

Hospital hypoglycaemia is a more common event in renal compared to other wards

Zac-Varghese S; Sisley M; Peprah D; Mathew S; Hardy D; Hodgkins S; Baldry N; Stanisstreet D; George S and Winocour P

East and North Herts NHS Trust

Background

Hospital inpatients are at risk of hypoglycaemia. People with renal disease have increased risk. In addition, the treatment of hypoglycaemia in renal disease can be complicated by the need to avoid fluid overload or hyperkalaemia.

Usual causes of hypoglycaemia

- ▶ Insulin
- ▶ Oral hypoglycaemic agents
- ▶ Propranolol, salicylates
- ▶ Alcohol
- ▶ Sepsis
- ▶ Acute or chronic malnutrition
- ▶ Liver disease
- ▶ Congestive heart failure
- ▶ Endocrine deficiency (e.g. hypoadrenalism)

Additional risks in patients with kidney disease

- ▶ Deficient gluconeogenesis
- ▶ Impaired glycogenolysis
- ▶ Diminished renal gluconeogenesis
- ▶ Impaired renal insulin degradation and clearance
- ▶ Poor nutrition
- ▶ Deficiency in counterregulatory hormones such as catecholamines and glucagon
- ▶ Dialysis

Methods

East and North Herts NHS Trust introduced linked glucose meters which can be used to monitor hypoglycaemia amongst hospital inpatients. We collected data on 32 days between July and October 2018. We analysed this data by ward.

In addition, we analysed data during a 1-week period using a standard audit form based on JBDS hypoglycaemia guidance.

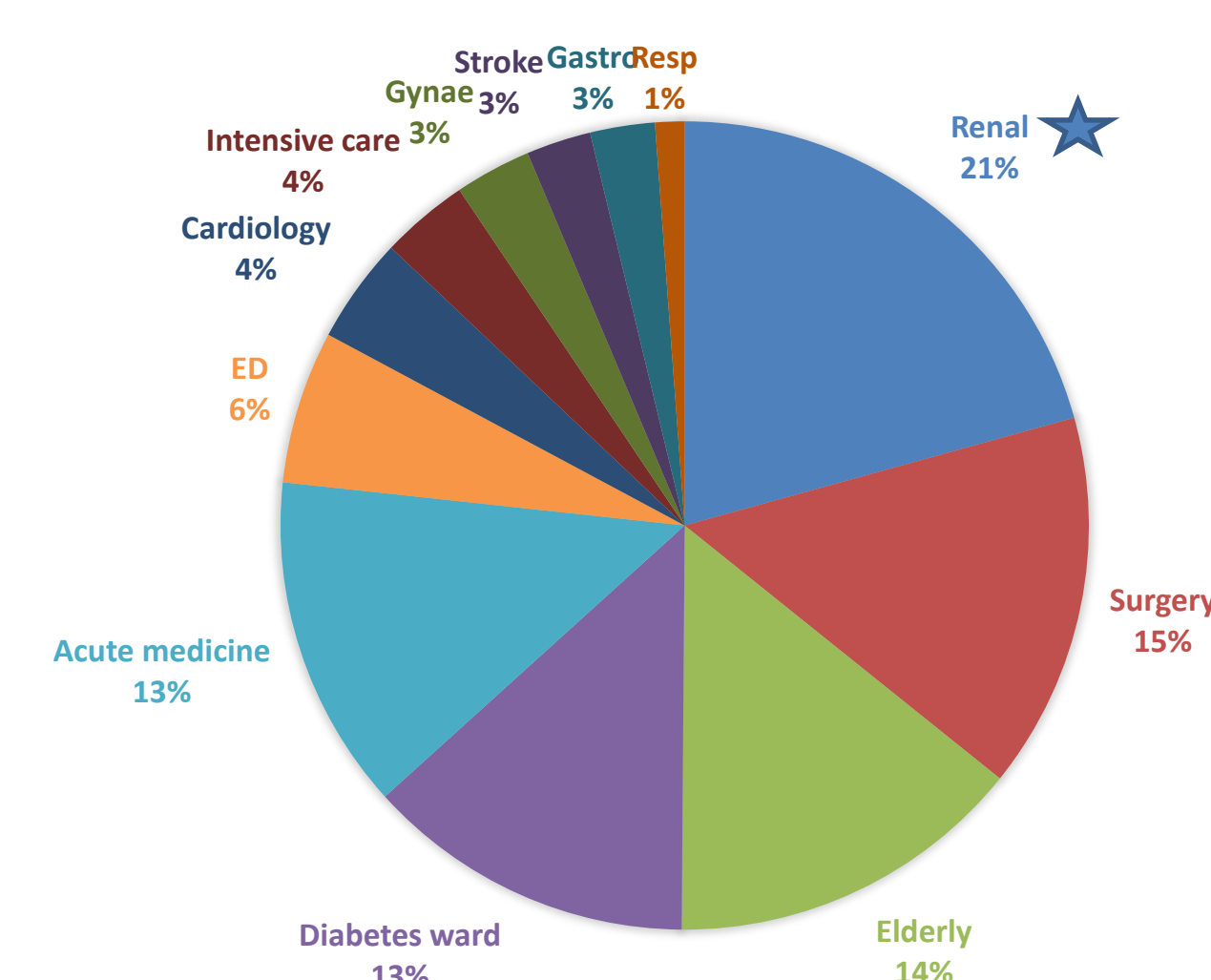
Finally, we carried out a questionnaire of staff on the renal wards evaluating knowledge of hypoglycaemia.

