



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

K Lazarus, AA Raheem, S Ross, E Nogueira, E Hui, G Zakout  
Northwick Park Hospital, London, UK



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%<sup>1</sup>. 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.
- The Joint British Diabetes Societies for Inpatient care (JBDS-IP) guidelines recommend measuring HbA1c to screen patients prior to starting steroids; however this can be misleading in patients with a paraprotein, splenomegaly, and recent blood transfusions – all frequently encountered findings in haemato-oncologic patients<sup>2</sup>. Patients without pre-existing diabetes on steroid therapy should have once daily monitoring of capillary blood glucose prior lunch or evening meal, and four times daily in those with diabetes.
- We evaluated the management of SIH/SID and implemented a protocol for detection and management of SIH/SID on a haemato-oncology ward.

### Risk Factors for SID/SIH<sup>3</sup>

- High steroid doses
- Prolonged steroid treatment
- Obesity (BMI>30)/Polycystic ovarian syndrome
- Increasing Age
- Personal History of previous SIH/SID and previous history of gestational diabetes
- Family History of Diabetes

### METHODS

- Data from a single-centre haemato-oncology inpatient service receiving therapy as per the NICE guidelines for their respective haemato-oncologic condition was collected using a standard proforma over a 2 month period 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).
- Teaching sessions were delivered and an algorithm for screening and management of SIH/SID based on JBDS-IP guidelines was introduced post Group 1 analysis.

### Type 2 diabetes and steroid treatment – General Guidance<sup>4</sup>

Monitoring	Guidance
Monitoring	<ul style="list-style-type: none"> <li>Set target for Capillary Blood Glucose (CBG) e.g. 6-10mmol/L</li> <li>Consider increasing monitoring to 4 times daily</li> <li>Refresh diabetes education with patient</li> </ul>
If hyperglycaemia on non-insulin therapies	<ul style="list-style-type: none"> <li>Gliclazide – titrate to maximum of 320mg daily, with maximum 240mg in the morning</li> <li>Metformin – titrate to maximum of 1g BD</li> </ul>
If hyperglycaemia on insulin therapies	<ul style="list-style-type: none"> <li>If on evening once daily human insulin consider switch to morning dosing</li> <li>If uncontrolled hyperglycaemia or multiple daily dosing of steroid consider switch to basal analogue insulin (or alternative regimen) and involve diabetes team in hospital or community</li> <li>Beware of nocturnal and early morning hypoglycaemia</li> </ul>

