



Assessing the Knowledge of Sick-Day Rules Among Patients on Long-Term Glucocorticoids and Healthcare Professionals in a UK District General Hospital

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Abstract

Introduction Adrenal insufficiency can happen because of decreased cortisol production as a result of negative feedback on the hypothalamic–pituitary–adrenal axis, caused by excess exogenous glucocorticoids (GC). The most common cause of adrenal insufficiency is, in fact, abrupt stoppage of exogenous GC. Patients with adrenal insufficiency are at risk of developing life-threatening adrenal crisis if GC is reduced or stopped abruptly, or if GC dose is not increased during periods of increased stress. The adrenal crises should be preventable with education of patients and healthcare professionals (HCPs) about “sick-day” rules, the importance of “steroid cards,” and the utility of parenteral steroids.

Methods This study was aimed at assessing the knowledge of sick-day rules in patients on long-term GC as well as HCPs.

Patients aged above 18 years on long-term GC presenting to the endocrinology clinic over 6 weeks were included after audit-committee approval.

Results We assessed 18 consecutive patients in total, 61% (11/18) of whom said that they have received information about sick-day rules from an HCP. Only 38% (7/18) had access to emergency hydrocortisone-kit.

We assessed 36 HCPs. Thirty-six (13/36) percent were aware of steroid emergency card and 50% (18/36) HCPs exhibited awareness regarding steroid dose during acute event and 27% of (10/36) HCPs were aware of accessible hospital intranet resources.

Conclusion This study revealed significant lack of awareness of sick-day rules among patients and HCPs alike. Majority of patients failed to carry steroid emergency card or medic alert bracelet and majority of HCPs and patients lacked knowledge of sick-day rules.

Keywords

- ▶ adrenal insufficiency
- ▶ glucocorticoid
- ▶ healthcare professionals
- ▶ patients
- ▶ steroids

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Introduction

Exogenous glucocorticoid (GC) supplementation is known to cause secondary hypoadrenalism by suppressing hypothalamic–pituitary–adrenal (HPA) axis.¹ This can lead to decreased production of both corticotropin-releasing hormone from the hypothalamus and adrenocorticotropic hormone from the pituitary gland, leading to a low serum cortisol level.²

The most common cause of cortisol deficiency is sudden stoppage of exogenous GC.³ Patients taking 5 mg prednisolone or equivalent oral doses of GC for longer than 4 weeks are at risk of HPA axis suppression and adrenal crisis if physiologically stressed, for instance, during acute illness, surgery, or other invasive procedures.⁴

The use of systemic GCs is 1 to 3% of the general population.^{5–8} A systematic review and meta-analysis found that the absolute risk of adrenal insufficiency induced by oral GCs was 48.7%, with the highest risk in people with hematologic malignancies (60%), followed by patients with a history of renal transplant (56.2%), inflammatory bowel disease (52.2%), and rheumatologic disorders (39.4%).⁹

Patients with adrenal insufficiency are at risk of developing life-threatening adrenal crisis if GCs are reduced or stopped abruptly, or if GC dose is not adjusted during periods of increased stress (e.g., illness, trauma, or surgery). Acute adrenal crisis is a medical emergency and can present with hypotension, shock, and hyponatremia in 90% of patients. It requires urgent treatment with hydrocortisone. The healthcare workers not always realize the urgency of treatment for acute adrenal crisis or fail to heed the requests of well-informed patients for hydrocortisone.^{10,11}

The adrenal crises should be preventable with education of patients and healthcare professionals (HCPs). However, studies show significantly low awareness in both the groups,^{12,13} leading to failure to increase steroids during “stress” and potentially an adrenal crisis. Knowledge about “sick-day” rules, the importance of “steroid cards,” and the utility of parenteral steroids is shown to be suboptimal.^{14,15}

Methods

This study was aimed at assessing the knowledge of sick-day rules in patients on long-term GC as well as HCPs and implementing quality improvement measures at our district

general hospital (Noble’s hospital) in Isle of Man, United Kingdom.

