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## Hypoglycemic Patient Transported by EMS in Makkah Region, 2017

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**Abstract: Objective:** To estimate the incident rate of the hypoglycemic patients transported by EMS and to evaluate EMS primary impression for these patients.

**Methods and Design:** Retrospective, observational study was based on data for 150,563 SAUDI RED CRESCENT AUTHORITY Transported Patients during 2017. Subjects were defined as having Hypoglycemia if EMS personnel recorded a primary impression of hypoglycemia or low blood glucose (<60 mg/dL Or "unspecified low"). The outcome of interest was patient transport or non-transport to an emergency department or other care settings.

**Results:** Among 150,563 eligible encounters, 1984 (1.29%) were diagnosed with hypoglycemia, of which 536 (27%) were not transported. Non-transported was more likely among male adult patients age (40-59), initial blood glucose <60 mg/dl or EMS arrival time midnight – 6 A.M.

**Conclusion:** A low rate of the non-transported patient to ED, Imperfect agreement between a primary impression of hypoglycemia and documented low blood glucose.

**Keywords:** hypoglycemia, diabetes mellitus, transportation of the patient, Saudi red crescent authority, emergency medical services

## INTRODUCTION

Diabetes mellitus one of the most common diseases in the world. It's a disease in which the body's ability to produce or respond to the hormone insulin is impaired, resulting in abnormal metabolism of carbohydrates and elevated levels of glucose in the blood. DM has two types: type 1, and type 2. Type 1 is insulin-dependent diabetes. Type 2, where the body can't use insulin properly. The most common form of diabetes is type 2. According to The American Diabetes Association, nearly half of American adults have diabetes or pre-diabetes; more than 30 million adults and children have diabetes; and every 21 seconds, another individual diagnosed with diabetes in the US.<sup>2,10</sup> There are about 60 million people with diabetes in the European Region 10.3% of men and 9.6% of women aged 25 years and over.<sup>1</sup> In 2013 there were 382 million with diabetes.<sup>3</sup> Also the most affected age in Asia and the Pacific is more than 15 more likely twenty.<sup>12</sup> The number of people currently infected in the Kingdom of Saudi Arabia according to the Health Information Survey for 2013 is estimated at 1.851.080 persons over the age of 15 and will increase to more than 4,300,000 in 2030. Lifestyle playing an important role, more like a disease because the type of the food (junk food) and lack of exercise.<sup>15</sup> Total reported cases of hypoglycemia in the KSA was 4,553 from these cases, 1974 cases were reported in Makkah region which represent 43.5% of total cases.<sup>20</sup> Makkah city is one of the most important cities because of the Hajj and Umrah, people around the world come to do Hajj & Umrah, and many of them have DM. The primary impression of EMS for Hypoglycemia can save the time of diagnosis and deal with the patient to avoid further injury.<sup>8</sup> There is a shortage of data on the characteristics of

EMS performance for hypoglycemia and the rate at which patient transported to the ED.<sup>7</sup>

## RESEARCH DESIGN AND METHODS

This study used a Retrospective, observational method, this type of studies used the available database to investigate, analyze, and explain the findings. Makkah region has 137,000 km<sup>2</sup> in area with a population of 6,915,006 million. There are 72 Emergency Centers in Makkah region. Total ambulatory services in Makkah region 150,563 in 2015. Paramedics are allowed to treat a hypoglycemic patient with intravenous Dextrose, and they use a glucometer to measure the blood glucose.

The patient has the right to refuse the transport after treatment, some of them prefer eating instead of transporting. The paramedics have to encourage the patient to go to the nearest health center. There is a refusal form signed by the patient if he disagrees to be transferred.

## DATA COLLECTION

We collected our data from red crescent database after meeting the head chief of the red crescent at Makkah region, which include: date, time patient sex and age, signs & symptoms of the patient, vital signs, medications, oral intake and if they were transported or not to ED. This study was based on data for 150,563 cases in Makkah region.

