JIMGS
Journal for International Medical Graduates

Volume 11 (06)
Accepted: June 1st, 2026.
Published: June 1st, 2026.
Systematic Review

When Confidence Surpasses Competence: Cognitive Bias and Training Deficiencies in Endocrine Emergency Management

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Journal for International Medical Graduates

Abstract

Background:
Managing high-acuity emergencies is a routine expectation for medical trainees, yet the skills required are anything but routine. Rare endocrine crises—thyroid storm, adrenal crisis, severe diabetic decompensation—sit at a particularly difficult intersection: infrequent enough that trainees rarely encounter them, yet serious enough that errors carry real consequences. It is in exactly these moments that a dangerous gap tends to surface between how ready a trainee believes they are and how ready they are.

Several well-described cognitive biases, including overconfidence, anchoring, availability bias, and the Dunning–Kruger effect, help explain why this happens. Under pressure, these tendencies distort clinical judgment in ways that trainees themselves often cannot detect. Compounding the problem are structural gaps in graduate medical education, including overreliance on self-assessment, uneven access to simulation, and inconsistent supervision. Research has repeatedly shown that self-assessment is a poor proxy for actual competence, yet it continues to shape decisions about trainee autonomy and readiness for independent practice.

Discussion:

Endocrine emergencies make this problem especially stark. Their rarity means most trainees finish residency with little direct experience managing them, yet their severity leaves no room for on-the-job learning. Trainees may carry confidence built on textbook knowledge rather than clinical exposure, and faculty, lacking direct observation, may mistake familiarity with general medicine for readiness to manage these specific crises.

Conclusion:

Closing this gap will take more than awareness—it requires concrete changes to how training programs assess and develop trainees. Structured direct observation, cross-specialty simulation, and feedback that is both timely and specific are not optional enhancements; they are foundational to accurate competence assessment. Faculty development must also address the harder task of recognizing cognitive bias in real time and resisting the tendency to equate a trainee's confidence with their capability. Until these changes take hold, the gap between perceived and actual readiness will continue to put patients at risk in precisely the scenarios where precision is vital.

Keywords: Cognitive bias, Simulation training, Graduate medical education, Emergency preparedness, Self-assessment, Decision-making

Introduction

Graduate trainees across specialties often encounter high-stakes clinical scenarios demanding quick recognition and action. Rare endocrine emergencies—including thyroid storm, adrenal crisis, and severe diabetic decompensation—represent particularly challenging situations because delayed recognition may carry serious consequences(1,2). Trainees frequently struggle to assess their abilities accurately. Self-assessments frequently fail to align with objective measures of competence, with lower-performing individuals tending to overestimate their abilities, while higher-performing individuals may underestimate their performance (3–5). These misperceptions matter because discrepancies between self-perceived and externally assessed competence may influence entrustment, supervision, and readiness for independent practice(5,6). The Dunning–Kruger effect describes how individuals with lower competence may overestimate their abilities because they lack the metacognitive insight needed to recognize their own deficits(4). In procedural and simulation-based training, women residents may perform equally well but report lower self-efficacy, whereas lower-performing trainees may demonstrate unwarranted confidence(4,7). These misperceptions matter, as self-assessment influences entrustment, supervision, and readiness for independent practice. This perspective examines how cognitive biases and structural gaps in graduate medical education contribute to the confidence–competence gap

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in endocrine emergency management and discusses practical strategies to improve trainee assessment, supervision, and preparedness.

Literature Review Approach

This perspective paper was informed by selected peer-reviewed literature related to cognitive bias, self-assessment, graduate medical education, simulation-based training, and endocrine emergencies. Relevant articles were reviewed to provide contextual and educational insight into factors contributing to the confidence–competence gap in endocrine emergency management. This paper represents a conceptual synthesis of the existing literature rather than a systematic review or meta-analysis.

Background

Emergency settings widen the confidence–competence gap. High cognitive load, distractions, and time pressure push trainees to rely on mental shortcuts. Overconfidence bias may contribute to premature commitment to incorrect diagnoses, reduced recognition of diagnostic uncertainty, and delayed or missed diagnoses in high-pressure clinical settings (8,9). Anchoring may cause fixation on common presentations such as sepsis or dehydration, leading clinicians to overlook subtle signs of thyroid storm or adrenal crisis. At the same time, availability bias can make recent cases seem more common, leading to the underdiagnosis of rare emergencies. Reviews show that these biases contribute to diagnostic errors across specialties (10). These are not character flaws but human tendencies under stress. Still, graduate medical education rarely teaches trainees to recognize or address these biases.

