

INFLUENCE OF NURSING WORKLOAD ON TIGHT GLYCEMIC CONTROL

Carmona FJ, Martínez M, García S, Alameda R, Quirós C, Jara A,
Cerrillo I, Rollán G, Algora A, Sánchez JC
Critical Care Unit, Hospital Universitario Fundación Alcorcón (Spain)



Hospital Universitario
Fundación Alcorcón



Critical Illnes

HYPOTHALAMUS

Sympathetic nerves
↓
Adrenal medulla
↓
↑ adrenaline
↑ noradrenaline
↓
↑ glycogenolysis
↑ blood glucose

Adenohypophysis
↓
Adrenal cortex
↓
↑ glucocorticoids
↓
↑ gluconeogenesis

↑ Glucagon
↓
↑ glycogenolysis
↑ blood glucose
↑ gluconeogenesis

THERAPY
↓
Glucocorticoids
Enteral nutrition
Parenteral nutrition
Decreased level of activity

HYPERGLYCEMIA

HYPERGLYCEMIA



↓ Immune function

↓ Wound healing

↑ Oxidative stress

↑ Inflammatory factors

Endothelial dysfunction

Procoagulant state

Fluid shifts

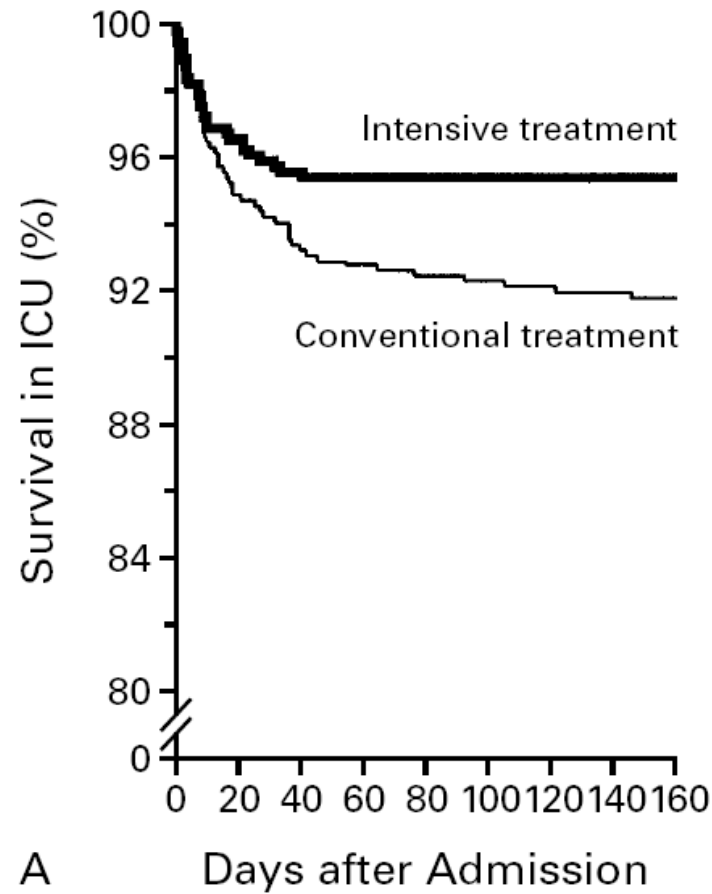
INTENSIVE INSULIN THERAPY IN CRITICALLY ILL PATIENTS

GREET VAN DEN BERGHE, M.D., PH.D., PIETER WOUTERS, M.Sc., FRANK WEEKERS, M.D., CHARLES VERWAEST, M.D., FRANS BRUYNINCKX, M.D., MIET SCHETZ, M.D., PH.D., DIRK VLASSELAERS, M.D., PATRICK FERDINANDE, M.D., PH.D., PETER LAUWERS, M.D., AND ROGER BOUILLON, M.D., PH.D. NOVEMBER 8, 2001

- RCT – 12 months – 1548 patients
- Intensive Insulin Therapy vs Conventional Treatment

- Conclusions:

