CASE STUDY

COGNITIVE STACKING: A CONCEPT ANALYSIS

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ABSTRACT

The aim of this paper is to analyze the concept of cognitive stacking and provide a definition suitable for application to the nursing process. Mental problem-solving is an essential skill for nurses who must multitask in patient care settings. This concept analysis was conducted using eight stages of concept analysis. A review of the literature was performed using databases, and peer-reviewed journals were examined. The analysis resulted in an operational definition of cognitive stacking applicable to the nursing care environment. Cognitive stacking is a mental process that individuals use to manage tasks and set priorities based on ongoing and changing factors. The concept relies on several key attributes, including situational awareness, deliberate hierarchical labeling, continual reorganization, delegation, and communication. In nursing, these attributes can be applied in the clinical setting to ensure safe and high-quality patient care.

Keywords: Cognitive, Stacking, Nursing, Cognitive Load Theory, Information Processing, Working Memory, Executive Function, Cognitive Overload, Mental Stacking.

INTRODUCTION

Cognitive Stacking, a term that is gaining traction in cognitive science and psychology, refers to the process by which individuals manage and prioritize multiple cognitive tasks simultaneously. This concept, akin to the way a stack of plates is organized and accessed, highlights how the human brain can handle complex and competing demands through a structured approach to mental workload. By examining the mechanisms and strategies involved in cognitive stacking, researchers aim to understand how people efficiently switch between tasks, manage cognitive resources, and maintain performance under varying levels of demand. This analysis not only sheds light on the intricacies of cognitive management but also has practical implications for optimizing productivity and mental well-being in both personal and professional contexts.

1. Literature Review

Sitterding et al. (2012) explain the understanding situation awareness in nursing work. Eighty percent of medical errors stem from human factors, with attention and situation awareness being notably underexplored. This article analyzes situation awareness using a hybrid concept analysis. Through semi-structured interviews with nurses, nine key themes emerged: perception, comprehension, projection, knowledge and expertise, cognitive overload, interruption management, task management, instantaneous learning, and cognitive stacking. The study defines situation awareness conceptually and offers recommendations for improving its application in nursing.

Laliyo et al. (2022) explain how they measured changes in students' understanding of the hydrolysis concept when taught using the inquiry model, employing stacking and racking analysis techniques within the Rasch model. This

research utilized stacking and racking analysis in the Rasch model to assess changes in students' understanding of hydrolysis through the POGIL model, focusing on socio-scientific issues, using a pretest-posttest control group design. Eleventh-grade students from a top Indonesian high school responded to 15 three-tier multiple-choice items before and after the intervention. Data analyzed with WINSTEPS 4.5.5 indicated that students taught with POGIL showed greater conceptual improvement compared to those in a conventional learning group. However, some positive changes were attributed to lucky guesses or cheating, while negative changes were due to carelessness or misconceptions. The analysis highlighted that not all students benefited equally from the intervention and emphasized the importance of detailed stacking and racking analyses in tracking changes in student abilities and item difficulties.

Cao et al. (2021) describe the recognition of cognitive load with a stacking network ensemble of denoising autoencoders and abstracted neurophysiological features. A novel neural network ensemble, SE-SDAE, was developed using Stacked Denoising Autoencoders (SDAEs) to assess cognitive load levels from EEG signals. By integrating multiple K-nearest neighbor and naive Bayesian classifiers with SDAEs, the approach enhances classification diversity and generalization. SE-SDAE's effectiveness was validated by comparing it to traditional pattern classifiers.

2. Concept Selection

In recent years, nursing errors and patient safety have been increasingly highlighted in social media and the news (Forte et al., 2019). During the pandemic, nurses faced intense scrutiny over patient safety and medication errors during a chaotic time in healthcare (Gilavand et al., 2023). Nursing educational institutions experienced decreased on-site clinical experiences and increasing patient-to-nurse ratios, which challenged educators to explore innovative ways to enhance pre-licensure students' abilities to apply their knowledge to the changing clinical setting. However, the process by which nurses apply their knowledge in an increasingly critical and distracting healthcare environment must remain organized, safe, and effective. Nursing students faced challenges in adopting time management and organizational skills, yet there was insufficient guidance to help them solidify these skills. Consequently, questions arise about whether recent nursing program graduates are adequately prepared for the environments they will face (Nicoll, 1997).

