

IMPROVING INPATIENT DIABETES CARE: NURSING ISSUES

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ABSTRACT

As the epidemic of diabetes continues to escalate, the number of patients with diabetes who are hospitalized also will grow. Current evidence shows the value of good glycemic control in reducing morbidity and mortality in patients with diabetes. Nurses will increasingly be called on to provide the majority of the hospitalized care for these patients, and to implement care strategies that are safe, efficient, and effective. This article lists barriers faced by nurses in the inpatient setting when providing care to patients with diabetes and hyperglycemia, describes certain strategies that have successfully overcome these barriers, and suggests other strategies for testing. (*Endocr Pract.* 2006;12[Suppl 3]:56-60)

Abbreviations:

A1C = hemoglobin A1c; **CBGM** = capillary blood glucose monitoring; **CP** = clinical pathway; **DSN** = diabetes nurse specialist; **NCP** = usual nursing care plan; **IV** = intravenous

INTRODUCTION

In the United States in 2001, there were 4.6 million hospitalizations related to diabetes, representing almost 17 million hospital days (1). Although these hospitalizations represent an enormous cost to the current healthcare system, the number of hospitalizations and hospital days for people with diabetes will only continue to grow as the epidemic of diabetes escalates (2). People with diabetes are admitted to hospitals for various reasons, often related to the long-term complications of diabetes. However, almost

52% of these hospitalizations are for issues other than the patient's diabetes (3). Thus, hospital staff may be focused on issues other than glycemic control. A recent root-cause analysis of hyperglycemia and hypoglycemia in an inpatient setting showed that a general "lack of ownership of the patients' diabetes management" was a major factor contributing to hyperglycemia in patients admitted for reasons not related to their diabetes (4). Regardless of the cause of hospitalization, patients with diabetes will receive nursing care during their hospital stay. Nurses are the largest segment of hospital-care providers, and are responsible for the majority of care for hospitalized patients on a 24-hour basis. Unfortunately, there is a paucity of research on improving diabetes care in the inpatient setting from the nursing perspective. This article addresses some of the barriers faced by patients and nurses, which have adversely affected diabetes care. It also identifies strategies that have been used successfully to overcome some of these barriers, and proposes other strategies for testing.

PERCEPTIONS AND BARRIERS

McDonald et al (5) surveyed nurses to determine their perception of diabetes patients. Nurses felt the primary problem faced by patients was their lack of acceptance of the need for long-term management, and that most patients were not ready to assume this management at discharge. Of the nurses surveyed, only 41% reported that they themselves had access to adequate education about diabetes, and 28% reported having had no continuing education on diabetes in the past 2 to 15 years. Only 37% of the nurses had practice guidelines available, and of those who did, 84% found them helpful. Although nurses reported that patients were unprepared to care for their diabetes, this survey indicated that many nurses may be unprepared to care for patients with diabetes, particularly because diabetes management has changed so dramatically in the past decade. Hirsch et al (6) have identified hospital staffs' lack of knowledge relating to diabetes, meal planning, and medications (especially insulin) as a barrier to optimal diabetes care for the hospitalized patient with diabetes. The root-cause analysis showed that poor overall diabetes management was the largest contributor to hyperglycemia (4).

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Manning and Jackson (7) examined barriers to optimal diabetes care in a subacute inpatient unit in Melbourne Australia, and found that capillary blood glucose monitoring (CBGM) usually was done more than 30 minutes before insulin was administered. It was also found that only 43% of conventional insulin doses were given at the recommended time before meals; however, 94% of rapid-acting insulin was administered at the recommended time before meals. One reason for the discordance among CBGM, insulin dosing, and meals relates to the established practice: CBGM is performed by the night shift, insulin often is given by the day shift, and meal delivery is unpredictable. This lack of coordination also is present in many hospitals in the United States (8).

