

# Do protected mealtimes improve inpatient glycaemic control?

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## Article points

1. Malnutrition remains a significant problem in people admitted to hospital.
2. Protected mealtimes (PRMT) is an initiative implemented to ensure that all patients in hospital receive adequate nutrition and time for meals.
3. As inpatients with diabetes are protected from interruptions under PRMT, nursing staff are unable to perform insulin administration and antidiabetes therapy.
4. Inpatients with diabetes under PRMT do not appear to have an improvement in glycaemic control following the implementation of this initiative.

## Key words

- Glycaemic control
- Inpatient care
- Nutrition
- Protected mealtimes

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Malnutrition remains a significant problem in people admitted to hospital; to tackle this issue the NHS Institute of Innovation and Improvement have introduced a protected mealtimes (PRMT) initiative to provide patients with adequate nutrition. While PRMT is laudable, it does not specifically address the needs of people with diabetes admitted to hospital. This article describes a study that investigated the effect of implementation of PRMT on glycaemic control in people with diabetes on a specialist diabetes ward. The results showed that PRMT did not improve glycaemic control in this group of inpatients with diabetes; these key findings warrant provision of a model of care aimed at targeting glycaemic control, particularly in relation to the key principles of ThinkGlucose (NHS Institute for Innovation and Improvement, 2010).

Malnutrition in hospital remains a significant health issue for patients. It has been estimated that up to 20% of people admitted to hospital are undernourished (Edington et al, 2000). The NHS Institute of Innovation and Improvement (NIII) have attempted to address this issue through its implementation of the Productive Ward module. Part of this new initiative incorporates the introduction of protected mealtimes (PRMT) to ward patients (Hospital Caterers Association, 2004).

The main purpose of introducing PRMT is to ensure that all patients in hospital receive adequate nutrition and time for meals. Under the

PRMT in the authors' trust, 1 hour is allocated three times a day over meal times for patients to have adequate time to receive and consume their meals without interruption from medical staff and services. Except for emergencies, nursing and medical staff are refrained from interrupting patients over this period. This includes the administration of antidiabetes therapy for the treatment of diabetes.

Within the authors' trust, the PRMT was implemented in the diabetes specialist unit, and inpatients with diabetes were to be managed in a similar fashion. This could potentially compete with the recommendation of the NHS Diabetes document Report

on the Safe and Effective Use of Insulin in Hospitalised Patients (Fowler and Rayman, 2010), which states that “the timing of insulin administration in relation to meals, the prevailing blood glucose and the pharmacodynamics of the particular insulin used are all important if hypo- and hyperglycaemia are to be avoided.”

### Effects of protected mealtimes on glycaemic control

#### Aims

The present study aimed to assess the impact of the implementation of PRMT on glycaemic control in people with diabetes on a specialist diabetes ward in the Hull Royal Infirmary. The purpose of this study was to investigate the impact of more structured mealtimes on the glycaemic control of inpatients with diabetes as evidenced by average random and pre-meal glucose values and incidences of complications such as hypoglycaemia (defined as a capillary glucose [CG] level of  $<3.5$  mmol/L).

The present study was designed so that its findings could be used to influence how the key principles of ThinkGlucose (NIH, 2010) might be applied around the timing and dosing of insulin therapy in inpatients with diabetes when it was implemented the following year.

PRMT was initiated in the authors' hospital from June to July 2008 onwards. The introduction of the PRMT initiative and the Productive Ward was audited and monitored by local administrators to ensure that the implementation happened smoothly.

#### Methods

All people with diabetes who had been admitted to the diabetes specialist unit 3 months before (BPM) the implementation of PRMT (March–May 2008) and 3 months after (APM) (August–October 2008) were included in the study.

Patients with four or more CG readings and who were admitted for more than 24 hours were included in the analysis.

Audit approval was obtained prior to commencement of the study. Data were obtained from the laboratory database serving

the entire trust. All CG readings that were performed in hospital as inpatients were stored in this central database.

