THE NEW ERA FOR DIABETES IN ICU

Prof. Dr. Sherif Wadie

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Advisor Minister of Health and Population for Emergency and Critical Care
Head of the Egyptian Health Authority Medical Advisory Borard

Content:

1. Binding Agreement
2. Statistics
3. Questions about Diabetic ICU patients
4. Recent Research
5. Take Home Message

Binding Agreement

Egyptian Constitution, Article 18: Health Care

Refusing to provide any form of medical treatment to any human in emergency or life- threatening situations is a crime.

الرؤية

توفير خدمة طبية لمرضى الحالات الحرجة بالمستشفيات ذات جودة عالية طبقا للمعايير العالمية وفى الوقت المناسب من خـلال فريق طبي ذو كفاءة عالية ملتزما بأخلاقيات المهنة، وباستخـدام أحدث التقنيات العلمية سعياً لإرضاء المرضى المترددين وذويهم وفقا لما نص عليه الدستور المصري (المادة الثامنة عشر).

CLINICAL PRACTICE GUIDELINES:

KING'S College LONDON

Barts and The London Children's Hospital

Edwin Smith Papyrus: The First Textbook in Surgery

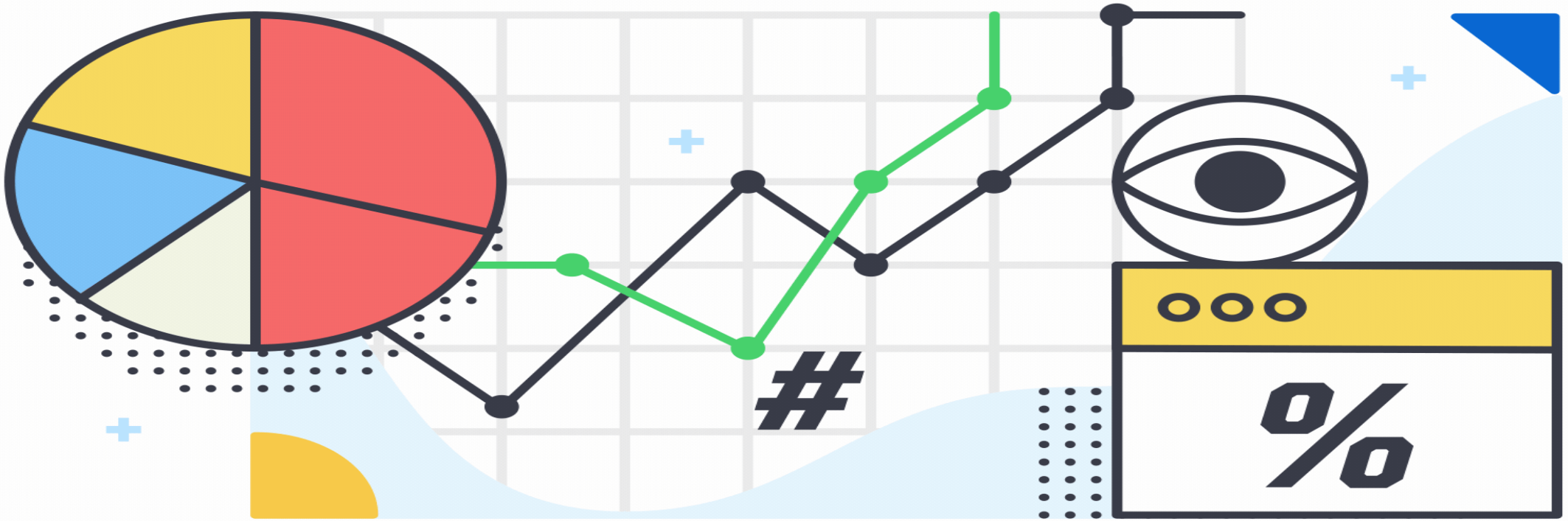
Abderahman Kamaledeen
Salah Kamaledeen

History Club
Aberdeen - July 2010

Scan me

Example for Egyptian Clinical Guidelines:

STATISTICS



Collector: Alexander Eser

Published: 7/23/2024

- Approximately 5.7 million patients are admitted to Intensive Care Units (ICUs) in the United States each year.
- ICU mortality rates range from 8% to 19%, depending on the type of ICU.
- The average cost of a day in the ICU is $4,000 to $5,000 in the United States.
- Patients in the ICU are at risk of developing delirium, with rates as high as 80% reported in some studies.
- ICUs account for approximately 20% of hospital costs in the United States.

Diabetes facts and figures show the growing global burden for individuals, families, and countries.
The IDF Diabetes Atlas (2021) reports that 10.5% of the adult population (20-79 years) has diabetes, with almost half unaware that they are living with the condition.
By 2045, IDF projections show that 1 in 8 adults, approximately 783 million, will be living with diabetes, an increase of 46%.

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Over 90% of people with diabetes have type 2 diabetes, which is driven by socio-economic, demographic, environmental, and genetic factors.

The key contributors to the rise in type 2 diabetes include:

- Urbanisation
- An ageing population
- Decreasing levels of physical activity
- Increasing overweight and obesity prevalence

DIABETES-SPECIFIC FORMULA IN THE I.C.U.

HOSPITAL ADMISSION GUIDELINES FOR DIABETES MELLITUS

CRITERIA FOR OF DIABETIC ICU PATIENT ADMINISTRATION:

Life-threatening **acute metabolic complications** of diabetes.

Newly diagnosed diabetes in children and adolescents.

Substantial and chronic **poor metabolic control** that necessitates close monitoring of the patient.

Severe chronic complications of diabetes that require intensive treatment or other severe conditions

Uncontrolled or newly discovered **insulin-requiring diabetes** during **pregnancy**.

Institution of **insulin-pump therapy** or other intensive insulin regimens.

ACUTE METABOLIC COMPLICATIONS OF DIABETES:

- **Diabetic ketoacidosis:**

Blood glucose>250 mg/dl with:

1) arterial pH <7.35, venous pH <7.30, or serum bicarbonate level <15 meq/L and 2) ketonuria or ketonemia.

- ***Hyperosmolar nonketotic state:***

Either blood glucose >350 mg/dl, serum osmolarity >295 mosM, and impaired mental status or blood glucose > 700 mg/dl.

- ***Hypoglycemia with neuroglycopenia:***

1) Blood glucose <50 mg/dl and the treatment of hypoglycemia has not resulted in prompt recovery of sensorium;
2) or coma, seizures, or altered behavior
3) or the hypoglycemia has been treated but a responsible adult cannot be with the patient for the ensuing 12 h;
4) or the hypoglycemia was caused by a sulfonylurea drug.

OTHER ACUTE MEDICAL CONDITIONS in Diabetics:

- **Acute on top of Chronic** cardiovascular, neurological, renal, and other diabetic complications may progress to the stage where ICU admission is appropriate.

- Conditions as:

➢ **Infections** e.g. Sepsis

➢ **Treatments** (e.g., surgery, chemotherapy, therapeutic intervention (e.g., large doses of glucocorticoid))

➢ **Acute onset** of retinal, renal, neurological, or cardiovascular complications of diabetes.

