

Background

Microsurgical free flap reconstruction is widely used for complex tissue defects, but outcomes are compromised by patient comorbidities. Diabetes mellitus (DM) is a well-recognized risk factor for impaired wound healing and infection, yet the relative contributions of **chronic glycemic control (HbA1c)** versus **acute perioperative hyperglycemia** remain incompletely defined.

Using a large multi-institutional EHR database with propensity score matching, we evaluated 60-day postoperative outcomes after free flap reconstruction across three diabetes-related exposures:

- DM vs non-DM
- HbA1c ≥7% vs <6.9% within 3 months preoperatively
- Perioperative glucose ≥180 vs <180 mg/dL on the day of surgery

Hypothesis:

Perioperative hyperglycemia is a strong predictor of postoperative complications after free flap reconstruction.

Methods

Data source. Retrospective cohort study of the TriNetX Research Network (de-identified EHRs from 70+ U.S. healthcare organizations, >100 million patients).

Population. Patients undergoing free flap reconstruction (CPT 15756–15758, 19364, 20955–20956, 20969) from July 2005 – July 2025. Patients with missing glycemic data were excluded.

Cohorts compared (after 1:1 propensity matching):

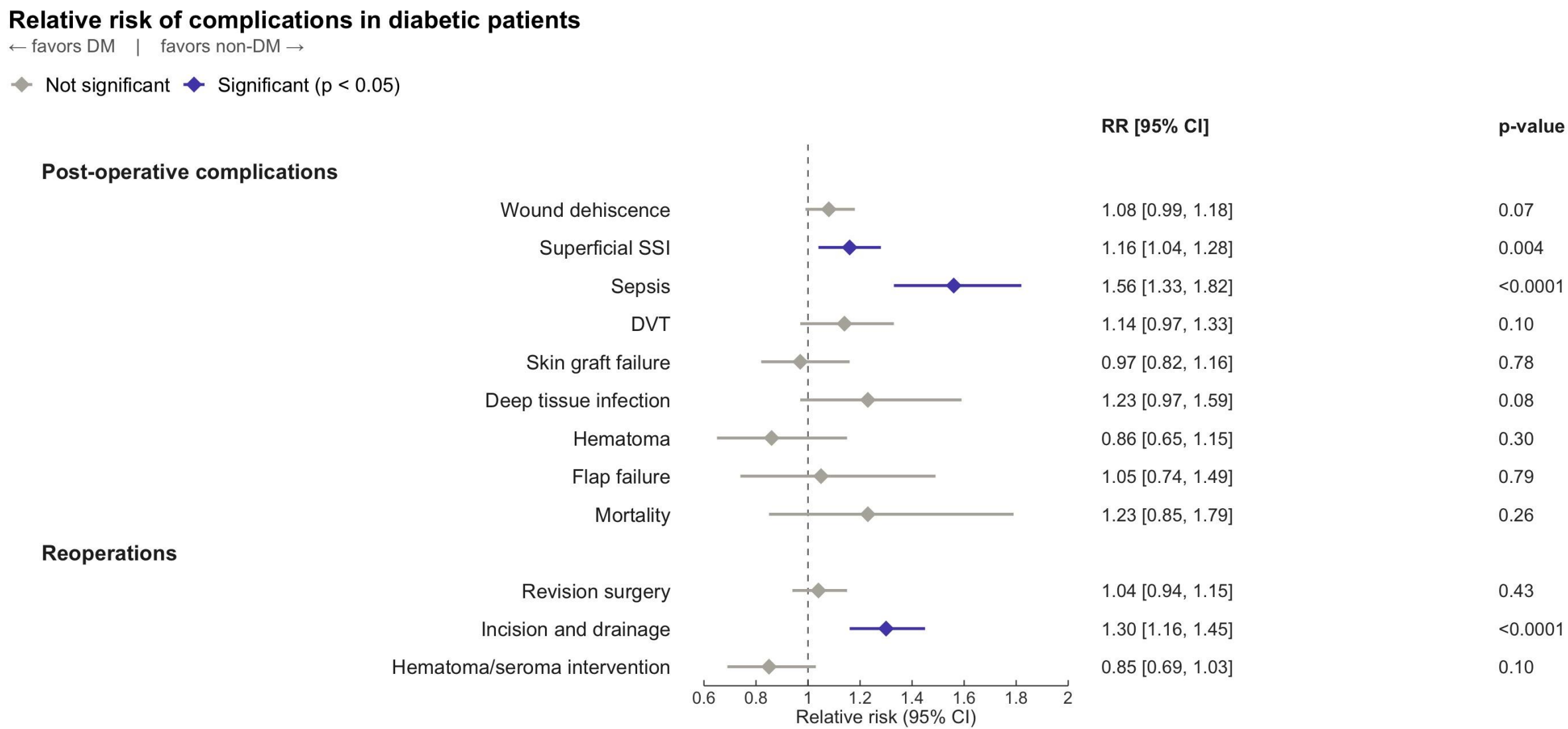
- DM (n=8404) vs non-DM (n=8404)
- HbA1c ≥7 (n=448) vs HbA1c <7 (n=338)
- Perioperative Glucose ≥180 (n=7312) vs <180 mg/dL (n=7312)

Matching covariates. Age, sex, BMI, nicotine dependence, hypertension, ischemic heart disease, liver cirrhosis, flap type.

