# HYPERGLYCAEMIA
## Supporting information

**This guideline has been prepared with reference to the following:**


Korytkowski MT, Muniyappa R, Antinori-Lent K et al. Management of Hyperglycemia in Hospitalized Adult Patients in Non-Critical Care Settings: An Endocrine Society Clinical Practice Guideline. J Clin Endocrinol Metab. 2022;107:2101-28

https://academic.oup.com/jcem/article-lookup/doi/10.1210/clinem/dgac278

NICE. Acute coronary syndromes. 2020. London. NICE

https://www.nice.org.uk/guidance/ng185

Qaseem A, Humphrey LL, Chou R, et al. Use of intensive insulin therapy for the management of glycemic control in hospitalized patients: a clinical practice guideline from the American College of Physicians. Ann Intern Med 2011;154:260-7

http://annals.org/article.aspx?articleid=746815


**If the patient is on rosiglitazone, insulin may precipitate heart failure?**
Canadian drug alerts have issued warning against this combination (Wooltorton, 2002). Glitazone therapy is associated in 2%-5% of patients with increases in fluid retention, increased plasma volume, and pulmonary oedema and may precipitate heart failure in patients with poor ventricular function (Wang, 2003).


Wang CH, Weisel RD, Liu PP, et al. Glitazones and heart failure: critical appraisal for the clinician. Circulation 2003;107:1350-4
http://circ.ahajournals.org/content/107/10/1350.long

Wooltorton E. Rosiglitazone (Avandia) and pioglitazone (Actos) and heart failure. CMAJ 2002;166:219
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC99278/


**Evidence Level: IV**

**Keeping glucose between 6-11 mmol/l with IV insulin improves the clinical outcome?**
A 2021 review stated that the general consensus is to maintain a blood glucose target of 7.8–10.0 mmol/l) for most hospitalized patients with and without critical illness (Goyal, 2021).
A meta-analysis of 35 RCTs involving 8478 patients (Pittas, 2004) showed a 15% decrease in short-term mortality associated with insulin therapy in critically ill hyperglycaemic patients (RR 0.85; 95% CI 0.75-0.97).
In an observational study involving 2,467 diabetic patients (Furnary, 1999), the use of IV insulin to keep glucose between 8.3-11.1 mmol/l decreased the risk of sternal wound infections following coronary artery bypass graft surgery by 58%.
The DIGAMI trial (Malmberg, 1997) demonstrated that the 1 year mortality rate in 306 diabetic myocardial infarction patients receiving intensive insulin therapy (keeping blood glucose to 8.2-9.6 mmol/l) was 29% lower than the 314 controls.
A randomised controlled trial of tight glycaemic control in 1,548 critically ill patients (Van den Berghe, 2001) found that patients with an average blood glucose level of 5.7 mmol/l experienced 44% lower mortality than those with an average of 8.5 mmol/l.
This suggests that hyperglycaemia is associated with adverse outcomes for hospitalised patients (both with and without diabetes) and that improvement in outcomes can be achieved with improved glycaemic control (Inzucchi, 2006; Montori, 2002).
An observational study in 38,864 acute coronary syndrome patients not previously known to be diabetic (Weston, 2007) found that 3835 (9.9%) had an admission glucose >/= 11 mmol/l. Insulin treatment was given to 31% of these patients (n=1188). The remaining patients not given insulin (n=2647) had a relative increased mortality risk of 56% at 7 days and 51% at 30 days.


Furnary AP, Zerr KJ, Grunkemeier GL, et al. Continuous intravenous insulin infusion reduces the incidence of deep sternal wound infection in diabetic patients after cardiac surgical procedures. Ann Thorac Surg 1999;67:352-62

Inzucchi SE. Management of hyperglycemia in the hospital setting. N Engl J Med 2006;355:1903-11

Malmberg K. Prospective randomised study of intensive insulin treatment on long term survival after acute myocardial infarction in patients with diabetes mellitus. DIGAMI (Diabetes Mellitus, Insulin Glucose Infusion in Acute Myocardial Infarction) Study Group. BMJ 1997;314:1512-5
http://www.bmj.com/content/314/7093/1512

Montori VM, Bistrian BR, McMahon MM. Hyperglycemia in acutely ill patients. JAMA 2002;288:2167-9

Pittas AG, Siegel RD, Lau J. Insulin therapy for critically ill hospitalized patients: a meta-analysis of randomized controlled trials. Arch Intern Med 2004;164:2005-11
http://archinte.jamanetwork.com/article.aspx?articleid=217492

Van den Berghe G, Wouters P, Weekers F, et al. Intensive insulin therapy in critically ill patients. N Engl J Med 2001;345:1359-67

Weston C, Walker L, Birkhead J. Early impact of insulin treatment on mortality for hyperglycaemic patients without known diabetes who present with an acute coronary syndrome. Heart 2007;93:1542-6
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2095747/

Goyal A, Mathew UE, Golla KK et al. A practical guidance on the use of intravenous insulin infusion for management of inpatient hyperglycemia: Intravenous Insulin Infusion for Management of Inpatient Hyperglycemia. Diabetes Metab Syndr. 2021;15

**Evidence Level: II**

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