The Critical Care Clinician's Handbook to the

2024 SCCM Guidelines for Glycemic Control

Monarch Medical™ Technologies

Executive Summary

The Society of Critical Care Medicine (SCCM) unveiled updated glycemic control guidelines at the 2024 Critical Care Congress. Developed by a panel of experts through comprehensive literature reviews and analysis of current clinical practices, these guidelines offer a roadmap for managing hyperglycemia in critically ill adults.

The recommendations emphasize the initiation of insulin therapy for persistent hyperglycemia, the minimization of hypoglycemia risk, the use of continuous intravenous insulin infusion, and the importance of frequent glucose monitoring.

A standout feature of the updated guidelines is the endorsement of decision support tools, specifically highlighting the EndoTool Insulin Dosing Software. EndoTool is praised for its capacity to enhance adherence to SCCM guidelines, significantly mitigate hypoglycemia risk, and streamline clinical workflows. The software's advanced algorithms provide personalized dosing recommendations, reducing the incidence of severe hypoglycemia to an extremely low rate and ensuring safer, more effective glycemic management.

The SCCM guidelines and the demonstrated efficacy of EndoTool represent a pivotal advancement in the care of critically ill patients with hyperglycemia. By integrating these guidelines with EndoTool's decision support capabilities, healthcare providers can achieve improved patient outcomes, including better glycemic control, reduced risk of hypoglycemia, and optimized clinical operations.

This ebook underscores the critical importance of adopting these updated guidelines and leveraging decision support technology like EndoTool to elevate the standard of care in critical care settings.

Introduction to the Updated SCCM Glycemic Control Guidelines

The 2024 Critical Care Congress, sponsored by the SCCM, unveiled updated guidelines on glycemic control for critically ill children and adults. These guidelines were developed by a panel of 22 individuals who performed extensive literature reviews, as well as a review of current clinical practices. This culminated in providing recommendations related to glycemic control including triggers for initiation of insulin therapy, route of administration, monitoring frequency, role of an explicit decision support tool for protocol maintenance, and methodology for glucose testing.

Glycemic management of critically ill patients can be a challenge for clinicians. EndoTool Insulin Dosing Software, a decision support tool, can mitigate many of these challenges and significantly improve adherence to the updated SCCM guidelines.

In this ebook, a summary of the adult guidelines will be unpacked with an additional focus on how EndoTool can allow clinicians to easily attain safe and evidence-based outcomes such as those recommended by the SCCM.

The complete recommendations and summary of their findings can be found here.

Key recommendations from the SCCM guidelines include:

Initiation of Glycemic Management
It's recommended to start glycemic control for adults with persistent hyperglycemia, defined as two consecutive blood glucose values above 180 mg/dL. This aligns with guidelines from other leading health organizations and aims to prevent the adverse outcomes associated with high blood sugar levels.

Low Risk of Hypoglycemia
Protocols should prioritize minimizing hypoglycemia, a common and dangerous complication. Immediate treatment of hypoglycemia is crucial.

Insulin Infusion Targets
The guidelines suggest against targeting lower blood glucose ranges (80–139 mg/dL) due to the increased risk of hypoglycemia, preferring a higher target range (140–200 mg/dL) instead.

Personalized Glucose Targets
There's a call for high-quality trials on individualized glycemic targets, considering patients' prehospital glycemic control, to improve outcomes.

Continuous IV Insulin Infusion
Recommended over intermittent subcutaneous insulin for acute hyperglycemia management due to better control and flexibility.

Monitoring Frequency
For patients on IV insulin, frequent monitoring (at least hourly) is suggested to manage glycemic instability effectively.