Indications and Outcome of Admission of Patients with Diabetes into Benha University Hospitals, Egypt: A Prospective Study

Amira M. Elsayed, Ayman M Elbadawy, Walla M. Ibrahim, Marwa S. Mahfoz, Rasha O. Abd Elmoniem,

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Received: 9 November 2020

Accepted: 22 March 2021

Abstract

Background: Patients with diabetes have a 3-fold greater chance of hospitalization compared to those without diabetes. The risk factors for hospitalizations in diabetic patients constitute poor glycemic control, longer diabetes duration, and coexisting morbidity. Other factors include, old age groups, insulin use, hypoglycemia, presence of chronic renal insufficiency and diabetes-related hospitalizations in the preceding year are other important risk factors. **Aim:** Our aim of the study is to report the causes, patient characteristics, and outcome of admissions of diabetic patients to the wards and emergency unit of Benha university hospital **Methods:** The study included 260 patients with known history of type 1 or 2 DM who were admitted from the emergency department, outpatient clinic ,and other departments of the hospital.Demographic data and laboratory investigations were collected. **Results:** The study constituted mainly type 2DM (90.4%). The mean age of the study population was 57± 14 years, most of them were females (55.8%).The median duration of diabetes was 10 years.The most common reason for diabetes related hospitalizations were chronic complications of DM, whereas sepsis is the most common reason of non diabetes related .The mortality rate was 26.9%, of overall deaths, cardiovascular disease was the most frequent(47.7%).**Conclusion:** The most frequent reason for hospitalization in diabetic related admissions was chronic complications of diabetes. Whereas, sepsis is the most common cause in diabetic non related admissions.Cardiovascular disease is still the main cause of death among diabetics.

Key words: Outcome; Diabetes; Hospitalization.

Guidelines on Glycemic Control for Critically Ill Children and Adults



Judith Jacobi, PharmD, BCCCP, MCCM; Kimia Honarmand, MD; Nicholas G. Bircher, MD, FCCM

PUBLISHED: 01/05/2024

Clinicians should use glycemic management protocols and procedures that demonstrate a low risk of hypoglycemia among critically ill adults and should treat hypoglycemia without delay.

- Critically ill adults
- Best practice statement
- Hypoglycemia

Based on available RCT data, in critically ill adults, we suggest against titrating an insulin infusion to a lower BG target INT:
4.4-7.7 mmol/L (80-139 mg/dL) as compared to a higher BG target range, CONV: 7.8-11.1 mmol/L (140-200 mg/dL)
to reduce the risk of hypoglycemia.
Quality of evidence: Moderate

- Critically ill adults
- Blood glucose control
- Conditional

Observational data suggest a potential benefit of personalized glucose targets that more closely match chronic prehospital glycemic control. We recommend high-quality interventional trials of individualized glycemic targets in critically ill adults, stratified by prior glycemic control.

- Critically ill adults
- Glucose targets

We suggest using continuous IV insulin infusion rather than intermittent subcutaneous insulin in the acute management of hyperglycemia in critically ill adults.
Quality of evidence: Very low

- Critically ill adults
- Conditional
- Insulin infusion

We suggest frequent (≤ 1 hour, continuous or near-continuous) glucose monitoring compared with monitoring at intervals greater than hourly in the management of hyperglycemia in critically ill adults on IV insulin during periods of glycemic instability.
Quality of evidence: Low

- Critically ill adults
- Blood glucose monitoring

AACE/ADA Recommended Target Glucose Levels in ICU Patients

- **ICU setting:**
  - –Starting threshold of no higher than 180 mg/dL
  - –Once IV insulin is started, the glucose level should be maintained between 140 and 180 mg/dL
  - –Lower glucose targets (110-140 mg/dL) may be appropriate in selected patients

Not recommended <110	Acceptable 110-140	Recommended 140-180	Not recommended >180

Latest Medication Options for Diabetes

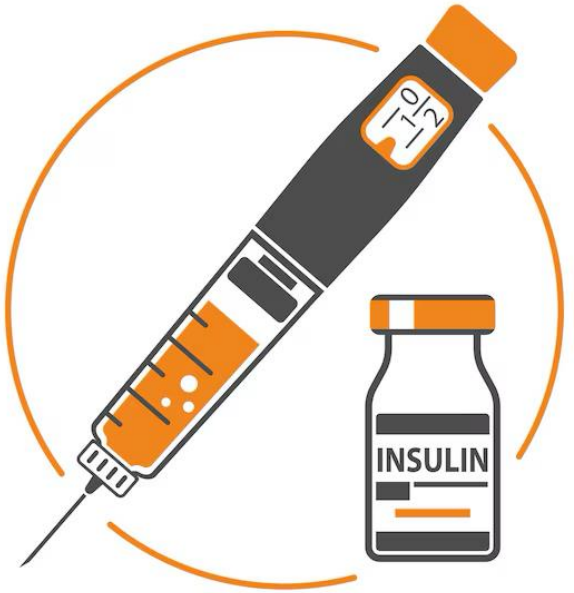
By Elizabeth Pratt | Updated on November 15, 2024

Medically reviewed by Isabel Casimiro, MD, PhD

TYPES OF ANTI-DIABETIC AGENTS:

- alpha-glucosidase inhibitors amylin analogs
- antidiabetic combinations dipeptidyl peptidase 4 inhibitors
- Incretin Mimetics (GLP-1 Agonists)
- insulin
- meglitinides
- miscellaneous antidiabetic agents non-sulfonylureas
- SGLT-2 inhibitors
- sulfonylureas
- thiazolidinediones

Insulin Administration



Continuous Subcutaneous Insulin Infusion Device:

Continuous subcutaneous insulin infusion (CSII) devices (also known as insulin pumps) are the most sophisticated form of insulin delivery. These are small, computerized devices that are programmed to deliver insulin under the skin. The insulin pump is durable and lasts for years, but the insulin supply and certain pump components (insulin reservoir, tubing and infusion set) are changed every few days. We have provided more detailed information in the insulin pump section.

Infusion

Human regular insulin may be injected directly into the vein in a hospital setting under close medical supervision only. Insulin is added to intravenous fluids, and the insulin dose and blood sugar are strictly monitored. The intravenous route of delivery is ONLY given under a doctor's orders in a hospital to facilitate the management of diabetes during surgery or an intensive care stay.

Intravenous Insulin Therapy

Updated: May 22, 2024 | Author: Guy W Soo Hoo, MD, MPH; Chief Editor: George T Griffing, MD more...

Intravenous insulin protocols

Among the differences between the various intravenous insulin protocols are the following:

- Presence or absence of preexisting diabetes
- Initial hyperglycemic threshold (>150-200 mg/dL)
- Initial bolus insulin dose (calculated [formula] versus fixed [predetermined])
- Subsequent bolus insulin doses
- Change in insulin dose (calculated vs fixed dose)
- Target glucose level (80-180 mg/dL, with a wide range of acceptable values)

ICU INSULIN INFUSION PROTOCOL FOR ADULTS:

- ***Insulin infusion:***

Mix 1 U regular human insulin per 1 mL 0.9% NaCl.

Administer via infusion pump in increments of 0.5 U/h

- ***Blood glucose target range: 120-160 mg/dL***

Use glucose meter to monitor blood glucose hourly

- ***Bolus and initial infusion rate:***

Divide initial BG by 100, round to nearest 0.5 U for bolus and initial infusion rates

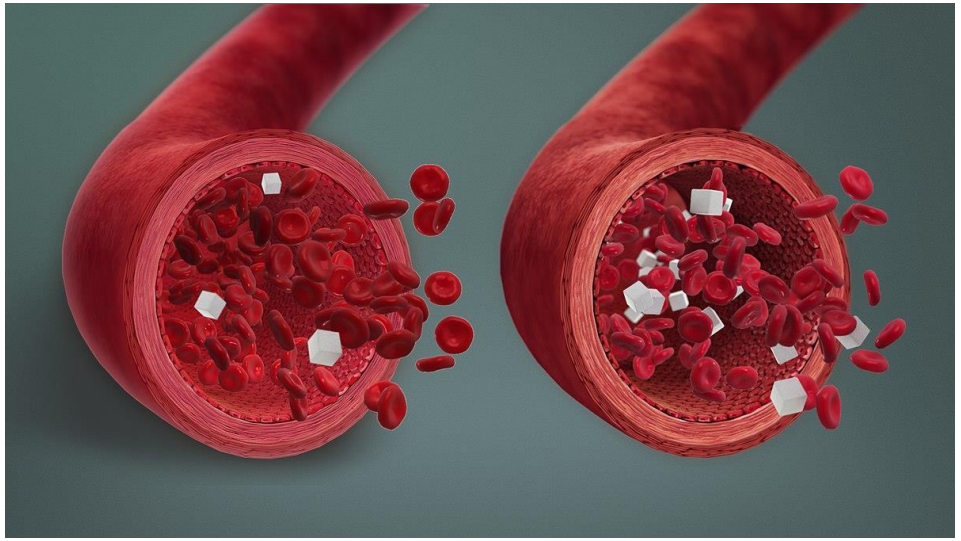
Example: Initial BG = 325 mg/dL = 325/100 = 3.25, round up to 3.5

