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Development of a Clinical Practice Guideline for Diabetic Ketoacidosis (DKA) Management in the Intensive Care Unit

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Walden University

College of Nursing

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the review committee have been made.

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Executive Summary: Clinical Practice Guideline
Development of a Clinical Practice Guideline for Diabetic Ketoacidosis (DKA)

Management in the Intensive Care Unit

by

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BS, Mountain State University, 2012

Executive Summary Submitted in Partial Fulfillment

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Summary

This Doctor of Nursing Practice (DNP) project addressed a critical gap in care at a 24-bed, combined, intensive care unit (ICU): The absence of a standardized, evidence-based clinical practice guideline (CPG) for managing diabetic ketoacidosis (DKA). DKA is a life-threatening emergency requiring timely, coordinated, and evidence-driven management. Despite its prevalence, the project site ICU lacked formal guidelines, resulting in fragmented care delivery and inconsistent treatment practices. Project site leadership expressed concerns that the absence of a unified protocol contributed to increased workload for nurses and physicians with frequent interruptions for order verification and delays that compromised patient safety and care efficiency. The project was guided by the following question: Can an evidenced-based CPG for adult patients with DKA in the ICU receive agreement by content experts of at least 80% in the six domains of the Appraisal of Guidelines for Research & Evaluation II (AGREE II) tool?

In the project, I followed the Walden University DNP Clinical Practice Guideline Development Checklist . The initiative involved collaboration with key stakeholders, multiple rounds of expert clinical review, and rigorous appraisal using the AGREE II Tool to ensure methodological quality and transparency. The DKA CPG achieved an overall quality score of 96.2, demonstrating intense methodological rigor, clarity, and applicability. Implementing this guideline will standardize ICU practice, reduce workflow interruptions, enhance the timeliness of care, and improve outcomes for critically ill patients with DKA. This CPG acts as a means for equity by transforming clinical standardization to address structural disparities.

Background

DKA is among the most severe acute complications of diabetes and remains a leading cause of ICU admissions in the United States (Eledrisi & Elzouki, 2020). Managing DKA requires prompt correction of hyperglycemia, acidosis, and electrolyte imbalances through structured protocols that guide insulin, fluid, and electrolyte management (Johnson et al., 2024). Despite established best practices, variations in treatment persist across hospitals, contributing to prolonged ICU stays and potential complications (Ghosh et al., 2023; Kumar et al., 2024).

At the project site, ICU nurses and physicians relied on inconsistent verbal or written orders for DKA management. Critical decisions, such as potassium replacement thresholds or insulin titration, varied by provider preference. Leadership identified that the absence of a unified protocol created workflow inefficiencies and communication gaps between providers, nurses, and pharmacists. These issues supported the need for a standardized, evidence-based CPG to improve consistency, nurse autonomy, and interdisciplinary coordination. The practice-focused question guiding the initiative was: Can an evidenced-based CPG for adult patients with DKA in the ICU receive agreement by content experts of at least 80% in the six domains of the Appraisal of Guidelines for Research & Evaluation II (AGREE II) tool?

Literature supports standardized DKA protocols to improve glycemic control, reduce ICU length of stay, and enhance staff satisfaction (Donihi et al., 2019; Messina et al., 2025; Park et al., 2023). I completed a comprehensive literature search using the following databases accessed through the Walden University Library: PubMed,

CINAHL, UpToDate, and Google Scholar. Search terms included *diabetic ketoacidosis*, *critical care*, *insulin infusion*, *electrolyte replacement*, and *protocol implementation*. Inclusion criteria consisted of English-language, peer-reviewed studies published between 2020 and 2025 that focused on the management of adult ICU patients with DKA. Thirteen articles met the inclusion criteria: nine Level I (i.e., systematic reviews and randomized controlled trials), two Level III (i.e., nonrandomized controlled studies), one Level IV (i.e., a cohort study), and one Level V (i.e., an expert opinion). All evidence was critically appraised and rated as moderate to high quality using the Johns Hopkins nursing evidence-based practice (JHNEBP) appraisal tool. The JHNEBP model served as the guiding framework for the development of the DKA CPG. This model provides a systematic approach for translating the best available evidence into clinical recommendations while integrating clinical expertise and patient-centered care principles (Melnik & Fineout-Overholt, 2022).