Patients aged above 18 years on long-term steroids presenting to the endocrinology clinic over 6 weeks were included after audit-committee approval.

Patient questionnaire (► **Table 1**) had questions on steroid emergency card, medic alert bracelet, receipt of sick-day rule information, accessibility to emergency hydrocortisone-kit, and awareness of sick-day rules. HCPs at Nobles hospital including foundation-year doctors, senior house officers, specialty registrars, and staff nurses were surveyed (► **Table 2**) on awareness of steroid emergency card, knowledge of emergency parenteral steroid use at home, steroid dosage during acute illness, and ability to access sick-day rule information on intranet.

As a service improvement/audit project, only verbal consent was obtained from all participants.

Results

We assessed 18 consecutive patients in total, in which only 66% (12/18) carried their steroid emergency card, 27% (5/18) wore a medic alert bracelet, and 61% (11/18) of patients said that they have received information about sick-day rules from an HCP. Only 38% (7/18) had access to emergency hydrocortisone-kit. Forty-four percent (8/18) patients were aware of steps to be taken in response to an acute infection and 11% (2/18) were aware of appropriate response to vomiting (► **Table 3**).

We assessed 36 HCPs and their responses were anonymized, and 36% (13/36) were aware of steroid emergency card. Only 11% (4/36) HCPs had knowledge of emergency use of parenteral steroids at home, 50% (18/36) HCPs exhibited awareness regarding steroid dose during acute illness, and 27% (10/36) HCPs were aware of accessible hospital intranet resources (► **Table 4**).

The study has limitations due to small number of patients and HCPs were recruited, as it was performed in a small district general hospital.

Discussion

Our study has revealed significant gaps in knowledge about safety aspects of long-term GC therapy among patients and HCPs.

Table 1 Patient questionnaire

Do you take STEROIDS for a medical condition?
1. Do you regularly carry a “steroid card” with you?
2. Do you wear a medic-alert bracelet that identifies you as someone who takes steroids?
3. Have you received any instructions about “sick-day rules” for steroids from your doctor/HCP team?
4. What you will do to your steroid daily dose if you develop fever, chest infection, or urine infection
5. What you will do to your steroid dose if you are feeling nauseous?
6. What you will do if you start vomiting?
7. Do you have a hydrocortisone emergency kit?

Abbreviation: HCP, healthcare professional.

Table 2 Healthcare professional questionnaire

1. What is your current role?
FY1 FY2 SHO StR SN others.....
2. Do you know the criteria for which patients should be issued with a steroid card?
3. Have you ever given advice to patients about “sick-day rules” when starting long-term steroid treatment?
4. How confident do you feel about giving advice on “sick-day rules” for patients taking long-term steroids?
5. What is your current knowledge of “sick-day rules” in steroid therapy?
6. Do you, or have you ever recommended parenteral steroids for emergency home use?
7. Do you know where to access advice on sick-day rules on the hospital intranet?

Abbreviations: FY1, foundation year 1; SHO, senior house officer; SN, staff nurses; StR, specialty registrars.

Table 3 Patients questionnaire response

Parameter	Percentage/number of patients
Carried their steroid emergency card	66% (12/18)
Wore a medic alert bracelet	27% (5/18)
Patients said that they have received information about sick-day rules	61% (11/18)
Had access to emergency hydrocortisone-kit	38% (7/18)
Patients were aware of steps to be taken in response to an acute infection	44% (8/18)
Appropriate response to vomiting	11% (2/18)

Table 4 HCPs questionnaire response

Parameter	Percentage/number of HCPs
Aware of steroid emergency card	36% (13/36)
Knowledge of emergency use of parenteral steroids at home	11% (4/36)
Awareness regarding steroid dose during acute event	50% (18/36)
Awareness of accessible hospital intranet resources	27% (10/36)

Abbreviation: HCPs, healthcare professionals.