Results

There was a daily occurrence of between 8-19 episodes of hypoglycaemia (with or without diabetes) (average 11 [mode]).

There was a marked variation across all wards with a higher incidence of hypoglycaemia on the renal and dialysis wards compared to other wards. Out of a total of 425 episodes, 20 % of these occurred on the renal wards. The wards with the lowest incidences of hypoglycaemia were respiratory (1 %), gastroenterology, stroke and gynaecology.

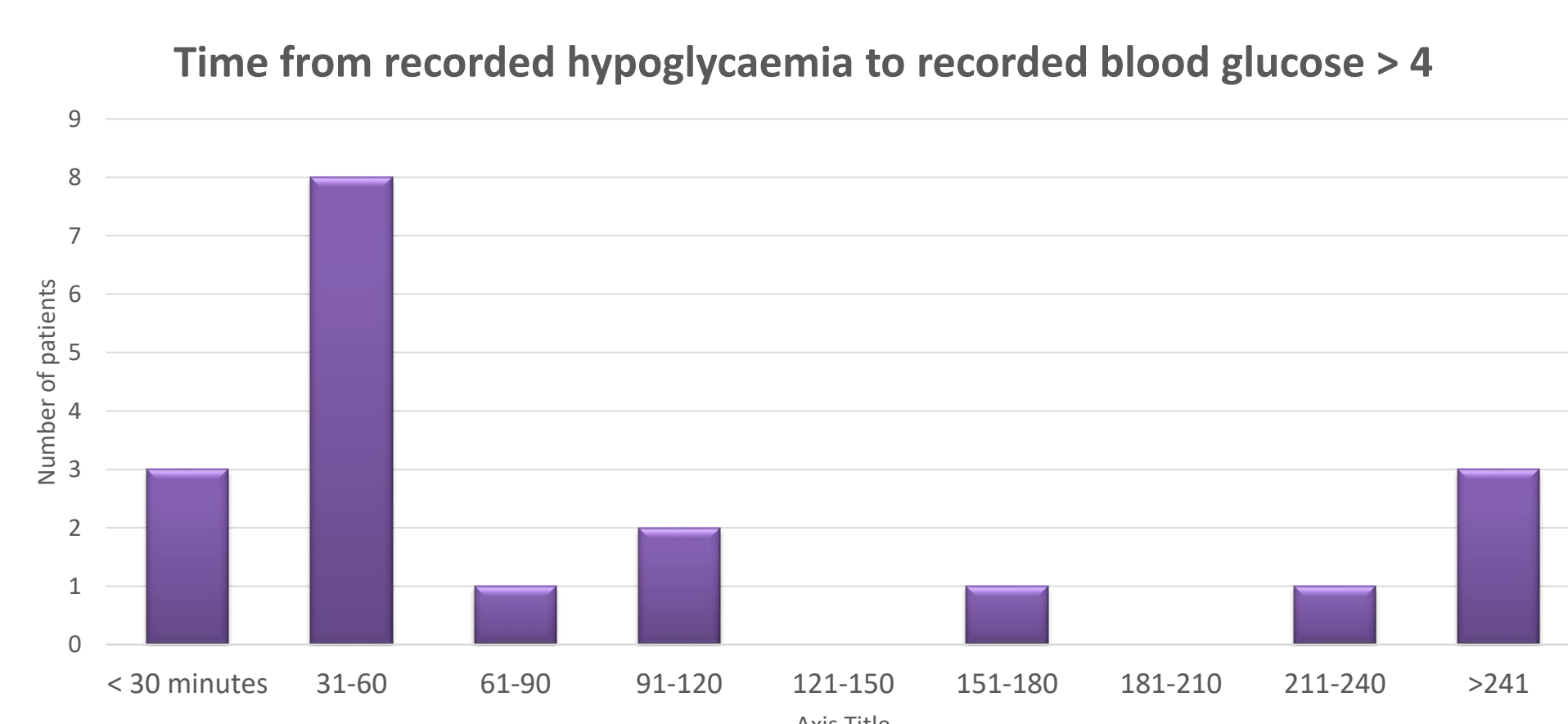
Hypoglycaemic episodes occurred more frequently on the renal wards



Audit of treatment of hypoglycaemic episodes

18 cases were reviewed in greater depth and audited against JBDS guidance.

