HbA1c levels and hospital admission in people with Type 1 diabetes

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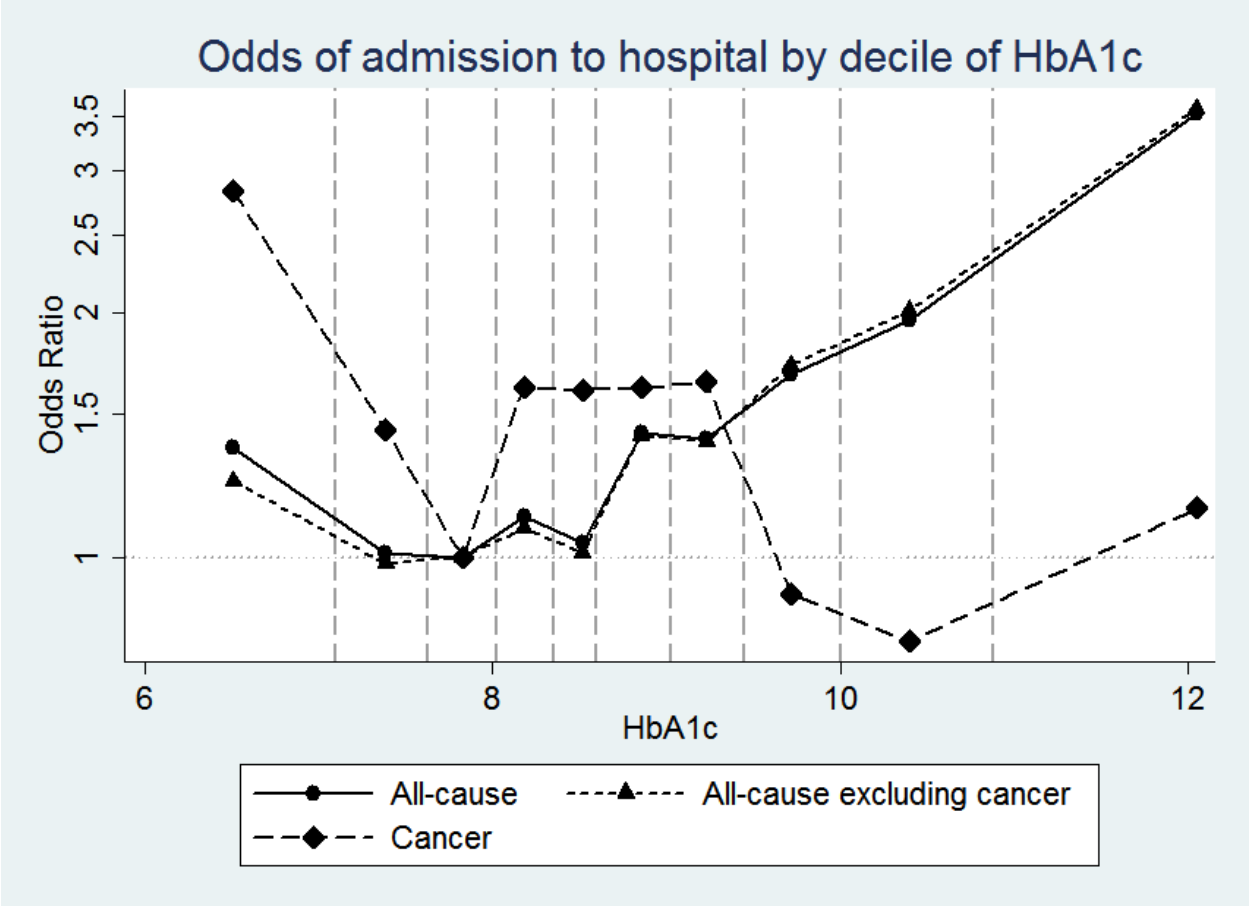
Background and aims: There has been recent concern that very tight glycaemic control might be associated with an increase in morbidity in people with diabetes. We assessed the relationship between deciles of HbA1c and hospital admissions in patients with type 1 diabetes.

Materials and methods: The Scottish Care Information – Diabetes Collaboration (SCI-DC) is a dynamic national register of diagnosed cases of diabetes in Scotland. These data were linked to centralised data on hospital admissions from Information Services Division (ISD) of NHS National Services. We identified 24,760 people with type 1 diabetes during January 2005 to December 2007 and include 19,777 patients with complete recording of covariates. Patients were divided into deciles according to levels of HbA1c. All-cause admission to hospital was the primary outcome. Logistic regression models were used to estimate the association between HbA1c and all cause admissions expressed with decile 3 (mean HbA1c 7.8%, range 7.6%-8.0%) as referent and adjusted for potential confounding factors including age, sex, previous vascular disease, creatinine, body mass index and diabetes duration.

Results: 8.1 % of people had HbA1c <7.0% and 16.2% under 7.5%. There was a J-shaped relationship of HbA1c to all hospital admissions with highest likelihood of admission (adjusted odds ratio 3.54, 95%CI 3.04-4.12) in the highest HbA1c decile (12.1%; 10.8-18.4%) but also increased admissions (adjusted OR 1.36, 95%CI 1.13-1.64) in the lowest HbA1c decile (6.5%; 4.4-7.1%). Cancer admissions showed a broadly inverse relationship with HbA1c (adjusted OR 2.38, 95%CI 1.33-6.03) in the lowest decile of HbA1c, see Figure. Vascular admissions showed a positive relationship with HbA1c with significantly higher likelihood of admission in HbA1c deciles 7 through 10 (9.03-18.4%). Likelihood of vascular admission was not significantly increased in the lowest decile of HbA1c (adjusted OR 1.10, 95%CI 0.65-1.87) and an increase in all cause admissions remained even after excluding admissions due to cancer and hypoglycaemia (adjusted OR 1.26, 95%CI 1.07-1.49).

Conclusion: Low and high mean HbA1c values were associated with increased admission to hospital with lowest rates of admission for any cause in deciles 2 through 5 (HbA1c 7.1-8.7%) People with the lowest levels of HbA1c had an increase in cancer admissions and this likely reflects reverse causality in this observational dataset. However, an increase in admissions remains even after exclusion of cancer and hypoglycaemic admissions. Overall the likelihood of admissions increases markedly with HbA1c and the highest levels of HbA1c marks out a group with high likelihood of admission and attendant hospital costs.


Odds of admission to hospital by decile of HbA1c
Odds Ratio
1
1.5
2
2.5
3
3.5
6
8
10
12
HbA1c
All-cause
All-cause excluding cancer
Cancer