Cognitive Biases

Cognitive biases influence both clinical reasoning and trainees' assessments of their preparedness. Confident residents may avoid needed supervision, while less confident ones might hesitate and delay vital interventions. The Dunning–Kruger effect suggests that lower-performing trainees may fail to recognize their own limitations, whereas more experienced or higher-performing individuals may underestimate their relative competence(4). These tendencies may influence supervision-seeking behavior, self-assessment, and readiness for independent practice(5). Gender differences in self-efficacy further complicate procedural training(7). These biases affect how trainees receive feedback, recall past performance, and judge readiness for independent practice. Without structured observation and timely feedback, trainees rarely adjust their self-perceptions. **Table 1** summarizes the main cognitive biases in emergency decisions.

Bias	How It Appears in Emergency Care	Relevance to Endocrine Emergencies
Overconfidence(10)	Premature commitment to diagnosis; delayed escalation	Residents assume they "know" thyroid storm or DKA management
Anchoring(10)	Fixation on initial impression	Mislabeling thyroid storms, such as sepsis, adrenal crisis, as dehydration
Availability(10)	Overweighting recent/common cases	Missing rare endocrine emergencies
Dunning Kruger(4)	Low performers are unaware of deficits	Trainees overestimate readiness for endocrine crises
Confirmation bias(10)	Seeking data that fits the initial hypothesis	Missing thyroid storm or adrenal crisis by focusing only on more common diagnoses

Table 1: Cognitive Biases Relevant to Emergency Decision Making

Clinical Context: Endocrine Emergencies as a Stress Test for GME

Endocrine emergencies expose these weaknesses. Managing thyroid storm requires prompt recognition, supportive management, treatment directed at reducing thyroid hormone synthesis and its peripheral effects, and identification of precipitating factors(11). Adrenal crisis requires urgent stress-dose steroids. Residents often delay while waiting for confirmation. Severe diabetic crises require careful metabolic, fluid, and electrolyte management because underlying endocrine and metabolic derangements substantially contribute to morbidity(12). Early mistakes can worsen outcomes.. Early mistakes can worsen outcomes. These emergencies are rare. Many residents finish training with little firsthand experience. Yet they are common enough that every internist, ER doctor, surgeon, anesthesiologist, and intensivist needs to know how to manage them.

The infrequency of these events creates a paradox: trainees feel confident despite limited exposure to complexity, while faculty often assume competence based on general knowledge rather than proven performance. As described by the Dunning–Kruger effect, individuals with limited competence may overestimate their readiness because they lack the insight to recognize their own deficits (4). **Figure 1** illustrates this confidence–competence gap and highlights why rare endocrine emergencies may be particularly vulnerable to delayed recognition or management, especially when inaccurate self-assessment and cognitive bias influence clinical decisions(4,5,8,10).

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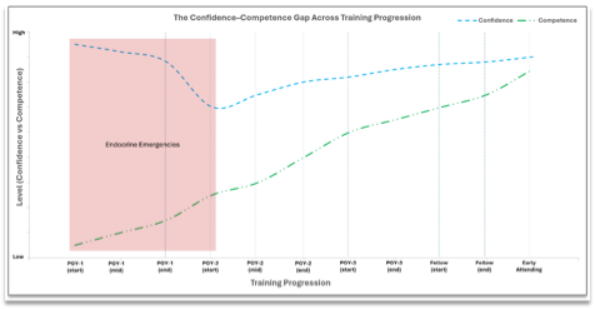

Figure 1: Conceptual illustration of early confidence exceeding competence, consistent with the Dunning–Kruger effect. The shaded "danger zone" highlights where rare, high-acuity endocrine emergencies may be particularly vulnerable to delayed recognition or management due to inaccurate self-assessment and cognitive biases that influence clinical decision-making(4,5,8,10).

System Factors

Graduate medical education (GME) systems unintentionally perpetuate the confidence–competence gap. Although self-assessment is commonly incorporated into portfolios, reflective exercises, and competency-based educational frameworks, evidence consistently shows that self-assessment alone is an unreliable measure of competence (3,5,8). Contemporary competency-based medical education frameworks emphasize longitudinal assessment, direct observation, and performance-based evaluation rather than reliance on self-perceived readiness(13). In clinical settings, supervision and assessment decisions may be influenced by trainees' confidence, self-presentation, and perceived readiness rather than by directly observed performance (5,13). Cognitive biases, such as leniency, the halo effect, and assumptions about readiness, influence faculty. Limited opportunities for structured observation and timely feedback may further impede trainees' ability to recalibrate self-perceptions and accurately assess their competence (5,13). As a result, the gap persists. This keeps the confidence–competence gap wide, especially in rare, urgent situations.

