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Diapositiva preparata da LUTGARDA BOZZETTO e ceduta alla Società Italiana di Diabetologia.
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LA GESTIONE DELLE FRECCHE DI TENDENZA



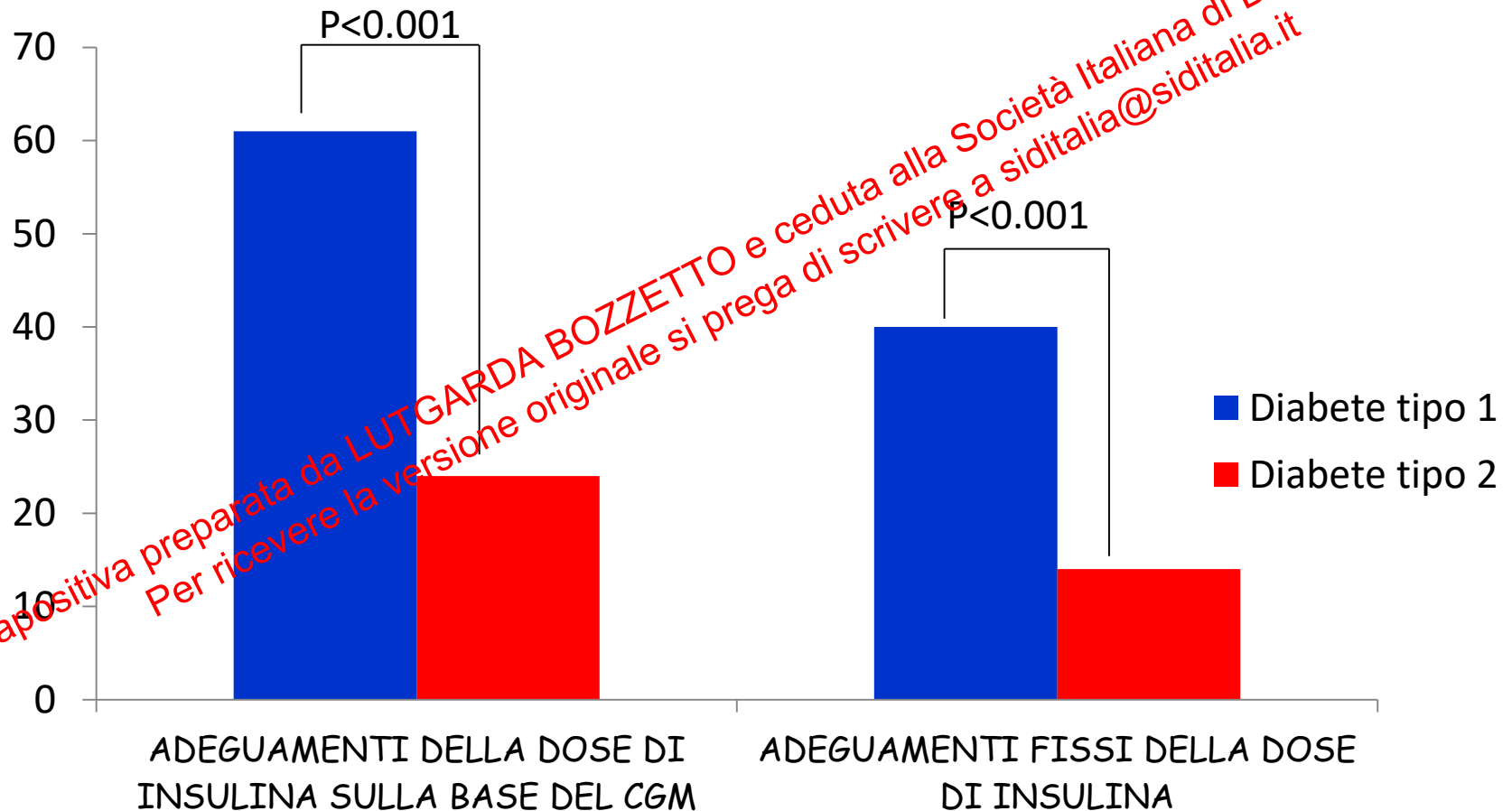
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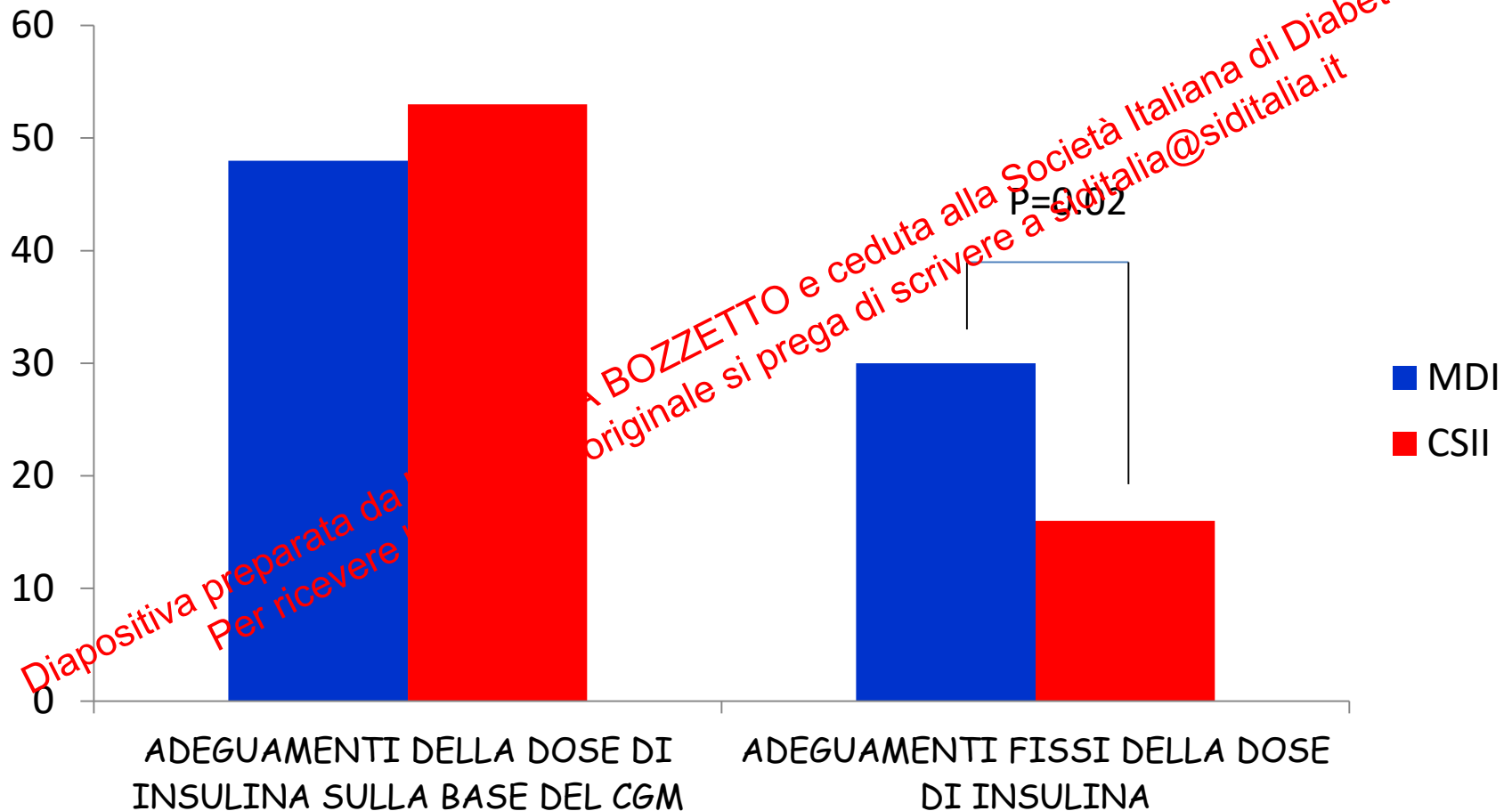
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Differences in Use of Glucose Rate of Change (ROC) Arrows to Adjust Insulin Therapy Among Individuals With Type 1 and Type 2 Diabetes Who Use Continuous Glucose Monitoring (CGM)



Use of Glucose Rate of Change Arrows to Adjust Insulin Therapy Among Individuals with Type 1 Diabetes Who Use Continuous Glucose Monitoring

