

Can Early Recognition of Neuropsychological Emergencies Change Outcomes?

A Narrative Review

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Abstract

Background: A sudden change in how a person thinks, feels, or behaves is usually read as psychological, yet the same presentations open stroke, seizures, autoimmune encephalitis, delirium, and life-threatening medication reactions, conditions in which outcome depends on how quickly the true cause is recognized and treated.

Methods: This narrative review examines neuropsychological emergencies as a problem of recognition and immediate response, and asks what the first critical minutes of an acute brain disturbance demand of the non-specialists, students, family members, and frontline staff, who almost always notice them first.

Results: Synthesizing foundational neuropsychology, clinical guidelines, and the literature on delirium, cerebrovascular disease, seizures, autoimmune encephalitis, catatonia, and medication-induced emergencies, the review finds a converging structure: acute disturbances of brain function surface as changes in behaviour because cognition, emotion, and behaviour are the observable output of failing neural networks, and recognition succeeds not through symptom memorization but through a small set of discriminating questions about change from baseline, speed of onset, surrounding context, and red flags. The evidence also warrants caution: early imaging and routine tests can be normal in serious disease, and the emergencies most often missed are those that arrive through the psychiatric door.

Conclusion: The review closes with design principles for teaching recognition and safe first response to lay and student audiences, including the wider work of education and awareness on which all such teaching depends, and with priorities for future research.

Keywords: neuropsychological emergencies, delirium, stroke, seizures, autoimmune encephalitis, catatonia, recognition, first aid

1. Introduction

A student who was well on Friday becomes paranoid and agitated over a weekend, then stops making sense on Monday morning. An elderly woman, normally chatty, announces that children are standing in her bedroom. A young man becomes mute, motionless, and unresponsive to reassurance. Each of these presentations is likely to be read first as psychological, and each may instead be the visible surface of a medical emergency unfolding in the brain. One question therefore runs through any serious consideration of these events: is this primarily psychological or psychiatric, or is the brain signalling a medical emergency? This narrative review takes that question as its thread, and asks what the answer requires of the people who are realistically in a position to ask it first.

A working definition clarifies the territory. A neuropsychological emergency is an acute disturbance of brain function that appears as a rapid change in thinking, emotion, behaviour, or consciousness, and that can threaten life, or the brain itself, if it is not treated quickly. Three features distinguish such events from long-standing psychological problems. They are sudden, developing over minutes, hours, or days rather than months or years. They have an underlying cause, infection, clot, medication, metabolic upset, that is often treatable if found in time. And delay makes them worse: while the change is attributed to behaviour, the cause keeps progressing. The conditions that populate this category are diverse in mechanism but united in presentation: delirium, stroke and transient ischaemic attack, seizures, autoimmune encephalitis, acute psychosis with red flags, catatonia, the medication emergencies of neuroleptic malignant syndrome and serotonin syndrome, and toxicity or withdrawal states.

The stakes of the recognition problem are measurable. In stroke, the treatments that work best are time-limited, and every minute of delay costs brain tissue (Centers for Disease Control and Prevention, 2024b). In anti-NMDA receptor encephalitis, a large observational cohort found that early treatment independently predicted good long-term outcome (Titulaer et al., 2013). And in delirium, unrecognized cases are associated with worse outcomes precisely because the underlying medical cause continues untreated while the confusion is explained away (National Institute for Health and Care Excellence, 2023). The sections that follow trace why brain emergencies so often appear as behavioural change, examine the mechanisms that produce this appearance, distill the evidence into a small set of discriminating questions, review the major emergencies through that lens, consider the conditions that most convincingly imitate psychiatric illness, and offer practical guidance for teaching recognition and safe first response.

2. The Brain-Mind Chain: Why Brain Emergencies Rarely Announce Themselves

Neuropsychology is the science of the relationship between brain function and cognition, emotion, and behaviour; it asks how the physical brain produces the mind, and what happens to the mind when the brain is suddenly disturbed (Lezak et al., 2012). Everything a person does sits somewhere on a single chain that runs from brain to cognition, from cognition to emotion, from emotion to behaviour, and from behaviour to daily functioning. The chain has an uncomfortable implication: an acute disturbance anywhere in the brain does not have to present as a brain symptom. Because the chain runs through cognition, emotion, and behaviour, the first sign of a brain emergency may look psychological, a sudden change in how someone thinks, feels, or acts.