- ↓ ICU mortality
- ↓ Hospital mortality
- ↓ complications
 - Bloodstream infections
 - Acute renal failure
 - Transfusions
 - Poly-neuropathy
 - ↓ days of mechanical ventilation



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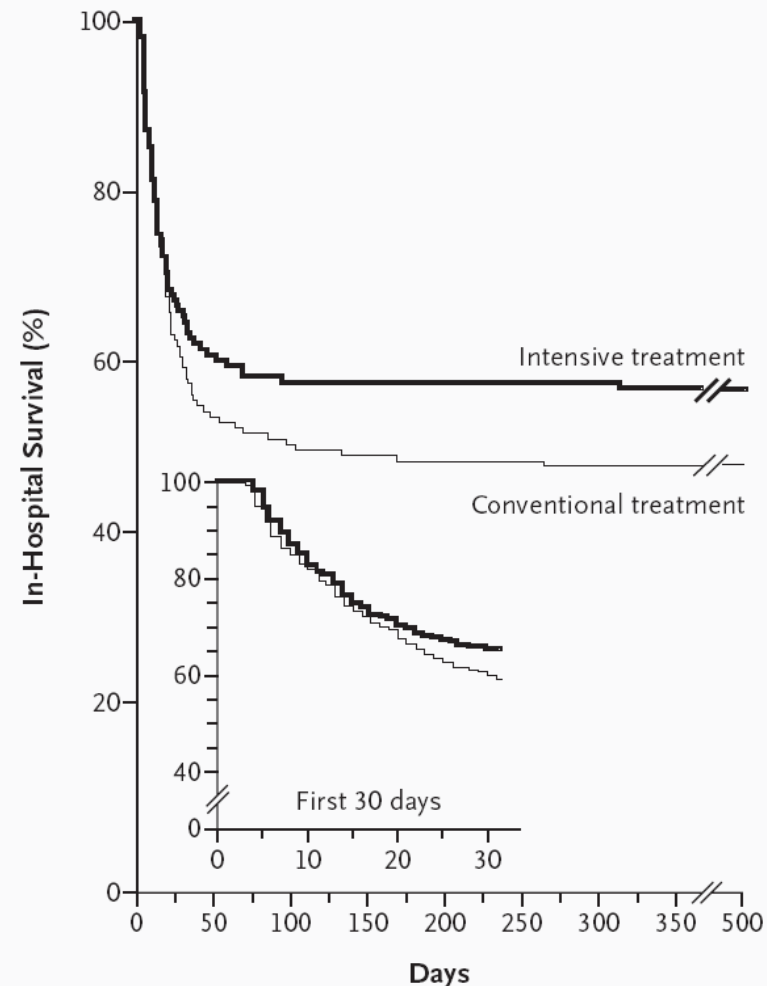
Intensive Insulin Therapy in the Medical ICU

FEBRUARY 2, 2006

Greet Van den Berghe, M.D., Ph.D., Alexander Wilmer, M.D., Ph.D., Greet Hermans, M.D., Wouter Meersseman, M.D., Pieter J. Wouters, M.Sc., Ilse Milants, R.N., Eric Van Wijngaerden, M.D., Ph.D., Herman Bobbaers, M.D., Ph.D., and Roger Bouillon, M.D., Ph.D.

- RCT – 1200 patients
- Intensive Insulin Therapy vs Conventional Treatment
- Conclusions:
 - ↓ ICU mortality (ICU LOS > 3 days)
 - ↓ hospital mortality (ICU LOS > 3 days)
 - ↓ morbidity
 - Acute renal failure
 - Accelerated weaning
 - ↓ hyperinflammatory states
 - ↓ costs

B Subgroup in ICU ≥3 Days (N=767)