Recommendations and Call to Action

Addressing the confidence–competence gap in endocrine emergency management requires deliberate changes in how graduate medical education programs assess and support trainees. Programs should reduce reliance on self-assessment as a measure of competence. While reflection remains an important educational tool, self-rating alone is an unreliable indicator of readiness for independent practice. Structured direct observation, simulation-based assessment, and multi-source feedback provide more accurate evaluations of trainee performance and clinical judgment.

Endocrine emergencies should be incorporated into simulation training across specialties, not only within endocrinology. These scenarios provide opportunities to teach diagnostic reasoning, crisis management, and recognition of cognitive bias in a controlled environment. Immediate, specific feedback is essential to help trainees recalibrate confidence and improve clinical decision-making.

Faculty development must also evolve to address the role of cognitive bias in supervision and assessment. Educators should be trained to recognize when trainee confidence does not accurately reflect competence and to adjust supervision and feedback accordingly. Open discussion among faculty regarding bias, entrustment, and performance evaluation may strengthen group judgment and improve consistency in trainee assessment.

Ultimately, assessment models should prioritize observed performance over self-perceived readiness. When trainees are evaluated based on demonstrated actions rather than confidence alone, the confidence–competence gap narrows, and patient care becomes safer. Strengthening these educational systems will better prepare trainees across specialties to recognize and manage rare but high-stakes endocrine emergencies.

Limitations

The evidence surrounding self-assessment accuracy, cognitive bias, and simulation-based education consistently highlights gaps between perceived and actual competence; however, the existing literature remains heterogeneous. Many studies evaluating self-assessment and simulation-based training are limited by single-institution designs, relatively small sample sizes, and variability in assessment methods, learner populations, and clinical contexts. In addition, the influence of cognitive bias on clinical decision-making is often inferred from observational or simulation-based settings rather than directly evaluated during real-world endocrine emergencies. These limitations should be considered when interpreting the broader applicability of existing findings across different specialties and training environments.

This perspective paper also has limitations. It represents a conceptual synthesis of selected literature rather than a systematic review or meta-analysis, and relevant studies may not have been included. The relatively small reference base and selective focus on endocrine emergencies may also limit the generalizability of the concepts discussed to other acute clinical scenarios or training settings. Future studies using objective performance-based outcomes may help further define effective strategies to reduce the confidence–competence gap in graduate medical education.

Conclusion

Rare endocrine emergencies do not occur often enough to teach themselves—and that is precisely the problem.

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When a trainee encounters thyroid storm or adrenal crisis for the first time, the margin for error is narrow, yet the preparation is often thin. This paper has sought to show that the resulting danger is not due to knowledge gaps. It is about a more insidious mismatch: trainees who feel prepared when they are not, and systems misunderstand false confidence for demonstrated ability. That mismatch does not arise from individual failure alone. It is shaped by how graduate medical education is structured, the weight placed on self-assessment, the inconsistency of simulation training, and the variability in the degree to which trainees are observed and corrected. In settings where confidence is implicitly rewarded, and direct observation is rare, the gap between perception and performance tends to widen quietly until a high-stakes case makes it visible.

What needs to change is both philosophical and practical. Programs must stop treating self-reported readiness as a reliable measure of competence. Structured observation, simulation-based evaluation, and multi-source feedback are not add-ons—they are the mechanisms through which real competence gets assessed and developed. Running endocrine emergency scenarios across specialties gives educators a controlled setting to observe diagnostic reasoning and crisis management in ways that clinical rotations rarely allow. But simulation alone is not enough if the faculty running it cannot recognize when a trainee's confidence is masking a gap. Faculty development must directly address this: how to spot cognitive bias in trainees, how to adjust supervision when confidence misleads, and how to give feedback that shifts self-perception. Trainees will always encounter cases they have never seen before, that is the nature of medicine. The goal of graduate medical education is not to eliminate that uncertainty but to ensure that, when it arrives, trainees have the judgment, skills, and self-awareness to navigate it safely. For rare endocrine emergencies, this means building programs around what trainees can do, not what they believe they can do. The changes outlined here are achievable. More importantly, they are necessary.

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