IV bolus = 3.5 U = start infusion at 3.5 U/h

- ***Subsequent rate adjustments:***

Changes in infusion rate are determined by **the current infusion rate** and **the hourly rate of change** from the prior BG level

- The risk of hypoglycemia did not differ significantly when a target blood glucose level of 144-180 or > 180 mg/dL was used. The risk of hypoglycemia was fivefold higher with target blood glucose levels of < 110 or 110-144 mg/dL compared to a target blood glucose level of 144-180 mg/dL.
- Therefore, a target blood glucose level of 144-180 mg/dL may be the better harm-benefit balance, especially in terms of avoiding hypoglycemia.



World J Diabetes. 2023 May 15; 14(5): 528–538.
Published online 2023 May 15.
doi: 10.4239/wjd.v14.i5.528

PMCID: PMC10236998 | PMID: 37273246

What, why and how to monitor blood glucose in critically ill patients

Deven Juneja, Desh Deepak, and Prashant Nasa

The innovation of continuous glucose monitoring (CGM) **may help to alert medical caregivers with regard to the development of hyperglycemia and hypoglycemia**, which may decrease the potential complications in patients in the ICU. Oct 16, 2021


12:53
141
350
250
150
50
04:00
08:00
12:00

Subcutaneous Continuous Glucose Monitoring at the ICU

Reliable and accurate method

Enhances patient safety

Equal performance in glycaemic controls

CGM may facilitate the process of glycaemic control

Brunner et al. CCM 2011; 2 Siegelaar et al. Diabetes Care 2011; 3Holzinger et al. Diabetes Care 2010

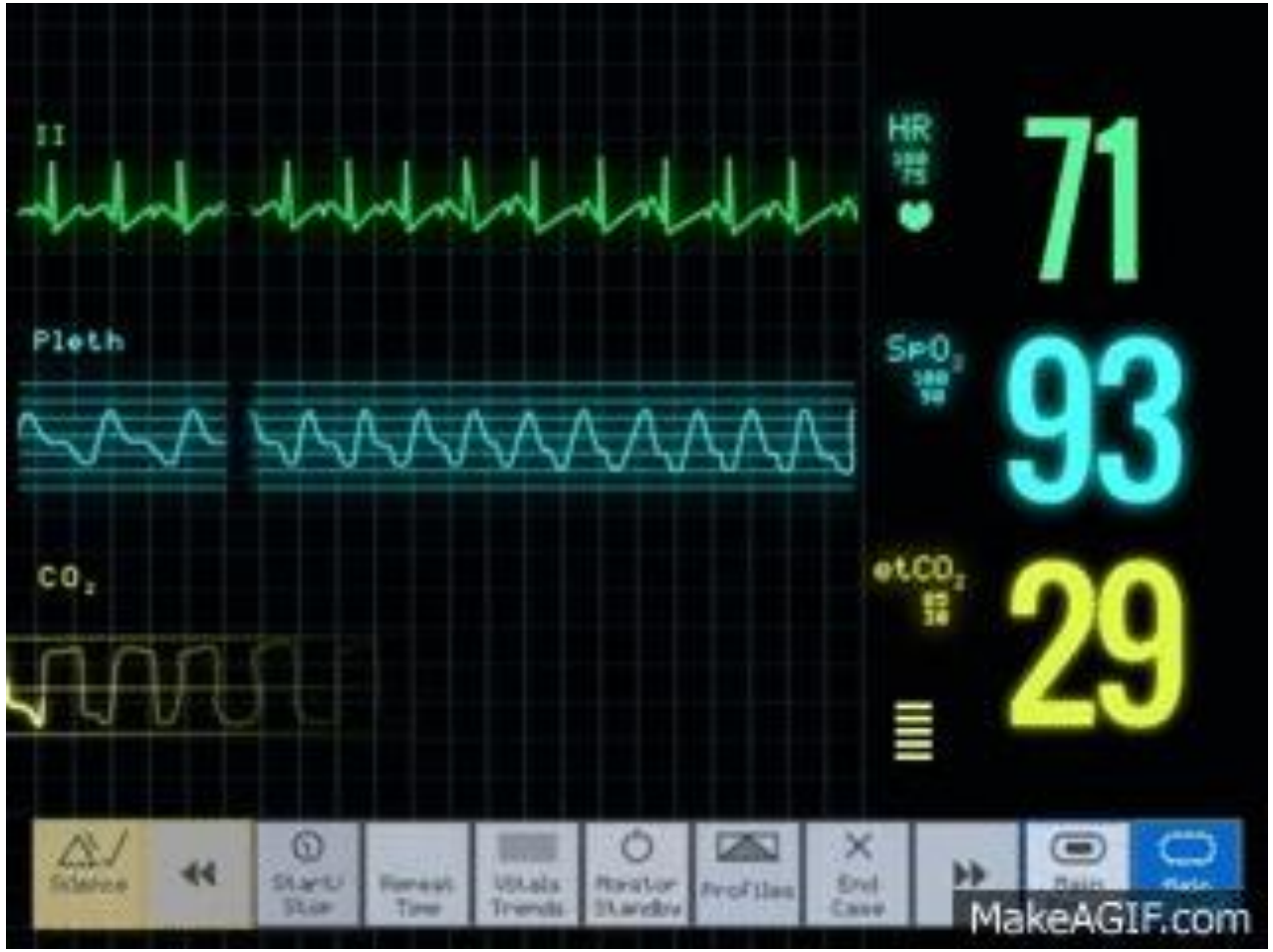
What is a CGM? (Continuous Glucose Monitor)

- A device that provides "real-time" glucose readings and data about trends in glucose levels
- Reads the glucose levels under the skin every 1-5 minutes (10-15 minute delay)
- Provides alarms for high and low glucose levels and trend information
- The 3rd era in diabetes management

