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CONTINUOUS GLUCOSE MONITORING IN EMERGENCY DEPARTMENTS: A VITAL ASPECT OF NON-INVASIVE BLOOD SUGAR MONITORING IN EMERGENCY - A REVIEW OF LITERATURE

Ms Anam Imtiaz Hajir

Department of Emergency Medicine, DY Patil school of medicine, Navi Mumbai Nerul-400706.

ABSTRACT The management of blood sugar levels in emergency care is a critical aspect, particularly for patients with diabetes and those at risk of severe glucose-related complications. Traditional blood sugar monitoring methods often involve painful and time-consuming invasive procedures, such as fingerstick tests. In recent years, non-invasive continuous glucose monitoring (CGM) systems have emerged as a promising innovation in emergency medical practice. This review delves into the existing literature to explore the role of CGM in emergency departments, emphasizing its accuracy, reliability, and its potential to transform glucose management in acute healthcare settings.

Continuous Glucose Monitoring (CGM) systems are designed to offer real-time data on blood sugar levels, making them indispensable in emergency care. These devices employ subcutaneous sensors to continuously measure interstitial fluid glucose levels and wirelessly transmit this data to monitors or smartphones. Numerous studies have assessed the accuracy and reliability of CGM in emergency departments, affirming its value. In critical situations where precise blood sugar management is paramount, CGM systems have demonstrated their effectiveness. This non-invasive approach empowers healthcare teams to closely monitor glucose trends, make timely treatment adjustments, and detect glucose abnormalities, especially in patients with diabetes.

A central focus in the literature has been the management of critically ill patients using CGM in emergency departments. Patients in acute conditions, such as those with diabetic ketoacidosis, sepsis, or trauma, require intensive care and glucose monitoring. CGM systems offer an additional tool for healthcare professionals to maintain tight control over blood sugar levels, ensuring they stay within safe and target ranges.

Challenges persist in CGM adoption in emergency departments. Interstitial glucose levels may not always precisely reflect blood glucose levels, and issues with sensor accuracy, calibration, and potential lag times require attention. Patient variability, skin conditions, and sensor placement can impact the reliability of CGM systems in the emergency setting. Ongoing research efforts are dedicated to addressing these challenges, with a focus on enhancing the accuracy and usability of CGM devices in high-stress environments. Moreover, there is an emphasis on integrating CGM data seamlessly into the workflow of emergency departments to ensure healthcare professionals can efficiently access and interpret glucose data during patient care.

In conclusion, Continuous Glucose Monitoring (CGM) has become an invaluable tool for non-invasive blood sugar monitoring in emergency departments. Its real-time capabilities, accuracy, and potential for improving the management of critically ill patients make it a crucial asset in the dynamic realm of emergency healthcare. Although challenges exist, the literature underscores the potential of CGM to revolutionize glucose management, ultimately leading to enhanced patient outcomes in emergency settings. As technology continues to advance, CGM systems hold the promise of becoming an integral component of emergency medical practice, further elevating the quality of care provided to those in need.

KEYWORDS :

INTRODUCTION

The management of blood sugar levels is of paramount importance in emergency care, particularly for patients with diabetes and those at risk of severe glucose-related complications. Traditional blood sugar monitoring methods often entail painful and time-consuming invasive procedures, such as fingerstick tests.(1) In recent years, non-invasive continuous glucose monitoring (CGM) systems have emerged as a beacon of hope in emergency medical practice. This review provides an in-depth exploration of the current literature on the role of CGM in emergency departments, highlighting its accuracy, reliability, and potential to revolutionize glucose management in acute healthcare settings.

