



Joint British Diabetes Societies for In-Patient Care (JBDS-IP)

**The Rowan Hillson Inpatient Safety Award 2017
Improving Inpatient Diabetes Safety: Best Digital Initiative**

How to enter:

1. Email your completed entry to: Christine Jones, JBDS Administrator at christine.jones@nnuh.nhs.uk

All entries must be emailed by: 28.02.17

2. Please submit any supplementary materials to support your initiative, as these will be considered as part of the judging process.
3. **Please note this competition is only for projects undertaken in the last 3 years i.e. since 1.1.2014.**

Your contact details:

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Additional contributors: Tina Fu, Tracey Rapson, Richard Stoker (Information Analytics), Jennifer Brown (Point of care testing lead), Dr Joanne Kerins and Professor John McKnight (Metabolic Unit)

Title of entry (10 words maximum)

Development of an inpatient diabetes dashboard to drive quality improvement

Brief summary of entry

Provide a short summary of your initiative in **no more than 200 words (The box will expand)**

Inpatient diabetes quality improvement initiatives have demonstrated that correct utilisation of data drives improvement in care^{1,2}. A significant challenge in busy clinical environments is the collection, presentation, analysis and dissemination of appropriate clinical data to facilitate this. We were keen to utilise capillary bedside glucose readings collected in our trust (40,000 per month) to drive improvement and collect, analyse and present this in a meaningful manner which would be visible and meaningful to senior management teams and busy ward environments. Working with colleagues in NHS Lothian

information analytics, we have developed a diabetes dashboard (appendix 1). This has driven significant improvement in clinical governance measures across acute areas (around 1800 beds), ensuring readings are associated with correct patient and staff identifiers and also allowed analysis of the impact of smaller scale quality improvement projects focusing in inpatient diabetes. A second dashboard has been developed focusing on key areas identified for improvement (including hypoglycaemia) which can be electronically distributed across all clinical teams. The work has been recognised nationally in Scotland with a neighbouring healthboard adopting the methodology for their inpatient data, and this work has also stimulated discussions and prototype development for a national in-patient diabetes dashboard for Scotland.

Background/Situation analysis/Innovation (300 words maximum)

Briefly provide the background and rationale for the initiative. From this the judges should be able to understand why there was a need for the initiative to be undertaken. Explain what makes your initiative innovative or pioneering.

It is well described and recognised that there are improvement opportunities in inpatient diabetes care^{1,2,3}. This in the quality of care delivered to an individual patient, and quality and efficiency savings to busy and stretched healthcare environments, both of which improve patient experience. A key challenge posed to our clinical teams is to improve the quality of care at a reduced cost, reduce waste, variation and length of stay.

Approximately 20% of inpatient beds in our healthboard are occupied with patients with diabetes, the vast minority are admitted due to a diabetes related complication. For the majority of inpatients with diabetes it is key that they receive good core diabetes management which relies on empowering and upskilling non-specialist healthcare professionals. The work of the Diabetes, Think, Check, Act programme² demonstrated the potential improvements in care (eg hypoglycaemia management) when routinely collected inpatient data (linked bedside glucometer readings) was utilised in a with other specific interventions (education and training). One of the other concerns for clinicians interested in inpatient diabetes care is the challenge in engaging the non-specialist audience in appreciating the current landscape of inpatient diabetes care and the potential and need for improvement.

It is difficult in the current clinical environment to release time for collection and analysis of data. Automated data collection and analysis would be exceedingly helpful in freeing the time for clinical teams to deliver the evidence based interventions which could then be measured automatically.

Our acute trust collects around 40,000 bedside capillary glucose readings per month. We were keen to utilise these readings to drive improvements in inpatient care and develop a prototype diabetes dashboard to realise potential opportunities. The combination of clinical interventions with robust data collection, had been successful in other aspects of clinical care such as hospital acquired infection and antibiotic stewardship⁴.

Objectives (200 words maximum)

State clearly the objectives of the initiative(s).