Outcomes. 60-day all, major (requiring surgery), and minor complications; wound-related, bleeding, and systemic events; reoperations. Risk ratios with 95% CIs; χ^2 , t-test, or Fisher-Freeman-Halton as appropriate. Two-sided p<0.05.

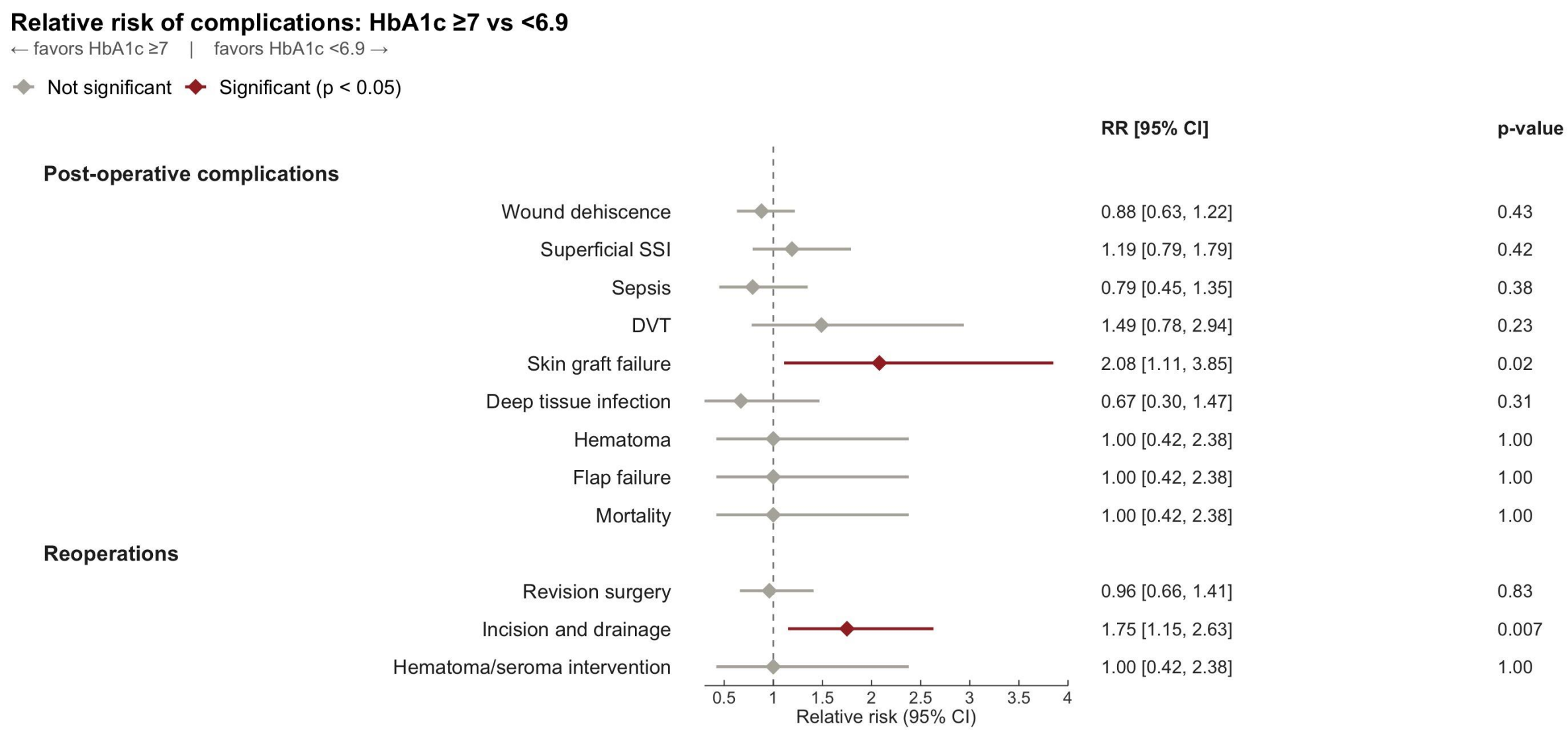
Outcomes : Preoperative Diabetes Mellitus vs No Diabetes

	Non-DM (n= 8404)	DM (n= 8404)	RR [96% CI]	p-value
All complications	4162 (49.53)	4333 (51.56)	1.04 [1.01, 1.08]	0.008
Major complications	1424 (16.94)	1585 (18.86)	1.12 [1.04, 1.19]	0.001
Minor complications	2738 (32.59)	2748 (32.70)	1.00 [0.95, 1.04]	0.88