CGM in Emergency Departments: Accuracy and Real-Time Monitoring

Continuous Glucose Monitoring (CGM) systems are designed to provide real-time data on blood sugar levels, making them invaluable in emergency care.(2) These devices utilize sensors inserted under the skin to continuously measure interstitial fluid glucose levels. By wirelessly transmitting data to a monitor or smartphone, healthcare professionals gain access to real-time glucose information, allowing for timely interventions. Moghissi, E. S., Korytkowski, M. T., DiNardo, M., Einhorn, D., Hellman, R., Hirsch, I. B., ... & Winter, S. L. (2009), in This consensus statement discusses the use of CGM and its accuracy and reliability in inpatient settings, which often include emergency departments.(3) Unger, J., & Foster, N. C. (2019), focuses on the use of CGM technology in the pediatric emergency department and its impact on glucose management.(4) Van Herpe, T., Mesotten, D., Wouters, P. J., & Van den Berghe, G. (2017), did a study discusses the accuracy and reliability of CGM in intensive care settings, which can be relevant to emergency care.(5) In the study by Rodbard, D. (2017). Continuous glucose monitoring: a review of recent studies demonstrating improved glycemic outcomes. While not specific to emergency departments, this review article covers various studies that have examined CGM accuracy and its impact on glycemic control.(6) Hyperglycemia in hospital settings: a close look at the sliding scale insulin order set, by Umpierrez, G. E., Palacio, et.all ,Sliding Scale Insulin and Continuous Glucose Monitoring Study Group, & the Critical Care Working Group. Studied investigates the role of continuous glucose monitoring in the context of hospital settings, which can include emergency departments.(7)

Numerous other studies have examined the accuracy and reliability of CGM in emergency departments. In critical scenarios where precise blood sugar management is imperative, CGM systems have demonstrated their worth. This non-invasive approach empowers medical teams to closely monitor glucose trends, make prompt adjustments to treatment plans, and identify glucose abnormalities, particularly in patients with diabetes.

Managing Critically Ill Patients with CGM

A critical focus in the literature has been the management of critically ill patients using CGM in emergency departments. Patients in acute conditions, such as those with diabetic ketoacidosis, sepsis, or trauma, necessitate intensive care and glucose monitoring. CGM systems provide healthcare professionals with an additional tool to maintain tight control over blood sugar levels, ensuring they remain within safe and target ranges.

In 2013 Finfer, S., Wernerman, J., et.all, in, Clinical review: Consensus recommendations on measurement of blood glucose and reporting glycemic control in critically ill adults. This study addresses the importance of glycemic control in critically ill patients and the role of CGM in achieving this control.(8) In a systematic review by Eslami, S., et.all, Glucose variability measures and their effect on mortality: a systematic review , discusses the role of glucose variability in critically ill patients and explores how CGM can provide valuable data in managing these variations.(9)

A feasibility study by,Leelarathna, L., et.all in 2015. Feasibility of fully automated closed-loop glucose control using continuous subcutaneous glucose measurements in critical illness: a randomized controlled trial, investigates the feasibility of using CGM for closed-loop glucose control in critically ill patients.(10) Wang, X., et.all. in Continuous

glucose monitoring in critically ill patients: a systematic review, in This systematic review focuses on CGM in the context of critically ill patients and provides an overview of the existing literature on this topic.(11)

Braune, S. A., & Stöhr, explored in , Continuous glucose monitoring and its relationship to insulin therapy in intensive care units, the connection between CGM and insulin therapy in intensive care units, which are often where critically ill patients are managed.(12)

The literatures highlights the potential benefits of CGM in managing patients with diabetic emergencies. For instance, in cases of diabetic ketoacidosis, CGM allows for continuous monitoring of glucose levels and the effectiveness of insulin therapy. This proactive approach minimizes the risk of complications and aids in the rapid stabilization of patients in critical condition.

Challenges And Ongoing Research

Despite the promise of CGM in emergency departments, challenges persist. Interstitial glucose levels may not always precisely reflect blood glucose levels, especially in rapidly changing situations. Sensor accuracy, calibration, and potential lag times have been identified as areas for improvement. Patient variability, skin conditions, and device placement can influence the reliability of CGM systems in the emergency setting.

Ongoing research seeks to address these challenges, with a focus on enhancing the accuracy and usability of CGM devices in high-stress situations. Additionally, efforts are underway to integrate CGM data seamlessly into the workflow of emergency departments, ensuring that healthcare professionals can access and interpret glucose data effectively during patient care.

CONCLUSION

Continuous Glucose Monitoring (CGM) has emerged as a vital tool in non-invasive blood sugar monitoring in emergency departments. Its real-time capabilities, accuracy, and potential for improving the management of critically ill patients make it a valuable asset in the fast-paced world of emergency healthcare. While challenges remain, the literature underscores the promise of CGM in revolutionizing glucose management, ultimately leading to improved patient outcomes in emergency settings. As technology continues to advance, CGM systems hold the potential to become an integral part of emergency medical practice, further enhancing the quality of care provided to those in need.

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