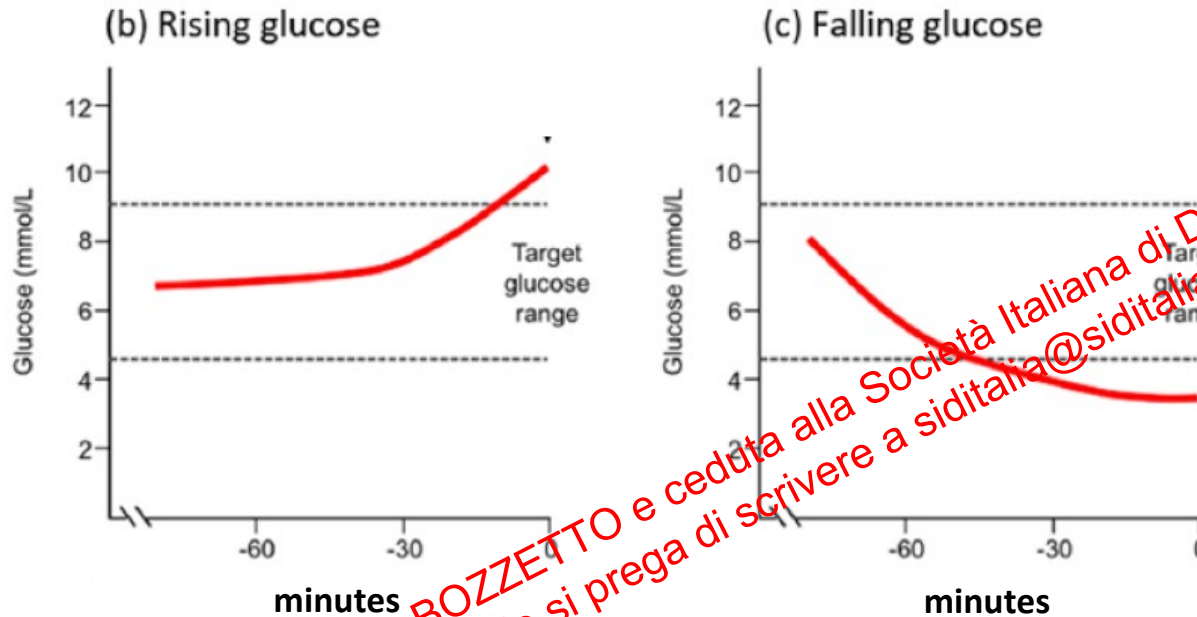


COSA INDICANO LE FRECCE

NUMERO DIREZIONE FRECCHE	TREND GLICEMIA	VELOCITÀ DI CAMBIAMENTO DELLA GLICEMIA (mg/dl/min)			
		L...E	D.....M	M.....L	E.....E
↑↑↑	IN SALITA	—	—	>3,0	—
↑↑		—	>3,0	>2,0	—
↑		>1,8	2-3	>1,0	>2,0
↗		1,1 - 1,8	1-2	—	1-2
→	STABILE	<1,1	<1,0	—	0-1
↘	IN DISCESA	1,1 - 1,8	1-2	>1,0	1-2
↓		>1,8	2-3	>2,0	>2,0
↓↓		—	>3,0	>3,0	—
↓↓↓		—	—	—	—

— non disponibile; *riferito agli ultimi 20 minuti.

COSA INDICANO LE FRECCE



- L'effetto di qualsiasi evento si determina determinando la perturbazione attuale del sistema continuerà ad agire per almeno altri 30-60 minuti
- In base a questo assunto è possibile "predire" il valore di glicemia dopo 15-45 minuti
- In base alla cinetica d'azione degli analoghi ultrarapidi il è verosimile che l'iniezione di un bolo di insulina in risposta alla comparsa di una freccia sia in grado di correggere il valore predetto di glicemia

Use of the DirecNet Applied Treatment Algorithm (DATA) for Diabetes Management with a Real-Time Continuous Glucose Monitor (the FreeStyle Navigator)