Our interest was to know the incidence of transporting patient diagnosed with hypoglycemia to ED and to know the effect of EMS primary impression of hypoglycemia patients on saving time for diagnosis and dealing with the patient.

**RESULT**

Among the total ambulatory services 150,563. 1984 (1.32%) were identified as hypoglycemia; 536 (13.5%) were not transported. (Table 1) Non-transport was more likely among male adult patients age 40-59 years of age, initial blood glucose >60 mg/dl, and EMS arrival time midnight-5:59.

There was an imperfect agreement between a primary impression of hypoglycemia and documented low blood glucose (Table 2). Among the 1,117 encounters with a primary impression of hypoglycemia, 929 (51.7%) also had documented low blood glucose. In the remaining 118 (16.83%) encounters which did not have documented low blood glucose, the patients may have received assistance

prior to EMS arrival, had “probable symptomatic hypoglycemia”<sup>4</sup> (i.e., symptoms but no documented blood glucose) or had “relative hypoglycemia”<sup>4</sup> (i.e., typical symptoms but blood glucose >60 mg/dl).

Among the 1796 encounters with documented low blood glucose (<60 mg/dL or inspected low value), 867 (48.27%) had a primary impression other than hypoglycemia; in most instances, the primary impression did not rule out hypoglycemia (e.g., missing (n = 54), altered level of consciousness (n = 51), general weakness (n = 208)), but in some instances there were conditions which may have been more salient than hypoglycemia [e.g., cardiac arrest (n = 43)], which was accompanied by low blood glucose.

Table 1. characteristics of Makkah Region Emergency Services ( 2017) for hypoglycemia event.

	ALL	TRASPORTED	NON TRESPORTES
<b>ALL , N (ROW %)</b>	1984	1448 (73%)	536 (27%)
<b>RACE</b>			
SAUDI	964 (48.6%)	887 (44.7%)	77 (3.9%)
NON-SAUDI	1020 (51.4%)	928 (46.8%)	92 (4.63%)
<b>SEX</b>			
MALE	1219 (61.4%)	1036 (52.21%)	183 (9.22%)
FEMALE	765 (38.6%)	711(35.84%)	54 (2.72%)
<b>AGE(YEARS)</b>			
0-18	36(1.81%)	36 (1.81%)	0 (0%)
19-39	158(7.96%)	145 (7.31%)	13 (0.65%)
40-59	865(43.6%)	761 (38.35%)	104 (5.24%)
60-75	584(29.44%)	566 (28.53%)	18 (0.91%)
>75	341(17.19%)	327 (16.48%)	14 (0.71%)
MISSING	0(0%)	0 (0%)	0 (0%)
<b>PRIMARY IMPRESSION</b>			
HYPOGLYCEMIA	1117 (56.3%)	882 (44.45%)	235 (11.84%)
ALTEREDLOC(NOTHYPOGLYCEMIA OR SEIZURE)	51 (2.5%)	32 (1.6%)	19 (0.9%)
NONE - MISSING	54 (2.72%)	16 (0.8%)	38 (1.9%)
GENERAL WEAKNESS	208 (10.48%)	150 (7.56%)	58 (2.92%)
CARDIAC ARREST	43 (2.16%)	43 (2.16%)	0 (0%)
NORMOGLYCEMIC ( $\leq 160$ )	66 (3.33%)	13 (0.66%)	53 (2.67%)
HYPERGLYCEMIA ( $\geq 160$ )	30 (1.51%)	30 (1.51%)	0 (0%)
SEIZURE	55 (2.77%)	48 (2.42%)	7 (0.35%)
SYNCOPE / NEAR SYNCOPE	35 (1.76%)	33 (1.66%)	2 (0.1%)
DIZZINESS / VERTIGO	86 (4.33%)	72 (3.63%)	14 (0.7%)
ABDOMINAL PAIN / PROBLEMS	32 (1.6%)	25 (1.26%)	7 (0.35%)
TRAUMATIC INJURY – NON-ACTIVATION	10 (0.5%)	10 (0.5%)	0 (0%)
BEHAVIORAL / PSYCHIATRIC CRISIS	17 (0.85%)	16 (0.8%)	1 (0.05%)
ALL OTHER PRIMARY IMPRESSION	180 (9.07%)	78 (3.93%)	102 (5.14%)
<b>FIRST EMS BLOOD GLUCOSE (MG/DL)</b>			
<60 (INCLUDE “ UNSPECIFIED LOW” )	1796 (90.52%)	1623 (81.8%)	173 (8.72%)
60	188 (9.48%)	74 (3.73%)	114 (5.75%)
<b>MEDICATION (NOT MUTUALLY EXCLUSIVE)</b>			
DEXTROSE 10%	1389 (70%)	917 (46.22%)	472 (23.8%)
DEXTROSE 50%	436 (22%)	388 (19.6%)	48 (2.42%)
OTHER (ORAL GLUCOSE)	159 (8%)	17 (0.86%)	142 (7.16%)
<b>ALCOHOL USE (YES)</b>	30 (1.51%)	30(1.51)	0(0)
<b>EMS ARRIVAL TIME</b>			
MIDNIGHT – 5:59	590 (29.74%)	348 (17.54%)	242 (12.2%)
6:00-11:59	367 (18.49%)	304 (15.32%)	63 (3.17%)
12:00-17:59	462 (23.29%)	327 (16.48%)	135 (6.8%)
18:00-23:59	565 (28.48%)	469 (23.64%)	96 (4.84%)