CPG Development

In this project, I adhered to the Walden University DNP Clinical Practice Guideline Development Checklist ensuring scholarly rigor and alignment with evidence-based methodology. An action plan was developed and revised collaboratively with the site mentor and ICU team leader to reflect institutional workflow and available resources. The project management plan outlined milestones, deliverables, and anticipated barriers, supported by a Gantt chart that tracked progress and ensured adherence to deadlines. The CPG incorporated evidence from the literature synthesis, specifying recommendations for fluid resuscitation, insulin infusion, electrolyte replacement, and monitoring parameters. I

included visual flowcharts and standing orders to enhance usability. After completion, the draft underwent evaluation by a clinical expert panel.

An expert panel of three clinical reviewers evaluated the DKA CPG for quality and applicability. The panel consisted of two ICU physicians experienced in managing DKA and the ICU charge nurse, a critical care nurse with over 15 years of experience. I provided each expert with evaluation instructions and referred to the *AGREE II User's Manual* to ensure consistent score (AGREE, 2017).

I employed the AGREE II Instrument to assess methodological quality across six domains: Scope and Purpose, Stakeholder Involvement, Rigor of Development, Clarity of Presentation, Applicability, and Editorial Independence . Items were scored on a 7-point Likert scale (1 = *lowest quality*; 7 = *highest quality*). The following formula was used to calculate domain percentages:

$$\frac{\text{obtained score} - \text{minimum possible score}}{\text{maximum score} - \text{minimum score}} \times 100$$
(AGREE, 2017).

Results

The mean AGREE II domain score across the six domains was 96.2%, signifying a high-quality, well-structured, and implementable CPG. Reviewers unanimously recommended its adoption for ICU use, describing it as comprehensive, clear, and directly applicable to practice.

Domain 1: Scope and Purpose

This domain assesses the overall objectives, clinical focus, and target population. The mean score of 100% demonstrated that reviewers found the CPG's purpose and

scope exceptionally clear, defining DKA management phases, monitoring requirements, and treatment transitions for adult ICU patients (see Table 1).

Table 1

Domain 1: Scope and Purpose

Appraiser	Item 1	Item 2	Item 3	Total
Reviewer 1	7	7	7	21
Reviewer 2	7	7	7	21
Reviewer 3	7	7	7	21
Total (%)				100%

Note. Calculation: $(63 - 9) / (63 - 9) \times 100 = 100\%$.

Domain 2: Stakeholder Involvement

This domain scored 97.6%, reflecting the CPG's strong multidisciplinary foundation (see Table 2). Reviewers acknowledged broad involvement from nurses, physicians, and pharmacists, ensuring relevance to all end-users. Although patient and family input was limited, appraisers agreed that the CPG's interdisciplinary collaboration strengthened its usability and credibility.

Table 2

Domain 2: Stakeholder Involvement

Appraiser	Item 4	Item 5	Item 6	Total
Reviewer 1	7	6	7	20
Reviewer 2	7	7	7	21
Reviewer 3	7	7	7	21
Total (%)				97.6%

Note. Calculation: $(62 - 9) / (63 - 9) \times 100 = 97.6\%$.

Domain 3: Rigor of Development

With a score of 94.7%, this domain demonstrated strong methodological soundness (see Table 3). Reviewers noted the extensive literature review covering studies

published between 2019–2025, adherence to American Diabetes Association (ADA) and Society of Critical Care Medicine (SCCM) recommendations, and inclusion of systematic reviews and meta-analyses (see Alnuaimi et al., 2024; Ghosh et al., 2023; Kumar et al., 2024). Suggested improvements included explicitly defining inclusion criteria and adding a formal schedule for future updates.

Table 3

Domain 3: Rigor of Development

Appraiser	Item 7	Item 8	Item 9	Item 10	Item 11	Item 12	Item 13	Item 14	Total
Reviewer 1	6	6	6	7	7	5	6	6	49
Reviewer 2	7	6	7	7	6	6	7	7	53
Reviewer 3	7	7	7	7	7	7	7	7	56
Total (%)									94.7%

Note. Calculation: $(158 - 24) / (168 - 24) \times 100 = 94.7\%$.

Domain 4: Clarity of Presentation

This domain evaluates structure and readability. The CPG received a 95.3% score for clarity, demonstrating that the content was specific, logical, and easy to follow (see Table 4). Reviewers praised the inclusion of flowcharts, phase-based structure, and tables that made critical recommendations visible immediately.