This is why brain emergencies so often knock on the psychiatric door first. The brain has no pain display for many of these problems; there may be no fever, no seizure, and no weakness to announce that something neurological is wrong. A sudden change in behaviour is frequently the only alarm the brain can raise, and the alarm rings at the far end of the chain, where it is most easily mistaken for something else. Recognition, therefore, is not a matter of spotting neurological signs. It is a matter of taking behavioural change seriously enough to ask what might be driving it.

3. Mechanisms: How a Medical Problem Becomes a Change in Behaviour

The brain is an organ with enormous demands: uninterrupted blood flow, oxygen, glucose, stable chemistry, and an immune system that leaves it alone. Every neuropsychological emergency begins when one of these requirements fails, and the failures cluster into six families. Vascular events, a blocked or burst vessel, starve brain tissue of oxygen, and neurons begin dying within minutes. Electrical failure sends neurons firing in sudden, uncontrolled bursts, the mechanism of seizures, and one seizure following another without recovery is life-threatening. Inflammation and immunity can reach the brain through infection or turn against it by mistake, as in autoimmune encephalitis. Metabolic and toxic insults, low blood sugar, sodium imbalance, liver or kidney failure, alcohol, drugs, poisoning, deprive the brain of chemistry it cannot run without. Medication effects can turn a drug meant to help into a dangerous reaction. And structural injury, trauma, bleeding, tumours, or swelling, raises pressure and distorts the networks on which cognition depends.

Different triggers converge on a single endpoint through a common cascade. First, a trigger, a clot, an antibody, a toxin, a glucose crash, a drug reaction, or an injury, disrupts brain cells. Second, signalling in the affected circuits becomes unreliable: too much, too little, or out of sync. Third, the distributed networks that run attention, memory, emotion, and movement lose coordination, and their output degrades as nodes fail. Fourth, the outside world sees behaviour: confusion, agitation, hallucinations, or personality change, not an obvious brain symptom.

Anti-NMDA receptor encephalitis illustrates the cascade end to end. The immune system produces antibodies that block NMDA receptors, glutamate receptors essential for signalling and plasticity; circuits for emotion, memory, and behaviour falter; and the first thing the world sees is often mania, psychosis, or agitation, weeks before seizures or movement problems appear (Dalmau et al., 2008). Early brain scans and routine blood tests can look normal throughout this period, so nothing sounds like neurology, and the first door these patients walk through is frequently a psychiatric one. Case series describe exactly this pattern, sometimes with long delays before the true cause is found (Barry et al., 2015).

4. The Recognition Problem: Four Questions Turn Strange Behaviour into a Decision

An acute brain disturbance rarely announces itself as one. It may first appear as sudden confusion, unusual behaviour, new memory gaps, hallucinations, agitation, personality change, reduced responsiveness, or strange speech, none of which sounds, at first, like neurology. Critically, none of these signs automatically means an emergency: each can also have an everyday or a psychiatric explanation. Memorizing a symptom list is therefore not the skill; it produces either indiscriminate alarm or the dismissal of the real emergency. The skill is a filter of four questions.

The first question is change: is this different from the person's baseline? A lifelong quiet personality and a suddenly quiet person carry very different meanings, and because change can only be judged against a baseline, the question requires asking the people who actually know the individual. The second is speed: how fast did the change develop? Delirium, for example, typically evolves over hours to days and fluctuates through the day, a signature formalized in the Confusion Assessment Method and embedded in clinical guideline criteria (Inouye et al., 1990; National Institute for Health and Care Excellence, 2023), whereas a problem building over months points somewhere else entirely. The third is context: what surrounds the change? New illness or fever, a new or changed medication, alcohol or substances, head injury, and known neurological history are where the cause usually hides. The fourth is red flags: is anything signalling immediate danger right now, consciousness dropping, weakness on one side, seizure activity, or fever with rigidity? Red flags skip every queue.