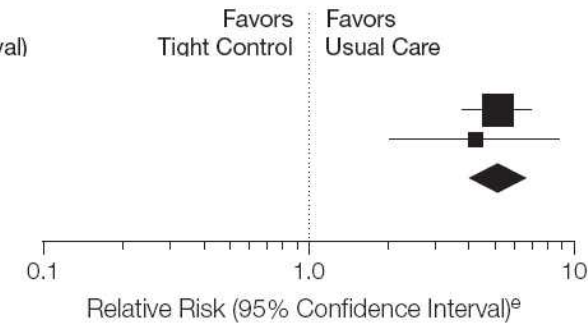


Benefits and Risks of Tight Glucose Control in Critically Ill Adults

A Meta-analysis

JAMA. 2008;300(8):933-944

Subarroup	No. of Studies	Outcome, No./Total No. of Patients (%)		Relative Risk (95% Confidence Interval)
		Tight Control	Usual Care	
Hypoglycemia (glucose \leq 40 mg/dL)^d				
Very tight control	11	409/2895 (14.1)	75/2952 (2.5)	5.23 (4.12-6.64)
Moderately tight control	4	41/380 (10.8)	9/386 (2.3)	4.37 (2.19-8.72)
Overall	15	450/3275 (13.7)	84/3338 (2.5)	5.13 (4.09-6.43)



- Meta-analysis – 29 RCT included
- No differences in mortality or new need for dialysis
- ↓ septicemia
- **INCREASED RISK OF HYPOGLYCEMIA**
 - 5-fold increase over conventional treatment
 - More common in very tight control
 - All ICU settings

EVALUATION OF NURSING WORK EFFORT AND PERCEPTIONS ABOUT BLOOD GLUCOSE TESTING IN TIGHT GLYCEMIC CONTROL

(*American Journal of Critical Care. 2006;15:370-377*)

- Small sample → 66 nurses

- Time

- 3 minutes 22 seconds
- 8 minutes 53 seconds

PERCEPTIONS

- TGC implies a great amount of nursing time (“too much work for bedside nurses”)
- Need for automation of blood glucose measurements

Table 2 Survey responses to statements about perceptions of glycemic control (n = 66)

Statement/question	Respondents	
	%	No.
Too much work	24	16
Takes too much time	44	29
Is a waste of time	6	4
Easier if automated	85	56
Like doing it	1.5	1
Is not difficult to do	38	25
Normal part of patients’ care	45	30
Should be done by someone other than a nurse	15	10
Willing to dedicate an intravenous catheter for measurement if automated and displayed	76	50
Who monitors blood glucose for patients receiving intravenous insulin infusions		
Registered nurses	90	
Clinical technicians	10	

OBJECTIVE

1. Evaluate nurse led TGC in our ICU:

- ✓ Assess the % of measurements within range
- ✓ Assess the number of hypoglycemic events

2. Determine the influence of nursing workload in a polivalent ICU in TGC

METHODOLOGY

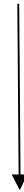
- Prospective correlational design → October '07 – May '08
- 12 bed polyvalent Intensive Care Unit
- 5 nurses / shift (ratio 1:2 – 1:3)
- Sample: 279 patients
- Data collected:
 - ✓ Glycaemic measurements in patients with TGC
 - ✓ Daily global NEMS score in ICU

TGC IN OUR ICU

Hyperglycemic patient



Physician prescribes TGC



Nurse

- Starts IV insulin infusion (1 unit/ml)

- Goal blood glucose range – 100-140 mg/dl

- Blood glucose measurements and insulin titration by nurse to achieve target range