Barbara Davis Center for Childhood Diabetes April 2010

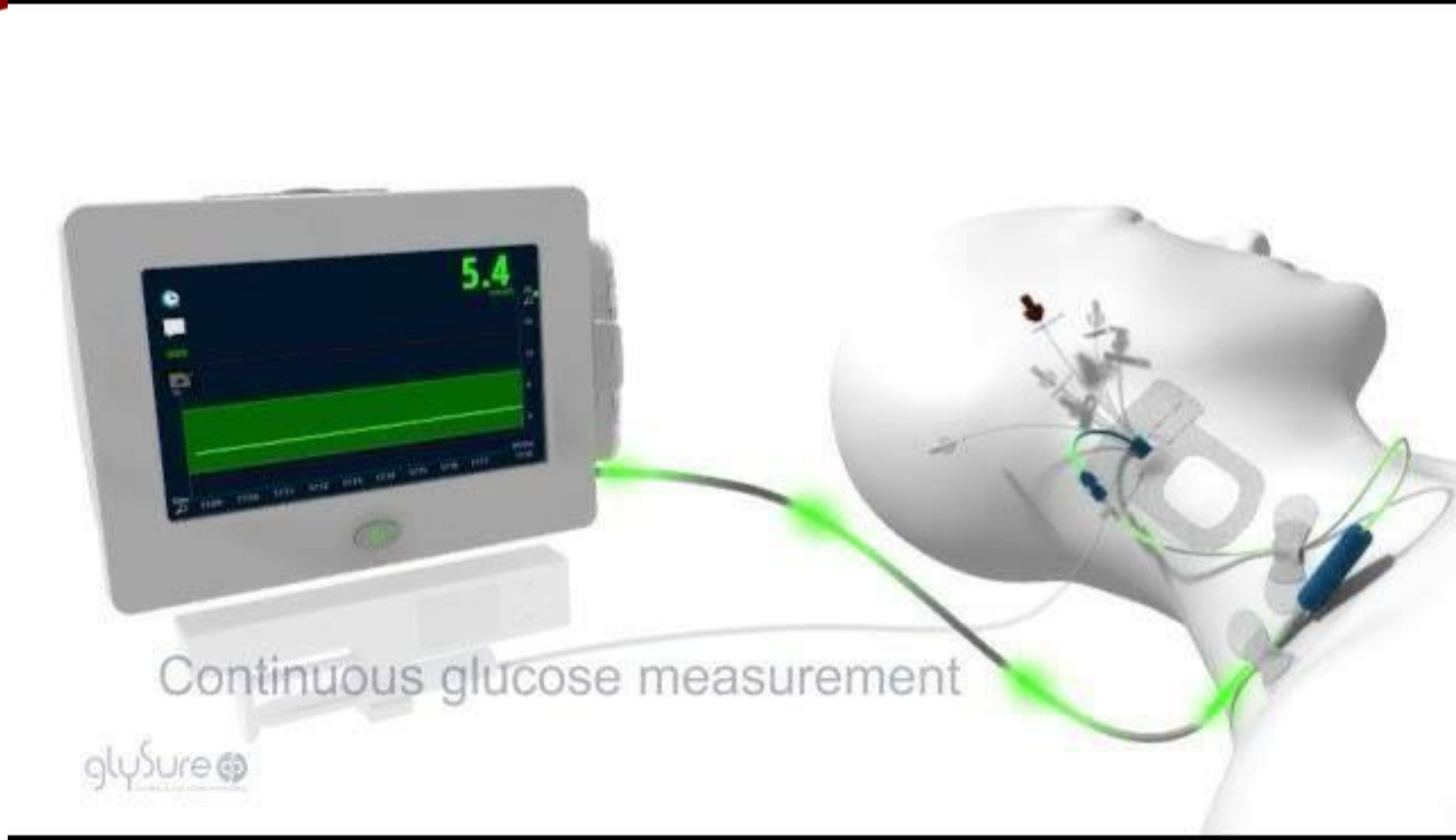
What is CGM?

Continuous Glucose Monitoring is an advanced way for people living with diabetes to check glucose levels in real-time or monitor sugar levels over a period of time.


II
HR
71
Pleth
SpO2
93
CO2
etCO2
29
MakeAGIF.com


OptiScan
Monitoring
07:59
High Glucose
Check hospital protocol
10:32
16:00
22:00
04:00
10:00
Glucose
at 07:50
mg/dL
160
Draw Interval
15 Min.
Target Range
mg/dL
90 / 150
Percent in Range
(last 22 hrs)
60 %
Menu

Glysure – Continous Glucose Monitoring System



Tight versus liberal blood-glucose control in the intensive care unit: special considerations for patients with diabetes

Published: April, 2024

- To avoid both complications related to hyperglycemia and hypoglycemia, it is currently recommended to initiate insulin therapy for ICU patients with persistent blood glucose concentrations over 10 mmol/L (>180 mg/dL), targeting a range of 7.8-10 mmol/L (140-180 mg/dL) for the majority of critically ill patients.

Hypoglycemia

April 1, 2023 by **Josh Farkas**

HYPOGLYCEMIA

- Prolonged severe hypoglycemia can cause **permanent brain damage**, similar to anoxic brain injury.
- Hypoglycemia is **most dangerous** among intubated and sedated patients, because mental status changes won't be immediately evident.
- Overall, hypoglycemia is far more dangerous than hyperglycemia. When dosing insulin in an acute care setting, it's always **safer** to leave the patient in a **mildly hyperglycemic range.**

Be conservative with insulin dosing:

- **Don't try to achieve tight glycemic control**. A glucose target of **<220 mg/dL** is fine for most patients. Patients with diabetes and elevated hemoglobin A1C >7 may do better if their glucose is allowed to **drift higher** (up to ~250 mg/dL)
- Consider **reducing** the insulin dose if the patient becomes **NPO**, or if **steroid** doses are **decreased**.
- Among all medications, **insulin** is one of the **most** prone to **serious** dosing errors.
- Patients with **cirrhosis** or **acute hepatic failure** tend to develop hypoglycemia, so monitor their glucose levels and avoid giving them insulin. Some patients with **severe hepatic failure** will require a continuous dextrose infusion to avoid hypoglycemia.

Persistent Hypoglycemic Encephalopathy

neuroimaging features

- (1) The most common finding is T2/FLAIR hyperintensity with strongly restricted diffusion affecting gyri in the parieto-occipital and temporal regions.(31589567)
- (2) Basal ganglia can be involved, which may be a poor prognostic sign.(31589567)
- (3) Characteristically there is *sparing* of the thalami, white matter, and cerebellum. This may help differentiate hypoglycemic injury from hypoxic-ischemic injury (which usually involves the thalami and cerebellum). (31589567)

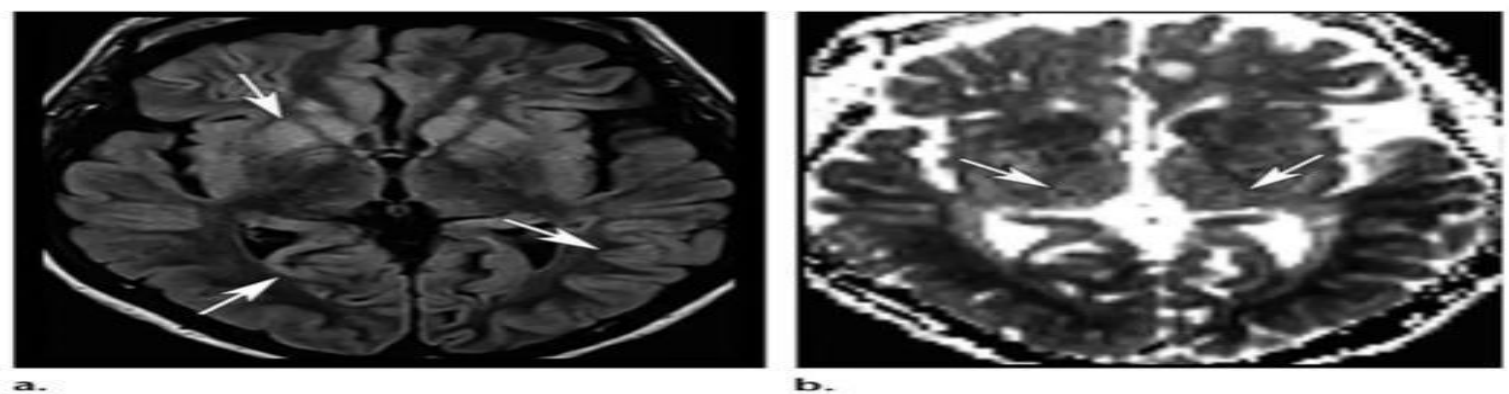


Figure 14. Hypoglycemia in a man with cirrhosis who presented in a coma with a glucose level of 20 mg/dL. **(a)** Axial FLAIR MR image shows symmetric hyperintensities involving the temporal and parieto-occipital cortex and the basal ganglia (arrows) and sparing the white matter and thalami. **(b)** Axial apparent diffusion coefficient (ADC) map shows true restricted diffusion (hypointensity) affecting the same regions and better depicts the thalamic sparing (arrows).

