STUDY ON EFFECTIVENESS OF GUIDELINES AND HIGH DEPENDENCY UNIT MANAGEMENT ON DIABETIC KETOACIDOSIS PATIENTS

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ABSTRACT

Objective: *To examine the quality of management of DKA and to assess the influence of guidelines and medical HDU on management.*

Material and Methods: *This study was performed on 87 patients who were admitted with the diagnosis of Diabetic Ketoacidosis (DKA). A comparison was made of the standards of DKA management before and following the introduction of local guidelines and after the establishment of the medical HDU (High dependency unit)*

Results: *Before starting the study our hypothesis was that "There should be gross improvement in the way these patients were managed after establishment of the guidelines and HDU". In our study this was not confirmed. We found important areas where proper management was lacking.*

Conclusion: *The introduction of guidelines and the availability of a medical HDU had little influence on the management of Diabetic Ketoacidosis. Fluid electrolyte management remained sub optimal and areas of concern.*

Key word: *Diabetic ketoacidosis, Guidelines.*

INTRODUCTION

Diabetic ketoacidosis (DKA) is a serious complication of diabetes. Mortality and morbidity remains high despite advances in our understanding of its pathogenesis and uniform agreement about management. The main reasons behind the complications have always been known to be related to electrolyte and fluid management.

Establishment of guidelines and Medical HDU should have beneficial effect with improvement in the management of DKA patients and thus reduction in duration of hospital stay.

Aims

To examine the quality of management of DKA and to assess the influence of the introduction of local guidelines and the establishment of the medical high dependency unit (HDU) on the adequacy of DKA management.

MATERIAL AND METHODS

This study was based on retrospective analysis of case records of patients admitted with DKA in Russell's Hall hospital in west midlands, United Kingdom. Between 2002 to 2004, a total of 87 cases of diabetic ketoacidosis were identified through hospital enquiry system.

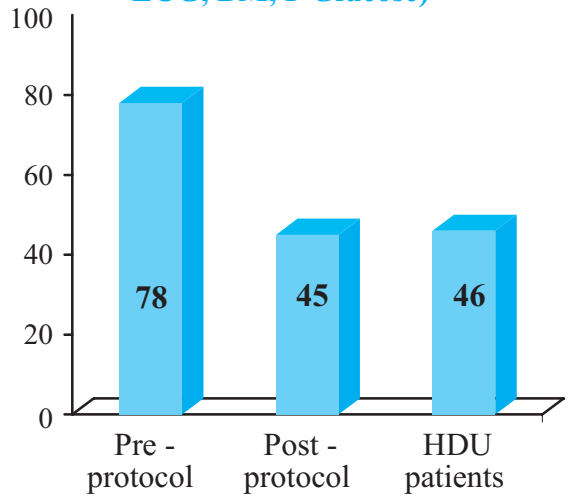
A total of 87 cases were identified and included in the study. 23 of these patients were of pre protocol times, where as 51 were post, and 13 were managed in HDU.

Majority of the admissions were via casualty where as one third were referred by General practitioners. On the other hand almost 85 % of admissions who eventually went to HDU were admitted via casualty as an emergency.

A comparison was made of the standards of DKA management before and following the introduction of local guidelines and after the

Percentage of Patients Who Underwent All Essential Baseline Investigations

(U&E, FBC, ABG, Urine dipstick, CXR, ECG, BM, P Glucose)



establishment of the medical HDU.

RESULTS

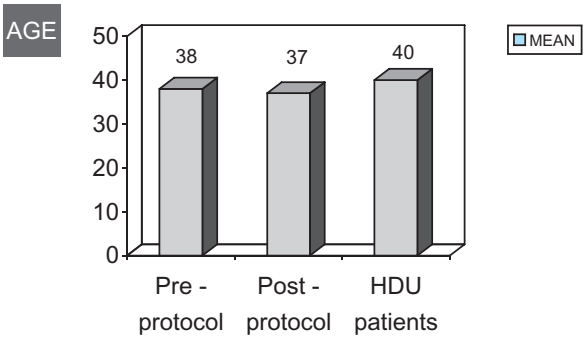
1 In the last 2 years only 60% of patients with DKA were seen within 30 minutes of presentation.

2. There was an increasing reliance on finger prick testing to diagnose hyperglycaemia with only 75% of patients having plasma glucose measurement.

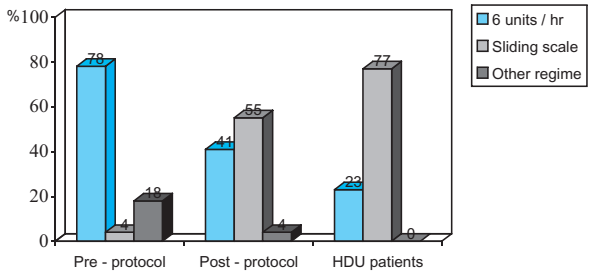
3. Essential baseline investigations recommended by the protocol were not performed adequately in a significant proportion of patients:

   - Only 77% of patients were tested for ketonuria
   - ECG not performed in significant proportion of patients.
   - Inadequate infection screening i.e. CXR, MSU etc.

DEMOGRAPHIC DATA - MEAN AGES OF PATIENTS



Insulin Regimen Used At Presentation



4. More than 50% of DKA patients did not receive education by Diabetic Specialist Nurse during their hospital stay.

5. Less than half the comatosed DKA patients received Naso-Gastric tube suction and/or catheterised.

6. Despite recent improvement, the minimum requirements in monitoring electrolytes were not fulfilled in at least 30% of DKA subjects.

