

Supplemental tables: eTable1 and eTable2

eTable 1. Definitions and Examples of Data Elements Utilized in Analysis of Emergency Department Visits and Emergent Hospitalizations for Insulin-related Hypoglycemia and Errors

Data Elements	Definitions/Examples	Comments
Location of Event		
Home	e.g., patient's home, including adult or youth group home	
Institutional setting	e.g., long-term care, mental health facility, assisted living facilities	
While driving (including found in car)	e.g., hypoglycemia episode leading to MVA, or hypoglycemic patient "found in car"	
Work, school, or place of recreation/sports	e.g., swimming pool, gym, senior center	
Outpatient setting	e.g., physician office, dialysis center, outpatient surgery center	
Other public property	e.g., sidewalk, at shopping mall	
Clinical Presentation of Event		
Hypoglycemia	Diagnosis or treatment for hypoglycemia	
With shock, loss of consciousness, or seizure	e.g., "Unresponsive to stimuli", "Hypoglycemic seizure", "Loss of consciousness", "Shock hypoglycemic", "Hypoglycemic coma"	
With fall or injury	e.g., "Fall", "Road traffic accident", "Head injury", "Laceration", "Contusion", "Fracture"	
With altered mental status	e.g., "Mental status changes", "Confusional state", "Depressed level of consciousness", "Lethargy", "Aggression", "Disorientation"	<ul style="list-style-type: none"> • Clinical presentations were coded using MedDRA terminology and were categorized in hierarchical and mutually exclusive fashion; e.g., a case where a patient fell and had a hypoglycemic seizure is categorized under "Hypoglycemia with shock, loss of consciousness, or seizure".
With other neurologic sequelae	e.g., "Hyperhidrosis", "Tremor", "Speech disorder", "Fatigue", "Headache"	
With presyncope/syncope	e.g., "Dizziness", "Syncope", "Presyncope"	
With other sequelae	e.g., "Muscular weakness", "Vomiting", "Nausea", "Malaise", "Dyspnea"	

eTable 1. Definitions and Examples of Data Elements Utilized in Analysis of Emergency Department Visits and Emergent Hospitalizations for Insulin-related Hypoglycemia and Errors (continued)

Documented Diabetes Therapy		
Insulin Product Type		
Short-acting	Regular	<ul style="list-style-type: none"> • All narrative and medication fields were searched to identify recorded insulin products and all products were included under Insulin Product Types (eTable 2). • Insulin product types were assumed to be single agent formulations (e.g., "NovoLog") unless specified as mix preparations (e.g., "NovoLog 70/30"). • Ambiguous insulin mentions (e.g., "Humulin", "Novolin") were categorized as "Not documented".
Rapid-acting	Aspart, Lispro, Glulisine	
Intermediate-acting	NPH, Lente	
Long-acting	Glargine, Detemir	
Insulin Mix	e.g., "Mix", "70/30", "75/25"	
Insulin Inhaled		
Not documented	e.g., "Insulin" not otherwise specified	
Other Diabetes Agents		
Oral diabetes agents	Alpha-glucosidase inhibitors (e.g., acarbose, miglitol), Biguanides (metformin), Dipeptidyl peptidase-4 inhibitors/Gliptins (e.g., saxagliptin, sitagliptin), Meglitinides (e.g., nateglinide, repaglinide), Sulfonylureas (e.g., glimepiride, glipizide, glyburide), Thiazolidinediones/Glitazones (e.g., pioglitazone, rosiglitazone)	<ul style="list-style-type: none"> • All narrative and medication fields were searched to identify recorded diabetes agents other than insulin. • Combination oral diabetes agents were categorized separately as their individual components (e.g., "Glucovance" is counted under both "Sulfonylureas" and "Biguanides"). • Cases where oral diabetes therapy (e.g., "diabetes pill") is mentioned, but the agent is not specified were categorized as "Other/unspecified oral agent".
Injectable diabetes agents	Amylin analogs (e.g., pramlintide), Glucagon-like peptide-1 agonists (e.g., exenatide, liraglutide)	

eTable 1. Definitions and Examples of Data Elements Utilized in Analysis of Emergency Department Visits and Emergent Hospitalizations for Insulin-related Hypoglycemia and Errors (continued)

