

The Impact of Continuous Glucose Monitoring Combined with Intensive Insulin Therapy on Glycemic Control and Clinical Outcomes in Critically Ill Patients

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Abstract: This work aimed to assess whether real-time continuous glucose monitoring (CGM) paired with intensified insulin management alters glucose regulation and patient endpoints for severely unwell adults admitted to ICUs. **Methods:** A historical controlled cohort study was performed, recruiting 120 adult critically ill patients hospitalized in our ICU between January and June 2024. Sixty patients admitted from January to March were assigned to the control group receiving routine bedside blood glucose monitoring plus insulin pump treatment, while another 60 patients from April to June formed the intervention group treated with real-time CGM and intensive insulin therapy. We contrasted glycemic metrics, insulin-associated markers and patient clinical endpoints across the two cohorts. **Results:** Compared with the control group, the intervention group had significantly higher glucose target attainment rate, lower blood glucose coefficient of variation and hypoglycemia incidence, as well as shorter time to reach glycemic target. Moreover, participants within the intervention cohort demonstrated decreased daily insulin requirements, briefer periods for intravenous insulin delivery, as well as shortened lengths of ICU hospitalization (all $P < 0.05$). **Conclusion:** CGM combined with intensive insulin therapy effectively optimizes glycemic management for critically ill ICU patients, decreases glycemic variability and hypoglycemia risk, accelerates target glucose attainment, cuts insulin consumption and shortens ICU hospitalization.

Keywords: Continuous Glucose Monitoring; Glycemic Control; Critically Ill Patients; Intensive Insulin Therapy; Intensive Care Unit

1. Introduction

Severely unwell hospitalized individuals frequently develop stress-triggered hyperglycemia resulting from physiological stress responses, inflammatory responses, neuroendocrine disturbances, and exogenous factors (such as glucocorticoids, vasoactive drugs, and nutritional support), with an incidence as high as 70%–80% [1]. Numerous studies [2,3] indicate that hyperglycemia, hypoglycemia, and amplified glycemic fluctuation among severely unwell hospitalized adults maintain strong correlations with poor clinical endpoints, which involve elevated infection risk, extended ICU hospitalization and increased mortality. Therefore, safe and effective glycemic management is an essential component of treatment for ICU patients [4]. In recent years, adoption of intensive insulin therapy (IIT) within ICUs has seen a conceptual transition, moving away from rigid glycemic targets (80–110 mg/dL) toward a moderate glucose management range (140–180 mg/dL) [5]. Guidelines released in 2024 by the Society of Critical Care Medicine (SCCM) recommend glucose management goals set at 140–180 mg/dL for severely unwell hospitalized adults, while highlighting the necessity to prevent hypoglycemia [6]. However, traditional glucose monitoring methods—intermittent point-of-care testing (POCT)—have limitations such as long monitoring intervals and an inability to promptly detect trends in glucose fluctuations. This makes it difficult to effectively guide adjustments to insulin infusion rates and increases the workload for nursing staff [7].

CGM enables continuous, real-time blood glucose monitoring and provides a complete blood glucose trend curve, thereby more accurately reflecting a patient's blood glucose fluctuations [8]. Adjusting insulin doses based

on real-time data helps reduce “glucose blind spots” and improves the timeliness and precision of treatment [9]. At the same time, when combined with intensive insulin pump therapy, this approach is expected to reduce both hyperglycemic exposure and the incidence of hypoglycemia, leading to more stable blood glucose control [10].

However, debates still persist surrounding clinical use of CGM paired with intensified insulin regimens for severely unwell hospitalized adults. Notably, no unified agreement exists concerning its real-world effectiveness and influences on patient endpoints among varied ICU cohorts [11].

Therefore, This work draws upon clinical records obtained within the Critical Care unit of a tertiary Grade A hospital to assess the practical merits of real-time continuous glucose monitoring paired with intensified insulin regimens for glucose regulation and patient endpoints in severely unwell hospitalized adults. Our findings intend to deliver evidence that supports refined glucose control protocols inside ICUs.

2. Subjects and Methods

2.1 Study Participants

This single-center retrospective cohort investigation enrolled severely unwell hospitalized individuals admitted to the Critical Care Department of Jiangxi Provincial People’s Hospital during the period spanning January 2024 through June 2024.

