Rowan Hillson Insulin Safety Award 'best in class' insulin prescription chart competition

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ON BEHALF OF THE JOINT BRITISH DIABETES SOCIETIES FOR INPATIENT CARE

Abstract

The National Diabetes Inpatient Audit for 2013 described insulin-related prescription errors in over 21% of patients each year from the beginning of data collection in 2010. Error rates have fallen year on year but remain unacceptably high, with significant variation between hospitals. Many of these issues were related to insulin prescribing.

In 2014, the Joint British Diabetes Societies for Inpatient Care (JBDS) organised a competition for the 'best in class' current insulin prescription chart from hospitals in the UK. The aim was to identify safe and effective insulin charts, and make them available to the other clinical teams. A total of 41 Trusts submitted their insulin prescription charts, which were considered by an expert panel of independent judges against predefined criteria based on guidelines on the safe prescription of insulin from the UK National Patient Safety Agency.

The charts from Nottingham University Hospitals won this competition, with East Sussex Healthcare, Worcestershire Royal Hospital and Western Sussex Hospitals as runners up. The competition identified areas of particular strength in the winning charts, which are available online (see Box 1).

This article describes the background to the competition, with an account of the winning entry. The judging process highlighted a number of valuable mechanisms for improving insulin prescribing in UK hospitals.

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Key words: Insulin, safety, prescription chart, award, competition

The problem

The National Diabetes Inpatient Audit (NaDIA) for 2013 found that about 16% of acute hospital beds in the UK were occupied by someone with diabetes,[1] of whom 37% experienced at least one diabetes medication error, 22% at least one prescription error, 21% at least one insulin prescription error, and 22% at least one medication management error in their drug chart in the previous 7 days of admission. Inpatients whose drug chart had at least one medication error were twice as likely to have a hypoglycaemic episode compared to those whose drug chart had no errors. Alarmingly, 63 patients (0.4%) were reported to have developed diabetic ketoacidosis (DKA) after their admission to hospital. Higher rates of hypoglycaemia and DKA were thought to be linked to unsafe management of insulin. Most incidents of high or low blood glucose were due to failure to recognise trends in blood glucose levels and to alter the dose of insulin accordingly.

Problems with insulin safety are not new, with previous findings of risks to patients associated with absent prescription, displaced documentation, use of abbreviations in prescribing, and illegible handwriting.[2] Between 2003 and 2009, the UK National Patient Safety Agency (NPSA) recorded more than 16,000 incidents involving insulin with 24% reporting harm to the patient and 18 with fatal or severe outcomes.[3] The Department of Health included maladministration of insulin in its 'never event list'.[4] There is a clear need for innovative approaches to reduce errors in the prescribing of insulin in the UK.

In 2014, the Joint British Diabetes Societies for Inpatient Care (JBDS, a collaboration between the Association of British Clinical Diabetologists [ABCD], Diabetes UK, and the Diabetes Inpatient Specialist Nurse UK group [DISN UK]) launched an annual national competition for innovations to improve inpatient insulin safety. The JBDS group named this project after Dr Rowan Hillson, who was the UK National Clinical Director for Diabetes from 2008–2013. The JBDS Safer Insulin Prescribing group (authors UD, EC and DS) organised the best in class insulin prescription chart competition as part of the first of these competitions. This article describes the background to the competition, this year's winner and important lessons for safer insulin prescribing that came out of the competition as a whole.

Overcoming the barriers to safer insulin prescribing

Noschese *et al*.[5] described the following system barriers to effective prescribing of insulin, based on a review of charts with blood glucose values either >16.7 mmol/L or <2.2 mmol/L[5]:

1. Absence of a section on the chart for use of rapid acting analogue insulin
2. Absence of a very low dose scale for insulin-sensitive patients

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Box 1. Download the winning insulin charts here

For all links see: http://www.diabetologists-abcd.org.uk/JBDS/insulin_chart_winners.pdf

For individual charts see:

The winner: Nottingham University Hospitals NHS Trust (Dr Jenny Clayton)

http://www.diabetologists-abcd.org.uk/JBDS/Winning_Chart.pdf

The runner-up: East Sussex Healthcare NHS Trust (Erwin Castro and Dr Umesh Dashora)

http://www.diabetologists-abcd.org.uk/JBDS/Runner-up_Chart1.pdf (standard chart)
http://www.diabetologists-abcd.org.uk/JBDS/Runner-up_Chart2.pdf (DKA and HHS)
http://www.diabetologists-abcd.org.uk/JBDS/Runner-up_Chart3.pdf (ACS)
http://www.diabetologists-abcd.org.uk/JBDS/Runner-up_Chart4.pdf (Surgery and NBM)

Highly commended:

Worcestershire Royal Hospital (Joanne Shuck)

http://www.diabetologists-abcd.org.uk/JBDS/Highly-commended_Chart_W1.pdf (s.c. chart)
http://www.diabetologists-abcd.org.uk/JBDS/Highly-commended_Chart_W2.pdf (i.v. chart)

Western Sussex Hospitals NHS Foundation Trust (Naomi Burns)

http://www.diabetologists-abcd.org.uk/JBDS/Highly-commended_Chart_WS.pdf

ACS: acute coronary syndrome; DKA: diabetic ketoacidosis; HHS: hyperosmolar hyperglycaemic state; NBM: nil-by-mouth.

