COVID19 ECHO Diabetes
Tools for Sick-Day Care
& Med Management Updates

April 28, 2020

Learning – and Adapting –on the Fly

- Epidemiologic/Surveillance data from other countries & US
  - ***Asymptomatic & Pre-symptomatic transmission***
  - ***Susceptibility / vulnerability***
  - ***Broader presentation of symptoms***
- ***Case Reports***
- ***Frontline experience – challenges and suggestions***

- ***Adapting management guidelines*** for supportive care & care of complications (***sick day management for diabetes,*** pneumonia, ARDS, AKI, thrombotic disorders, shock, etc.)

Creativity Required
Inviting innovation

Diabetes in the US – CDC (2017)

- **13.0% of all US adults have diabetes** (~34 million)
  - **23.5% of American Indians/Alaska Natives adults**

  - 50.0% had an A1C value of 7.0% or higher
    - 22.3% had an A1C value of 7.0% to 7.9%
    - 13.2% had an A1C value of 8.0% to 9.0%
    - **14.6% had an A1C value higher than 9.0%**
    - **A1c level of 10% or higher**
      - **16.3% of adults aged 18–44 years**
      - **12.7% of those aged 45–64 years and**
      - **4.3% of those aged 65 years or older (*high hypoglycemic risk*)**

  - ***21.4% of people with diabetes* are undiagnosed** (7.3 million people)

- **~35% of US adults** have **prediabetes** (~88 million)
  - ***~85%* are unaware** *of their prediabetes status*

Preliminary US Data on Diabetes & COVID

- ~11% of people with COVID 19 had diabetes
  - **~45% did not require hospitalization (home care)**
    - (~90% with no underlying condition)
  - **~34% required hospitalization but not ICU**
    - (~7.5% with no underlying condition)
  - **~20% required ICU**
    - (~2.4% with no underlying condition)
  - ~31% of people who died from COVID 19 had diabetes
    - One study showed average A1c of those who survive 7.9% vs succumb 9.9%

Potential mechanisms that may increase the susceptibility for *severe illness* include **blunted innate and adaptive immunity** with **accentuated inflammatory responses** (hyperinflammation and cytokine storm syndrome)

Frontline Experiences

- Increased **severity** of presentation for **non-COVID illness**
  - New onset condition or exacerbation of chronic illness
  - Reluctance to go to Urgent Care/ED – ("where the virus is")
  - Not knowing how to reach care team during the crisis
    "Collateral Damage" – this is preventable/actionable

- PWD with *milder COVID 19 illness* (**home**) – marked reduction in appetite – need for precautions to prevent both low & high blood glucose & dehydration

  - Need to think about new onset / exacerbated hyperglycemia (blood glucose) issues in people without formal diagnosis of diabetes (prediabetes, undiagnosed diabetes & prediabetes, obesity, & possibly due to islet cell SARS CoV2 infection) – watch for new symptoms of polyuria, polydipsia, blurry vision, etc.

Frontline Experiences

- **Severe hyperglycemia** on presentation to hospital for sicker patients
  - **Severe DKA** in *T1 & T2DM,* including *previously undiagnosed diabetes*
    - Challenges to treating DKA due to PPE and fluid restrictions for ARDS
  - **Severe hyperglycemia** (marked glucotoxicity) **& insulin resistance** in patients not previously requiring insulin (*Pre-DM, T2DM*) – occasional need for U500 insulin
    - *New onset hyperglycemia in people without pre-existing diabetes*
      - ? Infected/ inflamed beta cells / ? Worse outcomes
  - High rates of **dehydration**

  - Challenges to **BG checks** in ED /hospitalized patients (shortage of meters & PPE) -
    - Effects of high dose vitamin C on meter accuracy

Use this knowledge to identify where to put preventive efforts

The best way to prevent illness from COVID 19 is to **avoid being exposed** to the virus

Critical importance of HC teams being proactive in **explaining** how to limit exposure