de Oliveira AM et al. PMID 31589567

World J Diabetes. 2023 Nov 15; 14(11): 1710–1716.
Published online 2023 Nov 15.
doi: 10.4239/wjd.v14.i11.1710

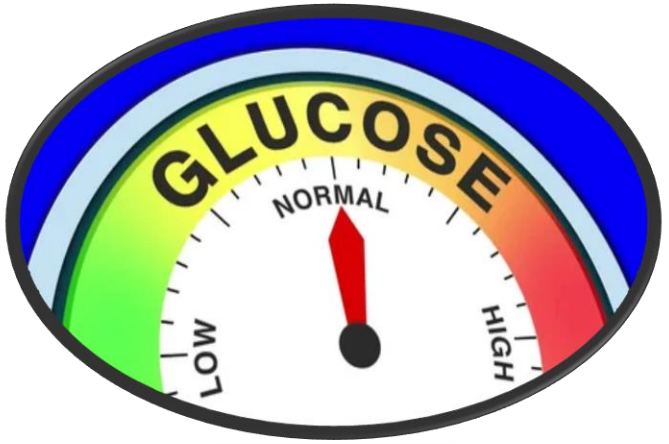
PMCID: PMC10704201 | PMID: 38077801

Rapid correction of hyperglycemia: A necessity but at what price? A brief report of a patient living with type 1 diabetes

Priscille Huret, Philippe Lopes, Randa Dardari, Alfred Penfornis, Claire Thomas, and Dured Dardari

► Author information ► Article notes ► Copyright and License information PMC Disclaimer

Nevertheless, the intense and rapid correction of glucose levels after a long period of hyperglycemia can produce or aggravate numerous macrovascular complications such as myocardial infarction or the risk of cardiovascular mortality



Endocrine Practice
Volume 28, Issue 9, September 2022, Pages 875-883

Original Article

What Is the Optimal Speed of correction of the Hyperosmolar Hyperglycemic State in Diabetic Ketoacidosis? An Observational Cohort Study of U.S. Intensive Care Patients

Sebastiaan P. Blank MD, MSc [1], Ruth M. Blank B Med, MSc [2], Lewis Campbell MB, ChB, MSc [1 3 4]

Conclusion

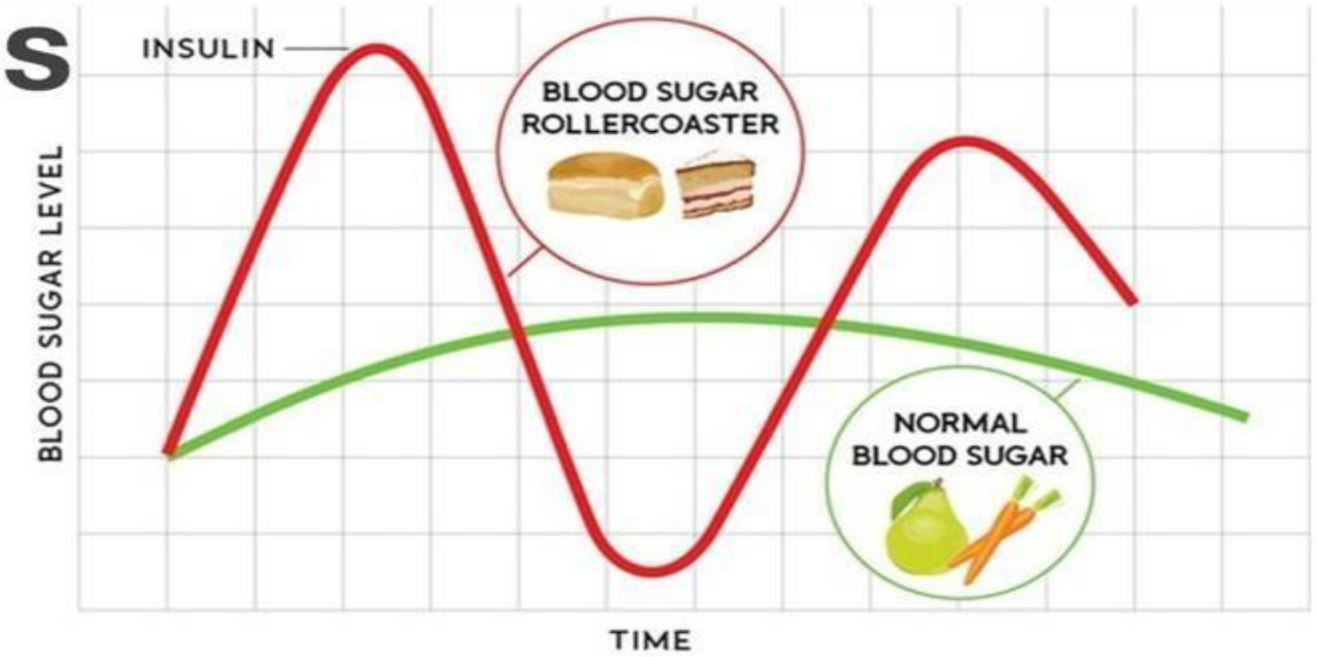
Based on large-volume observational data, relatively rapid correction of tonicity and glucose level was associated with lower mortality and more favorable neurologic outcomes. Avoiding a maximum hourly rate of correction of tonicity >5 mmol/L may be advisable.

Fluctuating blood sugar levels or Brittle diabetes

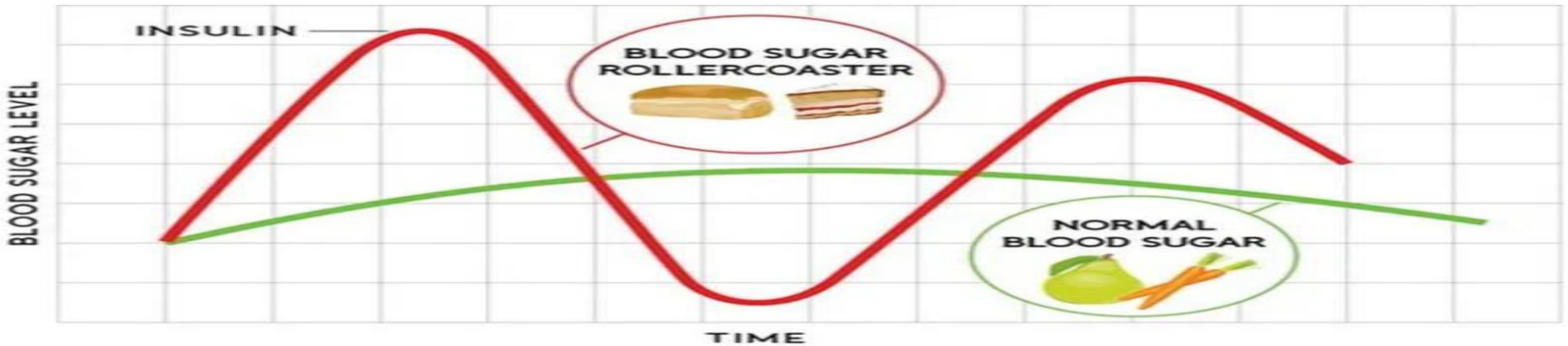
PACE HOSPITALS
State-of-the-art Liver and Kidney Transplant Centre

It occur because of explained and unexplained causes, leading to increased sugar levels (Hyperglycemia) and low sugar levels (Hypoglycaemia).

Extreme fluctuating blood sugar levels can cause a lot of emotional disturbance like depression, agitation, feeling irritable, anxiety, lack of energy, easy fatigability, and uncontrollable temper.



