Tight Glycemic Control In Critically Ill Patients: The STAR Framework

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Objective

Stochastic **TAR**geted (STAR) is a model-based, adaptive and patient-specific accurate glycemic control (AGC) framework, customizable to clinically specified glycemic targets, control approaches and clinical resources. This work compares two STAR pilot trials with different control approaches (insulin-only vs. insulin + nutrition) to results of the model-derived SPRINT.

Method

- STAR framework:
  - Measured blood glucose (BG)
  - Forecasted BG (intra-patient variability)

- Pilot trial of STAR in New-Zealand and in Belgium (SPRINT trial = reference)
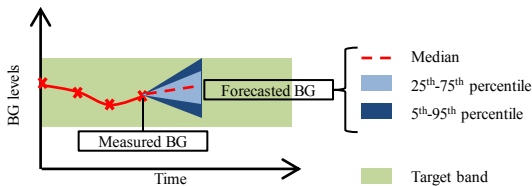
	STAR New-Zeland	STAR Belgium	SPRINT
Location	Christchurch Hospital (New Zealand)	Centre Hospitalier Universitaire (Liege, Belgium)	Christchurch Hospital (New Zealand)
BG target in mg/dL	80-120	100-140	72-110
Controller interventions	Insulin + nutrition	Insulin-only	Insulin + nutrition
Control length	Entire patient stay	24 hours	/
Measurement frequency	1-3 hourly	1-3 hourly	1-2 hourly

Results

- Belgian results:
  - Less % BG in bands, due to 24-hours trial length
  - BG levels are skewed slightly higher (given the target band), due to short trial length
  - Less moderate hypoglycemia (BG < 72 mg/dL), due to higher target band

- No severe hypoglycemia

- Tightly distributed BG levels (IQRs < 35 mg/dL)

	STAR New-Zeland	STAR Belgium	SPRINT
Hours of control	660	194	40.000
Number of measurements	402	91	/
BG levels in mg//dL (median [IQR])	108 [94-122]	134 [117-151]	104 [90-119]
% BG in 72-125 mg/dL	76%	35%	79%
% BG in 72-145 mg/dL	90%	65%	88%
% BG < 72 mg/dL	4.5%	1.1%	/
% BG < 40 mg/dL	0	0	2%

Conclusion

Pilot clinical trials demonstrate that STAR provides *flexible and customizable accurate glycemic control* to desired target levels, and compares well to a proven model-derived AGC protocol.

Contact

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