Make it Personal & Detailed

Reach Out to Patient – *personal preparation*

- Be sure patient prepared to stay home & prepared in case of illness
  - Supplies for personal and diabetes care
    - **Food** – 2-week supply
      - including items appropriate for *sick day* use (soup, 6-pack of each regular and diet 7-Up or Sprite; 2 or 3 packets of regular and sugar-free Jell-O; Gatorade and broth/bouillon)
    - **Prescriptions and medical supplies** **-** at least 30 days - 90-days if possible
      - Extra insulin, glucose test strips and maybe urine ketone sticks (foil-wrapped)
  - Importance of monitoring blood sugars, taking meds, BG control
    - Exercise, sleep, healthy foods, hydration, stress reduction
  - *Number to call* if any issues with **diabetes** or other conditions
  - *Number to call* if any **symptoms suggestive of COVID 19**
    - Instructions on what to do if COVID symptoms – call ASAP
      - Increase SMBG and when to call regarding BGs
- Consider scheduling time for diabetes phone check up with CDE/clinician
  - **Explain how remote medical care will be delivered**

COVID Crisis but Non-COVID illness
Diabetes Issues

- Encourage to take meds to stay healthy – to be in better shape to fight off the virus
  - If had been missing meds before – may need to reduce dosages ("diabetes camp effect") to avoid hypoglycemia (low blood sugar)
  - If physically active job but now "stay at home" – encourage outdoor activity but may need to increase meds and/or reduce food intake
  - Stress (anxiety, fear, loss, grief, etc.) can increase blood sugars
    - Resources to assist
  - Job loss, income loss, insurance loss → challenges to food, meds & supplies, housing, morale and more
    - If need to ration food, may need to reduce meds (stop SGLT2i med)
    - If can't get medication – options to offer to at least prevent severe hyperglycemia

Let them know you are available to provide help – **prevent** those **severe presentations of non-COVID illness**

Active Infection --- COVID-19 illness

- Onset of COVID 19
  - Signs and symptoms of COVID 19 develop on an **average of 5-6 days** after infection (the incubation period can vary in a wide range of between 1 to 14 days)

  - COVID-19 often presents initially with mild symptoms in the first week, which can include **fever**, **dry cough, fatigue, shortness of breath**, **myalgia, chills, sore throat, loss of sense of smell/taste,** (>27%) **GI symptoms**(loss of appetite, nausea, or diarrhea) *(nausea, vomiting & shortness of breath can also be sign of DKA)*
    - **Only 43.8% Wuhan patients** presented with **fever; only 25-32% of NYC and NY state** patients with **fever**
    - Fever & cough less common in elderly & immunocompromised – more often SOB at onset
    - Runny nose uncommon with COVID 19 – common with allergies

Active Infection in PWD:

- Worsening of COVID 19
  - The symptoms of the disease develop and change over time & **often *worsen as enters second week*** of infection
    - **Can worsen rapidly**, especially if immunocompromised etc.
  - **Severe and critical cases** can lead to severe pneumonia, respiratory failure, septic shock, and multiple organ dysfunction or failure.
  - In adults, **emergency warning signs** include:
    - Difficulty breathing or shortness of breath
    - Persistent pain or pressure in the chest
    - New confusion or inability to arouse
    - Bluish lips or face
    - Cold, clammy, pale mottled skin
    - Little or no urine output
    - Coughing up blood
    - Neck stiffness
    - Escalating fever
    - Stroke symptoms
  - If develop emergency warning signs for COVID-19 **get medical attention immediately** – *call first* to notify Clinic or ED
    - If possible, wear mask into the facility or prior to 911 arrival

Active Infection in PWD

- If **patients feel they are developing symptoms of COVID 19** they should **call their health care team** right away - don't go to UC or ED
    - Awareness for **monitoring** - critical
    - Ensure proper **isolation** (& quarantine of household members)
    - Criteria for testing
    - Need to know **how to access care if symptoms worsen**

- "...patients report receiving *vague directions* and varying responses as to *how they should follow up*, and how often.

- ...there's a lot of *confusion* around **what "monitoring symptoms" means**
    - That can be a real problem....**when the disease escalates, it can escalate very fast**.