In addition to time management and organizational skills, nurses must be trained to manage high patient loads, care for sicker patients, and handle increased workloads. To address this, cognitive stacking emerges as a concept that can be applied to nursing education to help guide students in adapting to shifting clinical settings. Cognitive stacking refers to the pre-planned, organized accumulation of mental tasks that students implement during patient care. These tasks involve mental processes such as problem-solving, decision-making, and critical thinking (Potter et al., 2010). Exposing students to this invisible process of cognitive stacking will equip them with skills for organizing, re-prioritizing, and making decisions about workflow and care delivery, which they can apply in clinical settings (Ebright, 2010). The educational importance of introducing cognitive stacking to nursing students lies in allowing them to develop and practice this mental reorganization, which is crucial for ensuring safe and high-quality patient care in clinical environments.

3. Aim of the Concept

The goal of the literature review was to identify articles and research pertinent to the uses and methods of the concept of cognitive stacking. This review aimed to explore the concept's application in the educational field and then extend it to nursing education. To better understand cognitive stacking, the terms "cognitive" and "stacking" will be examined independently. Ultimately, the aim is to discover how cognitive stacking can be effectively applied in nursing to promote safe patient care.

3.1 Definitions of Cognitive

Cognitive, as described by the Merriam-Webster Dictionary Online, is an adjective meaning "of, relating to, being, or involving conscious intellectual activity (such as

thinking, reasoning, or remembering)" (para. 1). The Microsoft Word Thesaurus lists synonyms for cognitive including reasoning, mental, intellectual, cerebral, perceptive, rational, thinking, and thought. The Cambridge Dictionary Online defines cognitive as "connected with thinking or conscious mental processes". Similarly, the Oxford Learner's Dictionaries Online defines cognitive as "connected with mental processes of understanding". A common theme among these definitions is the intellectual process of connecting thoughts.

In the educational field, cognitive is described as the brain's ability to absorb information from external sources and internal processing (Lin, 2022). If the brain has difficulty processing external information, the individual may reorganize the information to better process incoming stimuli, or they may block out the external information to prevent interference with the processing (Lin, 2022). Therefore, a person's cognitive ability is reflected in how well they accept, understand, absorb, and utilize information (Lin, 2022).

3.2 Definitions of Stacking

Stacking is defined by the Merriam-Webster Dictionary Online, as a verb, as "to arrange in a stack: pile". The Microsoft Word Thesaurus lists synonyms for stacking, including piling, loading, amassing, assembling, heaping, mounding, packing, filing, cramming, and squeezing. The Cambridge Dictionary Online defines stacking as "to arrange things in an orderly pile". The Oxford Learner's Dictionaries Online defines stacking as "to arrange objects neatly in a pile", such as stacking chairs. The common theme across these definitions is arranging or placing items in a pile.

In the educational field, educators assess how well a student can take external information and organize facts and thoughts to scaffold future information. Disorganized stacking of information will result in a poor ability to relay the relationships between the gathered information.

3.3 Definitions of Cognitive Stacking

After exploring the individual meanings, the words "cognitive" and "stacking" connect well with one another. The concept can be interpreted as an intellectual process of connecting thoughts and arranging them into an organized stack or pile. Whether one is organizing thoughts or planning how to process and utilize those stacked thoughts depends on cognitive ability and awareness of one's capability to process information. The "cognitive" part of cognitive stacking involves the conscious labeling of tasks in the brain, while the "stacking" part involves the conscious reordering of tasks according to priority. Therefore, the term "cognitive stacking" describes the accumulation of tasks and priorities neatly categorized in a systematic order to achieve a goal.

3.4 Educational History of Cognitive Stacking

The process of categorizing cognitive domains was first introduced into education who organized learning objectives into six major levels (Bloom, 1956). These levels followed a hierarchical structure to guide cognitive development for educational purposes. Over the years, educators have utilized tools developed from Bloom's work and from others who have studied cognition. Research has led to a better understanding of how individuals reason, understand, solve problems, and learn (Nersessian, 2024).