1. Clinicians were keen to utilise capillary glucose to drive improvement. The desire was for automated data collection and analysis, to facilitate improvements in inpatient diabetes care, freeing clinical time for intervention.
2. To have the ability to do this on all 3 acute sites and be able to interrogate data at an individual site, clinical directorate and ward level. It had been recognised that some interventions would be possible across the whole healthboard, with others requiring a more local approach.
3. The main initial aim of the work was to develop visualisation of the degree of glycaemic control across the acute trust and to capture both the number of hypoglycaemic episodes and the percentage of those episodes correctly treated.
4. There was also a desire to capture the number episodes where there was prolonged hyperglycaemia and failure to appropriately act on this.
5. The project team was keen that the data would be presented in a meaningful form for the target audience which would range from the senior management team to busy ward clinical leaders. It was appreciated that a single dashboard may not realise these aims, but a single data set could be modified to achieve this.

Project plan/methods (400 words maximum)

Please outline the method(s) you used to achieve your objectives. The judges will also be looking for a clear rationale for your method(s).

1. The clinical team met with colleagues from information analytics to outline the proposal
2. It was quickly identified that the Tableau data visualisation system⁵(used trust wide for other acute performance and quality dashboards) would be an appropriate vehicle for the dashboard
3. The clinical and information analytic teams had a series of meetings to define the code required to define hypo and hyperglycaemia. As a starting point we have defined hypoglycaemia as a blood glucose less than 4mmol/l, correctly treated if there is a blood glucose greater than 4mmol/L within 60 minutes of the initial reading.
4. The code was written and developed by the information analytics team.
5. Initial test data was automatically analysed by the written code was then tested and quality controlled by clinical review of the raw data.
6. The initial dashboard (appendix 1) was developed highlighting the following key areas:
 - a. Ability to select all areas in the acute trust or analyse at the level of a single acute site, clinical directorate or an individual / group of ward(s).
 - b. The number and percentage of linked glucometer readings that had the correct patient identification (CHI) number and health care professional identifier.
 - c. The number and percentage of glucometer data readings that were less than 4 mmol/L (our definition of hypoglycaemia) or greater than 15mmol/L (our definition of hyperglycaemia)
7. It was appreciated that the initial dashboard would be more relevant for specialist use,

strategic oversight and governance. Based on preliminary data and quality improvement experience with the Diabetes Think Check Act programme, we wanted wards to focus on ensuring appropriate patient and staff identifiers and the frequency and management of hypoglycaemia. A second dashboard was developed (appendix 2) with a clear concise, but precise, message to busy ward staff. Staff could sign up to delivery of this dashboard, and receive an automated electronic update every 4 weeks.

8. Our trust uses ACCU-CHECK® Inform II Glucometers (Roche) utilising the COBAS IT system for central download to clinical biochemistry. The data is extracted from this and published on Tableau. The code for the analysis has been independently developed by the analytics team, and sits separate to Tableau.

9. The dashboard reports on the preceding 4 weeks of glycaemic data

10. A bedside capillary blood glucose measurement should be associated with the unique patient identifier in Scotland (Community Health Index-CHI number), and a healthcare professional identifier code.

Evaluation and results (400 words maximum)

Use this section to report the results and demonstrate how you measured the success of your initiative/project

The dashboard was tested and available in summer 2016, and we were initially genuinely surprised and shocked at the significant number of bedside capillary glucose measurements that did not have appropriate patient and staff identification. This data could not be utilised for analysis.

A structured programme of education on point of care testing followed, with a significant improvement in the number of glucose readings with no CHI (33% to 5%) and staff identifier (29.5 to 3.4%) over a 6-8 month period across the whole trust (over 1800 beds). This has significantly improved the quality and quantity of inpatient glycaemia data that can be analysed correctly (appendix 3).

We have demonstrated the ongoing benefit of a targeted intervention by the inpatient specialist team to a 100 bed area on site, which had a 35% reduction in hypoglycaemic reading frequency and a 57% increase in appropriately treated hypoglycaemia episodes compared to the whole healthboard. The data has been utilised to identify areas of high hypoglycaemia frequency and help facilitate cross specialty discussion around interventions and solutions (eg an updated variable rate insulin infusion protocol). We are now able to map the peak times of hypoglycaemia, analyse the data and facilitate specific interventions to reduce the frequency. We are revising our insulin prescribing document following this.