A survey by Kate et al has also shown similar results with lack of awareness about different aspects of safe usage of supra-physiological doses of GC among both the groups. Only 20% of patients received instructions about “sick-day” rules from HCP, 2% had access to parenteral steroids at home, and 68% were unaware of precautions to take in the context of minor and major stress. Of the HCP group, 46% advised patients about “sick-day” rules at the start of treatment, 42% recommended parenteral steroids for emergency home use, and 12% responded that they have not recommended increasing steroid dosage during “stress.”¹⁵ In another survey in rheumatology practice during coronavirus disease 2019 (COVID-19) wave, only 50% HCPs always or usually counseled patients about corticosteroid sick-day rules, and 28% did this rarely or never.¹⁶

Adrenal crises can be easily prevented by following appropriate sick-day rules. Patients on corticosteroids with adrenal failure should carry a medical alert bracelet and a card stating that they take steroids daily. They need to be advised to double their regular GC replacement dose during

intercurrent illness and to alert doctors and nurses to the need for early admission and parenteral steroid replacement during more severe illness and surgery. It is also recommended that patients carry the emergency information issued by the Addison's self-help group.¹⁷

There is a recent guidance published by Society for Endocrinology Emergency Card working group on adrenal insufficiency and adrenal crises, entailing who is at risk and how should they be managed.¹⁸

The following group of patients should be given an emergency steroid card because of their risk of adrenal insufficiency. They should be given hydrocortisone 100 mg when they present to hospital being unwell or during surgery/procedures.

- 1) If a patient had three or more short courses of high-dose GCs (e.g., prednisolone 40 mg daily or equivalent) within the last 12 months and for 12 months after stopping.
- 2) If a patient has three or more GC intramuscular or intra-articular injections within the preceding 12 months and for 12 months after stopping.

- 3) Inhaled steroid therapy of fluticasone more than 500 µg/day or beclomethasone 1,000 µg/day and for 12 months after stopping.
- 4) Patient taking high-dose topical steroid (≥ 200 g/week) on large area of skin for 4 weeks and greater.
- 5) COVID-19 patients given dexamethasone for more than 10 days.

There is subgroup of patients who would need emergency steroid cards and also information on the sick-day rules. These are the group of patients at significantly higher risk of HPA axis suppression and accordingly adrenal insufficiency. They should be treated with hydrocortisone if present to hospital unwell and during surgery/procedures.

- 1) Patients on oral prednisolone more than or equal to 5mg/day or equivalent doses of other GC for more than 4 weeks and for 12 months after stopping.
- 2) Patients with chronic respiratory disease such as chronic obstructive pulmonary disease and asthma on high-dose inhaled steroids receiving repeated courses of oral steroids
- 3) Patients on GCs and CYP3A4 inhibitors at the same time (thus having enhanced serum cortisol concentrations with the resultant risk of HPA axis suppression).

A home emergency kit of hydrocortisone is not routinely needed in these patients unless there is a particular clinical concern. Also, to be aware that corticosteroids used via multiple routes simultaneously significantly increase the risk of adrenal suppression.¹⁸

The study was conducted in a small district general hospital and is single centered. The number of patients and HCP was limited due to the same reason.

Conclusion

This study revealed significant lack of awareness of sick-day rules among patients and HCPs alike. Majority of patients failed to carry steroid emergency card or medic alert bracelet due to compliance issues, and more than 50% lacked knowledge of sick-day rules due to knowledge gap and explanation of the importance of the same. Most of the HCPs were unaware of sick-day rules and available information resources.

Patients need to be advised on sick-day rules and this information should be reiterated at every patient contact.

Authors' Contribution

All authors contributing to data collection and writing/reviewing the article.

Compliance with Ethical Principles

Audit was internal audit committee approved and no ethical approval required as it was an audit.

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None.

Conflict of Interest

None declared.