On the other hand, the educational field has long studied how infants and children construct and stack toys. This activity is closely tied to the cognitive ability to stack (Marcinowski et al., 2019). For children, stacking involves physically placing toys or objects one on top of the other. As children grow, stacking becomes more complex, reflecting the interplay between cognitive abilities and physical skills. Eventually, individuals reach a point where the organization of stacking is internalized, leading to quicker execution of the task, which is largely related to improved motor skills (Marcinowski et al., 2019). This process is also connected to the increasing cognitive abilities as children age. Therefore, in the educational context, the mental processes involved in stacking or organizing physical toys evolve into the cognitive skills of arranging thoughts or facts into a hierarchy that can be recalled for testing purposes.

4. Definition and Defining Attributes of Cognitive Stacking

Identifying the defining attributes by drawing attention to the concept's common use aids in the clarification of the concept (Rew et al., 2005). Several common attributes emerged in the literature related to the concept of cognitive stacking. First, there is situational awareness of several tasks that must be performed within a limited amount of time. Secondly, those tasks require deliberate hierarchical labeling. This multitasking endeavor necessitates cognitive organization in the form of a variety of actions that must be completed while applying critical thinking, analyzing the situation, and implementing these tasks with the intent to optimize the outcome, rather than merely completing them. In nursing, these attributes are applied using clinical judgment and time management to provide safe, compassionate, and optimal patient care. Synthesizing these attributes, the nurse begins by assessing the various current tasks, then prioritizes and re-prioritizes how and when those tasks should be completed based on the patients' conditions and needs. The most important task is determined based on the patients' conditions. A third attribute that emerges is the continual assessment and reorganization of tasks in response to changing situations. Examples of the cognitive processes involved in assessing what requires reorganization include analyzing critical patient changes, assessing all patient needs, monitoring laboratory values closely, being aware of vital sign changes, and being attentive to emerging provider orders.

Carrying out the reorganized tasks may entail delegating to non-licensed assistive personnel or aides, which many new nurses struggle with if they are unskilled in cognitive stacking. A fourth attribute includes not just the ability to delegate, but also the ability to recognize which tasks can be delegated and to whom they should be delegated. A final attribute involves appropriate communication with the patient, family members, and healthcare team to streamline safe patient care. Communication is vital in each of the previous attributes to ensure successful cognitive stacking. To highlight the danger of lacking these attributes, the contrary case examines the characteristics of disorganization and lack of prioritization that compromise patient safety when critical thinking and judgment are deficient on the part of the nurse.

5. Cases

Four cases illustrate the attributes of the concept of cognitive stacking: the model case presents all the attributes; the contrary case reflects the absence of these attributes; and the borderline case includes some components of cognitive stacking.

5.1 Model Case

Emma, a registered nurse in the Post Anesthesia Care Unit (PACU), was responsible for the care of five postoperative patients. Her clinical priorities were as follows:

- Patient A had recently returned from abdominal surgery and was experiencing severe postoperative pain, necessitating comprehensive pain management strategies.
- Patient B required routine assessment of vital signs to monitor for any immediate postoperative complications.
- Patient C had a wound drain that required regular emptying and monitoring to prevent infection and ensure proper healing.
- Patient D needed assistance with ambulation to the bathroom to promote mobility and prevent complications such as Deep Vein Thrombosis (DVT) and postoperative constipation.
- Patient E was clinically stable but required ongoing regular monitoring to identify any changes in their postoperative condition.

Emma used a systematic approach to patient care by developing a routine for common tasks based on the initial patient reports she received. She prioritized patient care by assessing urgency, importance, and patient preferences. Emma started her shift by administering pain medication to Patient A, who was experiencing severe postoperative pain following abdominal surgery. She then measured and recorded the vital signs of Patients B and E to monitor their stability and detect any potential complications. Next, she managed Patient C's wound

drain, ensuring it was emptied and functioning properly to prevent infection. During these duties, she delegated Patient D's ambulation to the bathroom to a nurse technician, which was essential for promoting mobility and preventing postoperative complications such as Deep Vein Thrombosis (DVT). Emma continued to follow the hierarchy of task management and reorganizing while including Patient E's ongoing assessment.

Throughout her shift, Emma demonstrated cognitive stacking, which contributed to safe patient care. This included recognizing and prioritizing tasks, labeling tasks hierarchically, reordering and reorganizing tasks, exercising delegation when appropriate, and ensuring efficient and comprehensive care. Effective communication with patients, their families, and the healthcare team was integral to her practice, fostering a collaborative and supportive care environment. Emma managed interruptions and unexpected events by seeking assistance from colleagues, focusing on completing the tasks at hand, and striving for positive patient outcomes. She continually reflected on her performance, identified areas for improvement, and implemented changes to enhance her clinical practice.