#### Results

A total of 136 people in the BPM group (77 men; mean age 61 years, interquartile range [IQR] 54–75 years; 4128 CG readings) and 158 people in the APM group (80 men; mean age 64 years, IQR 55–78 years; 4464 CG readings) were enrolled in the study. The mean number of CG readings per patient was 25.8. The results are summarised in *Table 1* and *Figure 1*.

There was no significant difference noted between the overall glycaemic control in the BPM group ( $10.7 \pm 0.33$  mmol/L; mean  $\pm$  standard error [SE]) versus the APM group ( $10.6 \pm 0.32$  mmol/L;  $P=0.79$ ), or the mean variation of glucose ( $12.1 \pm 0.63$  vs  $12.3 \pm 0.61$ ;  $P=0.8$ ).

Interestingly, there was a trend towards PRMT resulting in a higher incidence of hypoglycaemia in the APM group versus the BPM group (25.2% vs 20.4%, respectively;  $P=0.36$ ), and a slightly longer length of stay of 4 days versus 3.7 days, respectively ( $P=0.11$ ).

Nursing staff levels were adequate throughout the study period and no insulin doses were inadvertently omitted.

#### Discussion

The present observational study finds no evidence to suggest that the implementation of the PRMT initiative alone had an impact on overall glycaemic control in inpatients with diabetes. Mean blood glucose levels, along with glycaemic variation, rates of hypoglycaemia and length of stay were no different before and after the initiation of PRMT.

Nursing staff levels were sufficient and insulin regimens were similar over the study period. The authors have previously shown that reduced nursing staff levels are closely associated with increased levels of hypoglycaemia in hospital (Ng et al, 2009), however the present study results show that this was not an issue and therefore did not contribute towards the findings.

#### Page points

1. The purpose of this study was to investigate the impact of more structured mealtimes on the glycaemic control of inpatients with diabetes as evidenced by average random and pre-meal glucose values and incidences of complications such as hypoglycaemia (defined as a capillary glucose level of  $<3.5$  mmol/L).
2. All people with diabetes who had been admitted to the diabetes specialist unit 3 months before (BPM) the implementation of protected mealtimes (March–May 2008) and 3 months after (APM) (August–October 2008) were included in the study.
3. There was no significant difference noted between the overall glycaemic control in the BPM group ( $10.7 \pm 0.33$  mmol/L; mean  $\pm$  standard error) versus the APM group ( $10.6 \pm 0.32$  mmol/L;  $P=0.79$ ), or the mean variation of glucose ( $12.1 \pm 0.63$  vs  $12.3 \pm 0.61$ ;  $P=0.8$ ).
4. The present observational study finds no evidence to suggest that the implementation of the PRMT initiative alone had an impact on overall glycaemic control in inpatients with diabetes.

**Page points**

1. The strengths of this study are that the hospital is served by a single central laboratory service and that all capillary glucose readings were recorded in this database. The initiation of protected mealtimes (PRMT) was also audited and, therefore, proper implementation of this initiative was carried out and instigated.
2. An alternative model of care would appear to be warranted. This model needs to consider nutrition in hospital and, in parallel, should address the requirements of inpatients with diabetes.
3. Given the prevalence of diabetes in hospitalised patients, it is inevitable that for the vast majority their diabetes care will be delivered by non-specialist staff. While mandatory training in diabetes to upskill the nursing workforce is highly desirable, this is problematic as there are so many demands on nursing time for other components of mandatory training.

The strengths of this study are that the hospital is served by a single central laboratory service and that all CG readings were recorded in this database. The initiation of PRMT was also audited and, therefore, proper implementation of this initiative was carried out and instigated. The study is limited by its retrospective component and relatively small participant numbers.

The present study raises several pertinent issues. It supports the fact that the PRMT initiative does not improve glycaemic control in people with diabetes in hospital. The results appeared to show a trend, albeit not statistically significant, in increased hypoglycaemia rates and length of stay with the implementation of PRMT; it is unclear why this should be the case.

