**Winners of the Rowan Hillson Insulin Safety Award 2015: The best UK inpatient hypoglycaemia avoidance initiative**

**Innovative use of ward glucose systems to reduce inpatient hypoglycaemia**

**Dr Gerry Rayman, Dr Rajesh Rajendran, Christopher Kelly, Sarah Barker, Rachael Round, Anne Scott and the DICE Team at the Ipswich Hospital NHS Trust**

**CASE FOR CHANGE**

Hypoglycaemia (hypo) is a distressing and potentially fatal consequence of poor glycaemic management. Inpatient glycaemic management is particularly concerning, as people with diabetes in hospital have less control over their own blood sugar when they cannot choose their meals, administer their own insulin or stick to their schedule. The National Diabetes Inpatient Audit (NaDIA) found that approximately one in five people with diabetes in hospital experiences a hypoglycaemic blood glucose result (<4.0mmol/l), and approximately one in ten experience a ‘severe’ hypoglycaemic result (<3.0mmol/l).

Despite initiatives to reduce hypoglycaemia, such as e-learning modules, the ‘think glucose’ programme, inclusion of diabetes education in junior doctor induction programmes, redesign of insulin/glucose charts, year on year reductions in hypoglycaemic events have been disappointingly small, falling from 22.8% to only 20%. Life threatening hypoglycaemia i.e. that requiring IV glucose or glucagon rescue treatment remained unchanged at approximately 220 events in the week of NaDIA equivalent to 11,500 events per year.

Dr G Rayman and his team worked together to address these issues and untilamtely reduce inpatient hypoglycaemia at Ipswich Hospital NHS Trust.

**WHAT DID THEY DO?**

Dr G Rayman, aided by the Diabetes Inpatient Care and Education (DICE) Team, worked to:

* Adapt their existing system to monitor capillary blood glucose (CBG) to link CBG data to unique patients, their ward location and the date and time for rapid analysis.
* Use this system to determine whether temporal trends existed in glycaemia that could reveal potentially correctable institutional practices, and implement new practices as a result of the findings.
* Develop an alert system based on daily CBG meter downloads to enable Diabetes Inpatient Specialist Nurses (DISNs) to quickly target patients with out of range results, particularly hypoglycaemic ones.

**HOW DID THEY DO IT?**

The team worked with their IT department and Abbott Diabetes Care UK data management staff to adapt their existing system (Precision Xceed Pro™) for monitoring CBG levels to ensure data extraction was clinically useful. This update involved moving from an ethernet system to Wi-Fi linked web system, giving DISNs rapid access to all CBG results.

The team used the data from Precision Xceed Pro™ to observe trends in the frequencies of hypoglycaemia. Anecdotally, the frequency of hypos increased overnight and the team confirmed this observation by using the Precision Xceed Pro™ system to examine over 15,000 CBG tests during September and October 2012 at Ipswich hospital. This showed that 70% of all hypoglycaemic events occurred between 21.00 and 09.00 h.

Following this study, the team initiated the Managing Glycaemia using Innovations in Care (MAGIC) study - a four week retrospective audit in 11 different NHS Trusts using the same Precision Xceed Pro monitoring system. They looked to see if the trends they observed locally were widespread, and if common factors could be identified as the reason for the pattern and changed.

**WHAT DID THEY FIND?**

The data pattern from the study within the Ipswich hospital were clear: 70% of hypoglycaemic events occurred “overnight,” from 21.00 and 09.00h. The MAGIC study confirmed this temporal pattern of hypos, with 68% of hypos occurring overnight. This study also showed that sulphonylurea treatment accounted for about one-third of hypoglycaemic readings. They also found that the Trust with the lowest number of overnight hypos provided a bedtime snack.

In response to these findings, they instituted a bedtime snack for all insulin and SU treated patients. This snack is provided as a prescription item (sticker on drug chart) to ensure that it is offered. DISN also now take a proactive approach to reduce basal insulin and SU therapy in patients on admission whom they suspect may be at increased risk (for example, those with reduced appetite or a previous low HbA1c).

**OUTCOMES**

The team found that by putting in an alert system, offering bedtime snacks and proactively reducing basal insulin:

* severe hypoglycaemia fell by 46%
* recurrent hypoglycaemia was reduced by 80%
* IV glucose rescue treatment went from 82 to 26 cases
* average length of stay in hospital (reflecting multiple interventions) was reduced from 8.6 to 7.6 days. The length of stay was unchanged in the non-diabetic population, showing clearly that these targeted interventions had a positive effect on in-patients with diabetes.

They have received feedback from the other hospitals in the MAGIC study that the introduction of the new hypo management methods has also led to reduced number of hypos and length of stay for patients with diabetes.

**LEARNING**

The team cited one of their most important lessons from the programme: the importance of teamwork. All of the innovations and initiatives in the project were achieved by a team, with doctors working with IT, DISNs with doctors, and 11 separate Trusts working together to share data to achieve one common and valued goal.

For more information, check out the published articles:

*Diabet Med. 2013 Dec;30(12):1403-6. doi: 10.1111/dme.12256.*

*BMJ Open. 2014 Jul 9;4(7):e005165. doi: 10.1136/bmjopen-2014-005165*