Inclusion criteria: ① Patients aged 18 years or older; ② ICU admission duration no less than 48 hours; ③ Development of hyperglycemia (glycemic readings exceeding 180 mg/dL) throughout ICU hospitalization and receipt of continuous intravenous insulin infusion therapy; ④ Complete clinical data. Exclusion criteria: ① Participation in other interventional clinical studies prior to ICU admission; ② Pregnant or lactating patients; ③ Individuals presenting with diabetic ketoacidosis or hyperosmolar hyperglycemic state upon ICU entry; ④ Patients with skin lesions or infections that preclude CGM sensor placement; ⑤ Patients with a life expectancy of <24 h; ⑥ Patients with a history of psychiatric disorders.

2.2 Study Design

Sixty eligible patients admitted between January and March 2024 constituted the control cohort (POCT combined with insulin therapy), and Sixty qualified individuals hospitalized between April and June 2024 formed the intervention cohort (CGM combined with optimized intensive insulin therapy). To minimize confounding effects brought by disparities in baseline features across the two cohorts on the results, individuals within both the control and intervention cohorts were managed by the same medical team in the same ICU. During the observation period, no other major changes in glycemic management were introduced, except for the method of blood glucose monitoring and the corresponding adjustments to insulin infusion and blood glucose monitoring frequency. This investigation obtained ethical clearance from the institutional Ethics Committee of our hospital (Ethics Approval No.: Ke Kuai 2024 (72)). Patients and their families in the intervention group signed informed consent forms; the control group served as a historical control, with clinical data extracted retrospectively, and was exempted from informed consent upon approval by the Ethics Committee.

2.3 Intervention Protocol

2.3.1 Blood glucose monitoring protocol

Control Group: Routine bedside blood glucose monitoring was employed. A blood glucose meter (Johnson & Johnson SteadyGluc Premium) was used to monitor peripheral blood glucose once every 4 hours, and glucose values were recorded. For individuals with elevated risk of (e.g., history of hypoglycemia, septic shock, hepatic insufficiency, or ongoing renal replacement therapy), the monitoring frequency was adjusted to once every 0.5–1 hour.

Intervention Group: CGM monitoring was combined with intensive insulin therapy; the surveillance interval was modified according to each individual’s glycemic readings to optimize the insulin adjustment rate protocol. Upon admission to the ICU, a trained ICU nurse inserted a CGM sensor (Abbott FreeStyle 2) subcutaneously into the patient’s upper arm or abdomen. The sensor continuously captured interstitial fluid glucose values at 5-minute intervals and displayed real-time blood glucose trends and rates of change. The accuracy of CGM readings was cross-checked by nursing staff every 4–6 hours against values from a

bedside blood glucose meter. When the difference between the CGM reading and the POCT value exceeded 20%, or when clinical conditions that could affect CGM accuracy were present (e.g., severe edema, hypotension, dependence on vasoactive drugs, etc.), the POCT value was taken as the definitive reading and recorded [12]. CGM sensors were replaced every 14 days.

2.3.2 Insulin treatment regimen

Patients in both groups received continuous intravenous insulin infusion (insulin solution, NovoLog®, 40 U/mL; prepared by diluting 1 mL of insulin in 39 mL of 0.9% sodium chloride injection, and administered via a microinfusion pump). ICU patients underwent routine blood glucose monitoring. The predefined glycemic target window was 7.8–10 mmol/L (140–180 mg/dL). Insulin therapy was initiated when an individual's glycemic reading was >10 mmol/L on two consecutive occasions or >13.3 mmol/L on a single occasion. The predefined glycemic target window was established at 140–180 mg/dL [13].

Control group: Patients measured their blood glucose levels once every 4 hours, following the protocol recommended by the SCCM 2024 guidelines [14] and the Portland draft proposed by Furnary [15] et al., The intravenous insulin titration protocol was defined below: for glycemic readings ranging from 6.8–10.0 mmol/L, no priming insulin bolus (0 U) was applied and the baseline infusion speed was set to 2.0 mL/h. For glucose values of 10.1–13.3 mmol/L, the priming bolus remained 0 U with an infusion speed of 3.5 mL/h. If glycemic measurements fell within 13.4–16.7 mmol/L, a 4.0 U priming bolus was administered alongside a baseline delivery speed of 5.0 mL/h. For readings between 16.8–19.9 mmol/L, an 8.0 U bolus was given with an infusion speed of 6.5 mL/h. When glycemic concentrations reached ≥ 20.0 mmol/L, a 12.0 U bolus was initiated and the delivery speed was adjusted to 8.0 mL/h. The priming insulin bolus and infusion speed were formulated according to each individual's measured glycemic concentrations.