IMPROVING GLYCEMIC CONTROL: STRATEGIES FOR NURSES

There are several strategies whereby nurses can improve glycemic control in hospitalized diabetes patients. One is the use of a clinical pathway (CP). A CP is a method of care delivery that guides treatment during hospitalization and post hospitalization. The purpose of a CP is to meet standards of care by outlining specific goals and the expected progress to be made toward these goals (which is measured at predetermined times). Discharge planning should be done at admission, and the hospital course incorporates education of the patient and family if indicated (9). Courtney et al (9) reported on a successful CP. This pathway was developed with input from endocrinology, nursing, nutrition, podiatry, social work, home health, health education, and quality assurance. Published standards were compared with established practice and gaps identified. At the same time, educational resources were identified and reviewed. Three predetermined timepoints were selected for interventions, admission, hospital course, and discharge. Post-implementation evaluation showed increased patient satisfaction (29% to 53%), improved documentation of patient self-management education, self-monitoring of blood glucose (SMBG) instruction (56% to 64%), increased nutrition assessment (52% to 74%), and insulin self-administration instruction (72% to 92%). Knowledge of the signs and symptoms of hypoglycemia and hyperglycemia increased from 34% to 65%. Suggestions from this intervention were that the team who develops a CP include providers who actually will be delivering the care, and that specific, measurable, valid intervals of care be used (e.g., 1 day; or for short stays, 4 to 8 hours). Variances should be recorded so that there is opportunity to identify these variances and to fix the problem areas. Continuous quality improvement can be used to identify trends over time. The specific steps for a CP are design, measurement, assessment, improvement, implementation, teaching, and training.

O'Brien et al (10) used a diabetes inpatient CP to determine if lengths of stay and levels of hemoglobin A1c (A1C) could be decreased. The diabetes care pathway was devel-

oped with unit staff and used evidence-based standards. All patients with diabetes newly admitted in a 12-month period, who agreed and provided informed consent, were randomized to receive care via the CP or the usual nursing care plan (NCP). In addition, to determine whether staff needed ongoing support, one group of nursing wards received ongoing support, consisting of visits by the investigator and reminders of how to use the pathway, and the other group of wards did not receive this support. Nursing staff knowledge was tested both before and after intervention.

Use of the CP plan significantly improved diabetes care (i.e., better management of A1C, urine protein, and cholesterol, more appropriate CBGM testing frequency, and referrals to the diabetes team) in comparison to the NCP. In addition, staff using the pathway was more apt to take action with abnormal results. Staff diabetes knowledge increased in both groups post intervention, but more so for the staff who received ongoing support. Lengths of stay and A1C values did not differ significantly between the CP and NCP groups, but the trend was lower in the CP group. There were significantly fewer readmissions among the CP group (36% versus 69% for NCP; $P = 0.008$). Although management of glucose potassium infusions (GKI) is part of the pathway, it was not used by any staff in either group, even though patients were on GKI. Documentation was suboptimal on the care plans in both groups, particularly the MD sections. The authors proposed that use of the CP might be improved by limiting its length to 1 page and by having more ongoing staff support.

The previously cited studies looked at improving all aspects of diabetes care, and glycemic control was not a major focus. Davis et al (11) studied implementation of intravenous (IV) insulin in intermediate care units. Studies (12,13) have shown that glycemic control using IV insulin is better in intensive care units where the nurse-to-patient ratio is usually 1 registered nurse (RN) for every 1 or 2 patients. However, in intermediate care units, each nurse (not always an RN) usually is assigned to 5 or 6 patients. The investigators used the audit and feedback method to implement change. This method has been shown to be most effective when adherence is low (14). The purpose of this study was to evaluate the safety and efficiency of the IV insulin protocol that had been used successfully in intensive care units, on intermediate care medical units in the same hospital. The protocol was piloted on 1 medical unit, which had volunteered to use the protocol. Prior to the intervention, staff nurses identified lack of knowledge and discomfort with the required math as their major barriers. To overcome these barriers, endocrinologists, the clinical nurse specialist, and the nurse manager provided intensive staff education to nurses on all shifts. In addition, the nurses were given easy access to calculators for determining insulin doses. Using the audit and feedback method, the intervention pilot unit showed that 275 of 276 hourly rate calculations were correct. The authors concluded that the IV insulin protocol could be used safely and efficiently on

units with a ratio of 1 nurse to 5 or 6 patients. The nurses on the pilot unit found the experience challenging and satisfying. Because of the initial success, the intervention was used hospital-wide, with nurses from the pilot unit serving as experts. The clinical nurse specialist planned and conducted the education in-services for the rest of the hospital nursing staff, and the protocol was implemented successfully throughout the hospital.

