

Assessment of diabetes knowledge in trained and untrained ward nurses before and after intensive specialist support

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Article points

1. The authors assessed diabetes knowledge among registered general nurses, healthcare assistants and student nurses in three hospitals and a university in their Trust.
2. Knowledge levels were insufficient for safe care of inpatients with diabetes, particularly when answering questions relevant to the practical management of the condition.
3. However, a 3-month intervention comprising regular structured teaching sessions and scheduled support visits from DSNs improved knowledge scores.

Key words

- Inpatient care
- Insulin safety
- Nurse education

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In the UK, approximately 12–25% of all hospital inpatients have diabetes, although most are admitted for other health problems. People with diabetes often have a prolonged hospital stay compared to people without the condition, often as a result of suboptimal inpatient management of their diabetes. During in-depth interviews conducted in the authors' hospital, inpatients reported that ward staff lacked basic knowledge to manage the condition. The aim of the present study, therefore, was to assess diabetes knowledge in trained and untrained ward nurses. Both groups were found to lack the basic knowledge required to manage inpatients with diabetes, as were student nurses approaching the end of their training. However, a programme of intensive specialist support and education for ward staff rapidly improved knowledge and confidence in managing diabetes.

Diabetes is a chronic condition affecting 3.2 million people in the UK, with an estimated 5.0 million expected to have the condition by 2025 (Yorkshire and Humber Health Intelligence, 2012). Compared to people without the condition, people with diabetes are more likely to be admitted to hospital and have an increased risk of complications, greater length of stay and greater likelihood of readmission within the same month (Kerr, 2011; Health and Social Care Information Centre [HSCIC], 2013).

In the UK, 1.34 million bed-days are used for inpatient diabetes care, with an estimated £465 million of the NHS budget spent on this (National Diabetes Support Team, 2008). Despite this, recent figures show that 57.6% of inpatients with diabetes did not receive a documented foot examination, 37.0% experienced at least one diabetes medication error and a total of 63 people developed diabetic ketoacidosis (DKA) in hospital (HSCIC, 2014). Why does diabetes inpatient care remain suboptimal? Are inadequate staffing levels

or poor availability of specialist resources solely to blame, or is it a lack of diabetes knowledge amongst healthcare professionals (Derr et al, 2007; Rubin et al, 2007)?

To explore this issue further, we undertook thematic analysis of in-depth, videotaped, semi-structured interviews in 10 people with diabetes who had a recent hospital admission (within 6 months). The participants reported that ward staff worked extremely hard but consistently lacked the necessary knowledge to help inpatients manage their diabetes. The authors hope to publish the results of analysis shortly.

In response to these findings, the aim of the present study was to formally assess knowledge relevant to the management of inpatients with diabetes among registered general nurses (RGNs) and healthcare assistants (HCAs) in St Helens, an acute general hospital.

Participants and methods

The study was approved by the St Helens and

Knowsley Local Research Ethics Committee and Liverpool John Moores University, and all participants gave written informed consent before undertaking any study activities.

Nurse questionnaires

In the first part of the study, 26 RGNs and 17 HCAs from general medical or surgical wards completed validated questionnaires (O'Brien et al, 2003) to assess knowledge relevant to inpatient diabetes management. RGNs had 66 questions and HCAs had 23. The questionnaire included sections on basic physiology, blood glucose monitoring, medications, hypoglycaemia, hyperglycaemia, insulin, complications, diet, prevention and surgery. Participants were asked to respond with "Yes", "No" or "Don't know" to each question. Questionnaires were completed in a quiet area in approximately 15–20 minutes.

Intervention period and re-evaluation

After baseline assessment over a 3-month period, a direct intervention was introduced on the medical and surgical wards for a further 3 months, in order to improve RGNs' and HCAs' diabetes knowledge. This included regular, structured teaching sessions for both RGNs and HCAs, as well as more visible presence and scheduled support visits from DSNs. At the end of the intervention period, participants were reassessed under similar conditions to assess the impact of the intervention programme.

Statistical evaluation

Data were analysed in Microsoft Excel 2010. They were normally distributed and are expressed as means and percentages, with before-and-after comparisons made using two-tailed, paired *t*-tests and between-group comparisons made using two-tailed Student's *t*-tests.

Results

RGNs on the medical ward scored a mean of 48.6 out of 66 points (74%) and HCAs 12.3 out of 23 points (54%). On the surgical ward, RGNs scored 48.0 (73%) and HCAs 11.4 (50%). There was no significant difference in scores between the medical and surgical wards. Ostensibly, these scores, particularly those of the RGNs, appeared

satisfactory, but these instruments require high scores if people with diabetes are to be managed safely and effectively.