Intervention Cohort: Glycemic readings were obtained under CGM monitoring. The initial dose and initial infusion rate for insulin were determined according to the control group protocol. Based on our center's clinical practice, the insulin infusion rate and blood glucose monitoring frequency were optimized according

to the following rules: When blood glucose is <3.9 mmol/L, stop the infusion and administer 20 mL of 50% glucose as an intravenous bolus; retest after 15 minutes, and change the blood glucose monitoring frequency to every 30 minutes; When glycemic readings fell within 4.0–6.1 mmol/L, intravenous delivery was suspended; if the previous blood glucose reading was <6.7 mmol/L, administer 20 mL of 50% glucose as an intravenous bolus, and adjust the blood glucose monitoring frequency to every 30 minutes; when glycemic readings ranged between 6.2–7.8 mmol/L, stop insulin infusion, and adjust the blood glucose monitoring frequency to every 30 minutes; When glycemic readings ranged from 7.8 to 10.0 mmol/L, if the glycemic measurement has increased by >1.1 mmol/L or decreased by >0.6 mmol/L compared to the previous reading, increase or decrease insulin by 1 U/h, respectively; in all other cases, maintain the original insulin dose, and adjust the blood glucose monitoring frequency to every 4–6 hours; When glycemic readings ranged from 10.1 to 13.3 mmol/L, if it has risen by >1.1 mmol/L or fallen by >2.8 mmol/L compared to the previous reading, increase insulin by 1 U/h or decrease it by 2 U/h; in all other cases, maintain the original insulin dose, and adjust blood glucose monitoring frequency to every 1 hour. When blood glucose is between 13.4 and 16.7 mmol/L, if it has risen by >2.8 mmol/L, maintain the original insulin dose; if blood glucose has decreased by <2.8 mmol/L, increase insulin by 2 U/h, and adjust blood glucose monitoring frequency to every 1 hour; if blood glucose is >16.7 mmol/L and has decreased by >4.4 mmol/L, reduce insulin by 2 U/h; if blood glucose decreases to <4.4 mmol/L, maintain the original insulin dose; if blood glucose rises compared to the previous level, administer the initial dose and raise the insulin delivery rate by 24 U/h, and adjust the blood glucose monitoring frequency to every 30 minutes.

2.4 Observation Indicators

2.4.1 Primary endpoint measures

① Glucose target attainment rate: The percentage of total monitoring time during which glycemic readings stayed within 7.8 to 10 mmol/L (140–180 mg/dL) while on insulin therapy; ② Coefficient of variation (CV): Coefficient derived from glucose standard deviation divided by average glycemic

concentration $\times 100\%$, reflecting the degree of blood glucose fluctuation; ③ Hypoglycemia incidence: The rate of episodes in which glycemic readings fell below 70 mg/dL (number of events / total number of monitoring sessions) and the proportion of patients experiencing hypoglycemia; ④ Time to glycemic control: The time required from the initiation of insulin infusion until blood glucose first entered the target range and remained there for at least 2 h.

2.4.2 Secondary outcome measures

① Daily insulin dose (U/day); ② Length of intravenous insulin delivery (days); ③ Length of stay in the ICU (days); ④ 28-day all-cause mortality; ⑤ Incidence of infections: encompassing newly acquired infectious complications including ventilator-associated pneumonia, catheter-related bloodstream infections, and urinary tract infections; ⑥ Rate of newly developed organ impairment: evaluated via the Sequential Organ Failure Assessment (SOFA) scale; newly developed organ impairment was defined as a rise in SOFA score by ≥ 2 points at 48 hours following ICU entry compared to the admission score.

2.5 Collection of Baseline Data

Data collected included patient gender, age, Acute Physiology and Chronic Health Evaluation II (APACHE II) scale, glycemic reading at ICU entry, ICU admission diagnosis, proportion of patients on mechanical ventilation, proportion of patients receiving vasoactive agents, and proportion of individuals receiving continuous renal replacement therapy (CRRT).

2.6 Quality Control

① All ICU nurses participating in the study received standardized CGM operation training and passed an assessment, covering sensor insertion, calibration, data reading, and alarm handling; ② CGM data were uploaded in real

time to the central monitoring system via a dedicated receiver or mobile device; the nurse in charge reviewed the data once per hour, and the research team verified data integrity daily; ③ Glucose meters underwent regular in-house quality control, and the CGM device was calibrated in line with the manufacturer's specifications; ④ Data collection was completed separately by two trained investigators and entered into the database after cross-checking.