Adeguamento del bolo preprandiale

➡	Constant: Your glucose is steady (not increasing/decreasing more than 1 mg/dL each minute)
↗	Slowly rising: Your glucose is rising 1-2 mg/dL each minute
↑	Rising: Your glucose is rising 2-3 mg/dL each minute
↑↑	Rapidly rising: Your glucose is rising more than 3 mg/dL each minute
↘	Slowly falling: Your glucose is falling 1- 2 mg/dL each minute
↓	Falling: Your glucose is falling 2-3 mg/dL each minute
↓↓	Rapidly falling: Your glucose is falling more than 3 mg/dL each minute

No modifiche

Aumento del 10 %

Aumento del 20%

Aumento del 20%

Riduzione del 10%

Riduzione del 20%

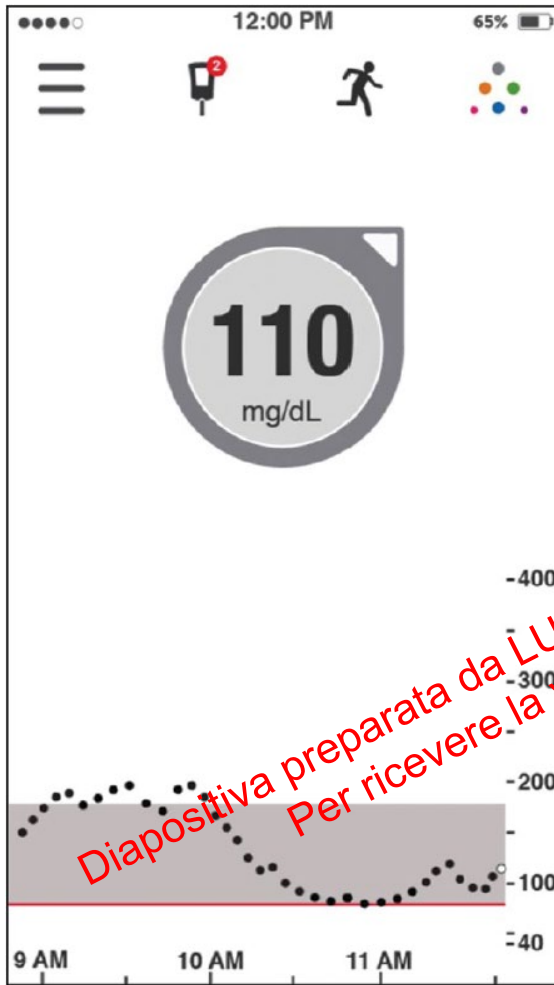
Riduzione del 20%

Recommendations for Using Real-Time Continuous Glucose Monitoring (rtCGM) Data for Insulin Adjustments in Type 1 Diabetes

Adjusted Glucose Value for Dosing	
 Glucose is <u>not</u> increasing/decreasing >1 mg/dl (0.06 mmol/l) per min	No Adjustment. Dose for current glucose value.
 Glucose increasing 1-2 mg/dl (0.06-0.11 mmol/l) per minute	Adjust UP -- current value <u>plus</u> 50 mg/dl <i>Actual Range: 30-60 mg/dl</i>
 Glucose increasing 2-3 mg/dl (0.11-0.17 mmol/l) per minute	Adjust UP -- current value <u>plus</u> 75 mg/dl <i>Actual Range: 60-90 mg/dl</i>
 Glucose increasing >3 mg/dl (0.17 mmol/l) per minute	Adjust UP -- current value <u>plus</u> 100 mg/dl <i>Actual Range: 90-150 mg/dl</i>
 Glucose decreasing 1-2 mg/dl (0.06-0.11 mmol/l) per minute	Adjust DOWN -- current value <u>minus</u> 50 mg/dl <i>Actual Range: 30-60 mg/dl</i>
 Glucose decreasing 2-3 mg/dl (0.11-0.17 mmol/l) per minute	Adjust DOWN -- current value <u>minus</u> 75 mg/dl <i>Actual Range: 60-90 mg/dl</i>
 Glucose decreasing >3 mg/dl (0.17 mmol/l) per minute	Adjust DOWN -- current value <u>minus</u> 100 mg/dl <i>Actual Range: 90-150 mg/dl</i>

The most conservative response to down arrows is to delay insulin administration until the trend arrow turns horizontal.

ESEMPIO: BOLO PREPRANDIALE



Target glicemico : 110 mg/dl for target glucose;

Rapporto Ins/CHO: 1:15

Fattore di correzione: 1:50 mg/dl

Quantità carboidrati: 45 g carbohydrate.