### RESULTS

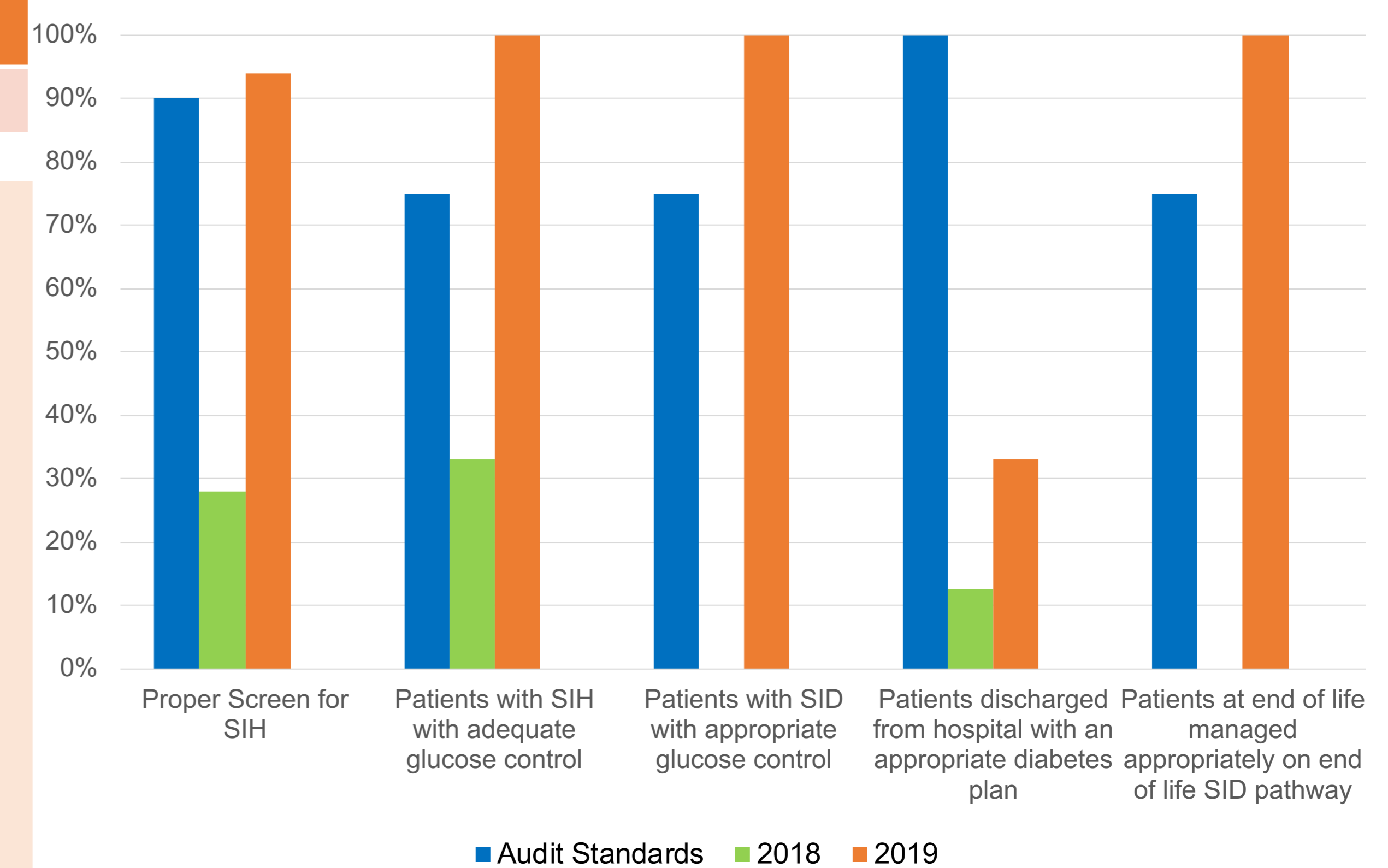
#### Patient Characteristics

	Pre-Guidelines 2018 (n = 18)	Post-Guidelines 2019 (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 (5 NHL, 1 HL) 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 + Methylpred (1) Dexamethasone + Pred (1) Dexamethasone + Hydrocortisone (1) Methylpred + Dexamethasone (1)	Dexamethasone (13) Prednisolone (5)
Percentage of patients with appropriate capillary blood glucose monitoring (as per JBDS guidelines whilst on steroids)	28%	94%

#### Capillary Blood Glucose Monitoring (according to JBDS Guidelines) and Prevalence of SID/SIH

Pre-Guidelines 2018	Post-Guidelines 2019
28%	94%
<b>2018</b> Total = 18  7 known Diabetes 11 no Diabetes  4/11 – No monitoring 4/11 Fasting CBGs only (?Undiagnosed SID) 3/11 – Infrequent/delayed monitoring 2/11 – Developed SID  6/7 Developed SIH	<b>2019</b> Total = 18  6 known Diabetes 12 no Diabetes  9/12 Developed SID 5/6 Developed SIH

#### Audit Standards and Findings Pre/Post Implementation of Guidelines



- With improved CBG monitoring, 78% of patients were found to have SIH/SID in Group 2, compared to 44% in Group 1.
- 9 out of 12 patients in Group 2 without known diabetes developed SID, 5 out of 6 patients with known diabetes developed SIH.
- This could be due to increased screening and a higher average steroid dose in Group 2 compared with Group 1.
- Escalation of diabetes treatment plan including gliclazide or insulin initiation based on the protocol was also proactively and promptly started in 6 patients in Group 2 before diabetes team review, compared to none in Group 1.

### CONCLUSIONS

- Awareness of SIH/SID was low among Haematology in the inpatient setting, in particular SIH.
- Our intervention led to 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.

### REFERENCES

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- Radin et al (2013), Pitfalls in HbA1c Measurement: When results may be misleading; *J Gen Intern Med* 29(2): 388-94
- Roberts et al (2018), Management of Hyperglycaemia and steroid (glucocorticosteroid) therapy: a guideline from the Joint British Diabetes Societies (JBDS) for Inpatient Care group; Diabetes UK Position Statements
- JBDS-IP Guidelines (2014), Management of Hyperglycaemia and Steroid (Glucocorticoid) Steroid Therapy.