Roller coaster effect (Fluctuating Sugar levels) in Diabetes



Pace Hospitals

Fluctuating Sugar levels in diabetes can lead to early diabetes complications; even if yours average HbA1c levels look good.

Reason for fluctuating blood sugar levels

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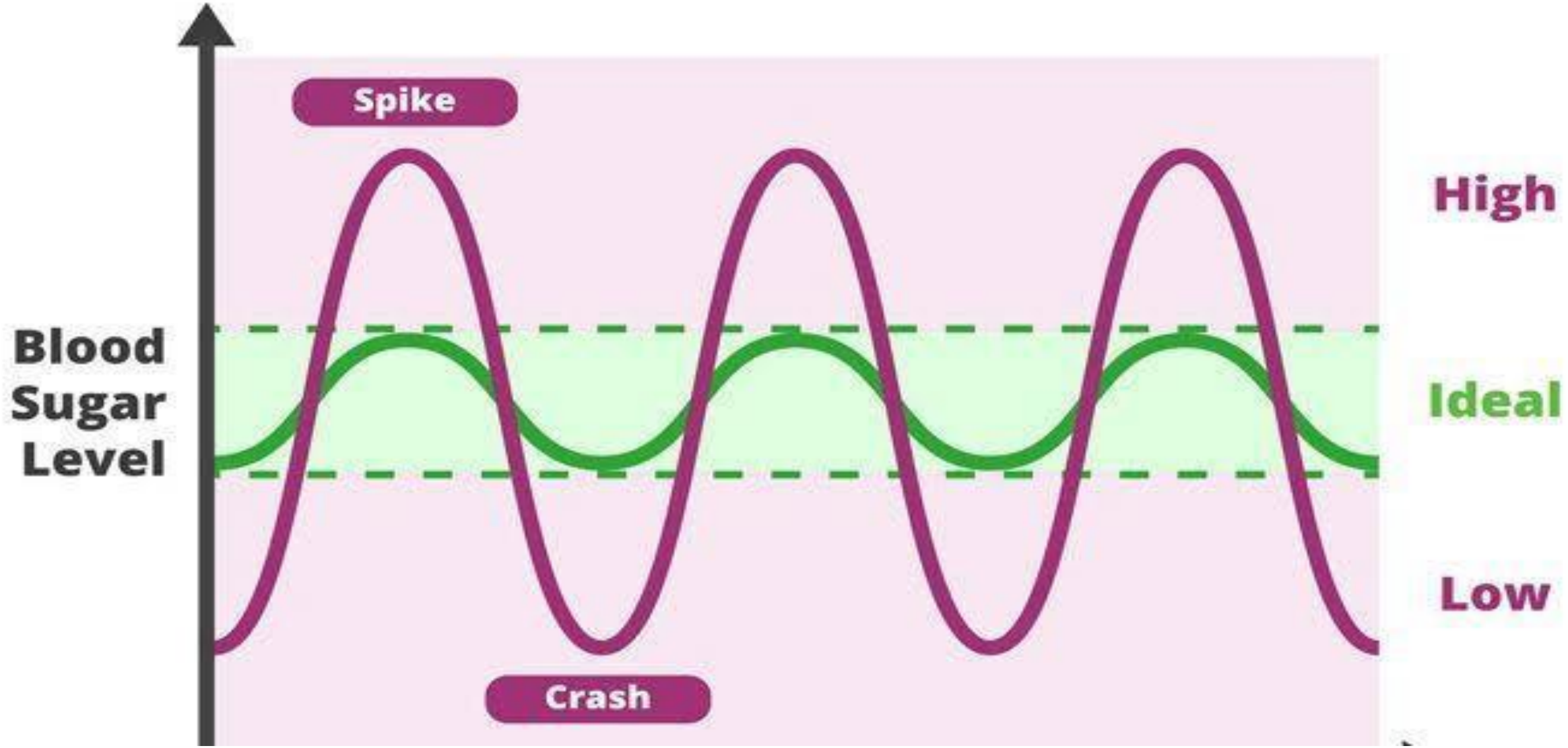
Few reasons that can cause blood sugar fluctuations:

- Sleep disturbances
- Emotional disturbances
- Infections like common cold
- Dehydration
- Hormonal fluctuation during periods and menopause
- Emotional or physical stress
- Oral contraceptives
- Drinks like tea, coffee, energy drinks
- Medications like steroids, diuretics & Antidepressants
- Long distance travel (change in time range)
- Excessive physical activity
- Alcohol
- Seasonal changes
- Artificial sweeteners

These fluctuation or swings in blood sugar levels in known as glycaemia variability. When there is high glycaemic variability, it can cause microvascular and macro vascular complications.

Extreme fluctuating blood sugar levels can cause a lot of emotional disturbance like depression, agitation, feeling irritable, anxiety, lack of energy, easy fatigability, and uncontrollable temper.


Spike
Blood Sugar Level
High
Ideal
Low
Crash

Journal of Critical Care
Volume 38, April 2017, Pages 319-323

Sepsis/Infection

Hyperglycemia and glycemic variability are associated with the severity of sepsis in nondiabetic subjects

Lukana Preechasuk MD [a], Nattakarn Suwansaksri MD [a], Nantawan Ipichart MD [a], Sathit Vannasaeng MD [a], Chairat Permpikul MD [b], Apiradee Sriwijitkamol MD [a]

November 2017

Association Between Preoperative Hemoglobin A_{1c} Levels, Postoperative Hyperglycemia, and Readmissions Following Gastrointestinal Surgery

Conclusions and Relevance Early postoperative hyperglycemia was associated with increased readmission, but elevated preoperative HbA_{1c} was not. A higher preoperative HbA_{1c} was associated with increased postoperative glucose level checks and insulin use, suggesting that heightened postoperative vigilance and a lower threshold to treat hyperglycemia may explain this finding.


SEPSIS AND
DIABETES

HOW DIABETES AFFECTS YOUR IMMUNE SYSTEM

- Suppresses White Blood Cell Activity
- Promotes Inflammation
- Imbalances Gut Microbiota
- Reduces Nutrient Absorption
- Increases Risk of Chronic Diseases

Relative Hypoglycemia in Diabetic Patients With Critical Illness:

Relative hypoglycemia is a decrease in glucose greater than or equal to 30% below prehospital admission levels (estimated by hemoglobin A1C) but not to absolute hypoglycemia levels.It is a recognized pathophysiologic phenomenon in ambulant poorly controlled diabetic patients but remains unexamined during critical illness.

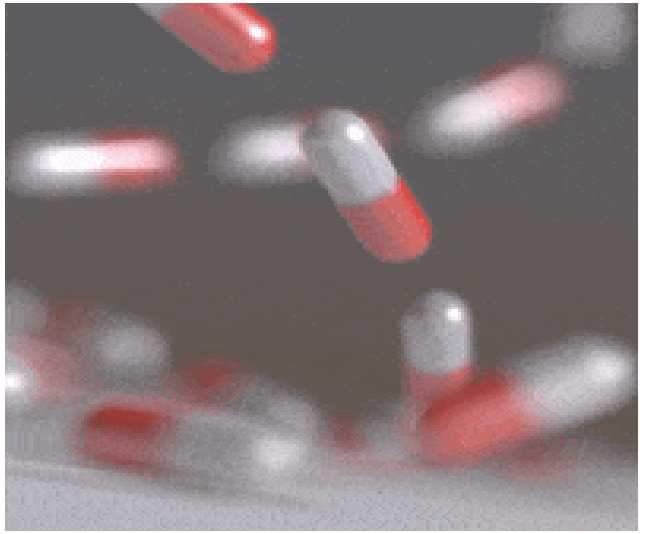
A1C and Estimated Average Glucose Levels

