Inpatient diabetes: do-it-yourself electronic referral system to support and enhance the Think Glucose project

background
Think Glucose is a national initiative led by the NHS Institute for Innovation and Improvement (www.institute.nhs.uk/quality_and_value/think_glucose/welcome_to_the_web site_for_thinkglucose.html). It aims to improve inpatient diabetes care including effective use of the inpatient diabetes specialist team (IPDST). The national initiative developed a comprehensive ‘traffic light’ system to give guidance to medical and nursing staff as to which patients should be referred to the IPDST. The traffic lights include 31 types of case – 16 types of ‘always refer’ cases (red), eight types of ‘sometimes refer’ cases (amber) and seven types of ‘rarely refer’ cases (green). (See Figure 1.) It is difficult for busy clinical staff to keep all these possibilities in their heads and, even with reminder cards, leaflets and posters, staff do not have these readily to hand when needed. Previously, referral to the IPDST required phone, fax or internal post, with their built-in delays and patients being missed.

Most NHS hospital trusts have an internal, online, electronic system to order investigations. Depending on the test being ordered, this brings up a form to be filled in and, on completion, sent electronically to the laboratory or imaging department concerned. We aimed to use this approach for Think Glucose assessment and referral.

Methods
Our trust has two hospitals, with 37 wards and 780 inpatient beds. In the trust the investigations ordering system is iSoft Clinical Manager (iCM). We used this to develop an electronic form for ‘Think Glucose Assessment’ (Figure 2), and mandated all clinical staff to ensure the assessment was carried out on all diabetes patients as soon as possible after admission. If the situation of the inpatient with diabetes changes, a further assessment can be made and sent. The quick-and-easy form incorporates the 31 traffic light cases with simple tick boxes for those which apply (Figure 2). There is also a section for safety data on glucose and feet assessment within 4 hours of admission (Figure 3).

A generic email account (swbh.thinkglucose@nhs.net) was set up on the NHS net to instantaneously receive the assessments once they were submitted in iCM. Thus, when assessments are made, they are immediately received in that mail box which can be accessed by the IPDST (Figure 4). Administrative staff collate the referrals creating virtual ward round lists every day in iCM enabling consultant, diabetes specialist nurse...
Early referral to diabetes team recommended
- Admission for urgent or major elective surgical procedure
- Acute coronary syndrome
- Diabetic ketoacidosis/hyperosmolar/ hyperglycaemic state
- Severe hypoglycaemia
- Sepsis
- Vomiting
- Impaired consciousness
- Unable to self-manage
- Parenteral or enteral nutrition
- Foot ulceration
- Newly diagnosed type 1 diabetes
- Newly diagnosed type 2 diabetes
- Intravenous insulin infusion for over 48 hours
- Intravenous insulin infusion with glucose outside limits
- Previous problems with diabetes as inpatient
- Patient request

Always refer

Referral to diabetes team may be required
- Intravenous insulin infusion with good glucose control
- Nil by mouth more than 24 hours post surgery
- Significant educational need
- Persistent hyperglycaemia
- Possible type 2 diabetes
- Stress hyperglycaemia
- Poor wound healing
- Steroid therapy

Sometimes refer

Referral to diabetes team not normally required
- Minor, self-treated hypoglycaemia
- Transient hyperglycaemia
- Simple educational need
- Routine dietetic advice
- Well controlled diabetes
- Good self-management skills
- Routine diabetes care

Rarely refer

Results
Our initiative gradually took off in the last four months of 2010. Patients who did not need to be seen by the IPDST were managed under the supervision of the wards’ ‘Think Glucose Champions’ (see above). Figure 5 shows the numbers of patients being seen according to the national referral criteria by the IPDST (consultants, specialist registrars [SpRs] and DSNs) from September 2010 onwards. The figures speak for themselves. The figures in September and October 2010 mostly reflect the activity levels before our initiative really started to take hold in November. Over the year following implementation, the number of patients seen by the IPDST increased from 83 per month to 452 per month, while at the same time ensuring that the patients seen were only those...
requiring it according to the national Think Glucose traffic light criteria. To cope with the service there were two DSNs to be the diabetes inpatient specialist nurses, with the other DSNs providing cover for annual leave etc. At job planning the diabetes consultants were each assigned one or two sessions per week for the Think Glucose ward rounds, and there was also support from two Sprs training in diabetes and endocrinology. Each weekday all the patients with red or amber classification on the traffic light system were seen either by consultant, SpR or DSN.

**Conclusion**

Implementation led to a dramatic increase in the number of inpatients seeing the IPDST while at the same time ensuring that these were appropriate according to national criteria. We have been able to optimise diabetes management during the admission facilitating better healing and earlier discharge. We have also frequently come across patients from the community with ‘neglected diabetes’ – typically, patients with long-standing poor glycaemic control, either because of insufficient primary care services, poor patient compliance, or both. The ‘neglected diabetes’ was often the reason for their admission, either direct diabetes problems or because of diabetes complications such as ischaemic heart disease, stroke, peripheral vascular disease, foot ulceration or renal failure. In such patients we have been able to facilitate improvement in their future diabetes care by setting in motion appropriate treatment plans while in hospital, expediting discharge after specialist input thus reducing hospital stay and planning further diabetes management after discharge according to need.

All hospitals with electronic test ordering systems could easily emulate our system.

**Acknowledgment**

This innovation was a joint project with the Sandwell and West Birmingham Hospitals NHS Trust IT department. We are grateful in particular to Andy Page, Alison Whitehall, Neil Isham, Bill Aldridge, Rob Jones, Mohammed Latif, David Kiffin, Michael Collins, Matthew Maguire, John Borland and Sue Wilson.