7. Following the introduction of DKA guidelines, 3 out of 27 patients who presented with hyperkalaemia were given K+ infusion with the 1st litre of saline.

8. Approximately 20% of normokalaemic DKA patients did not receive K^+ replacement in the first 24 hours of admission. This pattern remained unchanged following the introduction of the guidelines.

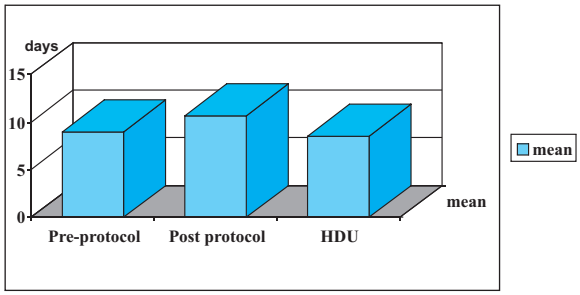
9. The introduction of guidelines and availability of medical HDU were not associated with a reduced bed occupancy rate.

DISCUSSION

Diabetic ketoacidosis (DKA) is a complex metabolic state of hyperglycemia, ketosis, and acidosis. DKA results from untreated absolute or relative deficiency of insulin in type 1 or type 2 diabetes mellitus, respectively.

Diabetic Ketoacidosis Acidosis (DKA) and

Length of Stay



Hyperosmolar Hyperglycemic Syndromes (HHS) remain the most common Endocrine Emergencies seen by Physicians in the casualty today.[1] Between 4.6-8 episodes of DKA occur per 1000 diabetics annually. At present over 2 million Canadians are living with Diabetes, a rate that is expected to climb annually.[2,3]

Approximately 90% of DKA occurs in Type 1 diabetics. A disturbing trend toward the development of DKA has been identified however, in a subset of Type 2 Diabetics with high Insulin resistance. The majority of these patients are young, where obesity, genetics, inactivity, diet and cigarette smoking appear to correlate with disease development.[4, 5, 6]

In Pakistan, a study[7,8] at Aga khan university hospital, in 1993 revealed that out of Sixty-two consecutive episodes of diabetic ketoacidosis (DKA), forty-four (71%) were type I and 18 (29%) type II diabetics. Mean age was 28.1 years and mean duration of diabetes 4.1 years. Infections were the most common precipitating factor accounting for 28 episodes (45.2%).

The pillars of management in DKA are intravenous fluids, potassium, insulin and bicarbonate. Fluid resuscitation is most important and should be the focus of the attending physician in the early hours of management. Despite intensive management its established that DKA is associated with significant mortality. This fact was shown in a vast study(9) held in Korea, involving DKA cases over a time frame of two decades. It showed that a dramatic increase in DKA admissions occurred over the two decades. A total of 30 patients died in hospital (11.8% of all episodes). Older age and infection appeared to influence mortality. It concluded that rapidly increasing episodes of DKA in Korea, in parallel with increases in the numbers of diabetic patients, continue to be associated with significant mortality.[11,12] However, recent studies[13] conducted at inner city hospitals in the United States suggest that the precipitating event often is omission of insulin because patients cannot access or afford medical care. A prospective study of 1,243 patients with type 1 diabetes from infancy to 19 years of age showed that elevated A1C levels, and concurrent presence of psychiatric disorders are important predictors of DKA[14]

Treatment of DKA requires intensive monitoring of patients, fluid resuscitation Insulin therapy and replacement of electrolyte losses, and careful search for the precipitating cause. As the majority of DKA cases occur in patients with a known history of diabetes, this complication should be largely preventable through early detection, and by the education of patients and the general public. Novel approaches to patient education incorporating a variety of healthcare beliefs and socioeconomic issues are critical to an effective prevention program.[10] Home blood glucose monitoring equipment with the capability to measure beta-hydroxybutyrate on finger stick blood is now available.[15] Home glucose monitoring may reduce admissions for DKA by causing patients to seek care earlier in the course of a hyperglycemic crisis. The use of low-dose intravenous insulin in the treatment of DKA is recognized as standard procedure.[11]However, most recent studies[16,17] on fast-acting insulins (i.e., lispro and aspart) demonstrate that subcutaneous injections of these analogs every one to two hours in patients with mild or moderate DKA on the general hospital wards is as effective as the use of regular intravenous insulin in the intensive care unit, and results in 40 percent cost savings.

This study unique in the way that, not much data is available which looks at the management of DKA and compares it following introduction of changes in the same institution over the period of two years. Interestingly enough it identified the need for implementation rather than just issuing the guidelines. It was recommended that a special protocol and check list format should be attached to each DKA diagnosed patient on admission. There will always be some aspects which will skip through the net, but presence of net is vital. Similarly, a system of patient sorting is crucial so that such patients end up in the right department under the right team.

CONCLUSION

1. Management of DKA remains suboptimal in a significant proportion of patients.
2. The introduction of guidelines and the availability of a medical HDU had a little influence on the management of DKA.
3. Management of potassium abnormalities in DKA remains a high risk area.
4. Inadequate awareness of the protocol by medical staff has been observed.
5. Extended role of nursing staff at the 'front door 'sites would help in areas such as electrolytes monitoring.
6. Continuity of medical care is likely to be an important factor in ensuring the implementation of guidelines.
7. Diabetes specialist nurse with a lead role in in-patients care may play a key role in ensuring the delivery of high standard acute diabetes care.

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