	A1C Percentage	Estimated Average Glucose (EAG)	
In-range	< 5.7%	< 117 mg/dL	6.5 mmol/L
Prediabetes	5.7-6.4%	117-137 mg/dL	6.5-7.6 mmol/L
Diabetes	> 6.4%	> 137 mg/dL	> 7.6 mmol/L
Increased risk of complications	6.5%	140 mg/dL	7.8 mmol/L
	7.0%	154 mg/dL	8.6 mmol/L
	7.5%	169 mg/dL	9.4 mmol/L
	8.0%	183 mg/dL	10.1 mmol/L
	8.5%	197 mg/dL	10.9 mmol/L
	9.0%	212 mg/dL	11.8 mmol/L
	9.5%	226 mg/dL	12.6 mmol/L
	10%	240 mg/dL	13.4 mmol/L


NEW
DRUGS

Oral Diabetes Medications

- Steglatro (Ertugliflozin)
- Glyxambi (Empagliflozin and Linagliptin)
- Steglujan (Ertugliflozin and Sitagliptin)
- Xigduo XR (Dapagliflozin and Metformin HCI Extended-Release)
- Synjardy (Empagliflozin and Metformin Hydrochloride)
- Segluromet (Ertugliflozin and Metformin Hydrochloride)



- Lactic Acidosis Warning
- Lactic acidosis is a medical emergency.
- Keep in mind that the following medicines carry a warning for lactic acidosis:
- * Xigduo XR (dapagliflozin and
- metformin HCl extended-release)
- * Synjardy (empagliflozin and metformin hydrochloride)
- * Segluromet (ertugliflozin and metformin hydrochloride)

- Metformin-associated lactic acidosis can occur acutely in an overdose but typically has a more gradual onset in patients with hepatic or renal dysfunction due to decreased excretion. It often presents with nausea, abdominal pain, tachycardia, hypotension, and tachypnea.
- Lactic acidosis resulting from metformin toxicity should be suspected in any patient who has all of the following five criteria: (1) a history of metformin administration; (2) a markedly elevated lactate level (> 15 mmol/L) with a large anion gap (> 20 mmol/L); (3) severe acidemia (pH 7.1); (4) a very low serum bi carbonate
- The term metformin-induced lactic acidosis refers to cases that cannot be explained by any major risk factor other than drug accumulation, usually due to renal failure.
- Treatment consists of vital function support and drug removal, mainly achieved by renal replacement therapy.

Afrezza (Inhaled Insulin)

- Afrezza (inhaled insulin) was approved for use in 2014, to help manage high blood sugar levels in adults with type 1 and type 2 diabetes. It is a fast-acting medication that is breathed in through the lungs.

- **Keep in mind:**
- In individuals with type 1 Diabetes, this medication should be used in addition to long lasting insulin
- It should not be used by anyone who has a lung condition.
- Common side effects include low blood sugar, a cough, and a sore throat.
- Dosage will be determined by your healthcare Provider.

Critical Care

BMC

LETTER ▸ Crit Care. 2024 May 13;28:159. doi:

10.1186/s13054-024-04945-9

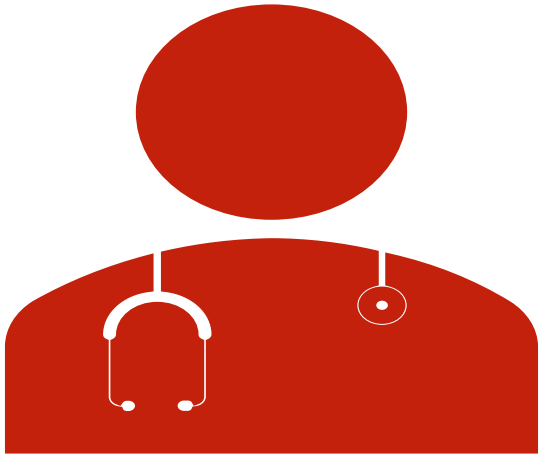
Potential implications of long-acting GLP-1 receptor agonists for critically ill

Luping Wang [1], Hao Yang [1], Xiaoxiao Xia [1], Bo Wang [1], Qin Wu [1],✉

GLP-1 Agonist Drugs Comparison

	DOSAGE	DOSAGE FORM	APPROVED FOR	WHO CAN TAKE IT?	OTHER BENEFITS
Ozempic (SEMAGLUTIDE)	1 WEEKLY		TYPE 2 DIABETES	ADULTS	HEART, KIDNEYS, WEIGHT LOSS
Rybelsus (SEMAGLUTIDE)	1 DAILY		TYPE 2 DIABETES	ADULTS	WEIGHT LOSS
Wegovy (SEMAGLUTIDE)	1 WEEKLY		WEIGHT LOSS	12+ → KIDS + ADULTS	N/A
Trulicity (DULAGLUTIDE)	1 WEEKLY		TYPE 2 DIABETES	10+ → KIDS + ADULTS	HEART, KIDNEYS, WEIGHT LOSS
Victoza (LIRAGLUTIDE)	1 DAILY		TYPE 2 DIABETES	10+ → KIDS + ADULTS	HEART, KIDNEYS, WEIGHT LOSS
Saxenda (LIRAGLUTIDE)	1 DAILY		WEIGHT LOSS	12+ → KIDS + ADULTS	N/A
Byetta (EXENATIDE)	2 DAILY		TYPE 2 DIABETES	ADULTS	WEIGHT LOSS
Bydureon BCise (EXENATIDE)	1 WEEKLY		TYPE 2 DIABETES	10+ → KIDS + ADULTS	WEIGHT LOSS
Mounjaro (TIRZEPATIDE)	1 WEEKLY		TYPE 2 DIABETES	ADULTS	WEIGHT LOSS

GoodRx Health



Recent literature has highlighted the potential impact of GLP-1 RAs on gastric emptying in patients under anesthesia. Sen and colleagues reported that patients who were taking GLP1 RAS prior to surgery had larger cross sectional areas of the gastric antrum than those who weren't taking GLP1 RAs.

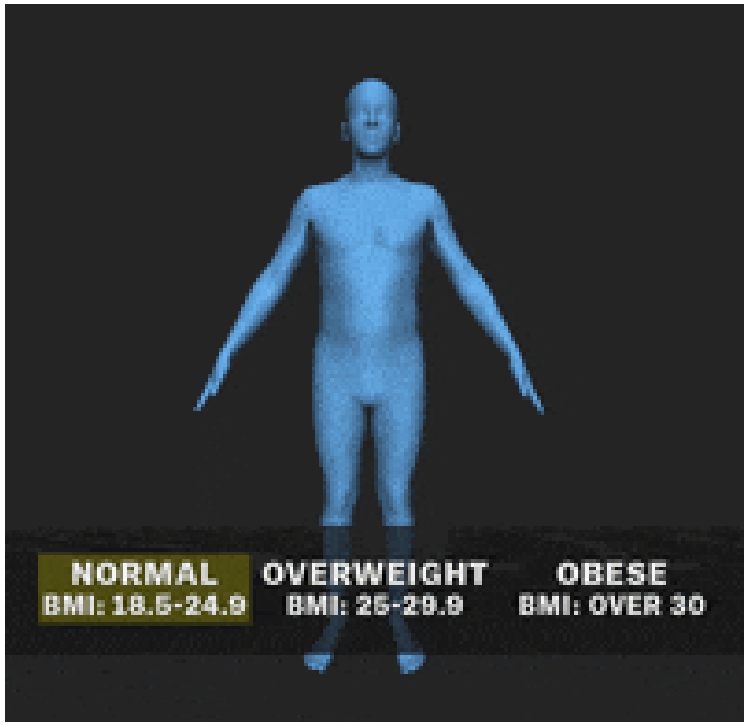
Prokinetic drugs, such as erythromycin, counteract the slowing of gastric emptying that occurs with GLP-1

- KFF Health Tracking Poll May 2024: The Public's Use and
- Views of GLP-1 Drugs
- Alex Montero, Grace Sparks, Marley Presiado, and Liz Hamel
- Published: May 10, 2024

Most adults who have taken GLP-1 drugs say they took them to treat a chronic condition including diabetes or heart disease (62%), while about four in ten say they took them primarily to lose weight.