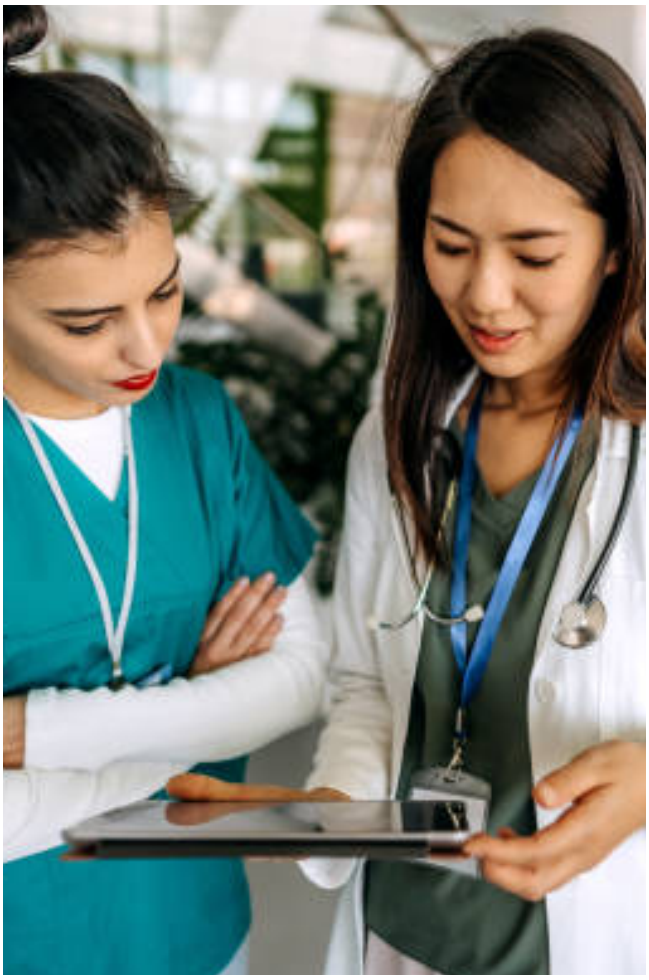
Use of Decision Support Tools
Protocols incorporating explicit decision support tools, like EndoTool, are preferred for their ability to provide personalized dosing recommendations and reduce the risk of hypoglycemia.

INITIATING GLYCEMIC CONTROL

Aligning with National Guidelines and Quality Measures

Beginning with the first recommendation which states that glycemic control should be initiated in patients with who have two serial glucose values greater than 180 mg/dL, this guidance should be familiar to most clinicians.

This recommendation is also found within the American Diabetes Association (ADA) and American Association of Clinical Endocrinology (AACE) guidelines.[1,2] Furthermore, quality measures recently adopted by the Center of Medicare and Medicaid Services (CMS) require that no single glucose value to be greater than 300 mg/dL or two sequential daily values be less than 200 mg/dL.[3]



Attaining Glycemic Control: Avoidance of Hypoglycemia

The second recommendation is also fairly straight forward in that glycemic control should be initiated using procedures and protocols that have a low risk of hypoglycemia. There are many institutions that utilize EndoTool insulin dosing software in their critical care units with a protocol that initiates an intravenous insulin infusion when two or more glucose values are greater than 180-200 mg/dL. Once an infusion of insulin has begun, care must be taken to avoid hypoglycemia. In several of the studies reviewed by the SCCM workgroup, the occurrence of hypoglycemia had the potential for acute and long-term negative effects as well as an increase in mortality.[4,5,6]

In addition, in the rare instance when hypoglycemia does occur, EndoTool will recommend a patient-specific dose of dextrose to allow the blood glucose to return to a normal value. Furthermore, EndoTool recommends a small dose of supplemental intravenous or oral carbohydrate to prevent hypoglycemia when the application predicts an impending episode of hypoglycemia.

> An analysis of all hospitals utilizing EndoTool has revealed an extremely low incidence (0.01%) of severe hypoglycemia (<40 mg/dL).[14]

THE DEBATE

Lower versus Higher Blood Glucose Targets

Choosing an appropriate goal range when treating critically ill patients with hyperglycemia is a topic that continually generates much discussion and has been the focus of many clinical studies.