Table2. primary impression versus low blood glucose

LOW BLOOD GLUCOSE			
PRIMARY IMPRESSION:	NO ( $\geq 60\text{mg/dL}$ )OR MISSING	YES (<60MG/DL “UNSPECIFIED”)	OR
NO	0	867 (48.3%)	867
YES	188	929 (51.7%)	1117
	188 (9.48%)	1796 (90,52%)	1984

## DISCUSSION

In Makkah region during 2017, 1 in 4 (27%) EMS encounters for hypoglycemia did not result in transport to ED. We took the data from the Saudi red crescent authority. Compared to some previous research we found the same result that non-transported was more likely among male patient or age from (40-59)<sup>7,14,16,17</sup> or patients for encounters during midnight to 6 AM.<sup>7,17,9</sup> The differentiation was in use dextrose 10%<sup>7</sup> which is more likely used in Saudi Arabia, maybe because EMS is more familiar with it but in the end it depends on condition of the patient. We ran out of time, and there is a shortage of data on types of diabetes,<sup>11</sup> pickup locations, destination, a repeated call from the same patient,<sup>4</sup> follow up the patient in the hospital and the improvement of the patient status.<sup>8</sup> The Patient who refused transport in some cases preferred alternative transport mode or EMS deeming transfer unnecessary. The patient or who is responsible, e.g. (parents) should sign to refuse the transport. The transported patient was more in Un-Saudi, therefore maybe Saudi depend on transportation by they're on cars. However, protocol insists on transporting all the patient. A condition like hypoglycemia, the patient should be transferred to get suitable care, maybe EMS don't know the consequences for not transfer hypoglycemia patient where most of EMS have a diploma. In Germany, The Non-transported patient with type 1 diabetes increased from 8% to 25%.<sup>6,13</sup> In West Hampshire, UK, paramedics were trained to direct the majority of diabetes patients with hypoglycemia to community diabetes services and patients were taken to the ED only when "necessary;" after the introduction of the protocol, 23% of 291 patients experiencing a hypoglycemic episode were referred to the community diabetes specialist team, and non-transport to hospital increased from 12% to 40% of patients.<sup>11</sup>

## CONCLUSION

Among EMS encounters with patient having hypoglycemia in Makkah region, we found a low rate of the non-transported patient to ED; However, this rate is high as compared to what has been reported elsewhere. Additional research is needed to know the reasons of the non-transported patient, such as status before and after EMS response, type of diabetes, recurrent hypoglycemia, follow up the patient who was transported and to measure improvement rate.

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