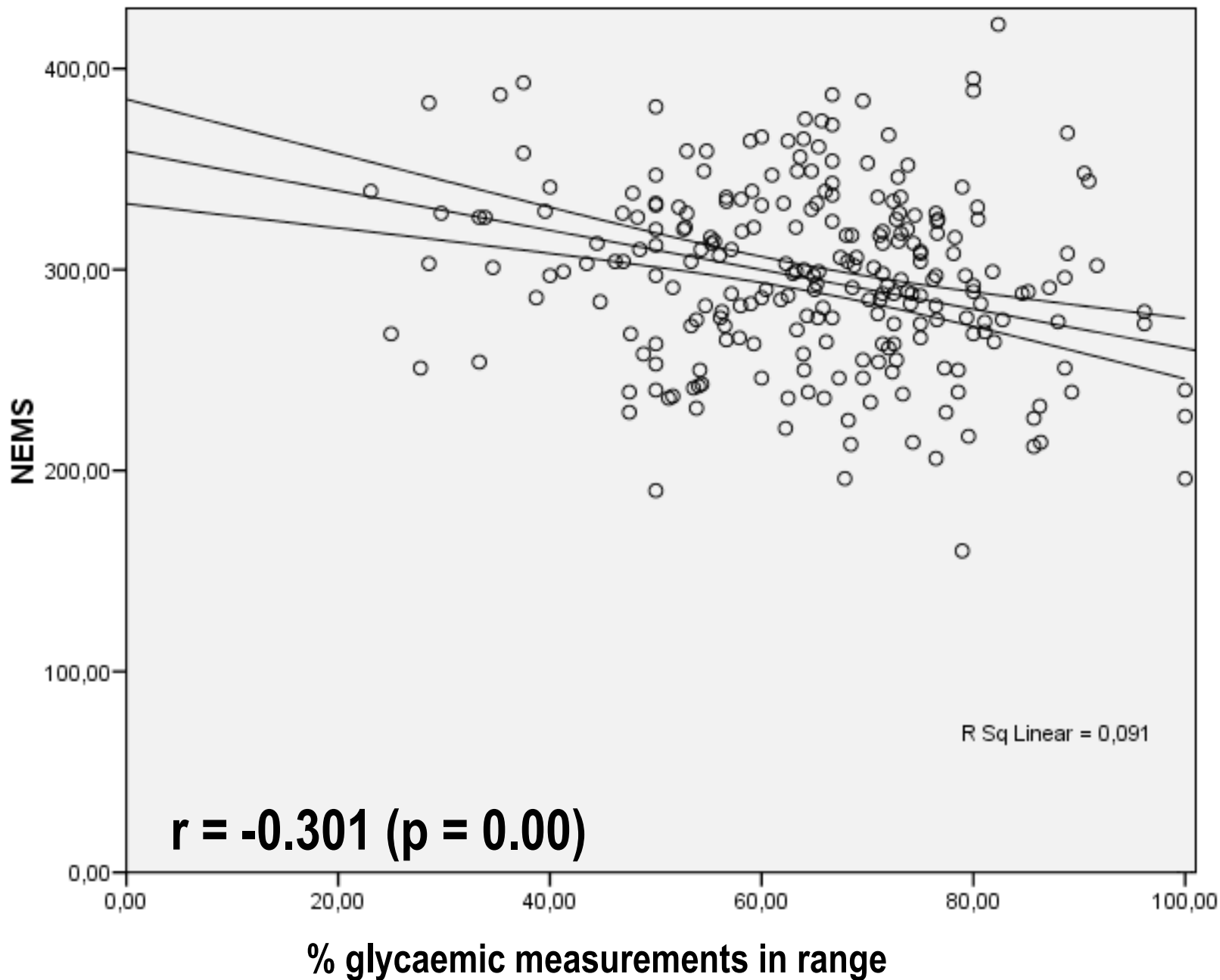
Mean occupancy = 91.1%	TGC group	Non-TGC group
Admission type	56	223
Coronary	6	113
Acute respiratory failure	24	36
Surgical procedure	3	4
Sepsis	10	8
Cardiac arrest	2	7
Politraumatism	2	6
Neurological	2	14
Other	7	35
Male	41	160
Female	15	63
Age	63.89 (14.00)	61.56 (15.31)
Length of stay	28 days	6 days

