

The Silent Cascades of Brain Failure

Why Unmonitored ICU Brains Cost Lives and Millions

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When a critically ill patient suffers heart failure, acute kidney injury, or respiratory arrest, we intervene instantly because we know the long-term cost of delay: permanent organ scarring, prolonged disability, and heightened mortality. Yet, when a patient quietly experiences acute brain health issues — silent nonconvulsive seizures or delirium — it often unfolds quietly. Left unaddressed, its long-term physical, cognitive, and financial toll compounds without being noticed.^{1,2,3} Left unmanaged, these overlapping neurological crises have the potential to devastate patients' outcomes long after they leave the intensive care unit (ICU).^{3,4,5,6}

The long-term impact of failing to rapidly catch both nonconvulsive seizures and delirium is severe.² Delirium, a clinical state characterized by an acute change in attention and awareness,⁷ affects over 7 million U.S. hospitalized patients annually.⁸ Just a single day of ICU delirium is independently linked to a 10% increase in mortality risk.⁹ It's also associated with long-term cognitive impairment,¹⁰ a median of 2.2 additional days spent in the hospital,² and over \$6,000 in incremental hospital costs per patient case.² Nonconvulsive seizures may also overlap with delirium in a large population of critical care patients.¹¹ Missing either condition has the potential to set off a cascade of prolonged hospitalizations,¹² elevated readmission rates,¹³ and irreversible loss of patient independence.¹⁴

¹ Girard, T.D., et al. (2008) *Crit Care*. 12(Suppl 3):S3

² Taha A., et al. (2023) *Medicine (Baltimore)*. 102(2):e32652

³ Laccheo, L., et al. (2015) *Neurocrit Care*. 22:202-211

⁴ Needham, D.M., et al. (2012) *Crit Care Med*. 40(2):502-509

⁵ Gutierrez-Viedma A, et al. *Acta Neurol Scand*. 2021;143:281-289

⁶ De Marchis, G.M., et al. (2016) *Neurology*. 86(3):253-260

⁷ Slooter, A.J.C., et al. (2020) *Intensive Care Med*. 46(5):1020-1022

⁸ Garcia Morales, E.E., et al. (2026) *Front Public Health*. 14:1750969.

⁹ Young, G.B., et al. (1996) *Neurology*. 47(1):83-89

¹⁰ Hayhurst, C.J., et al. (2020) *Crit Care Med*. 48(10):1452-1459

¹¹ Sambin, S., et al. (2019) *Front. Neurol*. 10:263

¹² Singh, J., et al. (2021) *J Clin Neurophysiol*. 38(3):221-225

¹³ LaHue, S.C., et al. (2019) *J Hosp Med*. 14(4):201-206

¹⁴ Pandharipande, P.P., et al. (2013) *N Engl J Med*. 369(14):1306-1316

The Next Indication to Really Challenge Your Thinking			
10% Increase in 6-month mortality with every day of ICU delirium ¹⁵	32% 6-month mortality in hypoactive delirium vs. 9% mixed delirium ¹⁶	~2.5x Higher odds of long-term cognitive impairment (vs. patients without delirium) ¹⁷	2.2 days Longer ICU stay per delirium episode ²
If your patient's delirium status could change at any moment between your two assessments, what are you potentially missing? What could that mean for the patient?			

The core problem isn't that we don't care; it's that our traditional tools face steep implementation challenges in real-world environments.¹⁸ With delirium, for example, the current standard of care relies heavily on periodic bedside behavioral assessments like the Confusion Assessment Method for the ICU (CAM-ICU), typically performed only twice a day at nursing shift changes.¹⁰

Large Variation of CAM-ICU Performance in Clinical Practice by Institutional Variables, Patient Factors, and Nursing Training ^{19,20}		
	Van Eijk 2011 ¹⁸	Breit 2025 ²¹
Hospitals	10	1
N	181	1442 (assessments)
Sensitivity	47%	26%
Specificity	98%	95%

¹⁵ Ely, E.W., et al. (2004) JAMA. 291(14):1753-1762
¹⁶ Robinson, T.N., et al. (2011) Arch Surg. 146(3):295-300
¹⁷ Tesfaye, Y., et al. (2025) Age Ageing. 54(7):afaf188
¹⁸ van Eijk, M.M., et al. (2011) Am. J. Respir. Crit. Care Med. 184(3):340-344
¹⁹ Miranda et al. (2023) Cochrane Database of Systematic Reviews. CD013126
²⁰ Finsterer (2025) Indian Journal of Critical Care Medicine. 29(5):472-473
²¹ Breit et al. (2025) Journal of the neurological sciences. 123619.

