Steroid Induced Hyperglycaemia and Diabetes on the Haematology Ward: Are we getting it right? Re-audit following Initiation of JBDS-IP Guidelines and Teaching

Lazarus K [1], Abdalraheem A [1], Ross S [1], Zakout G [2], Hui E [1]
Dept of Endocrinology & Diabetes (1) and Dept of Haematology (2), Northwick Park Hospital, London North West University Healthcare NHS Trust

INTRODUCTION

- High doses of pulsed steroids are commonly integrated in chemotherapeutic regimens used for treating haematological malignancies. This can worsen glucose control in people with pre-existing diabetes (steroid induced hyperglycaemia (SIH)) or induce diabetes (steroid induced diabetes (SID)).
- The prevalence of SIH/SID in the outpatient setting has been reported to be as high as 40%[1]. The prevalence however, of SIH/SID in haematology inpatients and the effects of different steroid regimens used in various haematological malignancies on glycaemic control in inpatients are not largely known.
- Our aim was to evaluate the prevalence and management of SIH/SID in patients admitted with haematological malignancies receiving steroid; and to compare the detection, diagnosis and management of SIH/SID with the audit standards outlined in JBDS for in-patient care, management of hyperglycaemia and steroid therapy before and after implementing local guidelines and teaching.

METHODS

- We collected data using a standard proforma based on NADIA on all patients admitted to the Haematology ward receiving steroids over 2 months in 2018 (Group 1) and re-audited in 2019 (Group 2) after implementing 2 single-paged guidelines on SID (for patients without known diabetes) and SIH (patients with known diabetes) based on the JBDS-IP guidelines .
- Teaching sessions were also delivered to haematology ward staff (aimed at both nursing and medical teams) on how to monitor glucose and how to escalate SID/SIH treatment based on the guidance.

PATIENT CHARACTERISTICS

	Group 1 (n = 18)	Group 2 (n = 18)
Mean age (years)	63	71
Age range (years)	30 - 88	31 - 91
Male, female	10 male, 8 female	13 male, 5 female
Haematological diagnosis	10 Lymphoma 4 Multiple Myeloma 2 ALL 1 AML 1 CLL	6 Lymphoma 6 Myeloma 1 ALL 3 CLL 1 Myelofibrosis 1 Waldenstrom's macroglobulinemia
Average dose (hydrocortisone equivalent dose/24 hours) and Average Duration	155 mg (100-625mg) 14 Days	462 mg (100-1332mg) 8.6 Days
Steroids Used (Number of Patients)	Dexamethasone (12) Prednisolone (2) Methylprednisolone (1) Prednisolone + hydrocortisone (1) Dexamethasone + hydrocortisone (1) Methylpred + Dexamethasone (1)	Dexamethasone (13) Prednisolone (5)

REFERENCES

1. Vidler et al (2017:) Outpatient management of steroid-induced hyperglycaemia and steroid-induced diabetes in people with lymphoproliferative disorders treated with intermittent high dose steroids. *J Clin Transl Endocrinol.* 2017 Jun 24;9:18-20
2. Radin et al (2013), Pitfalls in HbA1c Measurement: When results may be misleading; *J Gen Intern Med* 29(2): 388-94

RESULTS

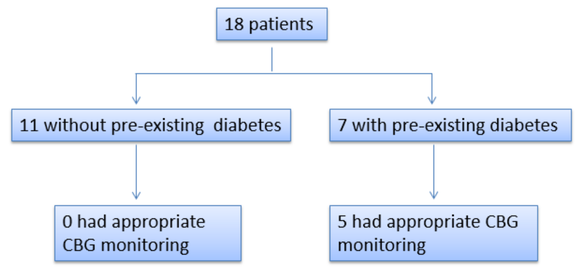
Percentage of haematology in-patients with appropriate capillary blood glucose monitoring as per JBDS guidelines whilst on Steroids

Figure 1.