3. Absence of readily-available guidelines for prescribing insulin
4. Lack of space for ordering scheduled insulin or for dose adjustments when nutritional intake changes

Other studies have indicated that poor knowledge and understanding of diabetes treatment is a potentially avoidable root cause of errors in the in-hospital management of people with diabetes.[6]

The solution lies in standardised prescribing guidance for the administration of insulin, which, compared with control patients, has achieved blood glucose within a target range with less risk of severe hypoglycaemia.[6-9] One study found that standard charts led to less need for correction of insulin doses, with a trend to more appropriate orders.[5,8] Such charts improved identification of insulin device, insulin administration, control of hypoglycaemia, compliance with evidence-based treatment, and opportunities to educate ward staff.[10] This approach also improved the clarity of insulin orders, documentation, management of blood glucose levels and documentation.[9] Standardised charts reduced prescription errors from 65% to 14%, and management errors from 40% to 14% from 2009–2012 at a hospital in Bournemouth, UK.[11] In East Sussex, UK, the introduction of a chart reduced management errors from 25% to 6.5% in 4 years. There is a potential for a well-designed insulin drug chart to reduce insulin errors.

The perfect prescription chart

No single chart can be perfect with complete uptake and total elimination of errors.[10] It appears that requiring a larger volume of information, for example blood glucose recording and timing of last meal, reduces the likelihood of any information being recorded.[10] An attempt in Australia to mandate daily insulin prescribing after reviewing the blood glucose level reduced the incidence of hypoglycaemia but increased the incidence of hyperglycaemia, due to missed doses of insulin.[9] Accordingly, the chart must be simple to use in order to reduce the risk to patients.

Development of the JBDS project

The NPSA and others have championed for many years the concept of a single, standardised national chart for insulin prescribing, without success so far. Varying needs, practices and existing protocols in different parts of the country mean that at present a common insulin chart is unlikely to be acceptable for every hospital. JBDS therefore conceived a national competition for the 'best in class' insulin prescription chart with the aim of promoting safer prescribing and allowing clinical teams access to the highest quality, and safest, insulin charts.

Diabetes specialist teams were invited to participate via the ABCD website and also by emailing DISN UK, which has members in 167 hospitals throughout the UK. The list was compiled by the administrator of the group who contacted individual hospitals and acquired details of DISNs who worked there. The invitation letter made clear that participants automatically consented to sharing their charts with other teams.

The quality of these charts was judged by an expert panel of independent judges (Appendix 1) according to predefined criteria based on the NPSA 2010 guidelines on safe prescription of insulin.[3] These included aspects related to clarity, user-friendliness, coherence, logical order, safety, accuracy and presentation. These criteria were scored quantitatively as well as qualitatively by individual judges before a final decision was made by the chair (see Appendix 2).

A total of 41 Trusts (25% of all NHS Trusts with DISN in the UK) submitted their charts. Each Trust submitted eight copies of their insulin charts in use, which were centrally collected at the JBDS office, anonymised and sent to the judges. One

Table 1 Characteristics of well-designed charts emerging from the judges' comments

Domain	Characteristics of the chart
Clear and user-friendly	Visually appealing; well formatted; easy to follow; well designed; uncluttered; pleasing to read; logical; colour coded; step-by step; having diagrams and pictures; clear target glucose and with adequate space for monitoring glucose; prescribing insulin; making dose changes.
Informative	Details on top tips; practice points; summary management of hyperglycaemia and hypoglycaemia; preadmission insulin regimen; when to use which insulin regimen or VRIII.
Instructive	Details on how to document self-management; how to store insulin; how to prepare insulin infusion; when to stop insulin infusion; how many times to monitor blood glucose; not to omit insulin in type 1 diabetes; not to omit long acting insulin on VRIII and when and how much to increase or decrease insulin dose.
Safe	Requires dose confirmation in patients on higher doses; separate charts for separate clinical scenarios like medical, obstetric, ITU and CCU patients; seeking advice when patients on insulin pump or U-500R are admitted; mandatory writing of units and not 'u' for insulin doses; listing allergies; recording individual-specific safety issues and non-return valves for i.v. insulin infusions.

