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DIABETIC Medicine

LETTER

COVID-19 and dexamethasone-induced hyperglycaemia: Workload implications for diabetes inpatient teams

The RECOVERY trial showed that mortality in patients requiring supplementary oxygen or ventilation for COVID-19 is reduced by administration of dexamethasone 6 mg daily for up to 10 days.[1] This welcome finding led to an increased frequency of dexamethasone use at our district general hospital. However, high-dose glucocorticoid exposure is a well-recognised cause of hyperglycaemia, particularly in the presence of diabetes.[2–7] Furthermore, glucocorticoid-induced hyperglycaemia is associated with an increased risk of mortality, infections, and cardiovascular events.[8] Guidelines have been developed to address these risks, both in the general inpatient setting and specifically in the context of COVID-19.[9,10]

After observing an increase in referrals for dexamethasone-related inpatient hyperglycaemia, and related complications, during the extended second wave of the COVID-19 pandemic, we decided to quantify the impact of this change in clinical practice on the workload of the diabetes specialist team. We conducted a retrospective audit, using ICD-10 codes to identify every inpatient episode at East Surrey Hospital with a coded diagnosis of COVID-19 whose admission started between 2 December 2020 and 2 February 2021 inclusive.

Overall, 1178 episodes included a positive SARS-CoV-2 RNA PCR test. Of these, the combination of ICD-10 codes U07.1, J12.8 and B97.2 identified 829 episodes of care, for 791 individual patients, that were coded as COVID-19 pneumonia, and medical records were reviewed in each case. A total of 186 patients did not require oxygen or ventilatory support and did not receive dexamethasone.

The remaining 605 patients ranged in age from 20 to 100 years, and all received dexamethasone therapy in accordance with the RECOVERY trial findings. Their clinical characteristics and outcomes are presented in Table 1. A total of 141 (23%) had a pre-existing diagnosis of diabetes mellitus, of whom 103 (17% of population receiving dexamethasone; 73% of those with known diabetes) experienced worsening hyperglycaemia, defined as either a requirement for additional antidiabetic medication, or for titration of existing medication. Three men developed ketoacidosis, and one man and one woman developed hyperosmolar hyperglycaemic state (HHS). Among these five individuals who experienced severe acute diabetic emergencies as inpatients, all were known to have diabetes, but none had been treated with insulin prior to admission with COVID-19. There was one death, after HHS.

Of the 464 patients without a prior diagnosis of diabetes mellitus, 52 (11%) developed hyperglycaemia, defined as capillary blood glucose ≥11.1 mmol/L on two or more occasions, but none experienced ketoacidosis or HHS.

Amongst those with pre-existing diabetes, the risk of worsening hyperglycaemia was greater for men than for women (odds ratio 2.55; 95% confidence intervals 1.18 to 5.59; Fisher's exact test $p = 0.027$; GraphPad Prism 8.4.3). In contrast, there was no statistically significant sex difference in risk of hyperglycaemia for patients without a prior diagnosis of diabetes (Fisher's exact test $p = 0.659$).

A networked blood glucose monitoring system at our hospital allows the diabetes specialist inpatient team to identify patients with dysglycaemia without requiring direct referral between teams. A total of 128 separate visits by the inpatient diabetes team were triggered, to assist in the management of 59 patients. Other inpatients were managed by their existing teams. After discharge from hospital, 47 patients had persisting hyperglycaemia, 39 of whom were referred to primary care for follow-up. Another eight patients required a total of 14 clinic visits or telephone contacts with the diabetes specialist team to monitor and adjust antidiabetic medication.

Decisions on which individuals required specialist follow-up, and which could safely be managed in primary care, were based mainly on local knowledge of the resources available in each general practice surgery. An ongoing requirement for injectable therapy characterised most of the individuals followed up in the specialist clinic but did not preclude successful discharge to primary care. Age, HbA_{1c} and estimated glomerular filtration rate were similar for both groups.

To the best of our knowledge, this brief study is the first published account of the increased workload experienced by diabetes specialist inpatient teams during the

TABLE 1 Characteristics, outcomes and follow-up requirements of inpatients prescribed dexamethasone for COVID-19 pneumonia

		Known diabetes ($n = 141$)		No known diabetes ($n = 464$)	
	Total ($N = 605$)	Men	Women	Men	Women
Inpatients prescribed dexamethasone for COVID-19 pneumonia					
Denominator	605	93	48	251	213
Outcome of admission					
Discharged alive	429 (71)	61 (66)	32 (67)	187 (75)	149 (70)
Deceased	176 (29)	32 (34)	16 (33)	64 (25)	64 (30)
New or worsening hyperglycaemia	155 (26)	74 (80)	29 (60)	30 (12)	22 (10)
Acute hyperglycaemic complications					
Ketoacidosis	3 (0.5)	3 (3.2)	0 (0.0)	0 (0.0)	0 (0.0)
Hyperosmolar hyperglycaemic state	2 (0.3)	1 (1.1)	1 (2.1)	0 (0.0)	0 (0.0)
Hyperglycaemia outcome					
Denominator	155	74	29	30	22
Resolved during admission	67 (43)	24 (32)	12 (41)	15 (50)	16 (73)
Unresolved by time of discharge	47 (30)	27 (36)	9 (31)	8 (27)	3 (14)
N/A (patient deceased)	40 (26)	23 (31)	7 (24)	7 (23)	3 (14)
Unknown	1 (0.6)	0 (0.0)	1 (3.4)	0 (0.0)	0 (0.0)
Additional medication for hyperglycaemia					
Oral hypoglycaemic agent	14 (9.0)	6 (8.1)	2 (6.9)	4 (13)	2 (9.1)
Insulin	99 (64)	58 (78)	24 (83)	15 (50)	2 (9.1)
Insulin and oral hypoglycaemic agent	16 (10)	10 (14)	3 (10)	1 (3.3)	2 (9.1)
Monitored without treatment	26 (17)	0 (0.0)	0 (0.0)	10 (33)	16 (73)
Inpatient diabetes specialist team involvement					
Patients requiring ward visits	59 (38)	34 (46)	18 (62)	6 (20)	1 (4.5)
Number of ward visits	128 (N/A)	83 (N/A)	34 (N/A)	10 (N/A)	1 (N/A)
Outpatient clinic follow-up					
Patients requiring outpatient appointments	8 (5.2)	6 (8.1)	1 (3.4)	1 (3.3)	0 (0.0)
Number of outpatient appointments (remote and/or in person)	14 (N/A)	11 (N/A)	1 (N/A)	2 (N/A)	0 (N/A)

Note: Data are *n* (%); denominators for percentages are indicated in each column.

COVID-19 pandemic. In the 4 months prior to the data collection period, during which there were relatively few admissions with COVID-19, the average time spent per month on inpatient referrals was 56.4 h, whereas in the subsequent 4 months, the average was 73.7 h, representing an increase of 31%.

In addition to delivering direct inpatient care under difficult circumstances, we provided remote inpatient clinical advice, training for hospital colleagues and a modified outpatient service. We speculate that other centres have had similar experience of increased workload in recent months and offer these data for use in future pandemic planning.

Note on codes used to identify cases:

U07.1: Emergency use of U07.1 [identifies every instance of SARS-CoV-2 RNA PCR positive test].

J12.8: Other viral pneumonia.

B97.2: Coronavirus as the cause of diseases classified to other chapters [attributes SARS-CoV-2 infection as the cause of J12.8].

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CONFLICT OF INTEREST

None.

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