COMMENTS AND RESPONSES

Hypoglycemia and Clinical Outcomes in Patients With Diabetes Hospitalized in the General Ward

Response to Turchin et al.

We read with interest the article by Turchin et al. (1) on clinical outcomes in patients with diabetes. The investigators show that hypoglycemia while in the hospital leads to an increase in length of stay and higher mortality. In parallel to this, we would also highlight the importance of staffing levels and the time to biochemical resolution of hypoglycemia. Previous studies have shown that low levels of hospital nursing staff lead to an increased incidence of pneumonia, bed sores, andtk;2 overall poorer outcomes (2). We studied the rates of hypoglycemia and the effect of nurse staffing on its resolution on a medical ward in Hull Royal Infirmary from March 2008 to November 2008 inclusive.

Hypoglycemia was defined as a blood glucose of <72 mg/dl (<4 mmol/l). A low level of trained nursing was defined as any day when nursing staff for the entire day was 75% (understaffed by at least two nurses in the 24-h shift) or less, while a high level of nursing staff was any day when there were the normal staffing levels with one nurse coordinator or maximum nursing levels.

All patients with four or more capillary glucose (CG) readings performed in a 24-h period were included in the analysis.

There were 31 days with understaffing versus 33 days with normal/maximum staffing over the study period with a total of 1,262 CG readings (116 patients) during understaffing and 1,236 CG readings (101 patients) during normal/maximum staffing. The median CG during understaffing was 10 mmol/l (interquartile range 7.8–14), and during normal/maximum staffing it was 9.8 mmol/l (interquartile range 6.6–14.5) (Mann-Whitney *U* test, $P = 0.17$).

The median variation of CG was not significantly different between understaffing and normal/maximum staffing (8.3 vs. 9.4, $P = 0.33$).

When recorded hypoglycemic events were compared, there were 34 events during normal/maximum staffing and 25 during understaffing. The time taken from the recorded onset of hypoglycemia until its biochemically confirmed resolution with a recorded repeat CG was 86 min (95% CI 62 −139) for understaffing and 54 min (95% CI 29–63) for normal/maximum staffing ($P < 0.05$).

We found that patients with diabetes are monitored similarly whether nursing levels are high or low, but when hypoglycemia was identified during periods of low nursing levels it took more than 30 min longer to confirm a recorded biochemical resolution of a hypoglycemic event.

Monitoring CG and the level of glycemia achieved appeared comparable whether nursing levels were high or low. However, unpredictable events such as hypoglycemia appeared significantly longer to resolve with lower nursing levels. With rates of hypoglycemia associated with increased mortality (1), confirmed biochemical resolution of hypoglycemia should be an essential aspect of inpatient diabetes care.

It is clear that the ongoing education of nursing staff is paramount to ensure that there is an understanding of the importance of managing hypoglycemia.

We feel that adequate nursing staff levels are essential in monitoring and maintaining adequate glycemic control, especially in detecting and treating hypoglycemia in those patients who are not able to self-manage their diabetes in the hospital.

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