The recommendations from SCCM panel result from a review of 44 randomized controlled trials comparing intensive insulin therapy (glucose goal range of 80-139 mg/dL) to conventional insulin therapy (140-200 mg/dL). Individual studies will not be referenced here but in summary there was no impact on hospital or ICU mortality between the two groups. There was a slight tendency towards a reduction in ICU length of stay, infections and neurologic injury in the intensive insulin therapy group. However, there was a much higher incidence of severe hypoglycemia in the intensive insulin therapy group compared with the conventional therapy group, 13% vs 4%. Given the previously cited potential for an increase in long term negative effects with hypoglycemia, the panel suggested against titrating glucose values to a goal range of 80-139 as compared to a conventional goal range. Fortunately, with the use of EndoTool hypoglycemic events are extremely rare.

> EndoTool patients treated to a goal range of 90-120 have an incidence of severe hypoglycemia of only 0.014%.[14]

However, the panel did suggest in recommendation number four that further research is needed to determine if "personalized glucose targets" are warranted based on a patient's prehospital glycemic control or glycosylated hemoglobin values. Six of the studies they reviewed showed an increased mortality with tight glucose control in patients with a history of diabetes but not in those without a history of diabetes. These findings are consistent with research previously published by Krinsley.[7] We have also previously reviewed this topic of individualization of glucose targets in our white paper titled "A Provider's Guide to Selecting Glucose Ranges for the Critically Ill." This paper may be viewed here.

CHOOSING THE OPTIMAL INSULIN ADMINISTRATION ROUTE

IV versus Subcutaneous

Following the determination of an appropriate glycemic goal for critically ill patients, the next recommendation from the SCCM panel focuses on the route of administration of insulin; continuous infusion or intermittent subcutaneous injections. In their review of the available literature which contained a limited number of observational and randomized controlled trials, there was no difference in mortality, ICU length of stay or number of infections between IV or subcutaneous insulin administration. Several studies demonstrated that the blood glucose values were in the desired control range for a greater proportion of time with IV insulin while others showed an increase incidence of hypoglycemia with IV insulin.[8,9] The panel did comment on the need for more frequent monitoring and higher nursing workload with IV insulin infusions.

Despite no strong evidence favoring one modality or the other, the panel did recommend that IV insulin was feasible and likely more comfortable for patients, however the panel felt that more research was needed. Many hospitals that utilize EndoTool have noted that nursing workload and cognitive burden is reduced when compared to a standard paper protocol. One institution noted a 43% reduction in blood glucose sampling with the use of EndoTool compared with a paper protocol.[10] While IV insulin is traditionally administered within the ICU, EndoTool has allowed IV insulin infusions to be administered in stepdown units due to its ease of use.

43%

Reduction in blood glucose sampling with EndoTool compared to paper protocols.[10]