Although RGNs were knowledgeable about the physiology of diabetes, with both wards scoring 100% in this section, they had poor understanding of more practical elements. This included knowledge about the timing and administration of some insulins, use of metformin in renal impairment and when to escalate blood ketone results. HCAs on the medical ward scored lower in food- and diabetes-related questions, which corresponded with consistent criticisms by inpatients in our interviews. Alarming, on the surgical ward, no HCA correctly answered a question on the treatment of hypoglycaemia. Both of these knowledge sets are key elements of the HCA role in our organisation.

Generalisability of findings

To assess whether these knowledge gaps were isolated to one hospital, we undertook the tests in 40 RGNs and 40 HCAs from two neighbouring university hospitals. RGNs in these hospitals scored a mean of 44.7 (68%) and HCAs 11.35 (49%), with similar scores in the two hospitals. Although specific knowledge gaps varied slightly from hospital to hospital, all participants were consistently poor in answering questions relevant to the practical management of inpatient diabetes.

Knowledge in pre-registration nurses

Having established that diabetes knowledge was inadequate in hospital RGNs and HCAs, we attempted to establish whether this was an undergraduate training issue or solely related to continuing professional development on the wards. Therefore, we administered the same RGN questionnaire in 86 third-year pre-registration nurses at Liverpool John Moores University.

Overall, pre-registration student nurses scored 36.0 (55%), with substantial knowledge gaps in the use of diabetes medications and glucose–potassium–insulin infusions. Moreover, 94% of the students did not know if a blood ketone value of >0.5 mmol/L needed medical attention and 97% did not know when insulin glargine should be given.

Page points

1. In the first part of this study, ward nurses filled in a validated questionnaire to assess their knowledge of diabetes and inpatient diabetes management.
2. Knowledge levels were poor, particularly in terms of the practical aspects of care. These findings were replicated in two other local hospitals and in third-year pre-registration nurses at a local university.
3. In an attempt to improve knowledge levels, a 3-month intervention comprising regular, structured teaching sessions and more visible presence and scheduled support visits from DSNs was implemented.

Page points

1. At the end of the intervention, participants in the authors' hospital were reassessed and demonstrated improvements in knowledge scores of around 10–20 percentage points.
2. While it is unknown whether these findings can be generalised to the rest of the UK, poor diabetes knowledge among nurses is a concern, as nurses play a crucial role in the management of inpatient diabetes.
3. The poor knowledge observed in student nurses suggests that some of the problem lies with basic nurse training. Whether this is due to inadequate ward-based placements or university curricula themselves is uncertain.

Post-intervention knowledge assessment

Following the 3-month intervention, total scores and critical knowledge gaps improved significantly in both RGNs and HCAs at St Helens Hospital (*Table 1*).

Discussion

The principle findings of this study are that general ward-based nurses (RGNs and HCAs) lack the diabetes knowledge they need to deliver high-quality care. Our finding that these deficiencies were very similar in three large acute hospitals in Merseyside suggests that our results may well be generalised to other hospitals throughout the UK. Observation that knowledge is poor in pre-registration student nurses suggests that part of the problem rests with basic nurse training. Encouragingly, however, brief (3-month), intensive education and support delivered by DSNs improved knowledge.

Nursing staff play a crucial role in the management of inpatients with diabetes. They are often the first point of contact for people seeking information about their condition (Dunning, 1995), and they are typically responsible for recognising and initiating investigation and management of acute complications of diabetes, such as hypoglycaemia and DKA (Chan and Zang, 2007; Tawalbeh and Gharaibeh, 2014).

A number of studies with results comparable to ours highlight a lack of diabetes-related knowledge in nurses (Uding et al, 2002; Thomas, 2004; Abduekarem and El-Shareif, 2013), and poor knowledge of insulin and

diabetes medications is common (Derr et al, 2007; Lee et al, 2013). Insulin is a commonly used medication in hospitals and frequently tops tables of medication-associated harm (Trepp et al, 2010). Indeed, maladministration of insulin is currently classed by NHS England (2015) as a “never event”. Poor knowledge of insulins among third-year pre-registration nurses is, therefore, cause for concern. It remains to be established whether knowledge gaps in student nurses arise from deficiencies in ward-based placements (Sharif and Masoumi, 2005; Tawalbeh and Gharaibeh, 2014), or from inadequate university curricula.

Although our brief intervention improved knowledge, gaps remained, particularly regarding insulin management. It is unclear whether more protracted DSN-delivered education and support would further improve knowledge, and we did not assess knowledge persistence. Moreover, we did not undertake research to establish whether improved knowledge led to better care, better outcomes and reduced length of stay, which are important areas for potential future research. Participant numbers in this study were modest and the research was confined to Merseyside in the north of England. It would be reasonable to undertake similar work in other cities and with more participants before concluding that these findings can be generalised to the rest of the UK. Factors such as participants' age, time since qualification and exposure to inpatients with diabetes were not assessed but might prove useful data in future studies.