The filter compresses into a single decision rule: sudden change, plus fast onset, plus suspicious context, plus any red flag, equals treat it as a medical emergency until a professional says otherwise. The rule also organizes the classic look-alikes. Delirium, dementia, and primary psychosis can resemble one another superficially, yet they separate cleanly on onset, course, and attention (Table 1). Attention and awareness are impaired early in delirium, the defining feature, but preserved until late stages in dementia and broadly intact in primary psychosis. Trained practitioners formalize the assessment with validated instruments such as the 4AT, or the CAM-ICU in critical care, which detects delirium with high sensitivity and specificity even in ventilated patients (Ely et al., 2001; National Institute for Health and Care Excellence, 2023). Recognition and escalation, however, require no tools at all.

Table 1

Distinguishing delirium, dementia, and primary psychosis at first presentation

	Delirium	Dementia	Primary psychosis
Onset	Hours to days	Months to years	Usually weeks to months
Course	Fluctuates within a day (often worse at night)	Steadily progressive	Persistent rather than fluctuating
Attention and awareness	Impaired early , the defining feature	Preserved until late stages	Broadly intact
Usual driver	Underlying medical cause , infection, medication, metabolic	Neurodegeneration	Psychiatric illness , but rule out medical mimics
First move	Urgent medical assessment	Planned clinical assessment	Psychiatric assessment , after medical causes are excluded when red flags exist

Note. Adapted from the National Institute for Health and Care Excellence (2023) indicators of delirium and its distinction from dementia and psychosis. The fastest discriminator is sudden onset plus hour-to-hour fluctuation.

5. The Major Emergencies, Seen Through the Filter

Delirium: sudden confusion is a symptom, not a personality. Delirium is an acute disturbance of attention, awareness, and cognition, usually driven by an underlying medical problem: infection, medication, metabolic upset, dehydration, withdrawal, and more (National Institute for Health and Care Excellence, 2023). What the observer sees is sudden confusion, fluctuating awareness, poor attention, hallucinations, agitation, and a disrupted sleep–wake cycle, or the easily missed opposite, hypoactive delirium, in which the person goes unusually quiet, drowsy, and withdrawn. An emergency patient is not always a distressed one. Delirium is dangerous because it signals an active medical process happening right now; while the confusion is attributed to behaviour or to age, the infection, toxicity, or metabolic cause keeps progressing untreated. The correct response is to treat it as medical, not psychiatric: arrange urgent medical assessment to find the cause, and tell clinicians exactly what changed and when.

Stroke and transient ischaemic attack: the treatments that work best are time-limited. Recognition rests on the **B.E. F.A.S.T.** mnemonic: sudden loss of Balance; sudden trouble seeing through one or both Eyes; one side of the Face drooping when the person smiles; one Arm drifting down when both are raised; slurred or strange Speech; and Time, the instruction to call emergency services immediately and to note when symptoms began, the “last known well” (Centers for Disease Control and Prevention, 2024b). Two features of the guidance deserve emphasis. Symptoms that disappear still count: a transient ischaemic attack clears on its own yet warns of a possible major stroke and demands urgent assessment. And an ambulance outperforms a private car, because paramedics begin treatment en route and alert the stroke team before arrival. Time is brain; the correct instinct is to call first and observe while help comes, never to wait and see whether it improves.

Seizures: they do not always look like convulsions. About one in ten people may have a seizure in their lifetime, making this the emergency on any such list that a lay responder is most likely to witness (Centers for Disease Control and Prevention, 2024a). A seizure may look like staring into space unresponsively, altered awareness or sudden confusion, unusual repetitive movements such as lip-smacking or fumbling, or a sudden unexplained behaviour change, as well as the stereotyped picture of falling and whole-body shaking. Most seizures last only a few minutes and stop by themselves; the event becomes an emergency when it lasts more than five minutes, repeats before recovery, is followed by difficult breathing or waking, causes injury, is a first-ever seizure, occurs during pregnancy, in water, or in a person with diabetes who loses consciousness (Centers for Disease Control and Prevention, 2024a). First aid is a discipline of doing the right less rather than the wrong more: stay with the person until fully alert, move hazards away, cushion the head, time the seizure, turn the person gently onto their side, and never restrain them, never put anything in their mouth, and offer no food or water until fully alert. Every harmful action comes from trying to do more; every safe action is about doing the right less.