Table 4

Domain 4: Clarity of Presentation

Appraiser	Item 15	Item 16	Item 17	Total
Reviewer 1	6	7	6	19
Reviewer 2	7	7	7	21
Reviewer 3	7	7	7	21
Total (%)				95.3 %

Note. Calculation: $(61 - 9) / (63 - 9) \times 100 = 95.3\%$.

Domain 5: Applicability

This domain scored 96.4% and highlighted the CPG's practicality and ease of implementation (see Table 5). Reviewers noted that including monitoring tools, electrolyte replacement charts, and clear standing orders supported nursing autonomy and efficient care. The guideline also addressed barriers, such as limited staff time and lab turnaround delays.

Table 5

Domain 5: Applicability

Appraiser	Item 18	Item 19	Item 20	Item 21	Total
Reviewer 1	7	7	6	6	26
Reviewer 2	7	7	7	7	28
Reviewer 3	7	7	7	7	28
Total (%)					96.4 %

Note. Calculation: $(82 - 12) / (84 - 12) \times 100 = 96.4\%$.

Domain 6: Editorial Independence

Scoring 95.7%, this domain confirmed that the CPG was free from conflicts of interest or external influence (see Table 6). I maintained ethical integrity through independent development and the Walden University ethics pledge.

Table 6

Domain 6: Editorial Independence

Appraiser	Item 22	Item 23	Total
Reviewer 1	6	6	12
Reviewer 2	7	7	14
Reviewer 3	7	7	14
Total (%)			95.7 %

Note. Calculation: $(40 - 6) / (42 - 6) \times 100 = 95.7\%$.

Impact on the Organization

The successful development of an evidence-based CPG for managing diabetic ketoacidosis DKA in the ICU, guided by the JHNEBP model and rigorously appraised using AGREE II, has the potential to significantly impact organizational practice. By establishing a standardized, patient-centered approach, the CPG can reduce care variability, enhance safety, and support measurable improvements in outcomes, such as ICU length of stay, anion gap closure time, and readmission rates. The project's stakeholder-informed design fosters interdisciplinary buy-in, paving the way for smoother implementation and sustained engagement. This project exemplifies how scholarly leadership can drive systemic change; elevate professional practice; and lay the foundation for scalable, equitable innovation in critical care.

Limitations and Impact on Results

While the development of this CPG followed a rigorous, evidence-based process, several limitations should be acknowledged. I created the guideline within the scope of a DNP project, which constrained the timeline and resources available for broader stakeholder engagement, pilot testing, and iterative refinement. The absence of implementation and outcome evaluation means the project's clinical impact remains theoretical until formally adopted and assessed in practice. Additionally, the guideline's applicability may be limited by institutional variability in ICU workflows, staffing models, and electronic health record capabilities.

Importance Beyond Local Site

This project holds significance beyond the local site, offering a scalable framework for evidence-based DKA management that can be adapted across diverse ICU settings. By aligning with national standards and leveraging validated appraisal tools, like AGREE II, the guideline contributes to broader efforts in clinical standardization, patient safety, and quality improvement. Moreover, the project exemplifies the DNP's role in advancing system-level change, positioning nurse leaders to influence policy, promote interprofessional collaboration, and drive innovation in critical care delivery across healthcare systems.

Conclusions

In conclusion, I successfully developed a high-quality, evidence-based CPG for managing DKA in the ICU, guided by the JHNEBP model and appraised using the AGREE II instrument. The CPG offers a standardized, patient-centered approach that has the potential to reduce care variability; improve safety; and positively influence key clinical outcomes, such as ICU length of stay, anion gap closure time, and readmission rates. The project's development process, which emphasized methodological rigor and stakeholder engagement, reflects the DNP's role in translating evidence into practice and fostering interdisciplinary collaboration to support sustainable change.

While the project was limited by the scope and resources typical of a DNP initiative—precluding pilot testing, broader stakeholder engagement, and outcome evaluation nonetheless lays a solid foundation for future implementation and evaluation efforts. The guideline's adaptability across diverse ICU settings and alignment with

national standards underscore its relevance beyond the local site. As such, this project not only advances local clinical practice but also contributes to broader efforts in quality improvement, health system innovation, and the elevation of nursing leadership in evidence-based care delivery.

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