5.2 Contrary Case

Octavia, a registered nurse in the medical-surgical unit, was responsible for the care of five postoperative patients. Her clinical priorities were as follows:

- Patient A was experiencing severe pain, reporting a pain intensity of 8/10 on the numerical pain rating scale.
- Patient B presented with a fever, had been administered an antipyretic, and required a follow-up temperature assessment after one hour.
- Patient C required a wound dressing change to ensure proper healing and prevent infection.
- Patient D required the administration of critical medication, which is an essential part of the treatment regimen.
- Patient E was preparing for discharge and needed comprehensive discharge instructions to ensure continuity of care post-hospitalization.

In this scenario, Octavia began patient care randomly and neglected to exercise situational awareness. She failed to administer pain medication to Patient A and performed other tasks, resulting in a delayed retrieval of Patient B's temperature after administering the antipyretic. Patient C's wound dressing change was not performed as required, and Patient E's family had questions regarding discharge instructions that went unanswered, as Octavia did not return to the patient's room to address their concerns. The situation underscores a critical failure in applying cognitive stacking attributes, including inadequate assessment and labeling of tasks, neglectful reorganization of tasks, improper delegation to non-licensed assistive personnel, and failure to communicate. Due to these lapses, the nurse failed to maintain patient safety and placed the patients at risk for complications.

5.3 Related Case

Richard, a registered nurse in the coronary care stepdown unit (CCU), was responsible for the care of five post-cardiac-catheter patients. His clinical priorities were as follows:

- Patient A required ongoing cardiorespiratory monitoring and management of oxygenation, which involved continuous assessment of heart rate, blood pressure, respirations, and oxygen saturation levels.
- Patient B required continual attention to the catheterization site along with serial laboratory blood draws.
- Patient C needed to begin anticoagulant therapy within the first hour after admission from the recovery room.
- Patient D was due for a comprehensive neurological assessment.
- Patient E requested pain medication for a pain intensity of 6/10 on the numerical pain rating scale.

Richard had learned about cognitive stacking in nursing school and was eager to apply the concept to his care of the assigned patients. He immediately documented a list of tasks to complete, starting with the patient closest to the nursing station, Patient D. His rationale was to minimize his steps on the unit, allowing more time with each patient.

After completing the neurological assessment for Patient D, he proceeded to Patient E's room, where he discovered that the patient's pain intensity had risen to 10/10 on the numerical pain rating scale. Although he initially planned to administer oral medication, he changed his plan to intravenous medication. After retrieving the medication and returning to Patient E's room, he assessed that additional calming and relaxing methods were needed, along with the administered medication.

Richard then moved on to Patient A's room but found that, due to the time spent with Patient E, vital signs for Patient A were not assessed in a timely manner. Next, Richard needed to draw laboratory specimens from Patient C. As a result, Patient C did not receive the anticoagulant therapy on time.

As Richard's shift neared its end, he felt disorganized and reflected on the subpar care he had provided. He questioned whether cognitive stacking was an effective approach for him. Richard failed to implement essential components of the concept that would have complemented his task management. If he had performed a deliberate hierarchical labeling of his patients' needs at the beginning of his shift, he could have facilitated continual reorganization of these tasks. Additionally, if he had implemented delegation and communication with the healthcare team, his workflow would have been more manageable, allowing him to maintain safe and timely care for his patients.

5.4 Borderline Case

Shirley, a registered nurse in the labor and delivery antepartum unit, is responsible for the care of five high-risk pregnant patients. Her clinical priorities are as follows:

- Patient A required 20 minutes of electronic fetal monitoring every four hours and was due at the beginning of her shift.
- Patient B required the administration of Magnesium Sulfate, and Shirley needed to stay with the patient for 30 minutes during the infusion.
- Patient C called out for help to go to the bathroom.
- Patient D was on continuous fetal monitoring and required ongoing assessment of maternal and fetal status.
- Patient E was diagnosed with gestational diabetes, and a blood sugar Accu-Chek needed to be completed before the first meal.