Catatonia: when movement and responsiveness break down. Catatonia is a syndrome of profound changes in movement, responsiveness, and behaviour, not one disease but a final common pathway that psychiatric, neurological, and medical conditions can all reach (American Psychiatric Association, 2022). It presents at two poles of a single syndrome: a quiet pole of mutism, staring, immobility, fixed postures, negativism, and echoing of others' words or actions, and a storm pole of purposeless, frenzied agitation, with the same person sometimes alternating between them. Unrecognized catatonia risks dehydration, malnutrition, blood clots, and injury, and its malignant form, with fever and autonomic instability, can be life-threatening and overlaps with neuroleptic malignant syndrome (Bienvenu et al., 2012). Structured instruments such as the Bush–Francis Catatonia Rating Scale exist for trained clinicians (Bush et al., 1996), but the responder's role is simpler: never force movement or try to snap the person out of it, treat the picture as an urgent medical sign, and escalate with a clear description of what changed and when.

Neuroleptic malignant syndrome: fever, rigidity, and a dopamine-blocking drug. NMS is a rare, potentially life-threatening reaction to dopamine-blocking medication, above all antipsychotics, and it can appear early in treatment, even at low doses, or after a dose increase (Berman, 2011). The pattern to recognize has four parts occurring together: a recently started or changed dopamine-blocking drug; altered mental status, from confusion and agitation to fading responsiveness; severe lead-pipe rigidity in which the limbs resist being moved; and high fever with autonomic instability of pulse, blood pressure, and sweating. The response is emergency medical care, now: clinicians stop the offending drug and give supportive and targeted treatment (Bienvenu et al., 2012), and the responder's job is to recognize the pattern and escalate, never to re-dose and wait. A final twist gives this emergency diagnostic significance: NMS appearing early in a supposed first psychosis can itself be the clue that the underlying illness is something else, and published cases describe rapid NMS on low-dose

antipsychotics as one of the signs that led clinicians past the psychosis label to anti-NMDA receptor encephalitis (Barry et al., 2015).

Serotonin syndrome, toxicity, and withdrawal: ask what went in, what stopped, and when. Serotonin syndrome is a reaction to serotonergic medication, alone, combined, or interacting, and presents as a triad of mental-status change, autonomic disturbance such as sweating, racing heart, fever, and diarrhoea, and neuromuscular signs of clonus, hyperreflexia, and tremor (Buckley et al., 2014). A memory aid separates the two medication emergencies: serotonin syndrome is fast and twitchy; NMS is slower and rigid. Management is medical, stopping the serotonergic agents with supportive and specialist care (Bienvenu et al., 2012). The wider rule covers toxicity and withdrawal of every kind: new, altered behaviour may be toxicological rather than psychiatric, arising from prescribed medication, substances, overdose, or sudden discontinuation, and alcohol and benzodiazepine withdrawal can themselves be life-threatening. Three questions unmask these states: what went in, what stopped, and when, the timeline set against the symptoms.

6. When “Psychiatric” Is Not Psychiatric: The Great Imitators

Most first-episode psychosis is psychiatric. But a treatable medical minority hides inside it, and that minority is where delays cause real harm. The question is therefore not which disorder fits best, but whether anything in the picture demands a medical workup first. Five signs shift the question from which diagnosis to what is causing this: atypical or very abrupt onset over days rather than months, especially without personal or family psychiatric history; fluctuating consciousness or cognition alongside the psychosis, a combination that belongs to delirium territory; seizures, fever, or autonomic instability, which primary psychosis does not cause; unusual movements such as grimacing, dyskinesias, or early catatonic features; and rapid deterioration or a course that does not behave like the psychiatric diagnosis it was given (Barry et al., 2015; Bienvenu et al., 2012). The rule that follows is the mental shortcut for the entire section: new psychiatric symptoms plus abnormal physical signs equals investigate medical causes.

Anti-NMDA receptor encephalitis is the condition that made this rule famous, the great imitator. It is an autoimmune disease in which antibodies attack the brain’s NMDA receptors, and the first thing the outside world sees is often behaviour rather than neurology (Dalmau et al., 2008). The illness typically unfolds in stages: a flu-like prodrome of headache and insomnia; a psychiatric stage of mania, paranoia, and hallucinations, which is frequently the first door into care; then seizures and movement disorders, classically orofacial dyskinesias; and in severe cases autonomic instability and reduced consciousness. It most often affects children, adolescents, and young adults; in some young women it is associated with an ovarian teratoma whose removal is part of treatment; and diagnosis rests on anti-NMDAR antibodies in cerebrospinal fluid or serum, with the electroencephalogram often showing diffuse slowing while early MRI and routine bloods remain normal, so normal tests do not rule it out (Barry et al., 2015; Dalmau et al., 2008).