- 15/18 patients had documented diabetes
- 1 had likely but undocumented diabetes
- 2 did not have diabetes and the hypoglycaemic episodes were therefore unrelated to diabetes.
- Blood glucose level varied from 2.4 to 3.9
- The conscious level was only documented in 4/18 cases (22 %)
- The actual treatment given to the patient was documented in 14/18 cases (78 %).
- Only 2/18 patients (11 %) had their blood glucose rechecked at 10-15 minutes.
- Only 2/18 patients (11 %) had documentation of the likely cause of the hypoglycaemic episode.
- The time between recorded low blood glucose (< 4) and blood glucose > 4 was variable and in the longest instance was 798 minutes.

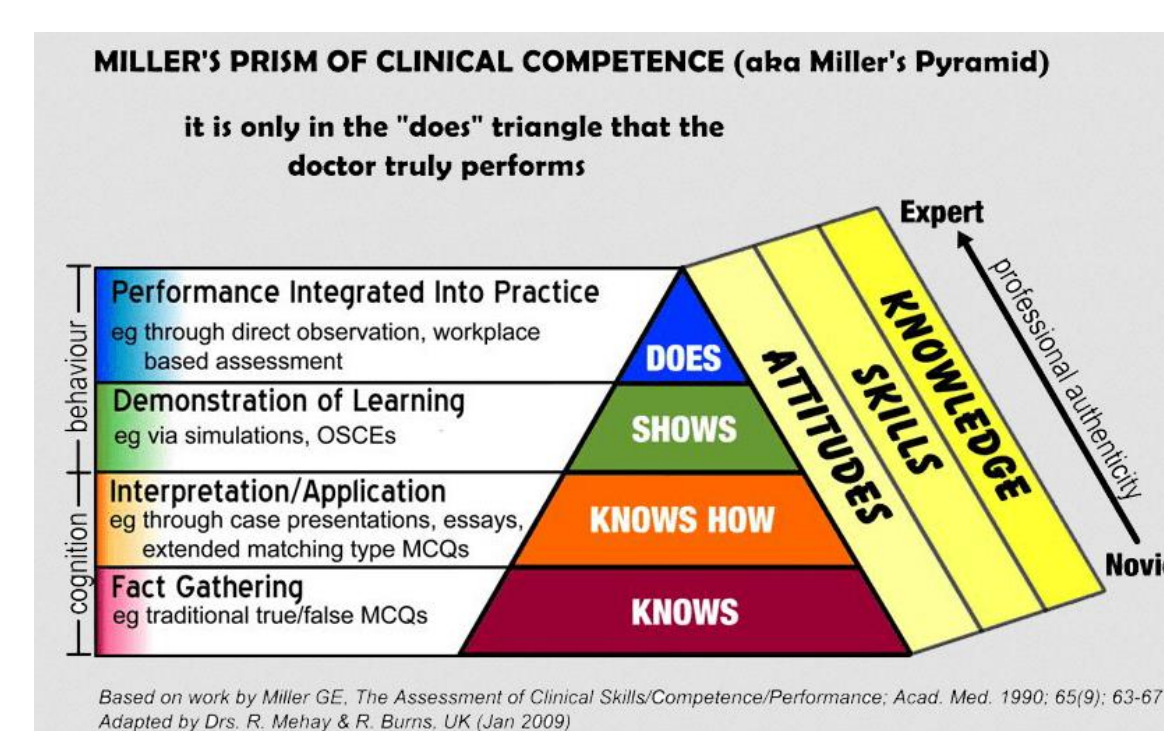


Survey of knowledge

Due to the variable documentation of treatment and variance in care we carried out a survey of knowledge of the treatment of hypoglycaemia. We carried out this survey on the renal wards as hypoglycaemic events were most frequent on these wards.