After receiving reports on her five patients, Shirley assessed the tasks at hand and mentally prioritized her responsibilities. She briefly introduced herself to each patient while mentally organizing her tasks. She began by placing Patient A on external fetal monitoring and then proceeded to Patient B's room to start the Magnesium Sulfate infusion. While monitoring Patient A, she called the nursing desk and asked the nursing assistant to obtain a blood sugar reading for Patient E and to assist Patient C to the bathroom. While remaining in Patient B's room, she used the monitor to assess the maternal and fetal status of her other patients. After completing these morning tasks, unexpected maternal changes occurred with Patient C, but Shirley continued to focus on Patient B, the priority for the morning. Due to her strict adherence to a labeled task order, Shirley was unable to maintain safe maternal and fetal monitoring assessments for all her patients. The key attributes of continual assessment and task reorganization, which Shirley failed to implement as part of cognitive stacking, potentially placed patients at an increased risk for adverse events.

6. Antecedents and Consequences

McEwan and Wills (2014) explain that delineating antecedents involves describing the contextual conditions that must exist before the occurrence of a specific concept, while consequences refer to the conditions that arise as a result of the concept. Both antecedents and consequences can be identified for the concept of cognitive stacking.

6.1 Antecedents

An antecedent of cognitive stacking includes patient assignments and the distribution of tasks. In nursing, reporting to assigned duties on a specific shift, regardless of the specialty, allows nurses to take on patient care tasks. A nurse, other than the one who will be implementing cognitive stacking, will create these

assignments. However, the assigned nurse depends on considerations such as patient mix and acuity, the knowledge level and competence of the nurse, staffing standards and guidelines, and the availability of the nursing workforce for that shift to ensure safe, quality care.

Another antecedent is the exchange of information in the form of reporting between outgoing and incoming nurses. This hand-off procedure also occurs during changes in the level of care, such as admissions or transfers of patients from other units. During the hand-off, the nurse provides additional information about the patient's medical status, interventions provided and expected, and outcomes of tests and procedures.

An additional important antecedent is the provider orders, which dictate specific patient care. Provider orders are like road maps, detailing what must be completed, who is responsible for the task, how frequently the task should be implemented, and how long it should continue. These orders are strategically based on parameters and signs and symptoms associated with the patient's conditions.

Unlike the implementation of labeling tasks, multi-disciplinary collaboration is a crucial antecedent for the success of the concept. The nurse collaborates and communicates with physicians, pharmacists, social workers, clinical laboratory technologists, dietitians, custodians, laundry attendants, and others. The nurse also works with non-licensed assistive personnel who are delegated to complete routine tasks according to hospital policies and the Nurse Practice Act. A functioning system with resources such as supplies, telecommunication equipment, and a fully operational patient unit is also considered an antecedent for cognitive stacking.

6.2 Consequences

The desired consequence and outcome of cognitive stacking would be the provision of safe and optimal patient care in a timely manner. Due to situational awareness, priority setting and re-prioritizing care, delegation, and optimal communication, there is a decreased risk of complications and increased positive patient outcomes, both of which contribute to safe, quality care. An additional consequence of cognitive stacking is nurse satisfaction. The nurse is expected to manage time wisely, delegate tasks appropriately, and allocate time for self-care activities, including taking breaks. Therefore, the consequences of cognitive stacking can be assessed through the results of these tasks and expectations.

As reflected in the model case example, the results are inferred due to the proper application of the concept of cognitive stacking. Pain medication was administered promptly, allowing for patient comfort and a decreased pain level upon reassessment. Prompt monitoring of vital signs revealed no complications in the patient. Timely wound care and drainage facilitated proper wound healing without infection. Lastly, patient mobility was ensured through delegation to a non-licensed employee, helping to prevent deep vein thrombosis. In contrast, if cognitive stacking attributes are lacking, negative empirical referents could appear as adverse patient outcomes, such as the development of deep vein thrombosis due to insufficient mobility.

6.3 Empirical Referents

The last step in a concept analysis is determining the empirical referents that indicate whether cognitive stacking is present or has occurred (Rew et al., 2005). Since cognitive stacking is individualized to a person's thought process, measuring this concept can be challenging. However, empirical referents for cognitive stacking may be guided by a progression of attributes. As noted in the related case, Richard had heard of cognitive stacking but failed to apply the appropriate attributes of the concept to achieve a positive outcome. Educators may map out the process in a graph or written form to help learners better grasp the concept.

