

Hypoglycemic Patients Treated by Paramedics & the Prehospital Predictors of Admission

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Background: Diabetes & Hypoglycemia

- › Diabetic Emergencies = 3-5% all paramedics calls
- › 29.1 million people (9.3%) have diabetes (US)
- › Hypoglycemia – risk associated with glycemic control
- › Hypoglycemia accounts for 282,000 ED visits/yr
- › Prevalence estimated to ↑ by 44% over next 10 years



Many people are seen in the ED for hypoglycemia

ED WAIT
TIMES

Most are transported by paramedics

OFF LOAD
DELAY

Majority are discharged....1/4 admitted

Treat & Release Hypoglycemia Protocol for Paramedics

Background: Treat & Release (T/R)

- › In Ontario, there are currently no prehospital treat and release protocols for hypoglycemia
- › Lack of research identifying *high risk factors* or *predictors* of short term adverse events
- › The safety remains unclear

Objectives

- › Describe the characteristics, management and outcomes of hypoglycemic patients treated by paramedics
- › Determine the prehospital predictors of admission for these patients within 3 days of initial prehospital hypoglycemic event

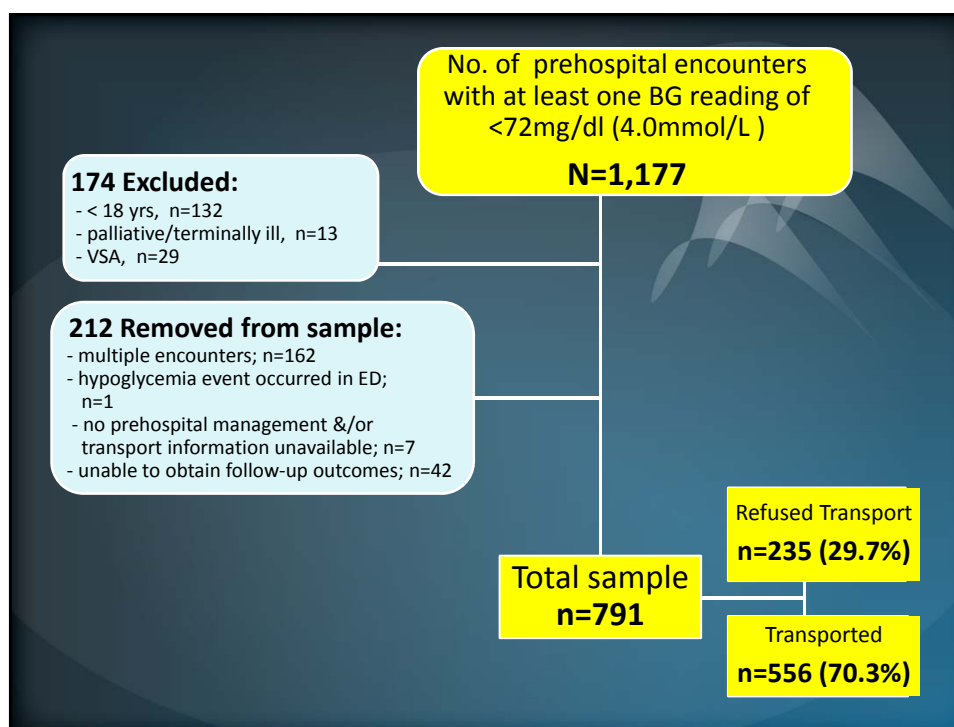


Methods

- › **Design:** 12-month health record review (01/01/11-31/12/11)
- › **Setting:** Catchment population of 1 million, urban/rural, ACP/PCP prehospital model
- › **Inclusion:** Patients ≥ 18 years with a prehospital BG < 72 mg/dl or 4.0mmol/L
- › **Exclusion:** Patients < 18 years, palliative and cardiac arrest patients

Methods

- › **Outcomes:** Proportion transported, paramedic/ED management & outcomes, & adverse events
 - › Admission to hospital within 3 days
 - › Repeat 911 within 3 days
 - › Repeat access to ED within 3 days
- › **Data Collection:** paramedic call reports, ED ROTs, nursing notes, labs, discharge summaries
- › **Analyses:** Descriptive statistics, chi-square, t-tests & logistics regression with adjusted odds ratios
- › **Ethics:** The study protocol was approved by 3 local hospital REB