	Clinical support worker	Clinical support worker	Pre-reg dialysis nurse	Registered nurse	Charge nurse	Acute dialysis registered nurse	Sister in charge (band 6)	Senior sister	Physician assistant	CT2	CT2	SpR
Level of BG you consider hypo	<4	<4	<7	<4	<3.5	<4	<4	<4	<4	<4	<4	<4
How would you treat a hypo	Glucogel, orange juice	Glucogel if unconscious	2 biscuits if <7, glucogel if <3	If alert glucogel x 2	Glucogel and biscuits and tea if they refuse	Orange juice, if <1 injection of 10% dextrose	Glucogel, carbs, a couple of biscuits	Hypostop, carbs	Oral glucose, gel, food, IV glucose, IM glucagon	Hypostop, glucogel	Glucogel	Oral sugary drink, hypostop, IV glucose
What would you do if they were unconscious or NBM	Ask nurse, doctor	IV saline	Refer to senior nurse, medical team, IV dextrose	Glucose IV	Ask medical doctor on call	IV dextrose	IV glucose	20% glucose IV	IV glucose	IV dextrose, glucagon if <1	IM glucagon, IV glucose	IV dextrose
When would you retest	20-30 mins	30 mins	30 mins	15 mins	15 mins	15-30 minutes	15 mins	quite quickly	15 minutes, depending on response	30-60 mins	15 mins	30 mins
What would you do if it was still low	Retreat and report	Repeat	Refer to doctor	Doctor	IV glucose	Repeat treatment	IV glucose	Give further IV glucose	IV glucose, sc glucagon	Repeat treatment	Repeat	IV dextrose
Causes of hypos	Not eating, too much insulin, no bedtime snack	NBM	Too much insulin, haven't eaten, kidney problems	Poorly controlled diabetes, NBM for procedure, haven't had bedtime snack	Sepsis, poor nutrition, NBM for procedures	Not eating, medications	Insulin treatment, eating less, dialysis, giving own insulin, vomiting, pancreatitis, liver failure	Too much insulin, insufficient carbs, sepsis	Too much insulin, wrong dose	Poor nutrition, NBM prep, CKD	Iatrogenic, sepsis	Iatrogenic, insulin OD double dosing, endocrine problem, dosing on dialysis
When would you call the diabetes outreach team?	If BG up or down, consistent hypos	Sugars still low, unconscious	Patient not taking meds, poorly controlled diabetes, consistent hypos, diabetic foot	If current treatment is not working, if newly diagnosed	Admitted with DKA, hypo after treatment	Any hypo	Ongoing hypo after treatment	New diabetic, anyone starting insulin, regular hypos	BG out of range and insulin needs to be adjusted, problems, overnight problems	Recurrent hypos, not responding to treatment	Major hypo, repeated hypos	Hypo or hyperglycaemia
Where do you document	Nursing notes, drug chart	Notes	Nurses notes, BM chart	Notes	Diabetic drug chart	Notes, drug chart	Medical and nursing notes and nerve centre	Nerve centre, medical notes,	Notes	Notes, drug chart	Drug chart, notes	Notes
Do you know where the hypo box is	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	no	no	Yes
What's in the hypo box	Orange juice, glucogel, biscuits, cannula	Roughly	Yes	Yes	Glucose 20%, cannulation pack, needles, syringes, pathway	Yes	Yes	Yes	Yes	Yes	Yes	Hypostop, 20% dextrose, glucagon

Use of connected glucose meters allows daily tracking of hypoglycaemia



Knowledge of hypoglycaemia treatment was reasonable across doctors and nurses of varying grades. However, there appears to be a discrepancy between factual knowledge (knows how) and practical knowledge (shows how and does).

Other factors interfering with good clinical practice

- Nursing staff levels
- Competency/training
- Technical factors – e.g. lack of bar codes to use connected meters.
- Any equipment issues quality control checked
- Change of shift and hypoglycaemia not handed over

Conclusions

We have shown that hypoglycaemic events occur more commonly on renal wards compared to other hospital wards. Despite good theoretic knowledge of the treatment of hypoglycaemia, hypoglycaemia was not treated to JBDS standards the majority of the time. This may be due to lack of confidence in applying theoretic knowledge. However, may also be due to human factors and technical issues using the new meters.

Further work

Staff and patient education is important to improve the treatment of hypoglycaemia and to reduce the frequency. We are in the process of a number of innovative education initiatives and will reaudit once these are complete.

- ▶ Think Glucose days
- ▶ Joint diabetes renal MDTs established
- ▶ Diabetes hypoglycaemia safety video piloted



REFERENCES

1. JBDS guidelines 2016 Management of adults with diabetes on the haemodialysis unit
2. NICE CG182, (2014) Chronic kidney disease in adults: assessment and management
3. JBDS guidelines 2018 The hospital management of hypoglycaemia in adults with diabetes mellitus 3rd edition