In implementing intensive insulin therapy at the author's facility, staff nurses from non-intensive care units who attended a half-day education program on diabetes and intensive insulin therapy (using basal, bolus, and correction insulin) identified several barriers to implementing this therapy. These barriers included lack of staff time; lack of coordination between CBGM, insulin injections, and meals; lack of predictability of meal times; lack of predictability of what patients would eat; patients eating snacks; competing situations around mealtime; and discomfort with giving insulin when blood sugar levels were in, or close to, the normal range. The focus of the education intervention was normal insulin physiology; pathophysiology in diabetes; the concept of basal, prandial, and correction insulin; and consistent carbohydrate intake for the hospitalized patient. Case studies were used as examples. In addition to the initial 4-hour education program, which many staff attended, 30- to 60-minute in-services were provided on each unit/ward as the protocol was being implemented. Additionally, this was followed by 30-minute in-services as requested by nurse managers or nursing staff.

Another strategy for overcoming barriers to improved diabetes care in the hospitalized patient is the use of diabetes nurse specialists (DSNs). Davies et al (15) and Pledger (16) reported that using DSNs in the United Kingdom reduced lengths of stay by 3 days, improved patient satisfaction, and did not result in more frequent readmission or greater use of community resources. The DSN advised staff nurses on clinical management plans, provided education to staff and patients, and was a resource to the ward staff. Pledger proposed that a DSN based on an individual ward can promote equitable, consistent, and high-quality diabetes care; serve as a resource; provide education updates; assist in care pathway development; help evaluate outcomes; and plan future interventions. After only 6 months, Pledger's analysis of the effect of adding a DSN to the nursing wards showed that the length of stay for diabetes patients was reduced by 1.14 days, and by 3.1 days among patients admitted with diabetes as a secondary diagnosis.

Cavan et al (17) used a diabetes nurse advisor to improve the care of hospitalized patients with diabetes, including glycemic control. The nurse advisor oversaw the diabetes management of patients hospital-wide. The objective of the intervention was to decrease lengths of stay. All diabetes patients were assessed by the nurse advisor. If patients were stable and remained so, they were not seen again. Unstable patients had their regimen adjusted by the nurse advisor using protocols developed with the admitting

medical team. Interventions by the nurse advisor included treatment changes, insulin initiation, reviewing glycemic control, staff education, and patient education, particularly of newly diagnosed patients. The nurse advisor was involved in discharge planning, follow-up, and maintaining telephone contact for 3 months after discharge with patients who had had insulin initiated during their hospital stay. Results of the intervention showed a 3-day decrease in length of stay in both medical and surgical wards ($P < 0.001$). This represents a savings of 4,171 hospital days. A staff audit performed after the introduction of the nurse advisor showed that all the doctors surveyed found the services of this nurse useful and that nursing staff received advice and guidance about patients more rapidly. Although glycemic control was not directly reported, the authors posit that poor glycemic control led to delayed discharges and longer lengths of stay. Thus, the shorter lengths of stay could be related to better glycemic control and better overall management of these patients.

Pollom and Pollom (18) reported on a program in a multihospital system that used a multidisciplinary team consisting of a case manager, clinical pharmacist, medical nutrition therapist, and the bedside nurse to implement a process of evidence-based care and support, and to connect inpatient care to outpatient support. With this program, patients with diabetes, or at high risk for stress hyperglycemia, are identified at admission. This early identification is necessary so that all appropriate services can be utilized prior to discharge. The nurse who is responsible for the patient's care does the admission database using an Admission Database form, to which 5 questions have been added to identify the need for diabetes self-care education. When a need related to diabetes or stress hyperglycemia is identified, the nurse contacts the appropriate team member (e.g., the medical nutrition therapist for nutrition issues, the pharmacist for medication issues, the case manager for financial or resource issues). Because diabetes is not the admitting diagnosis, many of these patients have their care delivered according to the care maps or CPs for their admitting diagnoses. This program adds a secondary care map related to diabetes, which is coordinated by the bedside nurse, including referral to the diabetes education program after discharge, if indicated. The bedside nurse also provides the self-management teaching, such as SMBG and insulin injections. All team members use the same education materials and resources so that the patient receives consistent information. Although no outcome data were provided, this process appears to be appropriate, particularly for addressing the diabetes needs of the >50% of hospitalized diabetes patients admitted for reasons other than poor glycemic control.