Dose di insulina per i carboidrati: 3UI

Dose di insulina per correggere la tendenza:

- Glicemia predetta in 30 minuti 160 mg/dl
- Dose di insulina necessaria per correggere la glicemia predetta 1UI
- **Dose di insulina da praticare 4 ui**

A Simplified Approach Using Rate of Change Arrows to Adjust Insulin With Real-Time Continuous Glucose Monitoring

Table 5. A Simple Formula to Adjust an Insulin Bolus by Adding to or Subtracting From the Usual Dose to Cover a 45-Minute Window, Based on Rate of Change Arrows.

Rate of change of rising glucose indicated by an arrow(s) on a CGM	1 to 2 mg/dl/minute	2 to 3 mg/dl/minute	>3 mg/dl/minute
Dose of insulin to be added to a bolus dose	1 unit	1.5 units	2 units
Rate of change of falling glucose indicated by an arrow(s) on a CGM	1 to 2 mg/dl/minute	2 to 3 mg/dl/minute	>3 mg/dl/minute
Dose of insulin to be subtracted from a bolus dose	1 unit	1.5 units	2 units

Table 6. The Minimum Total Daily Insulin Dose (Units) Corresponding to Three Insulin Sensitivities Determined by the CGM Rate of Change Arrow and the Formula Presented in This Article Than Calculated With the Rule of 1500 and the Rule of 1960.

Measured rate of change (mg/dl/min)	1-2 mg/dl/min	2-3 mg/dl/min	>3 mg/dl/min
Simplified rate of change	1.5 mg/dl/min	2.5 mg/dl/min	>3 mg/dl/min
Amount of change over 45 minutes	67 mg/dl	113 mg/dl	>135 mg/dl
Supplemental bolus dose per formula in this article	1 unit	1.5 units	2 units
Correction factor (mg/dl per unit) (= insulin sensitivity) to correct anticipated hyperglycemia	67	75	>67
Maximum insulin sensitivity that will result in both correcting hyperglycemia but avoiding overcorrection	67 mg/dl/unit	75 mg/dl/unit	>67 mg/dl/unit
Minimum total daily dose (TDD) to avoid overcorrection per rule of 1500: (1500/insulin sensitivity = TDD)	22 units/day	20 units/day	<22 units/day
Minimum total daily dose (TDD) to avoid overcorrection per rule of 1960: (1960/insulin sensitivity = TDD)	29 units/day	26 units/day	<29 units/day

Approach to Using Trend Arrows in the FreeStyle Libre Flash Glucose Monitoring Systems in Adults

Insulin Dose Adjustments Using the FreeStyle Libre System Trend Arrows in Adults: Pre-meal and Corrections ≥ 4 Hours Post-meal

Insulin Dose Adjustments

FreeStyle Libre
Trend Arrows

Correction Factor* (CF)

<25

25–<50

50–<75

≥ 75



+3.5 units

+2.5 units

+1.5 units

+1.0 units



+2.5 units

+1.5 units

+1.0 units

+0.5 units



No adjustment

No adjustment

No adjustment

No adjustment



-2.5 units

-1.5 units

-1.0 units

-0.5 units



-3.5 units

-2.5 units

-1.5 units

-1.0 units

Approach to Using Trend Arrows in the FreeStyle Libre Flash Glucose Monitoring Systems in Adults

Post-meal Scanning and Treatment Decisions for MDI and CSII-Treated Patients Using the FreeStyle Libre Systems

During the 4 hours following mealtime bolus, individuals needing corrective action should rely on current sensor glucose and predetermined ICR and CF values. Avoid taking additional bolus insulin doses within the first 2 hours to prevent insulin stacking.

2–4 hr Post-meal Glucose Concentration

>250 mg/dL

FreeStyle Libre Trend Arrows	Action
↑	Take corrective action using bolus insulin dose based on CF. Re-scan in 1 hour. If up arrow persists after additional hour: • Confirm with fingerstick • Change infusion site (if using an insulin pump) • Take additional corrective insulin dose based on CF
↗	Take corrective action using bolus insulin dose based on CF. Re-scan in 1 hour. Avoid additional correction doses for 2 hours.
→	No action needed. Rescan in 1 hour.
↘	No action needed. Rescan in 1 hour.
↓	No action needed. Rescan in 1 hour.