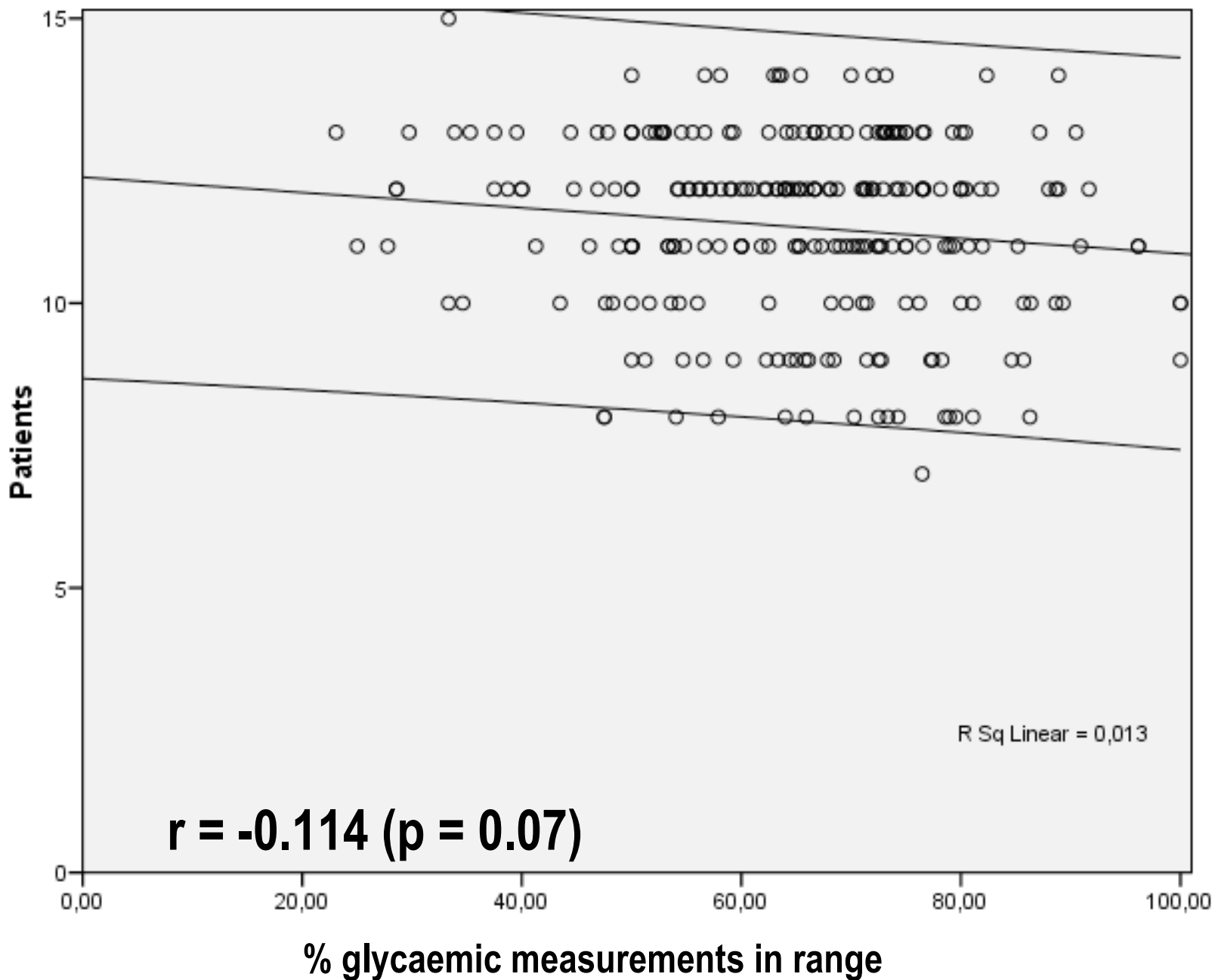
Hours of treatment	19041 hours	Median	190 h
	~ 794 days	P25	98.5 h
		P75	513 h

Measurements / patient	12.95 (5.99)
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	Range	n	%
9467 measurements	< 40	7	0.07
	41 – 89	468	4.94
	90 – 140	6135	64.80
	141 – 180	2219	23.44
	> 180	638	6.74

NEMS score	Median	297.5
	P25	268
	P75	328





CONCLUSIONS

1. Good blood glucose control in patients treated with TGC

- ✓ 65% measurements within target range
- ✓ Small incidence of hypoglycemic events (only 7 in over 19000 hours of treatment)

CONCLUSIONS

1. Global nurse workload in the ICU negatively influences TGC results



↑ nurse workload

↓ % of glycemic measurements within range

FUTURE RESEARCH

- Reevaluate the relationship between nursing workload and TGC using different scales (Nusing activities score → real nursing time)
- Need for inclusion of TGC in nurse workload measurements
- Need for new continuous blood glucose measurement devices in order to reduce adverse events