Clinical areas with high hypoglycaemia frequency can be identified, and staff can be directed to available online education modules², consolidated with face to face specialist team

education.

A significant advantage of this system is having data that visualises, highlights and quantifies specific measures of inpatient diabetes care facilitating discussion at a local or senior management level with non diabetes specialists (clinical and non clinical). This initiative is key to our ongoing inpatient improvement plan, alongside several other improvement areas, and we are able to quickly analyse the effects of intervention, leaving clinical staff to focus on care, education and training.

There have also been challenges. Writing code to define hyperglycaemia, and identify therapeutic inertia has been challenging in the context of busy, and often unpredictable, ward processes. Part of the data feed for the hypoglycaemia dashboard is outwith the control of the healthboard and if there challenges with the data feed, it is reliant on a 3rd party to rectify this.

This work was recognised and accepted for presentation at the NHS Lothian clinical Change forum receiving the support of the Board Chairman, Medical director, Chief Operating Officer and Chief Quality Officer.

Impact (300 words maximum)

Describe the impact of the initiative(s) for inpatients with diabetes and how this was measured.

The impact of this work has been significant in driving improvement in inpatient diabetes care both locally and nationally.

Local

There is greater visibility of the landscape of inpatient diabetes, with the ability to capture and quantify improvement, whilst also highlighting areas that require ongoing work. This is applicable at both a strategic and local level, for all acute sites. The dashboard has initiated, driven and captured the rapid response to the clinical governance issues with patient and tester identifiers on glucose results. This initiative has facilitated discussions leading to prioritisation of inpatient diabetes initiatives (eg utilising the benefit of the SCI-Diabetes inpatient domain) which is beneficial to patient with diabetes admitted to hospital. The data generated by the dashboard has facilitated discussion around other improvement areas eg staff education, improving our insulin prescribing documentation with the potential benefit of better recognition of hypoglycaemia and reduced medication errors.

We are able to capture quickly and efficiently the outcomes of specific interventions designed to improve inpatient diabetes care, but also utilise data to justify investment in specialist diabetes teams, and the impact of loss of service.

National

This dashboard is the first of its kind in Scotland, and has been recognised by Information Services Division of NHS Scotland and the Scottish Diabetes Group and has been used as the template for development of a pan-Scotland version for potential use in all Scottish

healthboards.

Diabetes is struggling to recruit medical and nursing trainees nationally, who will ultimately become the the senior healthcare professionals delivering and driving improvements in care for patients with diabetes. This work has attracted undergraduate student and trainee quality improvement projects, nurturing an early interest in specialty. As a result of this work one student received the runners up prize in the Undergraduate Endocrinology prize at Edinburgh University.

Adaptability, Cost and Sustainability (300 words maximum)

How easily could your initiative(s) be adapted to other hospital Trusts? Please state whether any other Trust(s) has adapted your initiative(s) and/or any steps you have taken to promote wider dissemination of your initiative(s).

Please demonstrate the sustainability of your initiative(s). Include the cost incurred and the source of funding i.e. acute trust or CCG or any other means. Describe the process by which the funding has been sought and the challenges experienced.

No additional funding was required to achieve this locally.

For our healthboard, all IT resources are in place. Tableau is a system accesible to all NHS staff in our healthboard, and the hypoglycaemia dashboard can be sent electronically to those who subscribe to this via email through existing structures.

Our nurse directors have agreed to disseminate this information via the clinical nurse manager structure to drive improvement at directorate level, consolidated with specilaist inpatient diabetes team support and education .

The principles of the dashboard have been replicated by a neighbouring healthboard also interested in developing inpatient diabetes data services. The current system sits in tableau which is adaptable to all Scottish Healthboards. The basis of the NHS Lothian dashboard has been the prototype for a pilot pan-Scottish inpatient diabetes dashboard, with recognition that utilisation of inpatient glycaemic data is key to driving improvement in this area.

Tableau is compatible with the Discovery⁶ data management system, which is available to all Scottish NHS Healthboards. Other browser based dashboard systems may also be able to accomodate this as the code for analysis the data sits outside the Discovery system.

