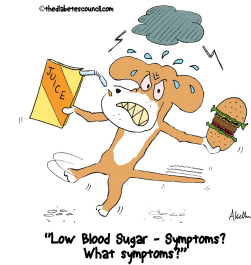


HYPOGLYCEMIA AND GLUCOSE MANAGEMENT

Peter Gottlieb, MD and Rachel Garcetti, PA-C



HYPOGLYCEMIA AND GLUCOSE MANAGEMENT

- WHAT IS HYPOGLYCEMIA?
- WHAT CAUSES IT?
- WHAT ARE THE SYMPTOMS?
- WHAT IS HYPOGLYCEMIC UNAWARENESS?
- WHAT IS THE BEST STRATEGY TO TREAT IT?
- WHAT CAN I DO TO PREVENT IT?
- WHAT IS THE BURDEN OF HYPOGLYCEMIA?



WHAT IS HYPOGLYCEMIA?

- IN A PERSON WITHOUT DIABETES, A RANDOM BLOOD GLUCOSE LEVEL IS USUALLY BETWEEN 70-140 MG/DL; FASTING VALUES ARE BETWEEN 70 AND 100 MG/DL
- HYPOGLYCEMIA OCCURS WHEN BLOOD GLUCOSE LEVELS DROP TO ABNORMALLY LOW LEVELS
- GLUCOSE IS THE BODY'S MAIN ENERGY/FUEL SOURCE
- AMERICAN DIABETES ASSOCIATION (ADA) DEFINES HYPOGLYCEMIA OR LOW BLOOD SUGAR AS BG < 70 MG/DL
- HYPOGLYCEMIA MAY ALSO BE REFERRED TO AS AN INSULIN REACTION, REACTION, OR A LOW
- ONCE BG IS < 70 MG/DL, SYMPTOMS OF HYPOGLYCEMIA MAY DEVELOP
- IN PEOPLE WITHOUT DIABETES, BG VALUES BETWEEN 60 AND 70 MG/DL ARE NOT UNCOMMON

WHAT CAUSES HYPOGLYCEMIA?

- SKIPPING MEALS OR EATING LATE
- EXERCISE
- INJECTING TOO MUCH INSULIN OR THE WRONG TYPE OF INSULIN
- ORAL DIABETES MEDICATIONS ESPECIALLY WHEN USED WITH INSULIN (I.E. GLYBURIDE, GLIPIZIDE, GLIMEPERIDE)
- INJECTABLE DIABETES MEDICATIONS WHEN COMBINED WITH INSULIN (I.E. BYETTA, VICTOZA, TRULICITY, BYDUREON)
- TAKING BATH, SHOWER, OR GOING IN A HOT TUB SHORTLY AFTER INJECTING INSULIN
- ILLNESSES, ESPECIALLY IF VOMITING AND DIARRHEA PRESENT
- STRESS
- DRINKING ALCOHOL

WHAT ARE SYMPTOMS OF HYPOGLYCEMIA?

- SUGAR (GLUCOSE) TO YOUR BODY AND BRAIN IS ANALAGOUS TO THE GAS THAT FUELS YOUR CAR
- WITHOUT AN ADEQUATE SUPPLY OF GLUCOSE, YOUR BODY AND BRAIN CANNOT FUNCTION PROPERLY
- WHEN BG LEVELS DROP TOO LOW, THE BODY PUTS OUT ADRENALINE, KNOWN AS THE "FIGHT OR FLIGHT" HORMONE AND PATIENTS MAY EXPERIENCE HUNGER, SHAKINESS, WEAKNESS, HEART RACING/POUNDING, AND SWEATING
- HEADACHES, CONFUSION, SLEEPINESS, MOOD/ BEHAVIOR CHANGES, AND VISION CHANGES MAY ALSO OCCUR
- SEVERE HYPOGLYCEMIA CAN LEAD TO LOSS OF CONSCIOUSNESS AND SEIZURES



WHAT IS HYPOGLYCEMIC UNAWARENESS?

- WHEN A PERSON HAS LOW BLOOD SUGAR BUT HAS NO SYMPTOMS/WARNING OF HYPOGLYCEMIA
- YOUNG CHILDREN MAY NOT RECOGNIZE LOW BLOOD SUGAR SYMPTOMS
- SOME MEDICATIONS MAY MASK BODY'S RESPONSE TO LOW BG
- LONG DURATION OF DIABETES MAY BLUNT BODY'S RESPONSE TO HYPOGLYCEMIA
- IF BG DROPS GRADUALLY SYMPTOMS MAY NOT BE AS PRONOUNCED
- IF BG CONTROL IS VERY TIGHT OR IN PATIENTS WITH FREQUENT HYPOGLYCEMIA, SYMPTOMS OF LOWS MAY NOT OCCUR DUE TO LACK OF ADRENALINE RESPONSE
- AVOIDING LOWS FOR 2-3 WEEKS AND LETTING BG RUN HIGHER MAY HELP RESTORE SYMPTOMS OF LOW BLOOD SUGARS
- CGM/BIONIC PANCREAS VERY HELPFUL TOOL HERE



WHAT IS THE BEST STRATEGY TO TREAT HYPOGLYCEMIA?

