132BEvidence Tables for Chapter 22. Inpatient Intensive Glucose Control Strategies To Reduce Death and Infection (NEW)

Table 1, Chapter 22. Large trials (n > 500) evaluating the health outcome effects of IIT

| **Patient population**  **Single or multi-center**  **Country** | **Implementation/ Context** | **Diabetes mellitus (%)** | **Glucose target, T v C (mg/dL)** | **Inpatient BG achieved,**  **T v C (mg/dL)** | **Mortality and T v C (RR, 95% CI)** | **Hypoglycemia**  **Definition (mg/dL), rate T v C, RR (95%CI)** | **Other reported outcomes\***  **T v C** | **Quality** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SICU  Single center  Belgium10 | Insulin protocol was developed and use overseen by study investigators. | 13 | 80-110 v 180-200 | 103 v 153†  (p<0.001) | ICU mortality 4.6 v 8% (p=0.005 unadjusted) RR 0.42 (95% CI 0.22-0.62);  Hospital mortality: 7.2 v 10.9% (p=0.01)  RR 0.66; 95% CI 0.48-0.92 | <40, 5 v 0.76%, RR 6.65 (2.83-15.62) | Renal replacement  4.8 v 8.2% (p=0.007)  Sepsis  4.2 v 7.8% (p=0.0003) | Fair |
| Neurosurgical ICU  Single center  Italy58 | Efforts made to limit nursing turnover. New nursing staff worked with experienced staff. | NR | 80-110 v 180-200 | 92 v 143‡ (p<0.001) | 6-month mortality: 74.0 v 72.0% (p=0.82) | <50, 93.8 v 62.8%, p<0.001 | Sepsis 2.9 v 3.3% (p=NS)  Long-term disability:  40.2 v 41.1% (p=0.98) | Fair |
| MICU  Single center  Belgium59 | Study conducted in a hospital that had already conducted similar IIT study in SICU patients. Authors note the nurse:bed ratio of 2.5 was not changed for study. | 16 | 80-110 v 180-200 | 111 v 153†  (p<0.001) | ICU mortality: 24.2 v 26.8% (p=0.31)  Hospital mortality: 37.3 v 40.0% (p=0.33)  RR 0.93; 95% CI 0.81-1.08 90d mortality: 35.9 v 37.7% (p=0.53) | <40, 18.7 v 3.1% | Infection 0.7 vs 0.8% (p=NS)  Renal replacement 20.8 v 22.7% (p=0.50) | MICU  Single center  Belgium59 |
| MICU  Multicenter  Germany20 | No details provided | 30 | 80-110  v 180-200 | 112 v 151†  (p<0.001) | 28d mortality: 24.7 v 26% (p=0.74) RR 0.95, 95% CI 0.70-1.28  90d mortality: 39.7 v 35.4% (p=0.31) | <40, 17 v 4.1%  RR 4.11 (95% CI 2.21-7.63) | Renal replacement 27.5 v 22.5% (p=0.001) | MICU  Multicenter  Germany20 |
| MICU/SICU  Multicenter  Europe60 | Characteristics from each study site were reported. Median nurse:bed ratio was 2. ICUs ranged widely in size, patient volume, and number of glucometers per ICU. | 17 T, 22 C  (p=0.031) | 80-110 v 140-180 | 117 v 144‡  (p<0.001) | ICU mortality: 17.2 v 15.3% (p=0.41)  Hospital mortality: 23.3 v 19.4% (p=0.11)  28d mortality: 18.7 v 15.3% (p=0.14) | < 40, 8.7 v 2.7% | Renal replacement (patient days) 519 v 523 (p=0.75) | Fair |
| MICU/SICU  Single center  Saudi Arabia18 | 24/7 ICU coverage by intensivists. Protocol designed by multidisciplinary team at study site. Physicians and nurses attended training sessions before and during study. | 32 T,  48 C  (p<0.001) | 80-110  v 180-200 | 115 v 171‡  (p<0.001) | ICU mortality: 13.5 v 17.1% (p=0.70)  RR□ 1.09 (0.70-1.72)  Hospital mortality: 27.1 v 32.3% (p=0.19)  RR□ 0.84 (0.64-1.09) | < 40, 28.6 v 3.1%, p < 0.001 | Renal replacement  11.7 v 12.1% (p=0.89)‖  Sepsis 36.9 v 40.9% (p=0.35) | Fair |
