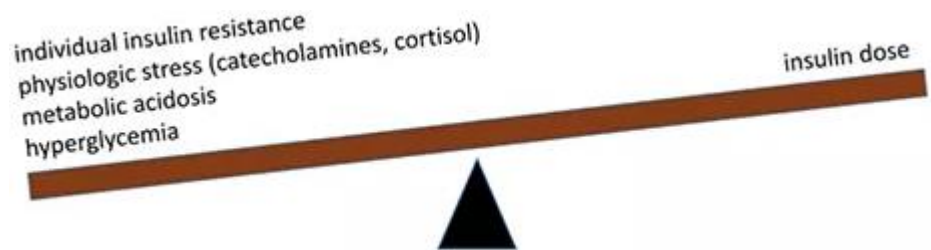


Pharmacy 5 Minutes Friday's



Insulin & Fluids in Hyperglycemic Emergencies

1. Diabetic ketoacidosis (DKA) is a serious, acute metabolic decompensation in persons with known or newly presenting diabetes.
2. Risk of death increases with the number of DKA admissions
 - a. Risk of death 13.5%, and 23.4% with 2-5 and > 5 DKA admissions
3. Management of acidosis in DKA is an ongoing source of confusion.
4. Management is driven by fluids, electrolytes, and insulin
 - a. Type of fluids and method of administration of insulin is debatable



	Insulin in DKA/HHS
When to start therapy?	DKA <ul style="list-style-type: none"> • pH < 7.3 (VBG or ABG is fine) • Ketosis (ketonemia or ketonuria) • HCO₃ < 15 mmol/L due to anion gap metabolic acidosis • Hyperglycemia <ul style="list-style-type: none"> ○ may be mild; euglycemic DKA can occur
What insulin to start?	IV regular insulin infusion <ul style="list-style-type: none"> • 0.1-0.14 unit/kg ± bolus 0.1 unit/kg onset/peak/duration: <ul style="list-style-type: none"> ○ IV: Immediate/immediate/ 2-6 hr ○ SubQ: 0.5-1 hr/ 2-3 hr / 4 to 12 hr SubQ insulin lispro/aspart <ul style="list-style-type: none"> • 0.1 units/kg onset/peak/duration <ul style="list-style-type: none"> • 0.10-0.25 hr/ 1-1.5 hr/ 3-5 hr
When to stop therapy?	DKA <ul style="list-style-type: none"> • Blood glucose < 200 mg/dl and TWO of the following: <ul style="list-style-type: none"> ○ Serum bicarbonate ≥ 15 ○ Anion Gab ≤ 12 ○ Serum pH level > 7.3 HHS <ul style="list-style-type: none"> • Improve mental status • Blood glucose < 300 • Serum osmololty < 320 mOsm/kg
Transition from IV to SubQ	<ul style="list-style-type: none"> • IV insulin continue for 1-2 hours after SubQ insulin • Transition back to home regimen if previously controlled • Calculate ~50-80% of the 8-24h insulin requirement split into 50/50 basal/bolus

Fluid	Na+ mMol/L	K+ mMol/L	Cl- mMol/L	Glucose g/L	mOsm/L
NS	154		154		308
½ NS	77		77		154
¼ NS	38.5				77
D5W				50 (2 amps of D50W)	154
D5W1/2 NS	77		77	50	406*
LR	131	5	111		274
Plasmalyte	140	5	98		294

Author	Design	Intervention	Result
Chua, 2012	Multicenter retrospective analysis	<ul style="list-style-type: none"> ❖ Exclusively PL up until 12 hours (n=9) ❖ NS infusion up until 12 hours (n=14) 	<ul style="list-style-type: none"> ❖ Patients with DKA resuscitated with PL instead of NS had faster initial resolution of metabolic acidosis and less hyperchloremia, with a transiently improved blood pressure profile and urine output.
Kitabchi, 2008	Prospective, randomized trial	<ul style="list-style-type: none"> ❖ Loading dose 0.07 units/kg plus 0.07 units/kg/hour; (n=12) ❖ 0.07 units/kg/hour with no loading dose; (n= 12) ❖ 0.14 units/kg/hour with no loading dose; (n= 13) 	<p><u>No significant differences in time to reach :</u></p> <ul style="list-style-type: none"> ❖ Glucose ≤ 250 mg/dL (14 mmol/L) ❖ PH ≥ 7.3 ❖ Bicarbonate ≥ 15 mEq/L (15 mmol/L)
Umpierrez, 2009	Prospective, randomized, open-label trial	<ul style="list-style-type: none"> ❖ IV Regular insulin (n= 34) → Subcutaneous insulin; NPH and regular insulin twice daily ❖ IV Glulisine insulin (n= 34) → Subcutaneous insulin; glargine once daily and glulisine before meals 	<p><u>No significant differences in:</u></p> <ul style="list-style-type: none"> ❖ Mean duration of treatment or in amount of insulin infusion ❖ After transition to subcutaneous insulin, differences in mean daily blood glucose levels after transition
Umpierrez, 2004	Prospective, randomized, open-label trial	<ul style="list-style-type: none"> ❖ Insulin aspart subcutaneously every hour ❖ Insulin aspart subcutaneously every 2 hours ❖ Regular insulin IV infusion 	<p><u>No significant differences in:</u></p> <ul style="list-style-type: none"> ❖ Mean time to correction of hyperglycemia ❖ Mean time to resolution of ketoacidosis ❖ Length of hospital stay ❖ Amount of insulin required for resolution of DKA ❖ Rates of hypoglycemia

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