- TREAT EARLY SYMPTOMS WITH 15 - 20 G OF A FAST-ACTING FORM OF CARBOHYDRATE SUCH AS CANDY, FRUIT JUICE, REGULAR (NOT DIET) SODA, GLUCOSE TABLETS, GLUCOSE GEL
- FOODS WITH FAT AND PROTEIN NOT GOOD AS INITIAL TREATMENT BECAUSE PROTEIN AND FAT WILL SLOW BODY'S ABSORPTION OF SUGAR
- "RULE OF 15:" 15 G OF CARBS, CHECK AGAIN IN 15 MINUTES, IF BG STILL < 70, REPEAT 15 G OF CARBS AND RECHECK AGAIN IN 15 MINUTES. REPEAT UNTIL BG > 70.
- SMALL CHILDREN MAY NEED LESS CARBS THAN HEAVY ADULT TO TREAT LOW
- IF BG SEVERELY LOW (<50 MG/DL), DOUBLE NUMBER OF CARBS USED TO TREAT
- ONCE BG HAS COME UP, GOOD IDEA TO EAT SNACK OR MEAL TO STABILIZE BG

WHAT IS THE BEST STRATEGY TO TREAT SEVERE HYPOGLYCEMIA?

- GLUCAGON IS A HORMONE MADE IN THE PANCREAS ALONG WITH INSULIN
- GLUCAGON ACTS TO RAISE BLOOD SUGAR LEVELS
- GLUCAGON INJECTIONS ARE USED TO TREAT LOWS IN A PERSON WHO IS UNCONSCIOUS, UNRESPONSIVE, OR UNABLE TO TAKE IN CARBS BY MOUTH
- NEVER PUT ANYTHING INTO A PERSON'S MOUTH WHEN UNRESPONSIVE
- CALL 911 IF GLUCAGON IS ADMINISTERED



WHAT IS THE BEST STRATEGY TO TREAT SEVERE HYPOGLYCEMIA?

- GLUCAGON APP FOR SMART PHONES GREAT TEACHING TOOL
- MAKE SURE FAMILY MEMBERS, FRIENDS, ROOMMATES, AND CO-WORKERS KNOW YOU HAVE DIABETES, KNOW WHERE TO FIND GLUCAGON KIT AND HOW TO USE IT
- LOW DOSES OF GLUCAGON GIVEN IN AN INSULIN SYRINGE CAN BE USED IN A PERSON WHO IS UNABLE TO KEEP FOOD DOWN USING ONE UNIT PER YEAR OF AGE UP TO AGE 15 YEARS; DOSE IN ADULTS IS 15 UNITS (MAY AVOID ER TRIP)



WHAT CAN I DO TO PREVENT HYPOGLYCEMIA?

- PREVENTING LOWS HELPS MAINTAIN ADEQUATE LEVELS OF EPINEPHRINE, GLUCAGON, AND OTHER HORMONES THAT PROTECT AGAINST HYPOGLYCEMIA
- LET BG RUN HIGHER FOR 48-72 HOURS AFTER A SEVERE LOW TO REPLENISH GLYCOGEN STORES IN THE LIVER
- CARRY RAPID-ACTING CARBS AT ALL TIMES; EAT REGULARLY THROUGHOUT THE DAY
- ADJUST INSULIN DOSES FOR EXERCISE AND ILLNESS
- TEST BG LEVELS OFTEN AND/OR USE CGM, ESPECIALLY IN THE SETTING OF HYPOGLYCEMIC UNAWARENESS
- BE CONSERVATIVE WITH INSULIN GIVEN AT BEDTIME
- "BIONIC" PANCREAS HAS THE ABILITY TO SUSPEND INSULIN DELIVERY TO AVOID HYPOGLYCEMIA

WHAT IS THE BURDEN OF HYPOGLYCEMIA?

- HYPOGLYCEMIA LEADS TO ALMOST 100,000 ER VISITS IN THE UNITED STATES EVERY YEAR
- ELDERLY WITH DIABETES OVER AGE 80 AT HIGHEST RISK
- EVERY YEAR, 1/49 INSULIN-TREATED SENIORS > 65 VISIT ER BECAUSE OF HYPOGLYCEMIA; 1/8 IN VERY ELDERLY OVER AGE 80
- OVER A 5 YEAR PERIOD, ER VISITS FOR HYPOGLYCEMIA COST THE US HEALTHCARE SYSTEM AN ESTIMATED \$600 MILLION, NOT INCLUDING HOSPITALIZATIONS

SUMMARY

- HYPOGLYCEMIA IS PREVENTABLE!
- KNOWLEDGE IS POWER!
- EDUCATE YOURSELF AND YOUR FAMILY AND FRIENDS ABOUT HYPOGLYCEMIA TO AVOID A TRUE HYPOGLYCEMIC EMERGENCY

things to remember when you get stuck



THANKS FOR YOUR ATTENTION!