Questionnaire bias could have been present in the post-intervention group, as participants had previously been subjected to the same tool; however, previous validation included assessments of stability and reproducibility (O'Brien et al, 2003). The intervention period was also limited in time and confined to one Trust, and it is not possible to say what contribution different elements of the intervention had on knowledge improvement.

Actions to improve inpatient care

In our hospital, partly in response to these findings, we have adopted the National Patient Safety Agency's *Safe Use of Insulin* package

Table 1. Pre- and post-intervention knowledge scores in RGNs and HCAs in medical and surgical wards at St Helens Hospital.

Healthcare professional	Baseline knowledge score (mean)	Post-intervention knowledge score (mean)	P-value
Medical RGN	48.6 (73.6%)	53.6 (81.2%)	0.002
Surgical RGN	48.0 (72.7%)	53.8 (81.5%)	0.001
Medical HCA	12.3 (53.5%)	16.6 (72.2%)	0.0001
Surgical HCA	11.4 (49.6%)	14.5 (63.0%)	0.03

HCA=healthcare assistant; RGN=registered general nurse.

(available at: www.nhs.uk/8473.aspx), which hopefully will lessen some of the gaps in insulin-related knowledge. However, it is too early to assess the impact of this programme. A free E-learning module, *The Six Steps to Insulin Safety*, is also now available to all healthcare professionals involved in the management or administration of insulin.

It is also important to acknowledge the role that HCAs play in diabetes management. Much of the literature concentrates on nurses, students and medical staff, but HCAs provide a significant part of patients' daily care. HCAs' roles increasingly include blood glucose monitoring, meal-time support and recognising hypoglycaemia, areas in which they scored poorly in our study. It is vital that HCAs are not overlooked when consideration is given to education and training in the future.

A number of studies have evaluated methods to deliver diabetes education programmes to improve knowledge among staff (Wilkinson et al, 2004; Veall and Bull, 2009; Wamae and Da Costa, 1999). However, is increasing education and training in the first instance enough? A number of clinical studies suggest that specialist diabetes inpatient teams can reduce prescribing errors, improve patient outcomes, reduce length of stay and provide support to ward-based staff (Clement, 2007; Manchester, 2008). However, recent figures show that 31.7% of hospitals in the UK do not have any diabetes specialist input for inpatients (HSCIC, 2014). Alabraba et al (2010) suggest that, unless inpatient support services are fully resourced, a large part of the work is reactive, leaving little time to educate staff. Trepp et al (2010) comment that, as long as funding is allocated according to treatment rather than prevention of diabetes complications, some hospitals may be reluctant to make changes a top priority.

Throughout the intervention period, staff reported they felt more confident with the increased DSN presence and appeared keen to improve their knowledge scores. They also liked the fact that they did not have to leave the ward environment for study sessions, a key aspect to promote self-directed learning (O'Shea, 2003). However, to maintain such intense

support would require additional investment in inpatient specialist services. Some would argue this could also, paradoxically, lead to de-skilling of general nurses. Although our study provides short-term evidence of improvement in knowledge, further assessment over a prolonged period is needed. This may provide more compelling evidence of other benefits that intensive specialist diabetes support can provide, such as improved glycaemic control or increased patient satisfaction.

Conclusion

People with diabetes occupy 12–25% of hospital inpatient beds and account for almost £0.5 billion of NHS expenditure. Evidence indicates that outcomes can be improved and expenditure reduced if inpatient diabetes care is improved. Our study revealed poor knowledge of diabetes management amongst RGNs, HCAs and pre-registration student nurses; however, this improved with education and support. ■

Page points

1. It is important to acknowledge the increasing role of healthcare assistants in diabetes management, and these professionals should not be overlooked when planning education and training.
2. Although specialist diabetes teams have been shown to improve inpatient outcomes, a significant number of hospitals in the UK have no such input. In the authors' opinion, this should be rectified.

Free E-learning module

The Six Steps to Insulin Safety is an essential module for all healthcare professionals prescribing, managing or administering insulin, with the overall aim of reducing insulin errors in clinical practice. It has been developed by the Primary Care Diabetes Society (PCDS) and Training, Research and Education for Nurses in Diabetes (TREND-UK).

The module is for all primary and secondary care healthcare professionals working in both generalist and specialist environments, including those managing inpatients on hospital wards.

The module takes approximately 60 minutes to complete and, on successful completion of a short assessment, users will receive a downloadable certificate that can form an essential part of their continuing professional development log.

The module also allows Clinical Commissioning Groups and Trusts to track the progress of all healthcare professionals working in their area, to ensure all staff are fully trained in the management of patients on insulin, to a standard recognised by the PCDS and TREND-UK

To access the module for free, go to:
www.cpd.diabetesonthenet.com

“Our study revealed poor knowledge of diabetes management amongst registered general nurses, healthcare assistants and pre-registration student nurses; however, this improved with education and support.”

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