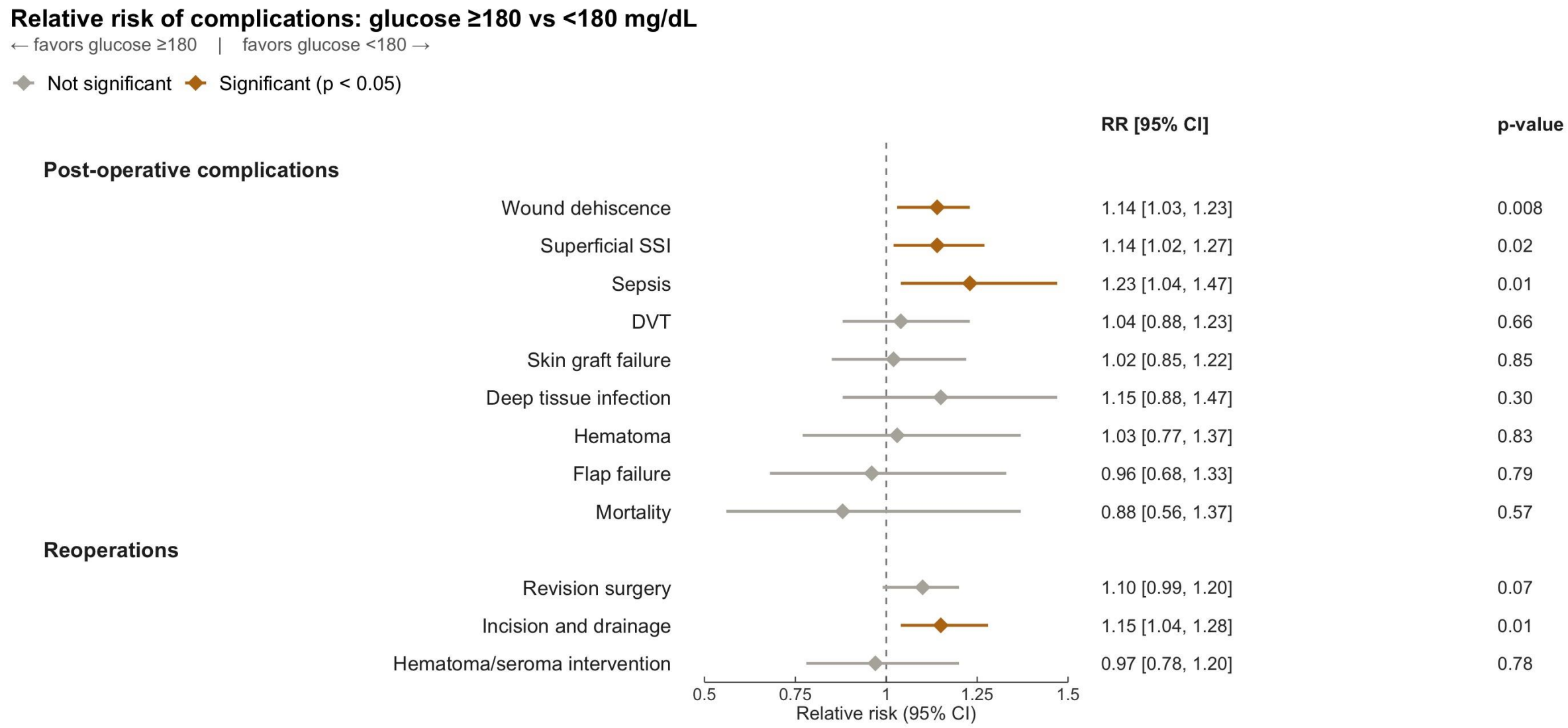
Outcomes : Preoperative Hba1c < 6.9 vs ≥ 7

	HbA1c <6.9 (n= 448)	HbA1c ≥ 7 (n= 448)	RR	p-value
All complications	252 (56.3)	255 (56.9)	1.01 [0.89, 1.14]	0.84
Major complications	86 (19.2)	103 (23)	1.19 [0.93, 1.54]	0.16
Minor complications	166 (37.1)	152 (33.9)	0.92 [0.77, 1.09]	0.36



Outcomes : Perioperative Glucose <180 mg/dL vs ≥ 180 mg/dL

	Glucose <180 mg/dL (n= 7312)	Glucose ≥ 180 mg/dL (n= 7312)	RR	p-value
All complications	3689 (50.45)	4163 (56.93)	1.14 [1.10, 1.16]	<0.0001
Major complications	1283 (17.55)	1436 (19.64)	1.12 [1.04, 1.19]	0.001
Minor complications	2406 (32.9)	2727 (37.29)	1.14 [1.09, 1.19]	<0.0001



Conclusions

- Diabetes** is associated with increased risk of **overall and major complications** following free flap reconstruction, particularly infectious complications:
 - Sepsis
 - Superficial surgical site infection (SSI)
 - Incision and drainage (I&D)
- Elevated HbA1c (≥7%)** is associated with approximately a twofold increase in skin graft failure and a significant rise in I&D requirement.
- Perioperative hyperglycemia (glucose ≥180 mg/dL)** is associated with increased risk of **overall, major, and minor complications**, including:
 - Wound dehiscence
 - Superficial SSI
 - Sepsis
 - Incision and drainage (I&D)