- ...some sort of *formalized system to call and check in* on potential coronavirus cases and make sure they haven't crashed would *fill a big need*"

Outpatient Risk Stratification for Patients with COVID19

More detailed outpatient risk stratification   *Presence of risk factor in any category may upgrade risk*

	Low Risk	Intermediate Risk	High risk
Symptoms	Mostly upper respiratory Mild cough NOT: short of breath	Cough Fever Mild shortness of breath	Shortness of breath Fever Severe or worsening cough
Risk Factors	Age <60 No underlying illness	Age 60-70 1 risk factor	Age>70 2 or more risk factors or single severe comorbidity
Social Factors	Able to self-isolate Anxiety, depression - provide resources where available	Able to self-isolate Uncertain/Unavailable caregiver	Able to self-isolate Caregiver available to provide support and monitoring
Disposition	Advise home care Strict return precautions Home quarantine precautions	Follow up virtual visit in 1-2 days with re-assessment per clinical judgement	Consider in-person, follow up virtual visit in 1 day, consider following daily for full 14 day course

All patients
- Quarantine instructions. See CDPHE website: https://covid19.colorado.gov/isolation-and-quarantine
- Counseling on expected course of disease including risk of double sickening
- Call back/ER precautions: any worsening symptoms, shortness of breath, new or worsening fever, chest pain

Risk Factors for Severe Disease*
- Age>60
- Immunosuppressed: transplant recipient, malignancy on chemotherapy, immunosuppressive treatment, HIV with +viral load
- Chronic Condition: HTN, diabetes, ESRD, COPD, Asthma, cirrhosis
- Pregnancy

*these risk factors are based on inpatient mortality data from China, Korea, New York

Infection in PWD --- Diabetes concerns:

- Worsening of diabetes (blood sugar issues) - *preventable/actionable*

  - Being ill can make it more difficult to manage diabetes.

    - **Hypoglycemia** - If a patient has severe malaise or loss of appetite or nausea/vomiting and is *unable to eat,* that can cause **glucose levels to fall** and/or **dehydration**

    - **Hyperglycemia** - Illness itself can increase insulin resistance and **raise blood glucose levels.**

      - **Increased insulin requirements** and/or **dehydration**
      - People with diabetes, **both type 1 and 2**, have a higher risk for **diabetic ketoacidosis (DKA)** when ill with a viral infection — that can make it harder to avoid sepsis and septic shock (impaired immune function, electrolyte and fluid imbalance)

Infection in PWD -- Worsening of diabetes
or if not sick but limited food intake

- **Hypoglycemia –** usually due to *reduced food intake*
  - Check blood sugar more often – instruct based on risk
  - **Stop SGLT2i** (at first sign of illness and/or reduced food intake)
    - Can take 3-4 days for effect to wane (accentuated stress & starvation ketosis)
  - May need to **reduce or stop sulfonylureas**
  - May need to **reduce or stop insulin**
  - Treat low blood sugar – PWD or caregiver *needs to know how to treat low BG before it happens*
    - Rapid glucose
      - If low (blood sugar below 70 mg/dl or target range), eat 15 grams of simple carbs that are easy to digest like glucose tabs, honey, jam, Jell-O, hard candy, popsicles, juice or regular soda, and re-check BG in 15 minutes to make sure levels are rising.
    - Glucagon rescue – sick day use
      - Kit
      - Pre-filled syringe
      - Nasal

Meal Planning on Sick Days

If able to eat meals

- Eat usual meals
- Drink **eight (8) ounces** of *calorie-free extra fluids each hour* throughout the day
- Examples:
  - water
  - tea
  - broth
  - diet soda
  - sugar-free Jell-O

If not able to eat usual meals

- Try eating or drinking food or beverage items with *15 grams carbohydrate* **every hour** (see list next slide)
- Continue to drink *extra calorie-free fluids* in between

Foods/Fluids that contain 15 grams of Carbohydrate

- 1/2 cup apple juice
- 1/2 cup regular soft drink (caffeine-free)
- 1 double-stick popsicle
- 1/4 cup regular pudding
- 1 slice dry toast
- 1/2 cup cooked cereal
- 6 saltine crackers
- 1 cup soup

- 1/3 cup frozen yogurt
- 1 cup Gatorade
- 1/2 cup regular ice cream
- 1/4 cup sherbet
- Milkshake (1/3 cup low fat milk and 1/4 cup ice cream)
- 1/2 cup regular gelatin/Jell-O
- 1 cup nonfat, sugar-free yogurt (not frozen)

