environment where there is an absence of orientation (clocks, glasses, hearing aids), no natural light, increased noise and disruptions, and limited interactions with familiar people. In this study, patients who developed delirium had more ED hallway exposure, longer ED LOS, and more ED room transfers. Patients who developed delirium were identified in the ED rather than in the general wards. Understanding and assessing delirium in the ED has substantial implications for improving patient safety.</p> <p>With universal overcrowding, patients are placed in the ED hallways for assessment or for boarding, and these patients can be excluded from delirium assessments, including due to high levels of ambient noise that impede cognitive assessments. The association between hallway LOS and delirium development has important safety implications and should be considered by emergency clinicians and department leaders looking to implement delirium mitigation strategies.</p> <p>Ultimately, as delirium is associated with higher mortality, hospital LOS, and costs of care, emergency clinicians and administrators need to be aware of the risk factors for incidents and prevalent delirium. Future research is needed to determine the impact of addressing and minimizing these risks on patient outcomes.</p>

## CASE CONCLUSION

After evaluation of the case in an ED clinical operations meeting, it was determined that patients presenting from nursing homes should be screened for delirium by nursing staff. A flag in the EMR displays every time providers order urinary catheters to assess for necessity. ED operations prioritize the transfer of older adults to inpatient beds after admission from the ED, limiting the boarding of admitted patients in the ED, with limited success in the Covid-19 pandemic era.

## KEYWORDS

Delirium, Screening, ED Operations

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## AUTHOR CONTRIBUTIONS

Natalie M. Elder and Meghan D. Webber are co-principal authors and shared conceptualizations, writing, and revision of this article. Katren Tyler, the senior author, provided oversight for the project.

**Sponsor Role:** There were no sponsors of this work.

**Funding:** There was no funding for this work.

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## CONFLICTS OF INTEREST

Authors have no conflicts to report.

## REFERENCES

1. Han JH, Eden S, Shintani A, et al. Delirium in older emergency department patients is an independent predictor of hospital length of stay. *Acad Emerg Med.* 2011;18(5):451-457. doi:10.1111/j.1553-2712.2011.01065.x
2. Han JH, Vasilevskis EE, Chandrasekhar R, et al. Delirium in the Emergency Department and Its Extension into Hospitalization (DELINEATE) Study: Effect on 6-month Function and Cognition. *J Am Geriatr Soc.* 2017;65(6):1333-1338. doi:10.1111/jgs.14824
3. Davis DHJ, Muniz-Terrera G, Keage HAD, et al. Association of Delirium With Cognitive Decline in Late Life: A Neuropathologic Study of 3 Population-Based Cohort Studies. *JAMA Psychiatry.* 2017;74(3):244-251. doi:10.1001/jamapsychiatry.2016.3423
4. Han JH, Wilson A, Vasilevskis EE, et al. Diagnosing delirium in older emergency department patients: validity and reliability of the delirium triage screen and the brief confusion assessment method. *Ann Emerg Med.* 2013;62(5):457-465. doi:10.1016/j.annemergmed.2013.05.003
5. Kakuma R, du Fort GG, Arsenault L, et al. Delirium in older emergency department patients discharged home: effect on survival. *J Am Geriatr Soc.* 2003;51(4):443-450. doi:10.1046/j.1532-5415.2003.51151.x
6. Lee S, Angel C, Han JH. Succinct Approach to Delirium in the Emergency Department. *Curr Emerg Hosp Med Rep.* 2021;9(2):11-18. doi:10.1007/s40138-021-00226-9