



## Short Communication

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## Influence of glycemia on admission for the intensive critical care patient outcome

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### Abstract

**Introduction:** The glycemic surveillance is important in intensive care unit in order to know the vital prognosis of each patient. **Methods:** We did a descriptive and analytical study during six months in the medical intensive care unit and toxicology at Joseph Ravoahangy Andrianavalona Academic Hospital. All admitted patients with high blood glucose level and the protocol done were concerned by this study. **Objective:** The aim of this study was to determine the outcomes for those patient with high blood glucose level during their stay in the unit. **Results:** Among 78 patients selected for this study: 22 (13%) of them died and 10 from those last received insulin therapy. The correlation between mortality rate and insulin use were non-significant. **Conclusion:** Hyperglycemia and insulin resistance are frequently seen while in intensive care unit and also associated with a high morbi-mortality rate.

**Keywords:** Blood glucose level, Intensive care, Outcomes, Management

### INTRODUCTION

The normal blood glucose level varies between 4-5 mmol/L on fasting and 7-8 mmol/ L after lunch. Glycemia is an essential parameter to survey in intensive care unit and gives a good metabolic status of a patient who is whether diabetic or not.

Hyperglycemia and insulin resistance contribute in increasing morbidity and mortality for patients in critical condition. They reduce their immune responses<sup>[1]</sup> increase the kidney failure, the mortality rate and the duration of stay in hospital<sup>[2]</sup>.

### Objective

An original survey, the first in Madagascar to show the existing link between admission glycemic rate and the critical care patient outcome.

### Materials and methods

We conducted a cross platform descriptive and analytical study during a period of 6 months from November 2014 to April 2015 in Medical Intensive Care Unit and Clinical Toxicology at Joseph Ravoahangy Andrianavalona University Hospital.

We included all admitted patients during the study period. Patients who had not benefited from the protocol and those who have been transferred to surgical unit were excluded.

The following parameters were taken in consideration: demographic criteria, the clinical signs, blood glucose level and treatment on admission, mortality rate.

The protocol for glycemic management in the unit was used. Insulin was administrated when the glucose level at admission was higher than 2g/L especially for non-diabetics patients. Our target level was 1.4 g/L. We used the rapid-acting insulin in intravenous by ESP (electric syringe pump) 0.1 to 0.2 U/kg / h (8 to 10 IU/h) or if bolus 5 to 10 IU every hour. A monitoring is required for glycemic control.

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A statistical analysis was done on the R software and the database collections in Excel. We used the Chi2 Pearson test with a "p" value signification at 0.05.

## Results

We selected 78 among 287 admissions durant the study, 10 of these patients were diabetics. The study population was predominantly male with a sex ratio 1.4 and an average age of 46 years (SD ± 17).

Poisoning are the main cause of entrance in 34 cases, unconsciousness was reported in 23 cases, high blood pressure was found in 10 cases and respiratory disorders or other causes (allergies, anxiety attack,...) were seen in 7 cases.

The average blood glucose level at admission was 1.64 g / L (SD ± 1.04). Fifty-four diabetic patients among all or not had presented hyperglycemia, hypoglycemia 18 and only 6 in normoglycemia.

The correlation between insulin and mortality had returned with a non-significant p = 0.6091 although we had 22 deaths and only 10 patients received insulin in the population studied. The correlation was not significant between the glucose intake and mortality with a p = 0.584. Fifty-four patients were hyperglycemic, 22 deaths, representing 13% of the population, 50% of it constituting 16 cases died in the group of hyperglycemia whatever their reasons for entrance (Table 1).

**Table 1:** Distribution of patients according to the actual or average (± SD) and p expressed that relationship over death

	Staff / medium (±SD)	Percentages (%)	p on deaths
Records :			
Not select	287	100	
Select	78	27,17	
Years	46,04(±17,28)	0	0,534
Diabetics	10	12,82	
Signs at the entrance :			
Intoxication	34	43,58	
Impaired consciousness	23	29,49	
Arterial hypertension	10	12,82	
Respiratory problems	7	8,97	
Others	7	8,97	
Average glucose entry	1,64 (±1,04)	0	
Blood sugar			
Hypoglycemia	18	23,08	0,584
Normoglycaemia	6	7,69	
Hyperglycemia	54	69,23	
Insulin	10	12,82	0,6031
Death:	22	100	
Hypoglycemia	4	18,18	
Normoglycaemia	2	9,09	
Hyperglycemia	16	72,72	

## Discussion

Hyperglycemia is a factor of poor prognosis and widely shown in diabetes but also in non-diabetics. It increases the risk of mortality by 4% in non-diabetic presented with stress hyperglycemia on admission.<sup>[3]</sup>

In recent years, studies on glycemic management have advanced after the initial work of Van den Berghe *et al.* they suggested an

improvement in the prognosis of ICU patients with tight glycemic control. Their results showed a 32% reduction in mortality and morbidity with a glycemic target <1.1 g / L and whose rate of hypoglycemia was 5.2%<sup>[4]</sup>.

Krinsley resumed earlier studies and found a decrease in the morbidity and mortality rate of 45% for patients with septic shock<sup>[5]</sup>.

A controlled randomized multicenter recent study in French centers showed no significant effect on mortality at 90 days after, in general intensive care patients<sup>[6]</sup>.

They had a larger number of hypoglycemia that was not a mortality factor contrary to what reported the study Nice Sugar<sup>[7]</sup>

In our study we introduced a simple treatment according to our established protocol from the study without strict glycemetic control. This explains the 10 patients who received insulin on 54 with hyperglycemia. The problems of cost for glycemetic control analysis and the same treatment induced a management problem. We had 22 deaths of which 16 were hyperglycemics. This explains that hyperglycemia in Madagascar is one of the independent risk factors for mortality because more than 50% of died patients were hyperglycemic whatever their reasons for admission.

This original study shows our daily practice. It allowed us to create a glycemetic protocol adapted to our situation in underdeveloped countries although the study was done for a short time and with a small sample. It was conducted in monocentric center and which differs from others studies.

## Conclusion

Stress hyperglycemia and insulin resistance are common in intensive care unit and associated with a bad outcome. Insulin therapy is the best treatment to maintain normal blood sugar level and decrease morbidity and mortality. Avoiding the occurrence of hypoglycemia is capital.

**Conflicts of interest:** None

**Authors' Contribution:** All authors declare that they had contributed to this work.

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