Approach to Using Trend Arrows in the FreeStyle Libre Flash Glucose Monitoring Systems in Adults

2–4 hr Post-meal Glucose Concentration

181–250 mg/dL



Consider corrective action using bolus insulin dose based on CF. Re-scan in 1 hour.
Avoid additional correction doses for 2 hours.



Consider corrective action using bolus insulin dose based on CF. Re-scan in 1 hour.
Avoid additional correction doses for 2 hours.



No action needed. Rescan in 1 hour.



No action needed. Rescan in 30 minutes.



No action needed. Rescan in 30 minutes.

Approach to Using Trend Arrows in the FreeStyle Libre Flash Glucose Monitoring Systems in Adults

2–4 hr Post-meal Glucose Concentration

181–250 mg/dL



Consider corrective action using bolus insulin dose based on CF. Re-scan in 1 hour.
Avoid additional correction doses for 2 hours.



Consider corrective action using bolus insulin dose based on CF. Re-scan in 1 hour.
Avoid additional correction doses for 2 hours.



No action needed. Rescan in 1 hour.



No action needed. Rescan in 30 minutes.



No action needed. Rescan in 30 minutes.

Approach to Using Trend Arrows in the FreeStyle Libre Flash Glucose Monitoring Systems in Adults

2–4 hr Post-meal Glucose Concentration

70–180 mg/dL



No action needed. Rescan in 1 hour.



No action needed. Rescan in 1 hour.



No action needed. Rescan in 1 hour.



Ingest 15 g fast-acting carbohydrate. Re-scan in 15–30 min. If sensor glucose ≤ 70 mg/dL with downward arrow at 30 min, confirm with fingerstick and ingest additional 15 g fast-acting carbohydrate.



Ingest 15 g fast-acting carbohydrate. Re-scan in 15–30 min. If sensor glucose ≤ 70 mg/dL with downward arrow at 30 min, confirm with fingerstick and ingest additional 15 g fast-acting carbohydrate.

Approach to Using Trend Arrows in the FreeStyle Libre Flash Glucose Monitoring Systems in Adults

Pre-Exercise Planning for Aerobic and Mixed Exercise Using Trend Arrows in the FreeStyle Libre Systems

Pre-Exercise Glucose Concentration

<100 mg/dL	100–180 mg/dL	181–250 mg/dL	>250 mg/dL
DO NOT Exercise <i>Ingest carbohydrate and/or wait until >100 mg/dL</i>	Exercise Carefully <i>Rescan every 30 minutes to avoid hypoglycemia</i>	Exercise <i>Rescan every 30 minutes to avoid hypoglycemia</i>	DO NOT Exercise <i>Correct and/or wait until ≤250 mg/dL</i>
↑ Wait until >100 mg/dL	↑ Rescan in 30 min	↑ Rescan in 30 min	↑ Correct to ≤180 mg/dL
↗ Wait until >100 mg/dL	↗ Rescan in 30 min	↗ Rescan in 30 min	↗ Correct to ≤180 mg/dL
→ Ingest 15 g carbohydrate	→ Consider ingesting 15 g carbohydrate*	→ Rescan in 30 min	→ Correct to ≤180 mg/dL
↘ Ingest 15 g carbohydrate	↘ Consider ingesting 15 g carbohydrate*	↘ Rescan in 30 min	↘ Wait until ≤250 mg/dL
↓ Ingest 30 g carbohydrate	↓ Consider ingesting 30 g carbohydrate*	↓ Consider ingesting 15 g carbohydrate	↓ Wait until ≤250 mg/dL

LIMITI DELL'UTILIZZO DELLE FRECCE

- In condizioni di fragilità bisogna utilizzare algoritmi più conservativi
- La malattia può modificare temporaneamente la sensibilità insulinica e rendere il controllo glicemico più erratico
- La composizione in macronutrienti del pasto può influenzare l'andamento glicemico postprandiale in una maniera che le frecce potrebbero non prevedere
- L'efficacia di nessuno degli algoritmi citati è stata verificata in e/o confrontata in trials randomizzati e controllati