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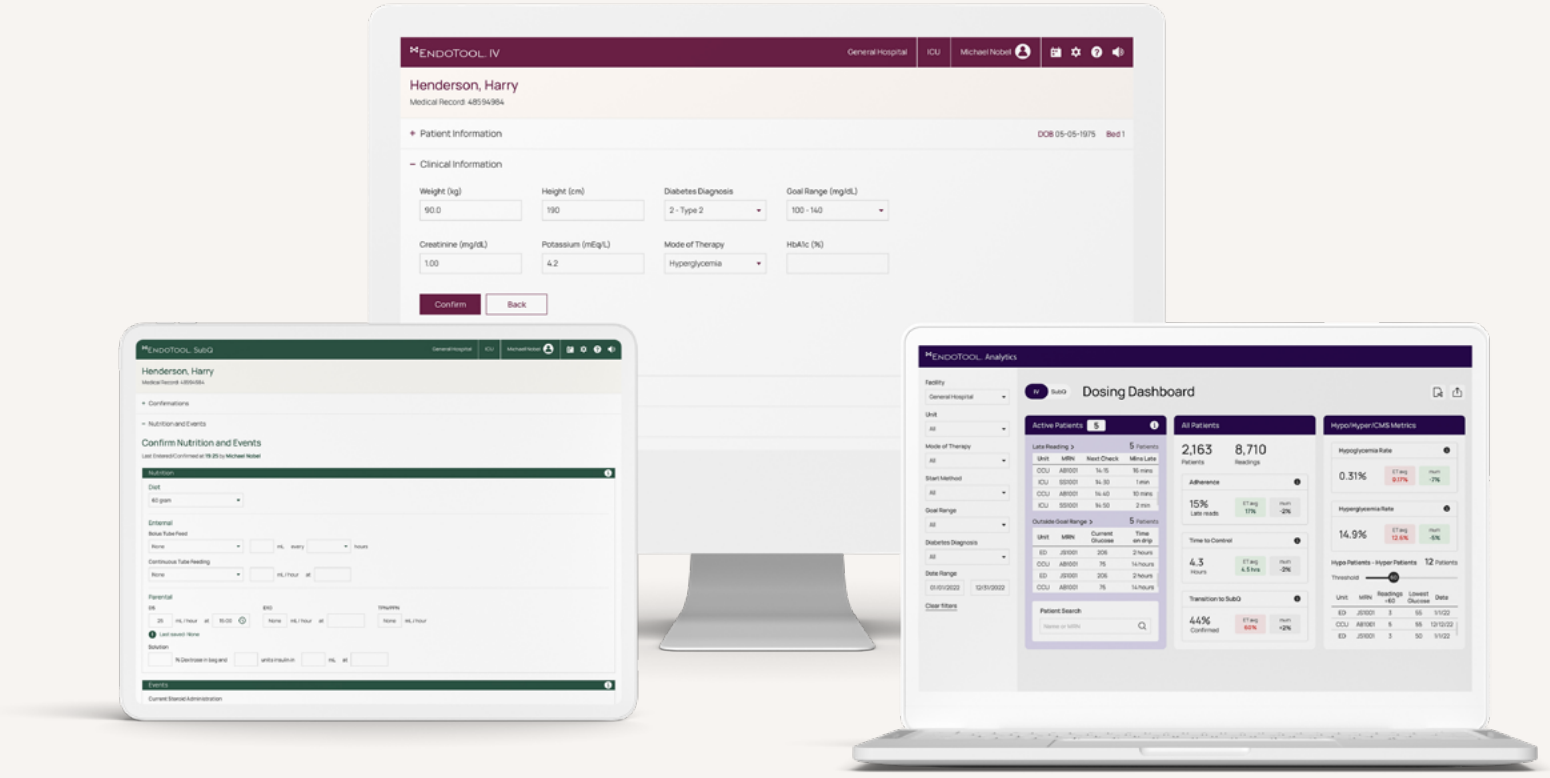

The Role of Decision Support Tools in Glycemic Management

The panel discussed the use of decision support tools, such as EndoTool, verse conventional insulin dosing protocols and suggested that decision support tools be utilized. Multiple studies have shown decreased rates of hypoglycemia and increased time in the target range. In one of these studies there was no impact on mortality or ICU LOS but the decision support tool was not one commercially available in the United States.[11,12,13]

In addition, an improvement in nursing workload, a reduction in cognitive burden and a decrease in the frequency of blood glucose testing are all observations seen with the use of EndoTool.[10]

> There have been recent abstracts presented where the utilization of EndoTool markedly reduced the incidence of hypoglycemia by a factor of 10, and an eight hour decrease in ICU length of stay.[11]

Optimizing Glucose Monitoring Frequency in Critical Care

Finally, the panel commented on the frequency of blood glucose monitoring while on an insulin infusion.