Calories: 140kcal
Sugar: 34.8g (8 tsps)

Maintain Hydration

- **Eight ounces (8 oz) of fluid each hour**
  - If not eating can add in fluids containing carbs
    - e.g. 4 oz Regular Sprite + 4 oz Diet Sprite or 8 oz Gatorade
- *Every third hour,* consume eight ounces **(8 oz)** of a **sodium-rich choice such as bouillon**

- If having trouble keeping fluids down, *have small sips every 15 minutes or so throughout the day to avoid dehydration*

- Recommend *good hydration (calorie-free fluids) as part of staying healthy* (avoid going into COVID illness with underlying dehydration)

Infection in PWD – Worsening of diabetes:

- **Hyperglycemia** & higher risk for **diabetic ketoacidosis (DKA)** when ill with a viral infection
  - Patients who are feeling sick need to **monitor their glucose more frequently** – even every 2 to 4 hours if /while blood sugar is elevated
  - They should **continue taking their diabetes medications**, *unless instructed otherwise* by their providers
    - Based on what we know about risk of DKA with ketogenic diet and surgical stress with SGLT2i meds – **stop SGLT2i**
    - if **patient is sick – at first sign of illness** (3-4 days for effect to wear off)
      - May then need to **add Insulin** to control blood glucose levels
    - if **unable to eat** or not sick but **needing to ration food**
      - May or may not need an alternative diabetes med – closely monitor
    - If **patient on both insulin and SGLT2i,** and gets sick, unable to eat or needs to limit food due to shortage → **STOP the SGLT2i first before reduce or stop insulin**
      - if reduce/stop the insulin and not the SGLT2i then much higher **risk for DKA** during stress of illness or reduced carb intake

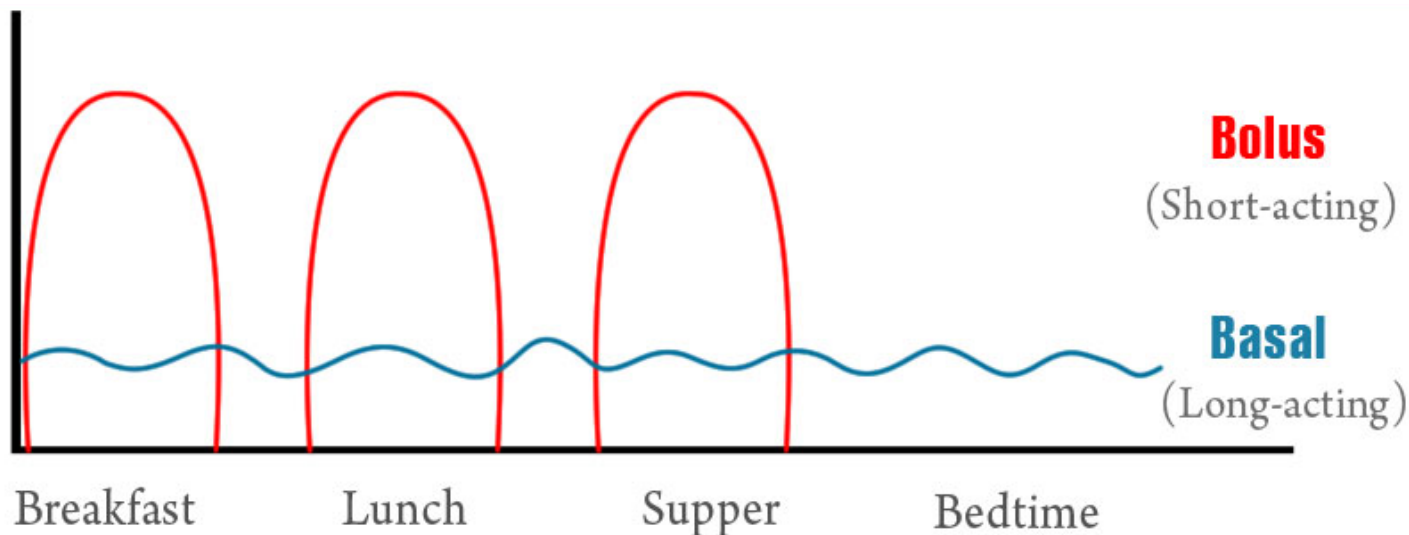# Infection in PWD – preventing high BGs/DKA:

- **Preventing severe hyperglycemia / DKA**
  - If sick & reduced intake, N/V/D, – stop Metformin, GLP1-RA
  - May need to **add "sick day" insulin**
    - Current insulin use
      - *Adjust Basal Insulin & add "correction insulin"*
    - Patients new to insulin
      - **Instructing patients** new to insulin – consider
        - Use pens, if possible, for simplicity
        - Tele-video visit to instruct and help monitor/adjust if possible
        - Phone call to instruct & monitor/adjust
          - if possible, use you-tube (several available) as visual aid
        - Car visit --- instructions provided from outside with patient/caregiver in car (window up – use phone if possible) – then monitor by phone
        - Brainstorm and share ideas
      - **Calculating Insulin doses in patients *new to insulin***
        - *Basal Insulin & Correction Insulin*

Basal Insulin – suppresses glucose production between meals & overnight to maintain blood glucose in normal range when not eating - ~ 50% of daily needs

Bolus (mealtime, prandial) Insulin – limits hyperglycemia after meals – ~50% of daily needs with 10 to 20% of total daily insulin requirement as rapid-acting insulin at each meal – should ***hold if NPO or not eating***

Correction Insulin – ***extra rapid-acting insulin given for high blood glucose*** to reduce BG to target range

Infection in PWD – preventing high BGs/DKA:

- **Adding "sick day" insulin** (can also use in hospital on ward)
  - Calculate **starting doses of insulin**
    - 0.5-0.7u/kg = Starting Total Daily Dose   or
    - 0.25u x weight in pounds = Starting Total Daily Dose
    - E.g. 100 kg patient = 50 - 70 units or 220 pounds = 55 units

  - Start with ½ as **Basal Insulin** - e.g. 25-35 units insulin glargine
    - If patient sick & has increased insulin resistance *may need to rapidly increase dose* - need to monitor & **adjust based on FBS** –
      - Call patient daily or algorithm for patient/caregiver
      - Start with 20% increase if BG in 200s, 30% increase if BGs in 300s
        - May need to double dose or even more if severe insulin resistance
      - With insulin glargine – split dose to BID if > 50u per injection
      - Can use NPH BID (some are doing q8hour during COVID19)
        - 50% AM and 50% PM if not eating (e.g. start at 15u BID for 100 kg patient) and adjust as needed
          - Can use 50% AM & 50% PM or 2/3 AM and 1/3 PM if eating

Infection in PWD – preventing high BGs/DKA:

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  - Calculate **starting doses of insulin**
    - 0.5-0.7u/kg = Starting Total Daily Dose   or
    - 0.25u x weight in pounds = Starting Total Daily Dose
    - E.g. 100 kg patient = 50 - 70 units or 220 pounds = 55 units

  - **Bolus (mealtime) Insulin** - if eating meals add 10-20% of starting dose as rapid-acting insulin with each meal – *hold if not eating*
    - e.g. 5-10 units before each meal for 50u starting total dose for 100 kg patient
    - More refined methods in extra slides added to end of slide deck (recovery stage of COVID19 illness)

  - **Correction Insulin** - Intended to *decrease BG* levels to target range – based on patient's "sensitivity or correction factor" - can be used to:
    - add more insulin to a mealtime bolus to correct for a high premeal blood glucose (e.g. 5u if BG 80-140, 6u (5u+1u) if 141-170, 7u(5+2u) if 171-200, etc.)
    - **Used alone to correct a high blood glucose outside of mealtime or if NPO**

Calculating the Correction Dose

Correction dose of Insulin = $\dfrac{\text{Current BG - Target BG}}{\text{CF}}$

Correction Factor (CF) or Sensitivity Factor (SF)

The CF = the mg/dl drop in BG caused by 1 unit of insulin
(depends on sensitivity to insulin - weight, age, renal function)

The right correction dose will return the BG to within
30 mg/dl of the target blood glucose about 3-4 hours
after the dose is injected

Calculating a
Correction Factor(CF)/Sensitivity Factor(SF)