Good glycaemic control has been shown to be associated with better overall outcomes in hospitalised people with diabetes (Rayfield et al, 1982; McMurry, 1984; Umpierrez et al, 2002). The results of the present study raise concern as they show that the mean glucose values over both the APM and BPM periods were above the recommended values by the American Association of Clinical Endocrinologists and the American Diabetes Association (ADA) of 10 mmol/L (Moghissi et al, 2009).

An alternative model of care would appear to be warranted. This model needs

to consider nutrition in hospital and, in parallel, should address the requirements of hospital inpatients with diabetes. This encompasses the need for adequate periods allocated for meals with correct timing for insulin administration. It needs to ensure adequate monitoring of CG and provision of the correct variety of meals, which should be available at all times in hospital.

Channelling resources towards care modules specifically aimed at targeting glycaemic control that incorporate the tools of the NIII (2010) ThinkGlucose campaign are likely to be more effective in dealing with glycaemic control in people with diabetes in the hospital environment. The ThinkGlucose programme is an adjunct to the Productive Ward initiative by the NIII.

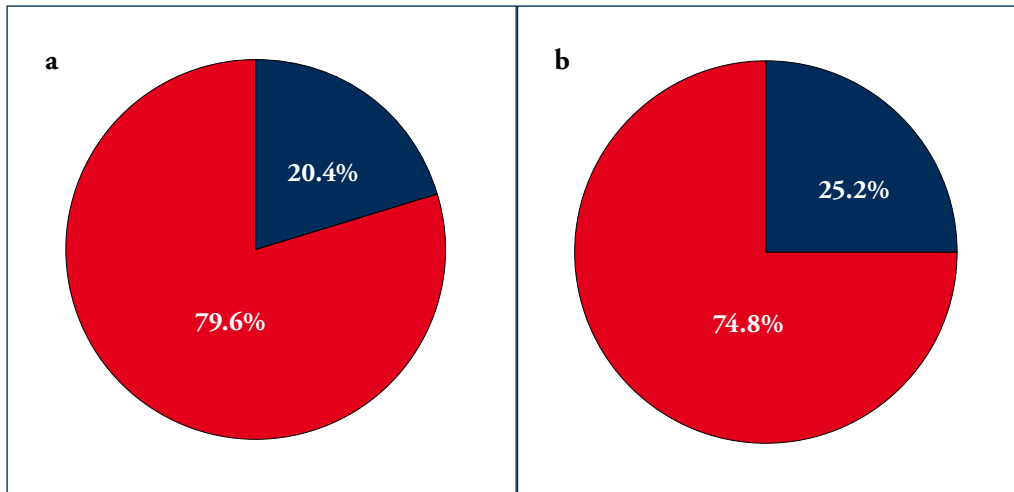
Given the prevalence of diabetes in hospitalised patients, it is inevitable that for the vast majority their diabetes care will be delivered by non-specialist staff. While mandatory training in diabetes to upskill the nursing workforce is highly desirable, this is problematic as there are so many demands on nursing time for other components of mandatory training. ThinkGlucose has targeted its tools for the non-specialist nursing and medical team and carries simple but important messages, particularly in relation to insulin administration.

**Table 1. Results of the protected mealtimes study.**

|   | <b>Before protected meal times</b> | <b>After protected meal times</b> | <b>P-value</b> |
|---|------------------------------------|-----------------------------------|----------------|
| Number of participants ( <i>n</i> )         | 136                                | 158                               |                |
| Insulin regimen:                            |                                    |                                   |                |
| Basal–bolus                                 | 22 (16.2%)                         | 22 (13.9%)                        | 0.65*          |
| Biphasic                                    | 45 (33.1%)                         | 57 (36.1%)                        | 0.53*          |
| Basal                                       | 69 (50.7%)                         | 79 (50%)                          | 0.90*          |
| Mean blood glucose (mmol/L [ $\pm$ SE])     | 10.7 $\pm$ 0.33                    | 10.6 $\pm$ 0.32                   | 0.79**         |
| Incidence of hypoglycaemia (CG <3.5 mmol/L) | 20.4%                              | 25.2%                             | 0.36*          |
| Mean length of stay (days)                  | 3.7                                | 4                                 | 0.11*          |

\*Chi-squared test; \*\*Mann–Whitney U test. CG=Capillary glucose level; SE=Standard error.

