The Impact of Diabetes on Infection Rates in Orthopaedic Joint Replacement Surgery

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Background

- Over the next decade the projected exponential rise in obesity is predicted to increase the prevalence of diabetes by greater than 50%. (1)
- Diabetes is a risk factor for post-operative infections, furthermore, higher rates of SSIs (surgical site infections) have been observed in patients with diabetes, particularly for total joint replacements. (2)
- Not only do infections add to costs for the NHS, they also increase a patient's length of stay and can lead to adverse health.
- The HbA1c test is utilised to determine average blood glucose levels over a 3-month period. A recent systematic review has postulated that preoperative HbA1c has little effect on outcomes, but there has been conflicting evidence. (3)

Aims and Objectives

The aim of this project is to evaluate the adherence and effect of the new set of guidelines recently established by the Cardiff and Vale Orthopaedic Centre (CAVOC) with a focus on diabetic control. This encompasses:

- Gaining an insight into the function of the CAVOC and examining historic infection rates in the department.
- Undertaking background reading of relevant studies on diabetic control and infection rates in total hip and knee replacements.
- Completing a retrospective cohort study to determine the impact that HbA1c has on infection rates.
- Discussing results from the study with the microbiology team and comparing them to predicted rates.

Methods

- The 7-week length of the project meant that a prospective study was not feasible as it leaves a short window for an infection to develop and then be followed up. Thus, a retrospective cohort study was selected for a 3-month period from December 2015 – February 2016.
- It was decided that all patients who underwent total hip and knee replacements as well as revisions would be enrolled for this data collection.
- Recent guidelines outlined by the department have stated that an HbA1c of less than 69 mmol/mol (8.5%) should be targeted prior to referral. This has been reduced from the previous value of 75 mmol/mol (9%).

Results

Variable		All patients (n = 321)	Percentage with infections
Sex	Male	124	5.7
	Female	197	3.6
Age	≥65	217	4.2
	<65	104	4.8
HbA1c	≥7% (53 mmol/mol)	12	16.7
	<7%	49	10.2
Presence of Diabetes	Diabetic	61	11.5
	Non-Diabetic	260	2.7

Table 1. Percentage of patients with infections with preoperative variables

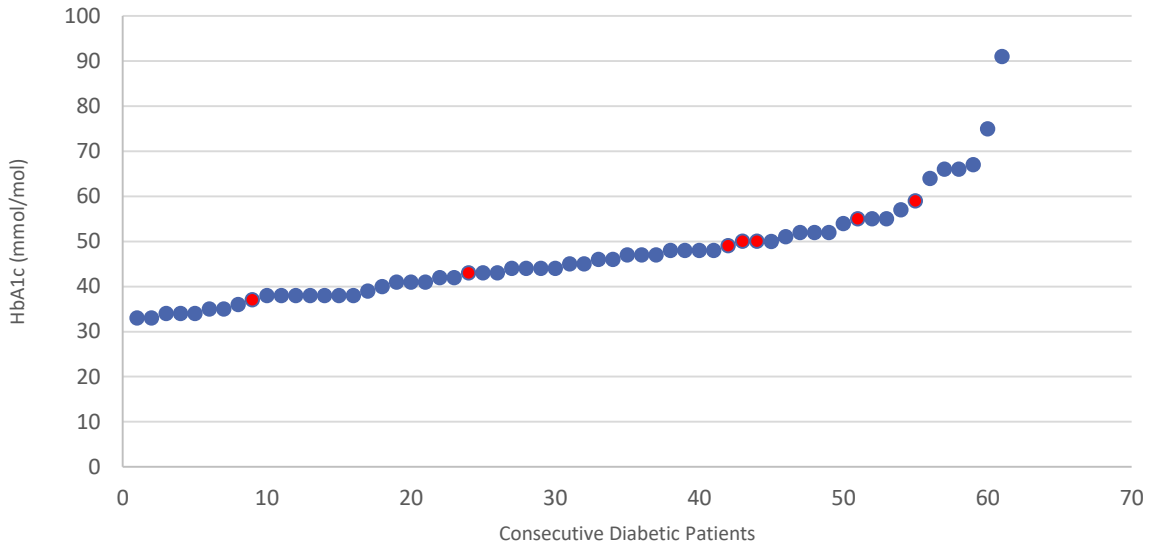

Figure 1. Preoperative HbA1c Values in Diabetic Patients with and without Infection (● = cases of infection)

HbA1c	Infection	No infection	Totals
HbA1c ≥7%	2	10	12
HbA1c <7%	5	44	49
		Relative Risk:	1.63

Table 2. Relative risk calculation

Discussion

- The study confirms an association between tight preoperative glucose control indicated by a HbA1c level less than 7% and a decreased risk of post-operative infections.
- A positive outcome of the study is that the results were utilised by the microbiology team who found that the rate of SSIs had been reduced.
- The team would expect a rate of surgical site infections of 1-2% for primary hip replacements (1.1% national average), and around 2% for knee replacements (1.7% national average) although this does not include revisions. Therefore, the results were slightly higher (2.6% for hip replacements and 1.8% for knee replacements in the population).

Conclusion

- A reduction in readmission rates secondary to SSIs is key, as this would enable patients to be managed in the community which would reduce financial costs.
- Ideally, blood glucose levels should be optimised prior to elective surgery with other risk factors accounted for.
- One aspect for the future that would be useful to focus upon is whether there is a significant difference in infection rates for the HbA1c values that are near the threshold. This is particularly relevant as there is still insufficient trial data to recommend an upper limit for the HbA1c preoperatively. (4)

References

1. Diabetes UK. Facts and Stats [Internet]. 1st ed. 2016 [cited 30 October 2016]. Available from: https://www.diabetes.org.uk/Documents/Position%20statements/Diabetes%20UK%20Facts%20and%20Stats_Dec%202015.pdf

2. Medscape. Diabetes a Big Risk Factor for Surgical Site Infections [Internet]. Medscape. 2016 [cited 30 October 2016]. Available from: http://www.medscape.com/viewarticle/856619#vp_2

3. Rollins K, Varadhan K, Dhatariya K, Lobo D. Systematic review of the impact of HbA1c on outcomes following surgery in patients with diabetes mellitus. Clinical Nutrition. 2016;35(2):308-316.

4. Diabetes UK. Management of adults with diabetes undergoing surgery and elective procedures: Improving standards. [Internet]. 1st ed. 2015 [cited 30 October 2016]. Available from: https://www.diabetes.org.uk/Documents/Professionals/Reports%20and%20statistics/Surgical%20guidelines%202015%20-%20full%20FINAL%20amended%20Mar%202016.pdf