

# FPIN's Clinical Inquiries

## Preoperative A1C Threshold in Patients with Diabetes

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### Clinical Question

In patients with diabetes mellitus who are preparing for total joint replacement, what is the preoperative A1C goal to reduce postoperative periprosthetic joint infections?

### Evidence-Based Answer

The risk of infection in patients with diabetes increases as the perioperative A1C level increases, although a cutoff of 7% for A1C is not achievable for all patients with diabetes. There is no definitive evidence-based A1C goal that will reduce periprosthetic joint infections for patients with diabetes who are preparing for total joint replacement. The evidence suggests that a perioperative A1C level of less than 7.5% may reduce the risk of such infections. (Strength of Recommendation: C, based on two retrospective cohort studies.)

### Evidence Summary

A 2018 systematic review and meta-analysis assessed the relationship between perioperative glycemic control and the risk of surgical site infection, mainly periprosthetic joint infection.<sup>1</sup> Six studies were included in the meta-analysis and had stratified glycemic control using a distinct A1C cutoff. The pooled results did not demonstrate a statistically significant association between an A1C level of greater than 7%

and surgical site infection or periprosthetic joint infection (pooled odds ratio = 0.87; 95% CI, 0.57 to 1.32;  $P = .51$ ). Heterogeneity among the studies was statistically significant ( $I^2 = 54.25\%$ ;  $P = .05$ ).

A 2017 retrospective cohort study (7,736 patients) analyzed the link between perioperative A1C and periprosthetic joint infections, as well as a potential threshold for risk stratification.<sup>2</sup> The risk of infection in patients with diabetes increases as perioperative A1C increases (odds ratio = 2.6; 95% CI, 1.9 to 3.4;  $P < .0001$ ). Out of 877 patients with an A1C level of 7.5 mg per dL (75 mg per L) or greater, 21 were infected (2.4%). In comparison, among those with an A1C level of less than 7.5 mg per dL, 69 out of 6,859 were infected (1.0%).

A 2017 retrospective multicenter study was designed to evaluate the potential link between A1C and subsequent periprosthetic joint infection, and to determine the optimal A1C threshold.<sup>3</sup> A total of 1,645 patients with diabetes were included in the analysis. Overall, 22 cases of periprosthetic joint infection occurred by one year (1.3%). A1C at a threshold of 7.7% was distinct for predicting periprosthetic joint infection. Using this threshold, periprosthetic joint infection rates increased from 0.8% (11 of 1,441) for patients with an A1C of less than 7.7% to 5.4% (11 of 204) in those with an A1C above 7.7%. In the

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## CLINICAL INQUIRIES

stepwise logistic regression analysis, periprosthetic joint infection was the only variable associated with higher A1C (odds ratio = 1.5; 95% CI, 1.2 to 2.0;  $P = .0001$ ). There was no association between high A1C levels and other complications.

### Recommendations from Others

The American Diabetes Association, American Association of Clinical Endocrinologists, American College of Endocrinology, and European Association for the Study of Diabetes support long-term target A1C levels below 6.5% to 7%, which can be a difficult goal for many adult patients.<sup>4-6</sup> The American Orthopaedic Association states that there is limited-strength evidence showing that patients with diabetes are at an increased risk of periprosthetic joint infection with hip or knee arthroplasty.<sup>7</sup>

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