For patient new to insulin/sick day insulin
calculate by using
3000/weight in Kg

e.g. patient weighs 100 kg
3000/100kg=30
1u should reduce BG by 30 points

If impaired renal function/older age – may need "weaker" correction dose by using larger CF (SF) number (e.g. 50 – 1u lowers BG 50 points vs 30 points)
This gives **less insulin** as the correction dose of insulin

With severe IR/infection, may need to go to "stronger" correction dose by using smaller CF (SF) number (e.g. 20 - 1u lowers BG 20 points vs 30 points)
This gives **more insulin** as the correction dose of insulin

Quick "cheat sheet" for *starting point* for Correction Factor(CF)/Sensitivity Factor(SF)

<u>CF based on patient weight</u>

- <60 lb. = 100

- 60—80 lb. = 75

- 81—100 lb. = 60

- 101—120 lb. = 50

- 121—140 lb. = 45

- 141—170 lb. = 40

- 171—200 lb. = 30

- 201—230 lb. = 25

- 231—270 lb. = 20

- >270 lb. = 15

Based on 3x ICR weight formula

Or – if patient already treated with insulin Can use:
- 1700/TDD* - or
- 3x their Insulin to Carb ratio Factor

Guide for Using Correction Insulin

- During illness aim for blood glucose in **110-180 range**
  - if high risk of low BG aim for 140-180 range
    - Therefore you might use target BG of 140 for 110-180 range

- Example of Correction dose calculation for CF 30
  - [**current BG-target BG/CF**] – e.g. Current BG is 350 and target is ~140
  - 350-140/30 = 210/30 = 7u correction dose of rapid acting insulin to bring BG down 210 points
    - To strengthen use smaller CF: e.g. 210/25= 8u; 210/20 = 10.5u; 210/15 = 14u … to reduce BG 210 points

  - Can give patient a **correction scale**: e.g. for BG 180-210 1u; BG 211-240 2u; BG 241-270 3u, 271-300 4u, BG 301-330 5u, etc.
    - See cheat sheet to copy and paste for different CF values

Correction Scales for different Correction Factors

- **CF 50:** for BG 180-230 give 1u; 231-280 2u; 281-330 3u; 331-380 4u; 381-410 5u; 411-460 6u; 461-510 7u, 511-560 8u, 561-610 9u, etc.

- **CF 40:** for BG 180-220 give 1u; 221-260 2u; 261-300 3u, 301-340 4u, 341-380 5u, 381-420 6u, 421-460 7u, 461-500 8u, 501-540 9u, 541- 580 10u, etc.

- **CF 30:** for BG 180-210 give 1u; 211-240 2u; 241-270 3u; 271-300 4u; 301-330 5u; 331-360 6u; 361-390 7u; 391-420 8u; 421-450 9u, 451- 480 10u, 481-510 11u, 511-540 12u, 541-570 13u, 571-600 14u, etc.

- **CF 25:** for BG 175-200 give 1u; 201-225 2u; 226-250 3u; 251-275 4u; 276-300 5u; 301-325 6u; 326-350 7u; 351-375 8u; 376-400 9u,401-425 10u, 425-450 11u, 451-475 12u, 476-500 13u, 501-525 14u, 526-550 15u, etc.