References

- 1 Liu D, Ahmet A, Ward L, et al. A practical guide to the monitoring and management of the complications of systemic corticosteroid therapy. *Allergy Asthma Clin Immunol* 2013;9(01):30
- 2 Schlaghecke R, Kornely E, Santen RT, Ridderskamp P. The effect of long-term glucocorticoid therapy on pituitary-adrenal responses to exogenous corticotropin-releasing hormone. *N Engl J Med* 1992;326(04):226-230
- 3 Charmandari E, Nicolaidis NC, Chrousos GP. Adrenal insufficiency. *Lancet* 2014;383(9935):2152-2167
- 4 Sagar R, Mackie SW, Morgan A, Stewart P, Abbas A. Evaluating tertiary adrenal insufficiency in rheumatology patients on long-term systemic glucocorticoid treatment. *Clin Endocrinol (Oxf)* 2021;94(03):361-370
- 5 van Staa TP, Leufkens HG, Abenham L, Begaud B, Zhang B, Cooper C. Use of oral corticosteroids in the United Kingdom. *QJM* 2000;93(02):105-111
- 6 Laugesen K, Jørgensen JOL, Sørensen HT, Petersen I. Systemic glucocorticoid use in Denmark: a population-based prevalence study. *BMJ Open* 2017;7(05):e015237. Doi: 10.1136/bmjopen-2016-015237
- 7 Overman RA, Yeh JY, Deal CL. Prevalence of oral glucocorticoid usage in the United States: a general population perspective. *Arthritis Care Res (Hoboken)* 2013;65(02):294-298
- 8 Laugesen K, Jørgensen JOL, Petersen I, Sørensen HT. Fifteen-year nationwide trends in systemic glucocorticoid drug use in Denmark. *Eur J Endocrinol* 2019;181(03):267-273
- 9 Broersen LH, Pereira AM, Jørgensen JO, Dekkers OM. Adrenal insufficiency in corticosteroids use: systematic review and meta-analysis. *J Clin Endocrinol Metab* 2015;100(06):2171-2180
- 10 Erichsen MM, Løvås K, Fougner KJ, et al. Normal overall mortality rate in Addison's disease, but young patients are at risk of premature death. *Eur J Endocrinol* 2009;160(02):233-237
- 11 Bergthorsdottir R, Leonsson-Zachrisson M, Odén A, Johannsson G. Premature mortality in patients with Addison's disease: a population-based study. *J Clin Endocrinol Metab* 2006;91(12):4849-4853
- 12 Quinkler M, Beuschlein F, Hahner S, Meyer G, Schöfl C, Stalla GK. Adrenal cortical insufficiency—a life threatening illness with multiple etiologies. *Dtsch Arztebl Int* 2013;110(51-52):882-888
- 13 Kampmeyer D, Lehnert H, Moenig H, Haas CS, Harbeck B. A strong need for improving the education of physicians on glucocorticoid replacement treatment in adrenal insufficiency: an interdisciplinary and multicentre evaluation. *Eur J Intern Med* 2016;33:e13-e15
- 14 Kampmeyer D, Haas CS, Moenig H, Harbeck B. Self-management in adrenal insufficiency - towards a better understanding. *Endocr J* 2017;64(04):379-385
- 15 Grounds K, Khan I, Adlan M, Premawardhana L. Poor knowledge of safety aspects of long-term steroid use among patients and healthcare professionals. *Clin Med (Lond)* 2017;17(04):378-380
- 16 Mehta P, Meeran K, Macphie E, et al. Variability in counselling for adrenal insufficiency in COVID-19 and beyond: a survey of rheumatology practice. *Lancet Rheumatol* 2021;3(02):e92-e94
- 17 Wass JAH, Howell TH, Arlt W, Pearce S. 2011 Addison's disease. Potentially life-threatening steroid dependency. Addison's Disease Self Help Group. 2011
- 18 Erskine D, Simpson H (on behalf of Specialist Pharmacy Service & Society for Endocrinology) Exogenous steroids, adrenal insufficiency and adrenal crisis – who is at risk and how should they be managed safely. 2021 https://www.endocrinology.org/media/4030/spssfesupporting_sec_final_hls-19022021-2-1.pdf. Accessed May 7, 2022