Two findings give this condition its place at the centre of the recognition literature. First, it is common enough to matter and structured enough to catch: expert consensus now supports a syndrome-based diagnostic approach in which clinical assessment and conventional tests, accessible to most clinicians, can establish probable autoimmune encephalitis and justify prompt immunotherapy before antibody results return (Graus et al., 2016). Second, timing changes outcomes. In an observational cohort of 577 patients, the large majority achieved a good outcome at 24 months, early treatment was an independent predictor of that outcome, and second-line immunotherapy improved results when first-line treatment failed (Titulaer et al., 2013). The question that saves these patients is deceptively simple, what else could be causing this, asked before, not after, treatment fails.

7. Recognition and Response: Design Principles for Teaching the First Link

In most real events, the person who notices first is a flatmate, a family member, a classmate, or a colleague, someone without clinical training who becomes the first link in the chain. The literature synthesized above suggests several concrete principles for educators preparing lay and student audiences to fill that role, and together they support treating recognition-and-response as a structured curriculum rather than a lecture of warning signs.

- **Teach the baseline, not just the signs.** Recognition is comparison: change only has meaning relative to who the person normally is. Training should rehearse asking the people who actually know the individual, family, friends, flatmates, teachers, what is different and when it began (National Institute for Health and Care Excellence, 2023).
- **Train one filter, not eight lists.** Symptom lists invite both over-calling and dismissal. A small set of discriminating questions, change, speed, context, and red flags, transfers across every condition in this review, because different triggers converge on the same behavioural endpoint (Dalmau et al., 2008; Inouye et al., 1990).
- **Anchor each emergency to a pattern.** B.E. F.A.S.T. for stroke, the five-minute rule for seizures, fever plus rigidity plus a dopamine-blocking drug for NMS, and the fast-and-twitchy versus slow-and-rigid contrast give learners compact, rehearsable structures rather than undifferentiated detail (Berman, 2011; Buckley et al., 2014; Centers for Disease Control and Prevention, 2024a, 2024b).
- **Rehearse the response, including what not to do.** First aid fails through well-meaning excess: restraint, objects in the mouth, re-dosing medication, waiting indefinitely. Training should practise protect, time, and stay, and should rehearse the escalation list until calling emergency services for red flags becomes the default rather than the exception (Centers for Disease Control and Prevention, 2024a).
- **Build the handover as a skill.** A complete handover has five parts, what changed, when it began, how fast it evolved, the context, and what has already been done, and can be delivered in twenty seconds. Learners should practise delivering it aloud, because clear communication to clinicians is where recognition becomes treatment.

- **Make the role boundary explicit, and repeat it.** Recognition, safety, and escalation are the responder's whole role. Diagnosing, prescribing, restraining, experimenting with medication, and waiting indefinitely are never theirs to do, and every one of those well-meaning actions has caused real harm in real homes.

Beyond curriculum design lies the wider task of education and awareness. Recognition can only occur in a population that already believes sudden behavioural change deserves to be taken seriously, and awareness work is what builds that belief before it is needed. The precedent is encouraging: sustained public campaigns have made face, arm, and speech a near-universal shorthand for stroke, and B.E. F.A.S.T. reaches lay audiences precisely because it was designed for repetition rather than completeness (Centers for Disease Control and Prevention, 2024b). The same logic applies to the emergencies in this review that still lack a public vocabulary. Students, flatmates, family members, and frontline staff do not need diagnostic training; they need to know, in advance, that a sudden change in how someone thinks, feels, or behaves can be medical, that asking what changed, how fast, and in what context is always legitimate, and that escalating is never an overreaction when red flags are present.