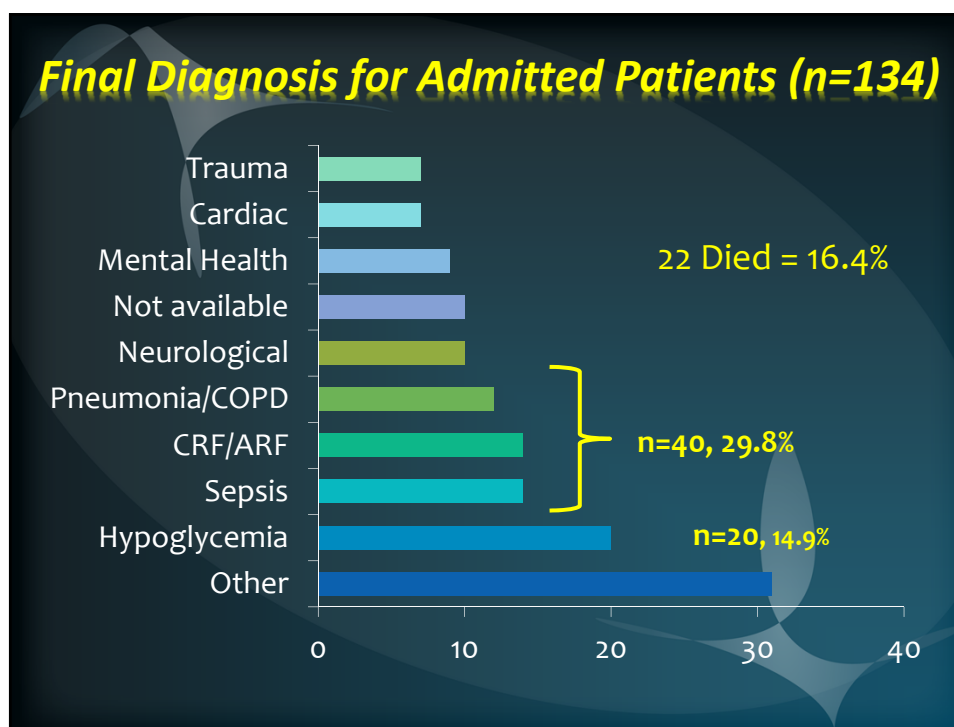
Patient Characteristics (N=791)		
	Refused n=235	Transported n=556
Mean age – yrs (SD)	➤ 52.7 (20.0)	57.7 (22.6)
Male sex – n (%)	➤ 148 (63.0)	266 (47.8)
Medical History - n (%)		
Diabetes – Type 1	➤ 46 (19.6)	45 (8.1)
Diabetes – Type 2	22 (9.4)	55 (9.9)
Diabetes – Type not documented	132 (56.2)	189 (34.0)
ETOH &/or drug dependency	10 (4.3)	59 (10.6) ◀
Cardiovascular disease	42 (17.9)	134 (24.1)
Seizure disorder	9 (3.8)	36 (6.8) ◀
Medications - n (%)		
Insulin	➤ 167 (71.1)	167 (31.7)
Sulfonylureas	19 (8.1)	60 (10.8)
Any oral diabetic agents	45 (19.2)	123 (22.1)
Beta-blockers	37 (15.7)	114 (20.5)
Corticosteroids	4 (1.7)	33 (5.9) ◀

Paramedic Response & Patient Characteristics (N=791)		
	Refused n=235	Transported n=556
EMS Dispatch – n (%)		
Diabetic Emergencies	1 (0.4)	10 (1.8)
Unconscious/Altered	1 (0.4)	17 (3.1)
Pick up location – n (%)		
Home/Residence	1 (0.4)	13 (2.3)
Nursing Home	1 (0.4)	15 (2.7) ◀
Advanced Care Facility	1 (0.4)	1 (0.2)
Initial mean blood glucose (mg/dL)	4 (1.7)	12 (2.2)
EMS Interventions		
50% IV Dextrose	➤ 107 (45.5)	192 (34.5)
Glucagon IM	25 (10.6)	116 (20.9) ◀
Simple CHO &/or Oral Glucose	➤ 167 (71.1)	311 (55.9)
Complex CHO/Protein	120 (50.1)	83 (14.9)
Median scene time – min(IQR)	44 (36-59)	24 (17-30)