Organization	Recommendation	Context
ADA & AACE	Every 30 minutes to 2 hours	General recommendation for blood glucose monitoring on insulin infusion
SCCM	Not less frequent than hourly	During periods of unstable glucose control

EndoTool determines the frequency of blood glucose monitoring based on the stability of glucose values.

EndoTool Recommendation	Context
As frequently as every 15 minutes	With impending or actual hypoglycemia or profound hyperglycemia
Increase to every 2 hours	As patient's blood glucose values stabilize

> As patients with hyperglycemia on EndoTool reach stability within 5-6 hours, the overall frequency of blood glucose determinations is approximately 30% less than with paper protocols.[11]

Conclusions

In summary, the updated guidelines for the management of glycemia are a practical and comprehensive resource for clinicians to safely and effectively manage critically ill patients with hyperglycemia. There continues to be some disparity in what the appropriate target glycemic goals are, though ongoing recent data supports "personalized" glucose targets and the need to avoid hypoglycemia.

In addition, there is a preference for the use of decision support tools. The utilization of EndoTool allows clinicians to adhere to these guidelines, provide patient specific dosing and significantly reduce the occurrence of severe hypoglycemia.

References

1. El-Sayed NA, Aleppo G, Aroda VR, et al; on behalf of the American Diabetes Association: Diabetes care in the hospital: Standards of care in diabetes—2023. Diabetes Care 2023; 46:S267–S278.
2. Blonde L, Umpierrez GE, Reddy SS, et al: American Association of Clinical Endocrinology clinical practice guideline: Developing a diabetes mellitus comprehensive care plan2022 update. Endocr Pract 2022; 28:923–10498.
3. Electronic Clinical Quality Improvement: eCQI Resource Center. Available at: http://ecqi.healthit.gov/ecqm/eh/2023/cms0816v2. Accessed July 11, 2023.
4. Krinsley JS, Grover A: Severe hypoglycemia in critically ill patients: Risk factors and outcomes. Crit Care Med 2007; 35:2262–2267
5. Egi M, Bellomo R, Stachowski E, et al: Hypoglycemia and outcome in critically ill patients. Mayo Clin Proc 2010; 85:217–224.
6. Finfer S, Liu B, Chittock DR, et al; NICE-SUGAR Study Investigators: Hypoglycemia and risk of death in critically ill patients. N Engl J Med 2012; 367:1108–1118.
7. Krinsley JS, Rule P, Pappy L, et al: The interaction of acute and chronic glycemia on the relationship of hyperglycemia, hypoglycemia, and glucose variability to mortality in the critically ill. Crit Care Med 2020; 48:1744–1751.
8. Cavalcanti AB, Silva E, Pereira AJ, et al: A randomized controlled trial comparing a computer-assisted insulin infusion protocol with a strict and a conventional protocol for glucose control in critically ill patients. J Crit Care 2009; 24:371–378.
9. Aron A, Wang J, Collier B, et al: Subcutaneous versus intravenous insulin therapy for glucose control in non-diabetic trauma patients. A randomized controlled trial. J Clin Pharm Ther 2013; 38:24–30.
10. Gambill K, Muza C: Proactive Prevention: A Technology Tool for the Management of Insulin Infusions to Ease the Burden for Nursing and Improve Patient Safety. Poster presentation, 2023 Nursing Magnet Conference.
11. Scheid Z, Salim K, et al: Utilization of a Computerized Dosing Algorithm to Improve Management in Diabetic Ketoacidosis. DTM 2023 Abstracts. Journal of Diabetes Science and Technology. 2024;0(0).
12. Salim K, Gomes J, et al: Evaluating the Effect of EndoTool Utilization for Glycemic Control in Critically Ill Patients. DTM 2023 Abstracts. Journal of Diabetes Science and Technology. 2024;0(0).
13. Aloi j, Price C, et: Improvement in Hypoglycemia Rates with EndoTool IV. ADA 2023 Scientific Session.
14. Multi-year experience of EndoTool® customers. Data on file.

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