- **CF 20:** for BG 180-200 1u; 201-220 2u; 221-240 3u; 241-260 4u, 261-280 5u, 281-300 6u, 301-320 7u, 321-340 8u, 341-360 9u, 361-380 10u, 381-400 11u, 401-420 12u, 421-440 13u, 441-460 14u, 461-480 15u, etc. **OR**
  - BG 180-220 give 2u; 221-260 4u; 261-300 6u, 301-340 8u, 341-380 10u, 381-420 12u, 421-460 14u, 461-500 18u, 501-540 18u, 541-580 19u, etc.
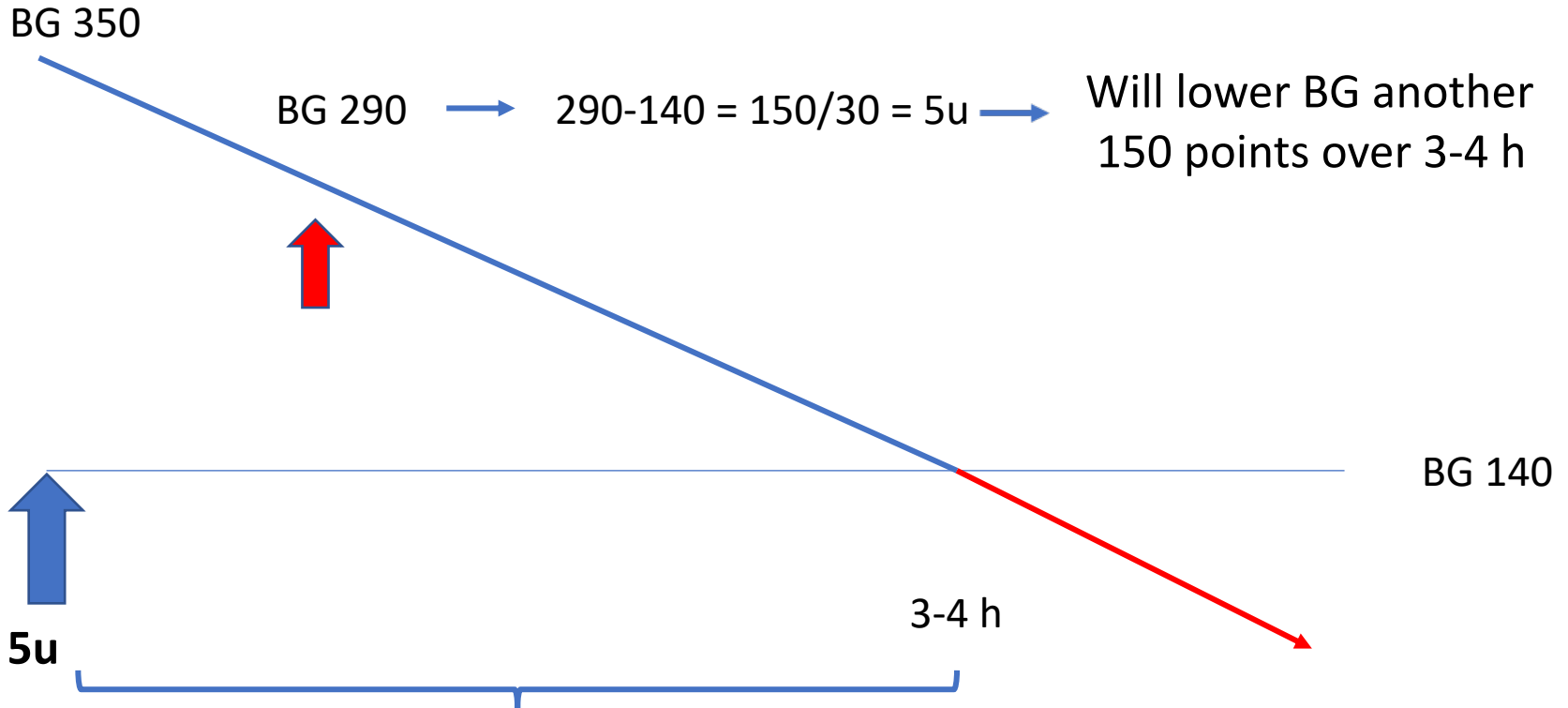
Guide for Using Correction Insulin

Only give (dose) **Correction Insulin**

- every **3-4 hours for analog insulin** –
- every **4-6 hours for Regular insulin** –
- otherwise end up **"stacking" insulin** and risk of low BG
  - Explain it takes Fast Insulin 3-4 hours to **finish working**