2.7 Statistical Methods

Statistical computation was conducted with SPSS 26.0 package. Continuous variables conforming to normal distribution were summarized as mean $\pm$ standard deviation ($\bar{x} \pm s$), and cross-cohort comparisons adopted the independent-samples t-test. Continuous indicators with non-normal distribution were reported as median plus interquartile range [M (P25, P75)], with between-cohort comparisons carried out by the Mann-Whitney U test. Categorical datasets were displayed as counts and proportions; inter-cohort comparisons used the χ^2 test or Fisher's exact test. A P-value below 0.05 was regarded as statistically meaningful.

3. Results

3.1 Comparison of Baseline Features across the Two Cohorts

A total of 120 individuals were recruited, with sixty participants within each cohort. No statistically meaningful disparities existed across the two cohorts for baseline features including gender, age, APACHE II scale, glycemic reading at ICU entry, admission diagnosis, proportion of patients on mechanical ventilation, proportion of patients receiving vasoactive agents, and proportion of patients undergoing CRRT ($P > 0.05$), demonstrating that the cohorts were well-matched. The clinical characteristics of patients are shown in Table 1.

Table 1. Comparison of Baseline Features across the Two Cohorts

General Characteristics	Intervention Group	Control Group	Statistical Value	P
Gender (Male/Female, n)	38/22	35/25	$\chi^2 = 0.313$	0.576
Age (years, $\bar{x} \pm s$)	58.72 $\pm$ 16.35	61.08 $\pm$ 15.87	t = -0.803	0.423
APACHE II Score (points, $\bar{x} \pm s$)	18.67 $\pm$ 5.82	19.43 $\pm$ 6.15	t = -0.697	0.487
Blood glucose on ICU admission (mg/dL, $\bar{x} \pm s$)	218.45 $\pm$ 35.67	225.32 $\pm$ 38.21	t = -1.028	0.306
Sepsis/Infectious shock [Cases (%)]	25 (41.67)	22 (36.67)	$\chi^2 = 0.318$	0.573
Multiple trauma [Cases (%)]	15 (25.00)	17 (28.33)	$\chi^2 = 0.170$	0.680
Neurological disorders [Cases (%)]	12 (20.00)	14 (23.33)	$\chi^2 = 0.190$	0.663

Mechanical ventilation [cases (%)]	42 (70.00)	38 (63.33)	$\chi^2 = 0.600$	0.439
Vasopressors [Cases (%)]	35 (58.33)	32 (53.33)	$\chi^2 = 0.303$	0.582
CRRT [cases (%)]	12 (20.00)	10 (16.67)	$\chi^2 = 0.224$	0.636

Indicators across the Two Groups

3.2 Comparison of Glycemic Control

Table 2. Comparison of Glycemic Control Parameters across the Two Cohorts

Observation Indicators	Intervention Group (n=60)	Control Group (n=60)	Statistical Value	P-value
Blood Glucose Control Rate (%), $\bar{x} \pm s$	87.50 $\pm$ 8.32	73.33 $\pm$ 12.45	t = 7.302	<0.001
Blood Glucose CV (%), $\bar{x} \pm s$	22.36 $\pm$ 6.48	31.75 $\pm$ 8.92	t = -6.567	<0.001
Time to achieve target blood glucose (h), $\bar{x} \pm s$	5.32 $\pm$ 2.18	8.67 $\pm$ 3.45	t = -6.318	<0.001
Hypoglycemia (<70 mg/dL) [cases (%)]	3 (5.00)	10 (16.67)	$\chi^2 = 4.227$	0.041

As illustrated in Table 2, the proportion of successful glycemic management within the intervention cohort was markedly elevated relative to the control cohort ($P < 0.001$). The glucose coefficient of variation was substantially reduced compared with the control cohort ($P < 0.001$). The frequency of hypoglycemic episodes was lower in the intervention cohort ($P = 0.041$). Additionally, the duration required to attain glycemic targets was notably shorter in the

intervention cohort ($P < 0.001$).

3.3 Comparison of Insulin Therapy-Related Indicators between the Two Groups

As presented in Table 3, the daily insulin bolus requirement within the intervention cohort was markedly lower relative to the control cohort ($P < 0.001$). Meanwhile, the length of intravenous insulin delivery was briefer in the intervention cohort ($P < 0.001$).