Learning (300 words maximum)

One of the main aims of the competition is to enable learning and sharing of initiatives for the benefit of inpatients with diabetes. Use this section to outline any learning(s) that can be taken from the initiative(s) and/or challenges faced along the way that could be transferred to other Trusts looking at introducing similar initiatives.

This is the candid and 'real life' learning from this initiative.

- Given the number and distribution of patients with diabetes across acute trusts it is essential to empower and educate non-specialist staff in good core diabetes

knowledge and skills. The inpatient specialist teams cannot do this alone and require the support of senior non-specialists in both clinical and non clinical roles in prioritisation and execution.

- These conversations are easier when there is data to back up the areas identified for improvement! It is crucial that data is collected and analysed in an automated fashion. Having data can unlock doors to discussion, secure meetings with influential staff in your organisation, and facilitate 'how can I help' discussions, allowing development of project plans to rectify problems. Having data that is applicable and relevant to the area that you are trying to influence is priceless.
- Do not underestimate the power that quality data can have, it can be very influential and drive real change and secure senior support. Speak to your target audience and listen to what will for them – think win/win
- Having collaborative discussions with non-clinical colleagues (eg information analytic teams) can be very beneficial to problem solve. Sometimes the infrastructure and knowledge already exists, and does not require a business plan or funding application!
- We can use routinely collected glucose data to show both successful improvement initiatives, but also areas requiring attention. It is crucial that the data is presented with a clear and specific message to busy clinical teams. The data can be adapted to be applicable to the target audience whether that is the trust board or a medical receiving unit.
- Improving the care of patients with diabetes admitted to acute hospitals is dependant on a number of key areas improving (eg insulin prescribing, recognition and treatment of hypoglycaemia). Utilising the glycaemic data can really drive problem solving, novel interventions and motivate teams in challenging times.

Feedback from staff and patients (300 words maximum)

Please include a summary of any patient feedback and evaluations of the initiative(s). It will be helpful if you can provide (as supporting materials) the tools used to gather this information. If available please include summary of staff feedback to demonstrate their perspective on the initiative(s)' impact on the care of inpatients with diabetes in relation to improved insulin and prescribing safety.

We have patient representation on our managed clinical network in-patient subgroup and have the full support of our patient representative group with positive feedback on this work, and this has also stimulated invitations to speak from patient groups in neighbouring regions. Whilst expressing some concern at the baseline measures and room for improvement, the measures and demonstration of improvement are noted, and well received through representation at the regional and national diabetes 2017/18 conferences.

Acute services clinical staff(non specialist), working in busy clinical environments, were involved in the planning of which data, and its delivery, would be potentially effective to drive change. Through development of all our inpatient initiatives, there has been close

involvement with these teams, which again is well recieved. Acute teams have responded to the data, and worked in quality improvement structures to improve measures. The benefits of this is evident in the data presented.

The initiative has been supported by the senior management team in NHS Lothian (eg evidenced by business plan support, recognition by the quality and clinical change forums), and we have been able to build on this to gain support around other initiatives (eg updated insulin chart, education, prevention of foot disease).

This dashboard is the first of its kind in Scotland, and has been recognised by Information Services Division of NHS Scotland and the Scottish Diabetes Group and has been used as the template for development of a pan-Scotland version for potential use in all Scottish healthboards. The methodology has also been adopted by a neighbouring healthboard with a strong track record in inpatient diabetes care. We have viewed these actions as very positive.

Supporting materials

The judges' core assessment of your initiative will be based on this entry form. However, we do recommend that you **support your entry** with relevant materials, as these will be made available to the judges and are often the deciding factor in short listing the finalists.

Supporting materials could include: IT based programmes, pamphlets, booklets, audits, events, reports, journal articles, evaluation documentation, websites etc.

Supporting materials along with your entry form should be submitted by email to christine.jones@nnuh.nhs.uk.

Closing date: 28.02.2018

The winners of the Rowan Hillson Insulin Safety Award 2017: Improving Inpatient Diabetes Safety: Best Digital Initiative will be published on the Association of British Clinical Diabetologists (ABCD), Diabetes UK and DISN UK Group websites and will appear and be referred to in future journal articles. By submitting your entry, you will be consenting to your initiative being used for these purposes.