CCU: Cardiac Care Unit; ITU: Intensive Therapy Unit; VRIII: variable-rate intravenous insulin infusion.

winner, one runner-up and two highly commended charts were chosen. The results were announced on the occasion of a meeting of ABCD at the Royal College of Physicians, London, UK, on 6th November 2014. Robert Gregory (ABCD Chair) introduced the winners and Dr Rowan Hillson presented the awards.

The overall winner was Nottingham University Hospitals NHS Trust. East Sussex HealthCare NHS Trust entry was runner-up, with Worcestershire Royal Hospital NHS Trust and Western Sussex Hospitals NHS Foundation Trust awarded highly commended status. Jenny Clayton, Umesh Dashora, Erwin Castro, Joanne Shuck and Naomi Burns collected the awards for their respective organisations.

The charts can be accessed online, free to download and use by other Trusts who want to develop their charts or improve them at: http://www.diabetologists-abcd.org.uk/JBDS/insulin_chart_winners.pdf (see Box 1).

An in-depth analysis of the comments made by judges on the various charts submitted, identified a number of themes which characterise a safe prescription chart (Table 1). Examples of comments made by judges about individual charts (unidentified here) are shown in Table 2.

Table 2 Illustrative positive and negative comments about the charts from the judges

- "Liked the spaces for needle size, stat insulin, fluid section, brand name of insulin".
- "Liked daily review of s.c. insulin". Some judges thought that daily review can be counter-productive: "insulin dose can be missed if daily review is mandated".
- "Liked the separate charts for the various i.v. regimens. This also means if national guidance alters, only one i.v. chart at a time will require review/amendment. Impressed with these charts!".
- "Lots of different sections which could cause a problem if they become separate from the pack".
- "Red text or highlighting not so good for the 10% colour blind males and even females".
- "Not clear how to record what the insulin to be given should be? No predetermined place to define times that insulin/blood glucose monitoring should be done in relation to food. This could cause misinterpretation about what needs to be given, when".

What did we learn from the project?

The JBDS initiated the competition not only to recognise excellence in insulin safety, but also to share and disseminate safe practice throughout the country. Indeed, at least 41 hospitals have carefully designed their own insulin prescription chart to improve patient safety.

This insulin chart competition proved popular, and the winning charts are freely available to inspire other teams to improve their own charts, as described above. The great enthusiasm seen in this project mirrors the high level of uptake of similar charts, to the tune of 80%[5] and 89%[8] in previous studies. Previous qualitative research has highlighted the need to address the deficiency of useful information and poor communication for better management of insulin therapy.[12] Any drug chart that seeks to improve insulin safety must contain all the critical information and guidance close to the place of prescription.

The judges' remarks suggest that a rigid chart can occasionally create some difficulties. One should not forget that a drug chart is intended to support safe clinical decision-making, but not to replace it in every possible situation. There will be times where an unusual situation may demand a highly-specialised and individual prescription or monitoring in consultation with the specialist diabetes team. Care is needed not to introduce new problems such as over-complexity and excessive data entry leading to missed insulin doses.

Summary recommendations

Judges' comments reflect that a safe chart should ideally be practical, appealing, user friendly, informative, educational and colour coded if necessary. Among other things (see above) it should include information on blood glucose monitoring, brand names, subcutaneous and intravenous prescribing, continuation of long-acting insulin, separate charts for separate situations, guidance for storage, preparation of variable intravenous insulin infusions and checking the dose before administering high doses. An ideal chart comprising of all these strengths is awaited.

Key messages

- National Diabetes Inpatient Audit found a significant number of errors in diabetes management
- A well designed insulin prescription chart can reduce insulin errors and improve patient safety
- Rowan Hillson insulin safety award has identified some model prescription charts and these are now on ABCD website

In the interim any trust can download the winning charts from the ABCD website (see above) and use them or improve them as per their needs.

Next steps

We plan to run the Rowan Hillson Insulin Safety Award every year to identify, recognise and promote excellent practice for safer insulin prescribing that is already in routine use in the UK. Key areas identified relate to reduction of hypoglycaemia, mealtime insulin, monitoring, education and management of the diabetic foot.

Watch this space for further announcements about these competitions, as we continue to promote improved safety in the use of insulin.

Appendix 1. The judges. Dr Rowan Hillson (Chair), Dr Clare Crowley, Consultant Medicines Safety Pharmacist (Oxford), Elizabeth Hackett (United Kingdom Clinical Pharmacy Association), Esther Walden, DISN UK Chair, David Gerrett (formerly NPSA), Bridget Turner (Diabetes UK), Dr Stuart Ritchie, Mags Bannister.

Appendix 1. Criteria for judging. Space does not permit reproduction of the criteria for judging insulin charts here. These can be downloaded from: http://www.diabetologists-abcd.org.uk/JBDS/Criteria_for_judging_insulin_prescription_charts_2014.pdf

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