REFUSE
Younger
Male
Type 1
Insulin
IV Dextrose
Complex CHO

TRANSPORT
Hx ETOH/Drug
Hx Seizure
Corticosteroids
Nursing Home
Glucagon

Outcomes (N=791)		
	Refused n=235	Transported n=556
Last mean blood glucose mg/dl & mmol/L (SD)	132 (59.7) 7.5 (3.2)	122 (65.6) 6.8 (3.6)
Transported - Urgent		
Urgent	n/a	109 (19.6)
Prompt	n/a	432 (77.7)
Emergency Department Disposition		
Discharged home from ED	n/a	383 (68.9)
LAMA/LWBS	n/a	29 (5.2)
Admitted to hospital	n/a	134 (24.1)
Died in ED	n/a	9 (1.6)
Emergency Department Diagnosis(es)		
Hypoglycemia	n/a	209 (37.6)
Infection	n/a	50 (9.0)
Other	n/a	278 (50.0)
Unknown – not documented	n/a	37 (6.7)



Short term adverse events (within 3 days of initial event)



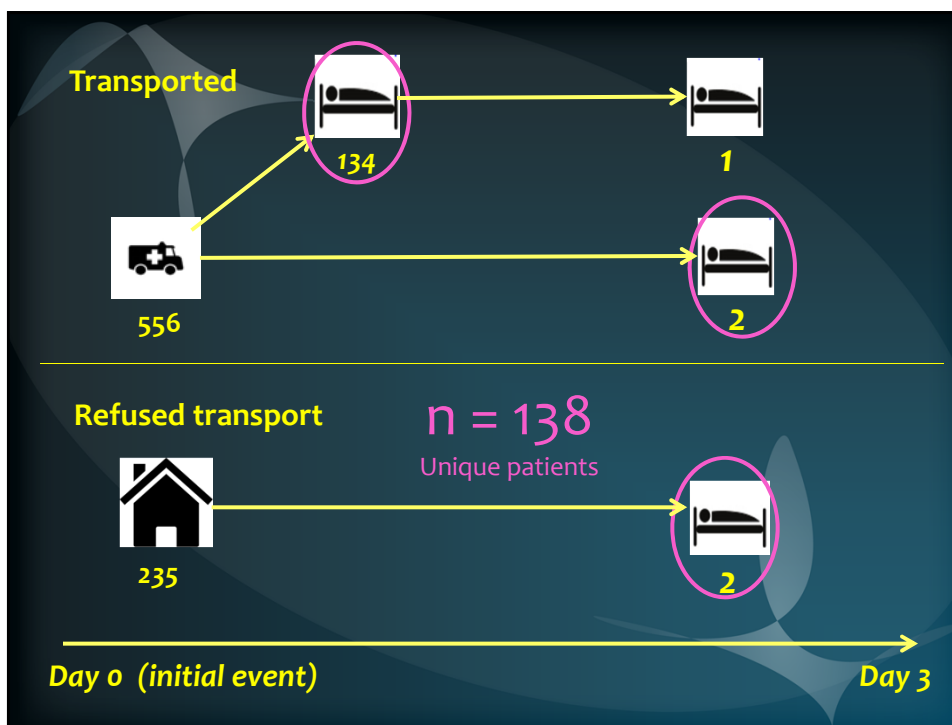
Repeat 911



Repeat Access to ED



Admission to hospital



Patient Characteristics (n=782)		
	Admitted (n=138)	Not admitted (n=644)
Mean age – yrs (SD)	➤ 67.0 (19.5)	53.9 (21.7)
Male sex – n (%)	62 (44.9)	352 (54.6)
Medical History - n (%)		
History of diabetes	74 (53.6)	404 (62.7) ⚡
Diabetes – Type 1	10 (7.2)	81 (10.2)
Diabetes – Type 2	12 (8.6)	62 (9.6)
ETOH &/or drug dependency	7 (5.0)	45 (6.9)
Cardiovascular disease	➤ 50 (36.2)	126 (19.6)
Seizure disorder	6 (4.3)	41 (6.3)
Medications - n (%)		
Insulin	34 (24.6)	309 (48.0)
Sulfonylureas	➤ 23 (16.6)	56 (8.6)
Any oral diabetic agents	➤ 41 (29.5)	127 (19.5)
Beta-blockers	➤ 41 (29.5)	110 (16.9)