These manual behavioral tests only give us a single, binary "yes or no" snapshot in time.²² They provide no quantitative trends, leaving us unable to continuously monitor a patient's immediate response to therapy.²² While highly effective in controlled research settings, real-world constraints cause their clinical sensitivity to drop to as low as 26%.²¹

The Danger of the Quiet Patient

This gap becomes perilous when dealing with hypoactive delirium, which accounts for 50% of all ICU delirium cases.²³ Unlike hyperactive patients who exhibit overt agitation and restlessness, hypoactive patients are characterized by confusion, sedation, decreased responsiveness, and lethargy.^{23,21} Because they don't make noise, 66% to 84% of hypoactive delirium cases go unrecognized.²⁴ Yet, these quiet patients suffer the worst prognoses, with some groups facing a 32% six-month mortality rate compared to just 9% for those with mixed delirium.¹⁶ In addition, one third of delirium patients have to deal with reduced income, and even 12 months after discharge, 50% are unable to work at their previous level.²⁵

The Game Changer: Unified Point-of-Care Neuro-Monitoring

To fix this, we must shift from intermittent behavioral checks to continuous, objective physiological monitoring. This is where a revolutionary shift in medical technology is rewriting the script. The time has come to treat brain health like a vital sign.

Historically, neuro-monitoring was split into silos. Seizures were treated as acute, emergent events lasting minutes to hours requiring rapid diagnosis, while delirium was viewed as a non-acute failure lasting days, focused on prevention or duration reduction. But the patient populations overlap heavily, affecting millions of critical care patients concurrently — and both conditions signal the same organ under profound stress.²⁶

The arrival of the market's first point-of-care device that combines continuous seizure detection and delirium tracking into a single bedside platform has the potential to fundamentally change how these patients are managed and treated. Following its December 2025 FDA 510(k) clearance,²⁷ the Ceribell Delirium Monitor System became the first and only FDA-cleared device used to aid in delirium screening and monitoring alongside its existing seizure monitoring capabilities.²⁸ By utilizing a rapid, non-invasive headband configuration at the bedside, clinicians

²² Khan, B.A., et al. (2017) *Crit Care Med.* 45(5):851-857

²³ la Cour, K.N., et al. (2022) *Crit Care.* 26(1):53

²⁴ Marra, A., et al. (2017) *Crit Care Clin.* 33(2):225-243

²⁵ Griffiths, J., et al. (2013) *Crit Care.* 17(3):R100

²⁶ Frei, A.I., et al. (2024) *J Neurol.* 271(1):231-240

²⁷ FDA 510(k) Clearance Letter K251936

²⁸ FDA 510(k) Clearance Letter K241589

can now view automated continuous trendlines, corresponding to presence of EEG features associated with delirium or non-convulsive seizures in real time — without needing separate devices for co-occurring risks.

Instead of waiting 12 hours for the next shift assessment to see if a patient is slipping, this multi-indication approach continuously monitors for delirium. It allows clinicians to evaluate management strategies and screen for “silent” seizures simultaneously.

Underscoring the profound recognition of the clinical necessity of treating brain care as a continuous vital sign, the Centers for Medicare & Medicaid Services (CMS) granted a New Technology Add-on Payment (NTAP) for the Ceribell Delirium Monitor System for eligible patients under the Inpatient Prospective Payment System (IPPS), starting October 1, 2026.²⁹

Since July, Ceribell accounts piloting the system have evaluated their patients in real time. The chart below reveals some of those results:

Delirium Monitoring Early Access Sites Results			
40%	46%	40%	22%
of Del+ recordings had positive seizure burden*	would have been difficult to assess via the CAM-ICU**	of recordings with improved decisions**	of recordings with reduced medication and/or sedation**
*Del+ defined as recording that is >20% delirium positive **Results from data collected on the Ceribell recorder post-recording by bedside providers as of June 30th, 2026. Guidance provided to clinicians on survey response options reflected minor variance by question. Survey completion is optional; results based on 128 surveys completed out of 303 total patients.			

Treating brain failure should no longer be a guessing game. By adopting point-of-care, multi-modality brain monitoring of seizures and delirium, we can finally give the brain the same importance we mandate for every other vital organ in the ICU and ultimately help bring better health care to patients.

With an aging population, delirium's impact on patient outcomes is more important than ever. Groups like the American Delirium Society, the Society of Critical Care Medicine (ICU Liberation), and the John Hartford Foundation (Age-Friendly Health Systems) continue to advance research and raise awareness on delirium. With an objective tool now in hand, individualized, targeted management of this complex syndrome may finally be within reach.

²⁹ <https://public-inspection.federalregister.gov/2026-15833.pdf>

More Delirium Resources: The American Delirium Society (ADS) newsletter featured an article by Dr. John Devlin, chair of the SCCM 2018 Pain, Agitation, Delirium, Immobility, and Disrupted Sleep (PADIS) clinical practice guidelines, on the potential role of continuous EEG monitoring for delirium in the ICU.³⁰ [Read Article](#)

³⁰ Devlin JW, et al. *Best Pract Res Clin Anaesthesiology* 2012; 6(3), 385-393