Education for Continuous Subcutaneous Insulin Infusion Pump Users

American Association of Diabetes Educators

This is an official position statement of the American Association of Diabetes Educators (AADE). AADE is dedicated to advancing the role of the diabetes educator and improving the quality of diabetes education and care.

Continuous subcutaneous insulin infusion (CSII) is a treatment option for patients with diabetes who desire intensive insulin management to achieve the goal of blood glucose levels as close to normal as possible with minimal hypoglycemia. Planned education with a diabetes treatment team that is familiar with the use of the insulin pump is an integral component of care.

INDICATIONS AND SELECTION CRITERIA

Given the results of the Diabetes Control and Complications Trial (DCCT), CSII should be considered a treatment option because it offers increased lifestyle flexibility and enhanced self-management that improves blood glucose control. CSII is appropriate for individuals with diabetes who (1) require or desire improved blood glucose control, especially during pregnancy, and/ or (2) require the flexibility that CSII offers.

Although there is no firm evidence linking specific patient characteristics/capabilities to successful insulin pump use, the following should be considered when patients select pump treatment: (1) motivation to achieve normoglycemia using self-management skills, (2) evidence that the individual has accepted the self-care responsibilities associated with diabetes and does not have unrealistic expectations of CSII therapy, (3) technical ability to accurately perform blood glucose monitoring and operate the insulin pump, (4) intellectual ability to learn and retain information, (5) effective coping patterns, (6) availability of support systems, and (7) financial resources to cover the cost of CSII therapy.

EDUCATION

CSII can be initiated in both inpatient and outpatient settings if adequate education and support are provided. In these settings insulin dose adjustments can be made and aspects of technical management of the pump can be demonstrated. Management guidance and support from the treatment team must be ongoing. A healthcare professional who is knowledgeable about pump treatment should be available 24 hours a day to assist the individual in integrating new concepts and management routines into his/her lifestyle. The following components of insulin pump education should be included:

1. Monitoring of blood glucose Blood glucose levels form the basis upon which to adjust insulin, food, and exercise, and evaluate the effect of actions taken. The frequency of blood glucose testing should be individualized, but all patients should monitor at least 4 times a day (before each meal and at bedtime). Blood glucose monitoring is most effective when patients are instructed regarding what their glucose goals are; how to relate blood glucose levels to events, food, and exercise; and how to respond appropriately to achieve those glucose levels. This educational process should begin before initiating pump therapy training.

2. Diet The use of an insulin pump provides many options for food choices. The various meal-planning approaches for medical nutrition therapy might include, but are not limited to, carbohydrate counting, food exchange system, calorie and/or fat counting, and total available glucose. Emphasis should be placed on healthier food choices and

consistency with grams of carbohydrate in meals and snacks. Achievement of euglycemia can precipitate weight gain and increase the incidence of hypoglycemia. Adjustment in the caloric content of the meal plan is helpful for maintaining a reasonable body weight. A thorough nutrition assessment and ongoing diabetes nutrition education are an essential component of education for patients using pump therapy.

3. Exercise Exercise is an important component of insulin pump therapy. The patient should be familiar with how to adjust food and/or insulin in anticipation of exercise or physical activity. The patient should also know when it may be harmful to exercise, such as during ketosis or if insulin flow has been interrupted (eg, clogged tubing or needle out) and hyperglycemia occurs.

4. Technical aspects of insulin infusion pump therapy Patients must become competent at performing operating procedures for whichever insulin infusion device is used. Patients should also investigate *any* high glucose levels because ketosis can occur quickly.

5. Sick-day management General principles of sick-day management apply to those using an insulin pump, including instructions to test for ketones during illness and whenever blood glucose concentrations are elevated above 240 mg/dL. Instructions should be given regarding adjusting the insulin infusion in response to changing blood glucose levels during illness.

6. Management of hypoglycemia Hypoglycemia is a concern with insulin pump therapy because (a) insulin is infused continuously day and night, (b) hypoglycemia unawareness is associated with near-normal glycemia, (c) there is an increased risk of hypoglycemia with intensive management, and (d) overinfusion of insulin can occur due to patient programming error. Patients and family members should be well educated about the causes, symptoms, prevention, and treatment of hypoglycemia, including the use of glucagon. Frequent self-monitoring of blood glucose may help avoid hypoglycemia.

7. Management of hyperglycemia/prevention of diabetic ketoacidosis Because the insulin pump delivers small amounts of fast- or rapid-acting insulin, any interruption of insulin delivery can result in elevated blood glucose levels and possible ketoacidosis. The patient must be instructed that urine ketones should be checked if unexplained hyperglycemia occurs. If ketones are present, the infusion set and site should be changed immediately. Insulin should be given by syringe as soon as possible even before the infusion set is changed.

8. Infection Infection at the infusion site is a potential complication of CSII. The patient should be taught to change the infusion site every 48 to 72 hours and to follow recommended skin preparation. If the patient is allergic to tape, hypoallergenic tape may be required or other skin protective agents may be necessary.

9. Problem-solving and decision-making Identifying problems and solutions requires a well-trained patient who understands his/her CSII regimen. Frequent outpatient visits and phone contacts upon initiation of pump therapy may be necessary, and patients should be instructed as to when to call their healthcare providers.

10. Special precautions and considerations Instructions regarding disposition of the pump during activities such as showering, sexual intercourse, strenuous exercise, and sleeping should be included in the educational process. Patients should also be instructed about how to return to conventional therapy should this become necessary.

SUMMARY

Successful implementation of CSII requires a motivated patient with a range of technical skills and self-management capabilities. Patients develop this expertise through an ongoing program of education and the support that a healthcare team knowledgeable in insulin pump therapy can provide.

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