Improving inpatient diabetic management in haemodialysis patients: a quality improvement project

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Background

According to current projections the prevalence of diabetes is set to increase from 2.8% to 4.4% by 2030 [1]. Some of the most vulnerable and severely affected patients are those with End-Stage Renal Failure (ESRF) requiring Renal Replacement Therapy (RRT).

RRT is associated with dysregulation of the normal physiological processes involved in maintaining normoglycaemia. Altered insulin sensitivity and clearance following commencement of RRT, as well as a reduced rate of gluconeogenesis in the liver and kidneys with ESRF, means that patients on RRT are at increased risk of hypoglycaemia [2].

Furthermore, owing to co-morbidities and polypharmacy, patients with ESRF are at an increased risk of the sequalae of hypoglycaemia - altered cerebral function, stroke, and cardiac dysrhythmias [3]. As such, it is not surprising that intensive glycaemic therapy is associated with increased mortality in diabetic dialysis patients [4].

Until recently, sufficient national guidance to support the specific management of this cohort was lacking. In 2016, the Joint British Diabetes Society and Renal Association produced guidelines covering the extensive and distinct needs of diabetic patients receiving haemodialysis (HD) [5].

Methodology

Using this guidance as a framework, we reviewed the management of inpatient diabetic HD patients at Lister Hospital, Stevenage, a tertiary nephrology unit in the United Kingdom.

We applied Quality Improvement (QI) methodology, using multiple plan- do- study- act cycles, to improve inpatient care in line with the national guidance.

Data was collected from all diabetic HD patients admitted to the main renal ward at Lister over two-week periods during April 2018, July 2018, and January 2019.

Data was collated from inpatient drug charts, nursing notes, and RenalPlus (electronic renal patient database).

Interventions

Training

Presentation of data and guidance at local staff training opportunities and departmental governance meeting.

Management of hypoglycaemia

Improved access to a suitable carbohydrate load in hospital dialysis areas, to be given to patients with pre-dialysis capillary blood glucose (CBG) <7.0mmol/L, as per JBDS guidance (figure 1)

Recording and notification of CBG

Use of a single document (inpatient drug chart) to record all CBG readings for a patient, including those pre- and post-dialysis.

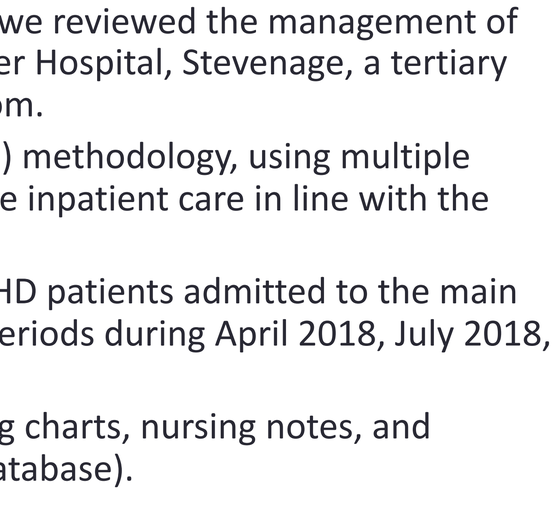


Figure 1. *JBDS recommendations on managing pre-dialysis hypoglycaemia [5]*

Establishment of joint Renal / Diabetes MDT (ongoing)

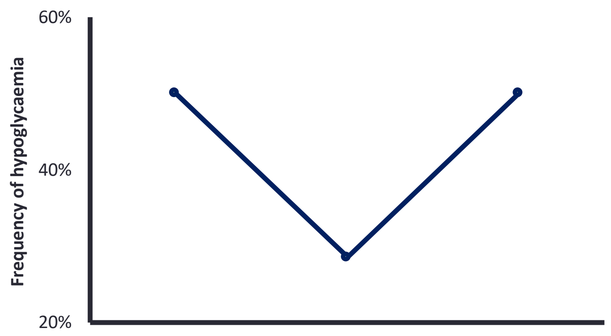
Results

Population data

Across the three intervention cycles we collected data from a total of 31 inpatient diabetic HD patients (n=12, n=7, n=12 for cycles 1-3 respectively). Of these, 0% were prescribed a sulphonyluria, 23% a DPP-4 inhibitor (Linagliptin or Vidagliptin), and 35% basal-bolus insulin.

Hypoglycaemic events

Between cycles 1 and 2 (3 month interval) we recorded a 21% reduction in the rate of hypoglycaemia, an effect which was entirely reversed in cycle 3 (further 6 month interval).



In cycle 1, of these hypoglycaemic events, 83% had HD in the preceding 24 hours, and of those, 100% had a pre-dialysis CBG <7.0mmol/L. This is compared to 100% / 100% in cycle 2, and 50% / 100% in cycle 3.

Bespoke insulin prescriptions

As shown in figure 2 (right) we observed significant improvements in the rate of bespoke insulin prescriptions to take into account dialysis and non-dialysis days.

Management of pre-dialysis CBG

Appropriate management of pre-dialysis CBG <7.0mmol/L was documented in 0% of cases in cycle 1, 50% in cycle 2, and 0% in cycle 3. Issues with documentation were sited as part of the reason for this.

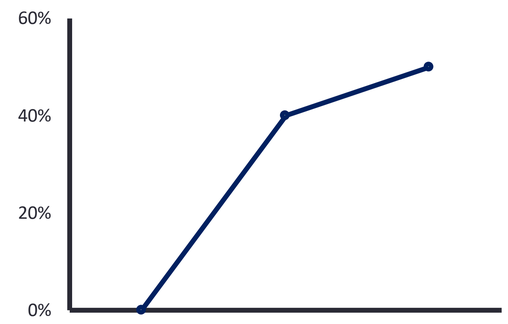


Figure 2. *Prescription rates of bespoke insulin regimens to take into account dialysis and non-dialysis days.*

Conclusions

Using QI methodology we have been able to demonstrate that simple, easily reproducible interventions can translate into meaningful outcomes for diabetic haemodialysis patients. The results of our most recent QI cycle suggest that some of these changes may however be short-lived (see hypoglycaemia results). As such, we suggest that these strategies are best supported by rolling long-term measures such as closer involvement of diabetic in-reach teams and establishment of a dynamic Renal / Diabetes MDT. We hope to report the results of such interventions in the near future.

We are also conscious that inpatient management represents only a small fraction of the solution to this enormous problem, and that patient education, as well as regular discussion/ review at each healthcare encounter, remains vital to help avoid adverse outcomes.

References

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