The first step for successful cognitive stacking is to thoroughly assess the situation to ensure situational awareness of the tasks. Secondly, it is crucial to deliberately label the tasks in a hierarchical manner for the process to succeed. In contrast to Richard's approach, continual assessment and reorganization of

tasks help maintain their hierarchical importance. The learner must then understand the scope and limitations of delegation. Finally, effective communication skills will enhance the flow of the concept from start to finish. Depending on the environment in which the concept is applied, these attributes can be further broken down into subcategories for a more comprehensive empirical understanding.

7. Implication for Nursing

Cognitive stacking can be seamlessly applied to the nursing profession. The term emerged from research by Dr. Patricia Ebright, who defined cognitive stacking as the accumulation of tasks and priorities that a nurse must manage during a patient-care shift (Brixey et al., 2005). Performing patient care can be daunting, as nursing functions are non-linear and fluid, based on the varying acuity of patients. A list of nursing tasks for assigned patients includes prioritized actions with the flexibility to adjust these priorities based on patient conditions. Additionally, nurses must monitor and track the necessary tasks, procedures, and processes (Potter et al., 2005). To cope, the nurse organizes and reorganizes the priorities of tasks based on fluctuating patient statuses (Brixey et al., 2005; Potter et al., 2005). Implementing cognitive stacking can ensure a smooth workflow, enabling nurses to deliver optimal care and maintain patient safety during each shift. However, the nurse's ability to implement these tasks requires developing complex pathways that are labor-intensive (Potter et al., 2005). Therefore, nurse preceptors, nurse educators, and nurse leaders must assist novice nurses in mastering time management, prioritization, and appropriate delegation (Kohtz et al., 2017).

Cognitive stacking is a workflow management process that helps nurses set priorities and manage their time. It is an unseen process that assists nurses in managing critical skills (Kohtz et al., 2017). Some have described cognitive stacking in nursing as organizing the accumulation of cognitive tasks or demands experienced during patient care. These tasks require cognitive processing, such as problem-solving, decision-making, and critical thinking. However, if nurses are unable to properly apply cognitive stacking, mental overload can occur (Potter et al., 2005). While many descriptions of cognitive stacking share common elements of setting and reprioritizing care, variations in its description and application across different nursing specialties have led to inconsistencies and confusion regarding its characteristics and goals in nursing practice. In proposing a definition of cognitive stacking in nursing, consideration has been given to the diverse specialty areas and settings where nurses practice. Therefore, a definition that emphasizes what nurses accomplish during a typical shift in a medical-surgical unit in an acute-care setting is proposed.

8. Discussion

In exploring the concept of cognitive stacking, this review underscores its significance in enhancing nursing practice and education. Cognitive stacking, which involves the systematic management and prioritization of multiple cognitive tasks, is integral to effective nursing care. By dissecting its theoretical underpinnings and practical applications, we gain insights into how this concept aids nurses in handling complex patient care scenarios, ensuring both safety and efficiency. The analysis of the defining attributes of cognitive stacking such as situational awareness, task prioritization, and continuous reorganization demonstrates its relevance to nursing practice. The model case of Emma and the contrary case of Octavia vividly illustrate the impact of cognitive stacking on patient care quality. Emma's effective application of cognitive stacking resulted in safe, timely, and comprehensive patient care, while Octavia's failure to utilize these attributes led to suboptimal patient outcomes.

Conclusion

The integration of cognitive stacking into nursing education and practice holds substantial promise. It offers a framework for developing crucial skills such as time management, prioritization, and delegation, which are essential for novice nurses facing the demands of real-world clinical environments. Implementing cognitive stacking strategies can help nurses navigate the complexities of patient care, thereby reducing errors and

enhancing patient safety. However, the concept's variability across different nursing contexts and specialties calls for a unified approach to its definition and application. Standardizing cognitive stacking principles and incorporating them into nursing curricula and professional development programs can provide a more coherent understanding and application of this concept. Cognitive stacking emerges as a valuable tool for optimizing nursing practice and education. By fostering a structured approach to task management, cognitive stacking enables nurses to deliver high-quality care while maintaining their own mental well-being. Future research and practical applications should focus on refining and expanding cognitive stacking techniques to address the evolving challenges in nursing and healthcare.

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