* About half (54%) of all adults who have taken GLP-1 drugs say it was difficult to afford the cost, including one in five (22%) who say it was "very difficult." While most insured adults who have taken these drugs say their insurance covered at least part of the cost, even among insured adults about half (53%) say the cost was difficult to afford?

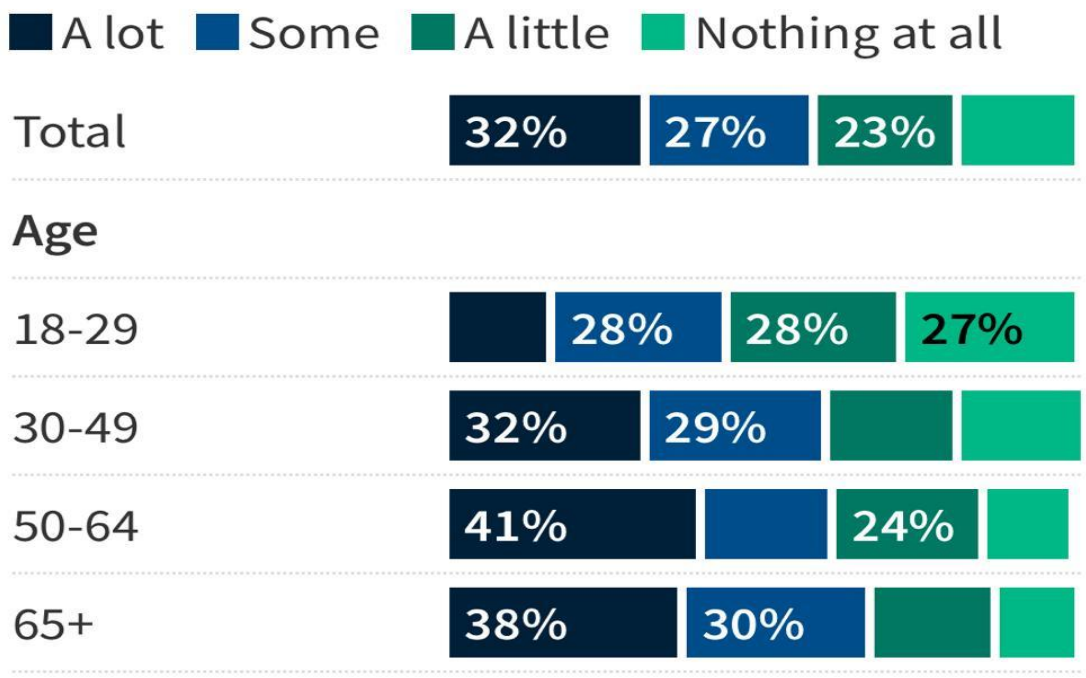
- While 8% of adults ages 65 and older say they have taken a GLP-1 medication for a chronic condition, just 1% say they have ever taken a GLP-1 drug to lose weight, which may reflect Medicare's lack of coverage for prescription drugs used for weight loss. Nearly four in ten (37%) adults ages 65 and older report being told by a doctor they are overweight or obese in the past five years.



With Medicare currently prohibited by law from covering prescription drugs used for weight loss, six in ten adults say they think Medicare should cover the cost of these drugs when prescribed for weight loss for people who are overweight, including more than half of Democrats, independents and Republicans. Similar shares of the public continue to support Medicare coverage of these drugs for weight loss even after hearing arguments for and against this proposal.

Larger Shares of Older Adults and Those With Chronic Conditions Have Heard “A Lot” About GLP-1 Drugs

How much have you heard, if anything, about a class of drugs being used for weight loss, such as Ozempic, Wegovy, and Mounjaro?



Sodium-glucose Cotransporter-2 (SGLT2) Inhibitors

Sodium-glucose cotransporter-2 (SGLT2) inhibitors are a class of oral (taken by mouth) prescription medicines that are FDA-approved for use with diet and exercise to lower blood sugar in adults with type 2 diabetes.

Approved medicines in the SGLT2 inhibitor class include:

- Brenzavvy™ (bexagliflozin)
- Invokana® (canagliflozin)
- Farxiga® (dapagliflozin)
- Jardiance® (empagliflozin)
- Steglatro® (ertugliflozin)

SGLT2 inhibitor and side effects

1. VOLUME DEPLETION /DEHYDRATION
2. GENITAL MYCOTIC INFECTION
3. EUGLYCEMIC KETOACIDOSIS
4. BONE FRACTURE

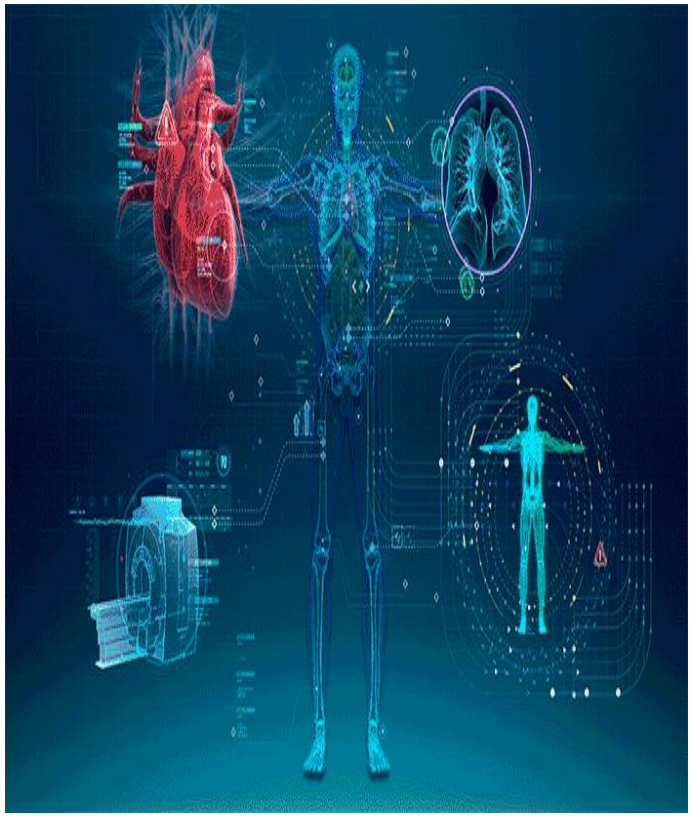

Insulin pump system
Insulin patch
Insulin vial and syringe
Insulin management system of a "pod" and a Personal Diabetes Manager (PDM)
Re-useable insulin pen
Disposable single-patient-use prefilled insulin pen
Smart insulin pen

Future of AI in Healthcare

- AI in the ICU enhances patient care by enabling predictive analytics for early detection of conditions like sepsis and patient deterioration.

- It aids in interpreting medical imaging, automating real-time patient monitoring, optimizing drug dosing, and managing mechanical ventilation.

- AI also streamlines resource allocation, improves workflow efficiency, and supports clinical decision-making. While AI reduces errors and boosts efficiency, it complements rather than replaces human expertise.



Take Home message:

1. Binding agreement is a MUST for the Medical Service
2. Clinical Practice Guidelines support Evidence-Based Medicine and better for the patients' outcome and safe for the healthcare and efficient use of resources
3. CGM is a MUST in ICU
4. Insulin infusion is the best way for insulin administration in ICU
5. Fluctuation of blood glucose causes life-threatening complications
6. Caring for diabetic patient in ICU for new drugs is very crucial

Thank you

Any question?