Blood Glucose (mg/dL)		
<40	"Too low to read", "LLL", "L," "Lo", "Critically low", "Low" were assigned a value of 39.5 mg/dL.	<ul style="list-style-type: none"> • All narrative fields were searched for the lowest, pre-treatment BG level documented. • BG level categories (<40, 40-50, 51-60, 61-70, >70) were chosen to reflect generally-accepted categories of hypoglycemia.²² • Where it was unclear whether BG level(s) were pre-treatment, the recorded lowest value was coded if either no hypoglycemia treatment was specified in the narrative, or the value recorded was in the hypoglycemic range (i.e., ≤70 mg/dL). • "Too low to read", "LLL", "L," "Lo", or "Critically low" were assigned a value of 39.5 mg/dL. • Reported ranges (e.g., "blood glucose in the thirties") were converted into the lowest decile plus 0.5 mg/dL (e.g., "BG in the thirties" was coded as 30.5 mg/dL); where a "less than" range was documented, the highest number minus 0.5 mg/dL was used (e.g., "less than 30" was coded as 29.5 mg/dL). • "Not documented" was coded if no BG level(s) were documented in the narrative or if BG level(s) were documented as being subsequent to treatment for hypoglycemia, or if it was unclear whether the BG level(s) were pre- or post-hypoglycemia treatment status and the recorded level(s) were >70 mg/dL.
40-50		
51-60		
61-70		
>70		
EMS or ED Treatments		
Intravenous dextrose	Dextrose 50%	<ul style="list-style-type: none"> • All narrative fields were searched for EMS or ED treatments specific to management of the hypoglycemic episode. • Treatments administered by patients, family members, or caregivers were excluded. • Treatments were categorized in hierarchical and mutually exclusive fashion; e.g., a case where both glucagon and intravenous fluids were administered was categorized under "Glucagon".
Glucagon		
Meal/juice or oral glucose	e.g., "Meal", "Food Tray", "Glucose"	
Observation/IV fluids only	Normal saline, Dextrose 5% or 10% in water	
Other treatment	Octreotide, potassium chloride, sodium bicarbonate	

eTable 1. Definitions and Examples of Data Elements Utilized in Analysis of Emergency Department Visits and Emergent Hospitalizations for Insulin-related Hypoglycemia and Errors (continued)

Precipitating Factor		
Meal-related misadventure	Administration of insulin without regard to food intake (e.g., neglecting to eat shortly after taking a rapid-acting insulin, not adjusting insulin regimen in the presence of reduced caloric intake due to illness)	<ul style="list-style-type: none"> • All narrative fields were searched for precipitating factors specific to the IHE.
Unintentionally took wrong insulin product	Accidental administration of the wrong insulin product	
Unintentionally took wrong dose / Confused units	Accidental administration of the wrong insulin dose	
Intentionally took "additional" dose	Intentional administration of insulin in addition to what is normally administered to the patient	
Pump-related misadventure	Complications specific to pump management (e.g., inadvertent bolus when changing pump, pump malfunction)	
Other misadventure	Insulin administration at the incorrect time or without regard to checking blood glucose, administration of "too much insulin" not further described, or medication error with insulin not otherwise specified.	

Abbreviations: BG, blood glucose; ED, emergency department; EMS, emergency medical services; IHE; insulin-related hypoglycemia and error; IV, intravenous; MedDRA, Medical Dictionary for Regulatory Activities; MVA, motor vehicle accident.

eTable 2. Number of Cases of Emergency Department Visits for Insulin-related Hypoglycemia and Errors, by Additional Case Characteristics, 2007-2011^a

Case Characteristics	ED Visits for IHEs	
	Cases	
	No.	%
Location of Event		
Home	4,316	53.3
Institutional setting	573	7.1
While driving (including found in car)	230	2.8
Work, school, or place of recreation/sports	231	2.9
Outpatient setting	72	0.9
Other public property	527	6.5
Not documented	2,151	26.6
Insulin Product Types^b		
Short-Acting (Regular)	480	5.9
Rapid-Acting	2,138	26.4
Intermediate-Acting	357	4.4
Long-Acting	2,663	32.9
Insulin Mix	564	7.0
Not documented	3,849	47.5
Blood Glucose		
<40	3,140	38.8
40-50	1,182	14.6
51-60	525	6.5
61-70	193	2.4
>70	111	1.4
Not documented	2,949	36.4
EMS or ED Treatments		
Intravenous dextrose 50%	4,116	50.8
Glucagon	345	4.3
Meal/juice or oral glucose	896	11.1
Observation/IV fluids only	680	8.4
Other treatment	24	0.3
Not documented	2,039	25.2

Abbreviations: ED, emergency department; EMS, emergency medical services; IHEs, insulin-related hypoglycemia and errors.

^a Case counts from the National Electronic Injury Surveillance System - Cooperative Adverse Drug Event Surveillance (NEISS-CADES) project, CDC. Refer to eTable 1 for definitions of case characteristics.

^b All insulin products reported in the ED medical record, including those implicated in IHEs and those listed as concomitant medications. Not shown: 3 cases of inhaled insulin. Categories are not mutually exclusive; therefore, percentages may not total 100%.