Table 3. Comparison of Insulin Therapy-Related Indicators between the Two Groups ($\bar{x} \pm s$)

Parameter	Intervention Group (n=60)	Control Group (n=60)	t-value	P-value
Daily insulin dose (U/day)	42.57 $\pm$ 15.32	55.83 $\pm$ 18.67	-4.289	<0.001
Duration of insulin infusion (d)	4.12 $\pm$ 1.87	6.35 $\pm$ 2.54	-5.447	<0.001

3.4 Between-Cohort Comparison of Clinical Endpoints

As illustrated in Table 4, the length of ICU hospitalization within the intervention cohort was markedly briefer compared with the control cohort ($P=0.002$). The 28-day mortality proportion reached 13.33% for the intervention cohort versus 21.67% within the control cohort;

this disparity lacked statistical significance ($P=0.229$). No statistically meaningful disparity was observed in the frequency of infectious episodes across the two cohorts ($P=0.501$). The rate of newly developed organ impairment was reduced in the intervention cohort relative to the control cohort ($P = 0.049$), with a relative risk of $RR = 0.50$ (95% CI: 0.26–0.97). This finding presented borderline statistical significance.

Table 4. Between-Cohort Comparison of Clinical Endpoints

Outcome Measure	Intervention Group (n=60)	Control Group (n=60)	Statistical Value	P-value
Length of ICU stay (days), $\bar{x} \pm s$	8.94 $\pm$ 4.12	11.67 $\pm$ 5.38	t = -3.126	0.002
28-day mortality rate [cases (%)]	8 (13.33)	13 (21.67)	$\chi^2 = 1.446$	0.229
Incidence of infection [cases (%)]	11 (18.33)	14 (23.33)	$\chi^2 = 0.450$	0.501
New-Onset Organ Dysfunction [Cases (%)]	9 (15.00)	18 (30.00)	$\chi^2 = 3.871$	0.049

4. Discussion

4.1 CGM paired with Insulin Intensive Titration Supports Sustained Glycemic Stability among Critically Unwell Individuals

The results of this study show that CGM combined with intensive insulin therapy can significantly improve the rate of glycemic target achievement in critically ill ICU patients (87.50% vs. 73.33%) and reduce the coefficient

of variation in blood glucose levels. These findings are consistent with the conclusions of the randomized controlled trial by Franck et al. [16], which likewise identified that CGM enhanced glycemic management among critically unwell individuals. CGM automatically records blood glucose data every 5 minutes, enabling real-time capture of glucose trends and rates of change. Compared to traditional intermittent POCT monitoring, it can detect rising or falling glucose trends earlier,

providing more timely and comprehensive information to guide adjustments to insulin infusion rate [17, 18]. Notably, the “trend arrow” feature of CGM provides early warning signals to healthcare providers, facilitating preventive interventions before blood glucose levels exceed target ranges and thereby enabling “feedforward” blood glucose management [19]. Glycemic fluctuation serves as a vital prognostic marker independent of mean glycemic concentrations and is strongly linked to mortality among critically unwell individuals [20]. Within this investigation, the glucose CV within the intervention cohort was markedly reduced compared with that of the control cohort (22.36% vs. 31.75%), suggesting that CGM-guided insulin infusion adjustments can effectively reduce the amplitude of blood glucose fluctuations. Reduced glycemic variability is crucial for maintaining a stable intracellular environment and alleviating oxidative stress and endothelial damage [21]. Moreover, the period required to reach predefined glycemic targets was markedly briefer within the intervention cohort relative to the control cohort (5.32 h vs. 8.67 h), indicating that the continuous glucose data provided by CGM facilitates faster achievement of initial glycemic control.

4.2 CGM Paired with Intensive Insulin Titration Mitigates Hypoglycemic Risk and Decreases Insulin Bolus Requirement

Hypoglycemia is one of the most dangerous adverse events in ICU glucose management and can lead to severe neurological dysfunction or even death [22]. This investigation demonstrated that the frequency of hypoglycemic episodes was markedly reduced within the intervention cohort compared with the control cohort (5.00% vs. 16.67%). Two severe hypoglycemic episodes (glycemic readings < 40 mg/dL) appeared in the control cohort, whereas no such events arose within the intervention cohort. Such observations matched the data published by Giovannetti et al [23], whose study found that integrating CGM into an insulin infusion calculator significantly improved the safety of glycemic management. The real-time hypoglycemia alert function of CGM enables healthcare providers to take preventive measures before blood glucose levels drop to dangerous levels—a capability not achievable with traditional intermittent monitoring [24]. Findings

from this investigation also demonstrated that no severe hypoglycemic episodes arose within the intervention cohort; however, the absence of severe hypoglycemia requires validation with a larger sample size. It should be highlighted that within this investigation, CGM sensors were positioned on the upper arm or abdominal wall; for critically unwell individuals, skin edema, hypoperfusion, and the use of vasoactive drugs may affect CGM accuracy [25]. Therefore, in clinical practice, cross-validation between CGM and POCT should be performed regularly to ensure the reliability of monitoring data.

