DKA treatment in the ICU: Is it always necessary?

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Introduction

In many hospitals diabetic ketoacidosis (DKA) requiring intravenous insulin infusion is a criterion for intensive care unit (ICU) admission. Several studies have now been published showing that DKA can be successfully treated in the emergency department or general medical ward setting with rapid acting insulin. However, the frequently-cited need for close blood glucose and vital signs monitoring results in most institutions admitting patients for DKA to the ICU. Resource availability varies widely between institutions and institutional level of care. Therefore, in order to improve upon healthcare resource utilization, determining which patients to admit to the ICU would then need to be characterized.

Materials and Methods

In the current study, the investigators performed a retrospective chart review of patients admitted to the ICU of an urban community hospital with a primary diagnosis of DKA.

Two groups were identified:

- Those requiring less than one day of ICU care
- Those requiring more than one day of ICU care

Groups were compared in terms of demographic and clinical characteristics including baseline lab values, symptom severity, chronic comorbidities, and acute concomitant acute illness.

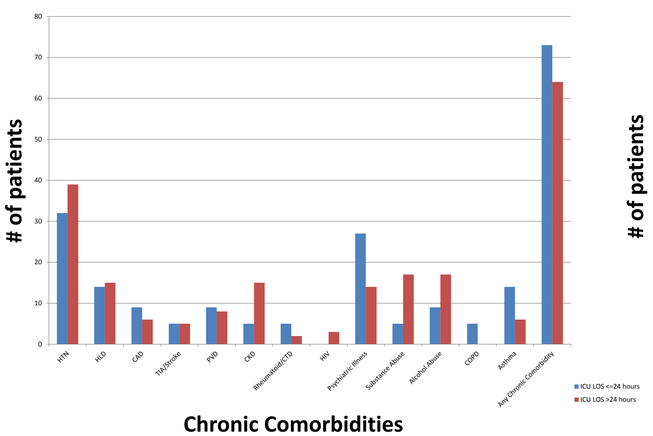
Results

Over a nine-month period, 88 patients were identified; 22 (25%) had an ICU stay of less than 1 day.

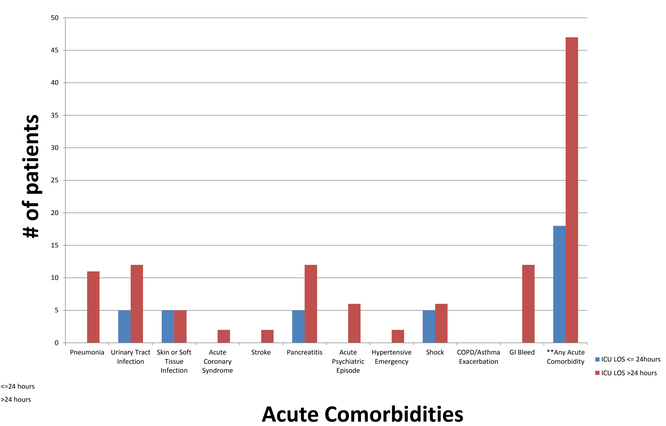
There were no significant differences between short-stay and long-stay patient groups in terms of demographic characteristics, admission lab values, symptom severity (Glasgow Coma Scale and APACHE 2), prior diagnosis, prior insulin use, treatment compliance, or admission in past year.

Patient Characteristics	Total Group	ICU LOS ≤ 24 hours (N=22)	ICU LOS >1 day (N=66)	p-value
Age	44.0 (17.7)	41.2 (16.70	44.9 (18.00	0.41
Gender, male	55 (63%)	15 (68%)	40 (61%)	0.53
Weight (Kg)	74.0 (21.7)	70.7 (23.6)	76.4 (21.0)	0.29
Prior Diagnosis of Diabetes	78 (87%)	21 (96%)	57 (86%)	0.25
Prior Insulin Use	62 (71%)	18 (82%)	44 (67%)	0.18
Treatment Compliance	36 (41%)	9 (41%)	27 (41%)	1
Admissionf for DKA in the past 1 year	45 (51%)	13 (49%)	32 (59%)	0.39

Admission Labs and Symptom Severity	Total Group	ICU LOS ≤ 24 hours (N=22)	ICU LOS >1 day (N=66)	p-value
MAP (mmHg)	94.6 (20.9)	93 (13)	95 (23)	0.7
Arteral pH	7.20 (0.15)	7.24 (0.14)	7.19 (0.16)	0.17
Arterial PO2	111.7 (64.0)	110 (51)	112 (68)	0.91
Sodium	137.4 (8.9)	135 (9.5)	138 (8.6)	0.22
Potassium	5.2 (1.0)	5.1 (0.8)	5.2 (1.1)	0.75
Chloride	100.0 (10.7)	96 (12.6)	100 (9.8)	0.11
HCO3	12.0 (6.1)	13.5 (7.4)	11.4 (5.4)	0.2
BUN	32.7 (24.3)	31.1 (25.1)	33.2 (24.2)	0.74
Creatinine	1.7 (1.2)	1.39 (0.91)	1.75 (1.3)	0.22
Highest Blood Glucose in first 24 hours	663.3 (282.5)	657 (261)	665 (21)	0.91
Lowest Blood Glucose in first 24 hours	179.7 (87.6)	173 (84)	182 (89)	0.68
Hematocrit	42.5 (8.6)	42.9 (7.2)	42.3 (9.1)	0.76
WBC count	14.2 (6.8)	13.1 (6.2)	14.6 (7.0)	0.38
GCS	15 (15,15)	15 (15,15)	15 (15,15)	1
Apache II	11 (7,15)	10 (6,12)	11.5 (8.75, 18)	0.1



Chronic Comorbidities



Acute Comorbidities

Patients with long-stays were more likely to have chronic alcohol (9% vs. 17%) or drug abuse (5% vs. 17%) histories. There were no other differences in chronic comorbidities.

No single acute comorbidity was identified as being significantly different between groups; However, a composite of any acute comorbidity was significantly higher in the long-stay group (47%) as compared to the short-stay group (18%; p=0.02), indicating that patients who have any form of acute comorbidity require longer ICU stays.

There was no difference in mortality between groups.

Discussion

Our data suggest that there are a proportion of patients that are admitted to the ICU for a primary diagnosis of DKA that are quickly stabilized and discharged within one day. With increasing evidence showing that rapid acting insulin may be as effective as intravenous insulin with no effects on mortality, ICU admission may not be required for all patients. If use of ICU beds can be avoided in patients with rapidly correcting DKA, via the use of rapid acting insulin in the emergency department or general medical ward without compromising efficacy or patient safety, then these ICU beds can be better utilized for patients with more complicated conditions. This would improve resource utilization and decrease hospital costs.

While our data is limited by the overall number of patients, it suggests that further and more comprehensive study in this area of resource utilization is warranted.

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