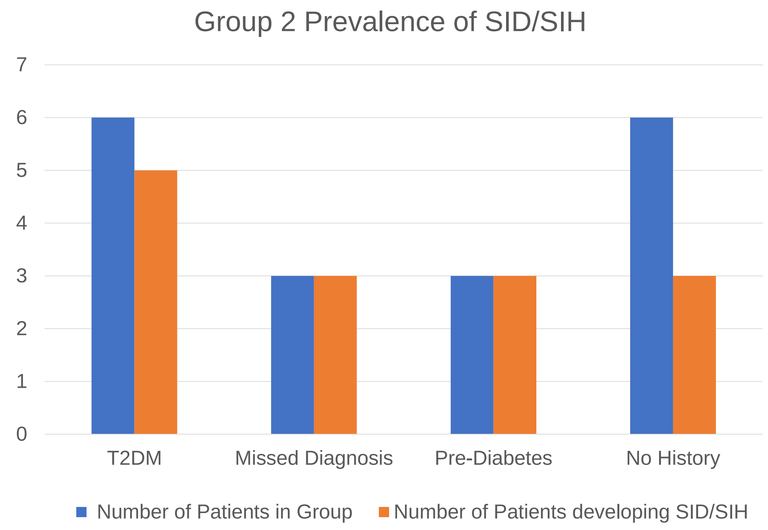
Group 1 Pre-Guidelines (2018) Appropriate Monitoring	Group 2 Post-Guidelines (2019) Appropriate Monitoring
28%	94%

- Figure 1 showed that prior to education and guidance in Group 1 (2018), only 28% had appropriate capillary blood glucose (CBG) monitoring.
- Figure 2 showed that in Group 1, none of the 11 steroid-treated patients without pre-existing diabetes had appropriate CBG monitoring, including 4 without any monitoring, 4 only had fasting CBG monitored and 3 had infrequent monitoring. 2 out of 11 developed SID and referred to diabetes team. 5 out of 7 with known diabetes had appropriate CBG monitoring and 6 developed SIH needing escalation or initiation of diabetes treatment. We concluded from our baseline investigation in 2018 that there was an underestimation of the prevalence of SID/SIH due to inappropriate monitoring of CBG, especially in patients without pre-existing diabetes.
- In Group 2, 94% (17 out of 18) patients had appropriate monitoring of CBG promptly after steroid initiation.

Figure 2.



Prevalence of SID/SIH



- Figure 3. Prevalence of SID/SIH in Group 2.
- 14/18 patients developed SID or SIH. 11/12 patients with a known diagnosis or pre-diabetes developed SIH. Of the 6 patients without a known diagnosis of diabetes, 3 developed SID. 3 Patients had a previous history of raised HbA1c and were labelled as a possible missed diagnosis. All 3 developed SID.
- The high prevalence in group 2 may reflect improved screening and a higher average dose of steroid than group 1

Audit Standards Pre and Post Introduction of Guidelines and Teaching

	Audit standard	Group 1 Findings	Group 2 Findings
Proper screen for steroid-induced hyperglycaemia	90%	28%	94%
Patients with steroid induced hyperglycaemia with adequate glucose control	75%	33 %	100%
Patients with steroid induced diabetes with appropriate glucose control	75%	0 %	100%
Patients discharged from hospital with an appropriate diabetes discharge plan	100%	12.5 %	33%
Patients with steroid induced diabetes, appropriately screened for diabetes	75%	0 %	*
Patients at end of life managed appropriately on end of life steroid induced diabetes pathway	75%	0 %	100%

* Incomplete follow up data in patients with SID following stopping steroids to screen for diabetes.

CONCLUSIONS

- Awareness of SIH/SID and need for appropriate monitoring was low among Haematology staff in the inpatient setting, especially in those without known diabetes underestimating the prevalence of SID/SIH.
- Following an awareness campaign through teaching and guideline implementation, there was a significant improvement in screening, detection and prompt treatment of SIH/SID.
- We achieved the recommended national standard of monitoring for SIH/SIH, in 94% being appropriately screened (JBDS-IP audit standard 90%).
- Further work is needed to improve post discharge care planning. Similar practice review is currently being planned in the outpatient setting, and on general medical wards.