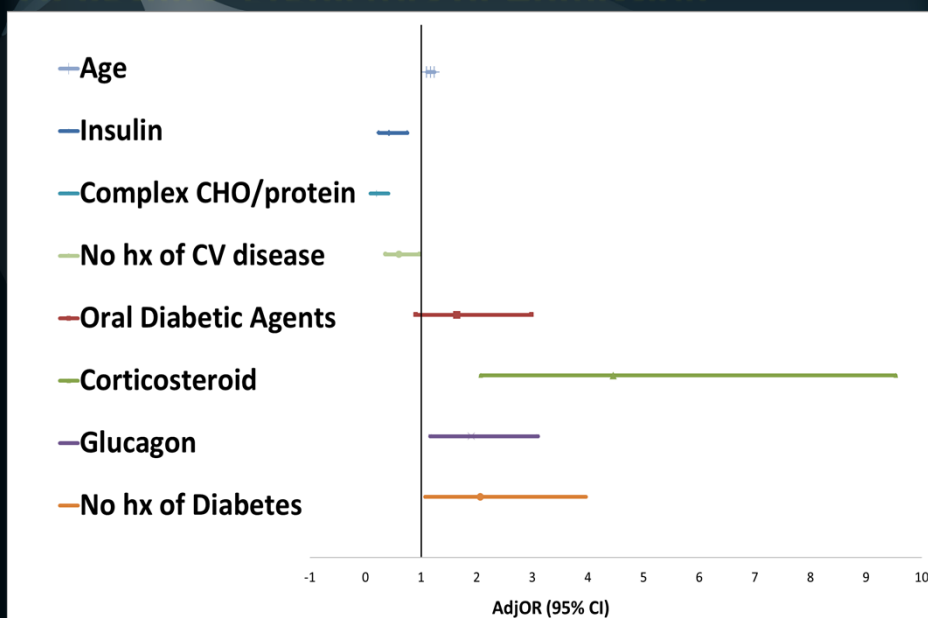
Paramedic Response & Management (N=782)		
	Admitted (n=138)	Not admitted (n=644)
Advanced Care Paramedic – n (%)	116 (84.1)	514 (79.8)
Refused transport on 1st encounter	2 (1.4)	233 (35.7)
Initial mean blood glucose mg/dl & mmol/L (SD)	51.9 (15.9) 2.8 (0.9)	49.6 (16.5) 2.8 (0.9)
EMS Interventions – n (%)		
Intravenous access attempted	➤ 86 (62.3)	325 (50.5)
50% IV Dextrose	57 (41.3)	242 (37.6)
Glucagon IM	➤ 39 (28.1)	102 (15.6)
Simple CHO/Oral Glucose	19 (13.8)	205 (31.8)
Complex CHO/Protein	9 (6.5)	194 (30.1) ⚡
Last mean blood glucose mmg/dl & mmol/L (SD)	98 (77.4) 7.0 (3.6)	113 (70.7) 7.0 (3.5)
Final GCS=15 – n (%)	71 (51.1)	477 (73.2)

LR Results: Predictors of Admission

Predictor	AdjOR	95% CI
Age (per 5 yr increase)	1.17	1.10-1.24
Insulin	0.41	0.23-0.75
Complex CHO/Protein	0.20	0.09-0.41
No hx of CV disease	0.60	0.36-0.97
* Oral Diabetic Agents	1.64	0.89-2.98
Corticosteroids	4.45	2.07-9.53
Glucagon	1.90	1.16-3.10
No hx of Diabetes	2.06	1.07 -3.96

Hosmer-Lemeshow p=0.670

LR Results: Predictors of Admission



Discussion

- › Markers of disease/sickness?
 - › Corticosteroids
 - › Glucagon
- › CV disease /Beta-blockers
 - › Increased risk of future CV event
 - › Mask symptoms
- › Sulfonylureas – not significant

Limitations

- › Retrospective cohort design
- › Single site – limits generalizability
- › Varying ED/ admission practices
- › Did not have access to death registry
- › May not have collected all pertinent risk factors
(ie. did not collect kidney/liver disease)

Conclusions

- › Patients without a history of diabetes, on corticosteroids or given glucagon are more likely to be admitted
- › Those without a history of CV disease, taking insulin or able to tolerate PO complex CHO/protein are more likely to NOT be admitted
- › These results should be considered when developing a safe treat & release protocol for hypoglycemia patients that could impact prehospital care

Questions?

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