Figure 1. Incident rate of hypoglycaemia (a) before and (b) after the introduction of protected mealtimes. ■=Percentage of people experiencing hypoglycaemia; ■=Percentage of people experiencing no episodes of hypoglycaemia.



ThinkGlucose aims to promote diabetes specialist support for those inpatients with diabetes who most need it, and audit to demonstrate improved clinical outcomes and patient experience. Increasingly, people with type 1 diabetes on multiple daily injections will have received training through structured education programmes such as DAFNE (Dose Adjustment for Normal Eating) and be capable of self-managing their diabetes in hospital. It would therefore be highly desirable to be able to facilitate this on the wards, something that is promoted in the ThinkGlucose toolkit. However, it is important to ensure that there are the correct clinical governance structures in place within a hospital to support this on wards where staff not trained in diabetes can implement diabetes self-management safely. Inpatients with diabetes require access to a locker for their own medicines on the ward and there should be a process of nursing assessment to encourage patients to self-manage their diabetes.

Anecdotally, in the authors' hospital, nurses report some anxieties about allowing patients to self-manage their own insulin injections due to concerns that the nurses are relinquishing some control from the process of care, although many accept that empowering individuals to self-manage is in line with the principles of chronic disease management. If a robust method of assessment, with clearly defined

criteria, is implemented, it should allow nurses to feel far more comfortable in the process of allowing patient self-management.

One of the major differences between the ThinkGlucose module and that of the PRMT initiative is the promotion of narrowing the "insulin to food gap". While the PRMT initiative is laudable, it does not specifically address the needs of people with diabetes, particularly those who are insulin treated. The National Diabetes Support Team (2008), now NHS Diabetes, reports a number of patient stories and it is clear that there are many issues for people with diabetes in hospital. This is best described by a person with diabetes:

*"On several occasions I found food delivered ... to eat when ... blood sugar was high and no insulin had been given and the insulin dose was not given for up to another hour ... had to let the food get cold and wait for the insulin ... On other occasions insulin had been given when ... blood sugar was at a moderate or low level and there was no food in sight".*

The delivery of antidiabetes therapy during drug rounds fails to address the needs of people with insulin-treated diabetes and ignores the many other facets of care in people with diabetes during their stay in hospital.

Page points

1. ThinkGlucose aims to promote diabetes specialist support for those inpatients with diabetes who most need it, and audit to demonstrate improved clinical outcomes and patient experience.
2. Increasingly, people with type 1 diabetes on multiple daily injections will have received training through structured education programmes such as DAFNE (Dose Adjustment for Normal Eating) and be capable of self-managing their diabetes in hospital.
3. While the protected mealtimes (PRMT) initiative is laudable, it does not specifically address the needs of people with diabetes, particularly those who are insulin treated.
4. The delivery of antidiabetes therapy during drug rounds fails to address the needs of people with insulin-treated diabetes and ignores the many other facets of care in people with diabetes during their stay in hospital.

***“The present observational study finds no evidence to suggest that the implementation of the protected mealtimes initiative alone had an impact on overall glycaemic control in inpatients with diabetes.”***

### Conclusion

The development of new health initiative models of care is of distinct relevance to nursing staff caring for people with diabetes.

The frontline role played by the nursing community is key not only in its successful implementation but also in the audit and assessment of the success or limitations of each of these health initiatives. In parallel to this, given the rising incidence of diabetes worldwide, there is a need for education and dissemination of timely and relevant information among nursing staff members to ensure that high-quality care is provided for hospitalised patients with diabetes. ■

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