Hypoglycemia, or fear of hypoglycemia, is another barrier to implementing protocols based on basal, prandial, and correction insulin. The review by Clement et al (3) indicates that the majority of hypoglycemic episodes in hospitalized patients are preventable, and emphasizes that all

staff must be aware of high-risk situations. The root-cause analysis by Smith et al (4) showed that almost 70% of the hypoglycemic events in their study were preventable. However, Hirsh et al (6) note that, although most hospitals have protocols for treating hypoglycemia, few have protocols for preventing hypoglycemia, which is a very preventable event. Nursing staff are concerned that patients will not eat, or that patients will have to leave the ward unexpectedly for a test or procedure between the time when prandial or correction insulin is given and when food is served. Nurses also are concerned about being called away for another patient or crisis between CBGM and the time insulin is given or the meal served. A strategy to address this concern is to make nurses aware that rapid-acting insulin analogs can be provided immediately after the meal is finished, when the nurse can assess how much carbohydrate the patient has consumed. Another strategy, if it fits within hospital rules, is to allow cognitively aware patients to administer their own prandial and correction insulin. Another strategy would be to keep a supply of “portable snacks” (such as breakfast bars) for patients who have to be unexpectedly transported between insulin injection and meal consumption.

Although the data are sparse, there are some interventions where nursing can assist in improving the care of hospitalized diabetes patients. CPs have been proven effective, as has the use of a hospital- or ward-based DNS. Staff education also been effective in improving inpatient diabetes care. However, it must be remembered by those providing this education, that nurses cover all 24 hours; thus, staff education will have to be given for all shifts. One effective way is to give in-services to the outgoing night shift and part of incoming day shift, then repeat the program for the remainder of the day staff and the incoming evening shift. Although time-consuming for the person providing the education, it is often more effective to educate each nursing unit or ward individually. The most effective time to provide this education is when the nurses will be immediately able to implement their new knowledge, that is, just before a new protocol is implemented—not 3 months prior. In addition, it is important that all staff receive similar education, including dietitians, doctors, pharmacists, and others who will be involved in improving glycemic control.

Some problem areas are system based and will require the coordination of several services. The coordination of CBGM, insulin dosing, and meal service is one of these areas. The managers of these services can together devise strategies to coordinate these critical components of improved glycemic control. In some cases, senior administrative staff may need to be involved and support the efforts. However, there are adequate data to show the cost-effectiveness of better diabetes care and glycemic control in terms of decreasing lengths of stay and readmissions, such that administrative buy-in should be attainable.

There are other strategies, which have not been studied very well, if at all, that might be effective in improving gly-

cemic control and overall diabetes care for the hospitalized patient. One strategy is to use a staff nurse as a “diabetes expert” on each nursing unit. This person would receive extra training in diabetes and serve as a resource to the rest of the unit. Another possible strategy is to develop “insulin teams” similar to “IV teams.” The insulin teams would coordinate their efforts with meal deliveries, so that they are on each unit or ward when the trays are delivered and can perform CBGM and administer prandial and correction insulin at the appropriate times. Another possible strategy would be to use diabetes educators to assist nursing and other hospital staff to improve the care of the hospitalized patient with diabetes. Depending on the size of the hospital, diabetes educator(s) may cover the entire hospital, or just be consulted for the more difficult cases. In addition, diabetes educators can assist nurses and other staff with CP and protocol development, implementation, and evaluation, and serve as a liaison to other departments and outpatient diabetes education and management.

The time is now to improve the care of hospitalized patients with diabetes or stress hyperglycemia. Nurses should be involved at all stages of improving this care, including planning and evaluation, because they will be doing the majority of implementation and are central to any effort to improve care for hospitalized patients.

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