The daily insulin bolus requirement within the intervention cohort was markedly reduced relative to the control cohort (42.57 U vs. 55.83 U), and the duration of insulin infusion was also significantly shorter (4.12 days vs. 6.35 days). This phenomenon may arise since continuous glycemic readings delivered by CGM permit more refined and precise adjustments to insulin infusion rates, thereby preventing excessive insulin administration caused by information lag [26]. At the same time, the reduction in insulin dosage itself helps lower the risk of hypoglycemia, creating a virtuous cycle [27]. From a health economics perspective, the reduction in daily insulin dosage and the shorter infusion duration can lower treatment costs to some extent; however, when accounting for the expense of the CGM sensor, the economic value of CGM paired with intensive insulin titration still demands additional pharmacoeconomic assessments for validation.

4.3 Influence of CGM Paired with Intensive Insulin Titration upon Clinical Endpoints

In this study, the intervention cohort exhibited a markedly briefer ICU hospitalisation period compared with the control cohort (8.94 days vs. 11.67%). The frequency of newly developed organ impairment was substantially reduced relative to the control cohort (15.00% vs. 30.00%). Even though the 28-day mortality proportion of the intervention cohort (13.33%) was lower than the control cohort (21.67%), this disparity lacked statistical significance ($P = 0.229$). Each cohort contained 60 individuals, this study lacked sufficient statistical power; therefore, the findings regarding mortality and infection rates are only exploratory. Previous studies [28, 29] have verified that glycemic management among critically unwell individuals is closely associated with clinical outcomes.

Stable blood glucose control can reduce oxidative stress damage, improve immune function, and reduce the likelihood of infectious episodes, which may confer beneficial effects for preservation of organ function and improved prognosis. The marked drop in the rate of newly developed organ impairment within the intervention cohort observed in this investigation may be attributed to diminished glycemic fluctuation, as significant fluctuations in blood glucose are believed to exacerbate mitochondrial dysfunction and endothelial damage, thereby promoting organ dysfunction [30]. Regarding the incidence of infection, although no statistically meaningful disparity existed across the two cohorts (18.33% vs. 23.33%), the intervention group showed a downward trend; future studies could further validate this finding in a larger sample.

4.4 Study Limitations

This investigation carries the following limitations: (1) It employed a retrospective cohort study design rather than a randomized controlled trial, which may bring selection bias and confounding factors; (2) As a single-center investigation with a small sample volume, the extrapolation of such observations remains constrained; (3) Individuals within both cohorts were admitted during separate time windows although managed by the same ICU team, insulin adjustment regimens were not entirely consistent, and time effects may have potentially influenced the results; (4) There are differences in glycemic control targets and response patterns between patients with and without diabetes; this study did not conduct subgroup analyses; (5) The accuracy of CGM is influenced by multiple factors; although cross-validation was routinely performed in this study, deviations between CGM readings and venous blood glucose levels may have occurred in some cases.

5. Conclusions

Continuous glycemic monitoring paired with intensive insulin titration is capable of enhancing glycemic target attainment among critically unwell individuals in the ICU, as evidenced by an increased rate of glycemic target achievement, reduced glycemic variability, a reduced frequency of hypoglycemic episodes, and shorter time to glycemic target achievement. At the same time, it reduces insulin dosage and the length of insulin delivery, and could reduce ICU

hospitalisation period as well as decrease the likelihood of newly developed organ impairment. In clinical practice, continuous glucose monitoring can serve as a supplement to traditional bedside glucose monitoring. Under strict quality control and with regular POCT calibration, it helps clinical staff identify abnormal glucose trends more promptly. For patients who are hemodynamically unstable, have severe edema, or are receiving high doses of vasoactive drugs, POCT or venous glycemic readings should remain the primary foundation for clinical judgment. Large-scale, multicenter, prospective randomized controlled investigations are required to further confirm the utility of CGM for glycemic management among critically unwell individuals and to explore differentiated application strategies across different subgroups (e.g., diabetic versus non-diabetic patients, and patients with versus without sepsis).

Acknowledgments

This work was supported by the Jiangxi Provincial Health Commission Science and Technology Program Project (Contract No. 202310187)

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