An early version of this material was recently presented by the author as an interactive awareness workshop for a student and lay audience, structured directly on the principles above: the brain–mind chain as the opening frame, the four-question filter rehearsed against short vignettes, the anchored patterns for stroke, seizures, and the medication emergencies, and the twenty-second handover practised aloud. Two observations from that session are worth recording. First, participants learned the patterns quickly; the barrier was never capacity but exposure, and the most common response was some version of *“I did not know this could be medical”*. Second, the role boundary needed the most rehearsal: the instinct to do more, to restrain, to give something, to wait and see, had to be named and practised against before it could be replaced by protect, time, stay, and escalate. A single workshop is awareness, not evaluation, and it cannot demonstrate changed behaviour in a real emergency; but it confirms the premise on which this review rests, that the first link in the chain is teachable, and that people who are told what to look for, and told that noticing is enough, are willing to become the person who notices first.

Two cautions deserve emphasis. First, the goal of recognition training is calibrated escalation, not maximal alarm: an audience trained to call everything an emergency will eventually call nothing one, and the four-question filter exists precisely to keep thresholds honest. Second, evaluation should accompany implementation. Programs that teach recognition without measuring whether learners actually recognize, respond, and hand over more effectively will be unable to distinguish a genuinely protective curriculum from a reassuring one.

8. Limitations and Future Directions

This review is narrative rather than systematic, and the underlying literature has important limitations. Much of the evidence for recognition and immediate response derives from clinical guidelines, expert consensus, and observational cohorts rather than randomized trials, which are largely infeasible for rare, time-critical emergencies (Graus et al., 2016; National Institute for Health and Care Excellence, 2023). Case series, which dominate the autoimmune encephalitis literature, are vulnerable to selection and recall biases, and published series may over-represent dramatic presentations (Barry et al., 2015; Dalmau et al., 2008). Guidance on first aid and escalation is typically written for general first-aid contexts rather than validated specifically for neuropsychological presentations, and the performance of simple recognition heuristics, including the four-question filter advocated here, has not been prospectively tested against clinical assessment. Finally, most sources address high-income emergency systems with fast ambulance pathways, and the transferability of escalation advice to other settings is uncertain.

Future research should prioritize the systematic evaluation of recognition training itself: whether students and lay responders taught structured filters detect simulated emergencies faster and more accurately than those taught symptom lists, and whether that advantage persists over time. Diagnostic-delay studies in autoimmune encephalitis, catatonia, and medication emergencies would clarify where recognition fails in real pathways, psychiatric, primary care, or emergency department, and which interventions shorten the interval to definitive treatment. Investigators should also examine the costs of false alarms, since escalation thresholds that are too low may burden emergency systems without improving outcomes, and should test whether brief, standardized handover structures measurably improve the information that reaches clinicians. Finally, as syndrome-based diagnostic criteria for autoimmune encephalitis mature (Graus et al., 2016), the field needs prospective data on how early, how accurately, and by whom the first discriminating questions are asked.

9. Conclusion

Can early recognition of neuropsychological emergencies change outcomes? The available evidence suggests that it can, provided that recognition is understood as a structured skill rather than a memorized list. Acute disturbances of brain function, vascular, electrical, inflammatory, metabolic, pharmacological, and structural, converge on a single behavioural endpoint, which is why these emergencies so often present as changes in thinking, emotion, and behaviour and so often arrive through the psychiatric door. Evidence from clinical guidelines, foundational neuropsychology, and the condition-specific literature indicates that a small set of discriminating questions, about change from baseline, speed of onset, surrounding context, and red flags, is sufficient to separate the events that can wait from those that cannot, and that for stroke, status epilepticus, autoimmune encephalitis, and the medication emergencies, the interval between recognition and treatment is a determinant of outcome (Centers for Disease Control and Prevention, 2024b; National Institute for Health and Care Excellence, 2023; Titulaer et al., 2013). Importantly, recognition without response accomplishes little: the first link in the chain must also protect the person, escalate without hesitation when red flags are present, and hand over clearly, while remaining strictly inside a role that excludes diagnosis, medication decisions, restraint, and indefinite waiting. For educators, future efforts should focus on education and awareness as well as instruction, and on the rigorous implementation and evaluation of recognition-and-response curricula, with particular attention to whether structured filters outperform symptom lists, how diagnostic delay can be shortened in real care pathways, and how escalation thresholds can be calibrated to protect patients without flooding emergency systems. The closing principle is the simplest one: you do not have to know the diagnosis to recognize that something is wrong.

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