| MICU/SICU  Single center  Colombia53 | Three month staff training period before study. | 13 T,  12 C  (p=NS) | 80-110 v 180-200 | 120 v 149‡ (p,0.001) | ICU mortality: 33.1 v 31.2%; RR 1.06 (0.82-1.37)  28d mortality: 36.6 v 32.4%;  RR 1.1 (0.85-1.42) | <40, 8.3 v 0.8% | Infection 27.2 v 33.2% (p=NS)  Renal replacement  10.8 v 13% (p=0.45) | Fair |
| MICU/SICU  Multicenter International54 | Pre-trial pilot studies carried out to test/improve insulin protocol. Final computerized insulin protocol algorithm accessible to study sites through a central Web site. No clear explicit training prior to study. | 20 | 80-108 v <180 | 115 v 144§ (p<0.001) | 28d mortality: 22.3 v 20.8% (p=0.17)  RR 1.09 (0.96-1.23)  90d mortality: 27.5 v 24.9% (p=0.02)  RR 1.14 (1.02-1.28) | <40, 6.8 v 0.5%  OR 14.7 (9.0-25.9) | Renal replacement  15.4 v 14.5% (p=0.34)  Sepsis  12.8 v 12.4% (p=0.57) | Fair |
| Acute MI  Multicenter CCU  Sweden61 | No details provided | 39 | 126-198 v NR | 24 hours:  T: 172.8 (59.4)  C: 210.6 (73.8) p < .001 | 3 month mortality: 12.4% v 15.6%, p = NS 1 year mortality: 18.6% v 26.1 %,  RR 0.69; 95% CI 0.49-0.96 | <54, 15.0 v 0% (p < .001) |  | Fair |
| Acute MI  Multicenter Europe62 | No details provided | 77 established DM; 23 new DM  of < 1y | group 1 and 2: 126-180 group 3: NR | 24 hours: group 1: 163.8 (54.0), group 2: 163.8 (50.4), group 3: 180.0 (64.8) p = .0001 | Adjusted 2-year mortality:  Group 1 v 3 = 1.19 (0.86 - 1.64) Group 2 v 3 = 1.23 (0.89 - 1.69) | < 54, Gr 1 v Gr2 v Gr3: 12.7 v 9.6 v 1.0 |  | Poor |
| Stroke  Mutlicenter Britain63 | Conducted as a “pragmatic” trial as part of routine clinical care. No clear explicit training prior to study. | 17 | 72-126 v <306 | 24 hour mean difference I v C (95% CI): 10.3 (4.9 - 15.5), p < .0001† | 90-day mortality: 30.0% v 27.3%,  OR (95% CI) = 1.14 (0.86-1.51) 90 day severe disability: 35.1% v 36.0%,  OR (95% CI) = 0.96 (0.70-1.32) | < 72 for > 30 mins, 15.7, control group rate NR |  | Poor |

Abbreviations: BG = Blood glucose; d = day; CCU = coronary care unit ; ICU = intensive care unit; MICU = medical intensive care unit; SICU = surgical intensive care unit; C = comparator; DM = diabetes mellitus; NR = not reported; NS = not statistically significant; RR = relative risk; T = treatment  
Other reported outcomes include renal replacement, infection, cardiovascular events, and long-term disability.   
Quality was assessed using criteria from the US Preventive Services Task Force.  
SI unit conversion for glucose: 1 mg/dL x 0.0555 = 1 mmol/L.  
**\*** Infection includes wound infection, urinary tract infection, or pneumonia; or a combination of these.   
† Morning blood glucose.  
‡ Average of blood glucose measurements, not otherwise specified.  
§ Time weighted mean blood glucose.  
□Adjusted for chronic liver disease, traumatic brain injury, APACHE II and international normalized ratio.

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