Rapid Acting insulin action diagram

| Time 0 | 2 hours | 4 hours |
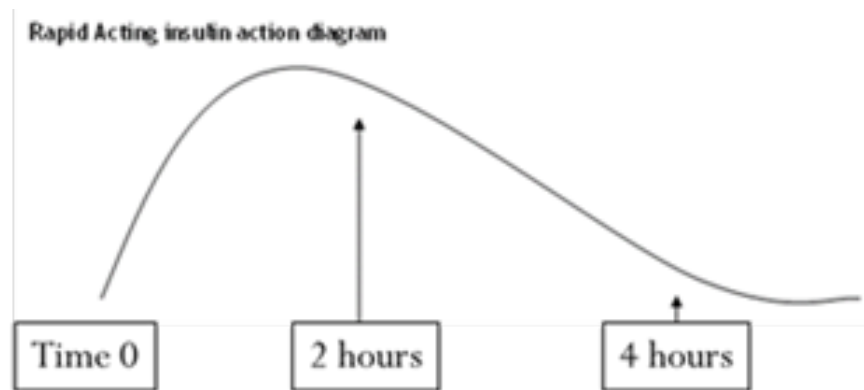
"Stacking" Correction Doses

Correction dose: 350-140 =210/30 = 7 units

BG 350

BG 290 → 290-140 = 150/30 = 5u → Will lower BG another 150 points over 3-4 h

BG 140

5u

3-4 h

7u will lower BG 210 points over 3-4 hours

Glucose Meter Issues in the COVID Crisis

- Challenges to blood glucose monitoring
    - Due to PPE resource conservation – reduced opportunity for poc glucose checks in ED or hospitalized patients
        - Need to bundle or cohort testing with other needs to enter room (3-4x per day)
    - Shortage of hospital glucometers in some settings
    - Suggestion by many (requires relaxation of hospital regulations) is to have **patient bring their home glucose meter & strips** with them to ED/hospital – can check their own BG and can help staff
        - https://www.fda.gov/medical-devices/blood-glucose-monitoring-devices/faqs-home-use-blood-glucose-meters-utilized-within-hospitals-during-covid-19-pandemic

    - Be aware - high dose vitamin C being used by some patients to Rx COVID19 via social media recommendations - interferes with glucose oxidase-based test strips – falsely high readings
        - Ask about in patients at home – advise against

Hydroxychloroquine associated Hypoglycemia

- "…a rare but documented adverse effect, in **diabetic or nondiabetic patients** treated with hydroxychloroquine"
  - During a study looking at what happened when people were given Hydroxychloroquine, the *serum level of insulin* during an OGTT was *significantly elevated* after treatment by hydroxychloroquine
    - In vitro, chloroquine reduces intracellular insulin degradation, increases intracellular insulin accumulation, delays receptor recycling and activates insulin-mediated glucose transport. A **reduction in insulin resistance** has also been observed.
  - Hydroxychloroquine has been reported to **reduce insulin requirements by an average of 30%** in people with T2DM
    - "When hydroxychloroquine is initiated…in a type II diabetic requiring insulin or sulfonylurea treatment, blood glucose levels should be monitored closely, and the insulin dose may need to be reduced"

This is not a suggestion to use hydroxychloroquine to treat diabetes – rather a warning to be aware of risk of hypoglycemia.

DPP-4 inhibitors to treat COVID 19 ?

Two **coronavirus receptor** proteins -- **angiotensin converting enzyme 2 (ACE2**) and **DPP-4** -- are known transducers of metabolic signals and pathways *regulating inflammation*, etc.

- Could medications impacting these proteins increase risk or reduce risk of serious COVID 19 illness ?
  - Evidence **does not** show changes in markers of **immune function** after administration of **DPP-4 inhibitors** in diabetes or non-diabetes patients [regarding response to COVID 19]

- *Insufficient evidence* to suggest that **DPP-4 inhibitors or GLP-1 receptor agonists** could *safely replace insulin* as the agent of choice for managing *critically ill patients with type 2 diabetes and coronavirus infections.*
  - Insulin should be used to treat diabetes with COVID-19

And regarding ACE2 receptors

https://covid19treatmentguidelines.nih.gov/
Persons with COVID who are prescribed ACEIs or ARBs for cardiovascular or other indications should continue these medications

Association of Inpatient Use of Angiotensin Converting Enzyme Inhibitors and Angiotensin II Receptor Blockers with Mortality Among Patients With Hypertension Hospitalized With COVID-19

- Conclusions: Among hospitalized COVID-19 patients with hypertension, inpatient use of ACEI/ARB was associated with ***lower risk of all-cause mortality*** compared with ACEI/ARB non-users.
  - While study interpretation needs to consider the potential for residual confounders, it is unlikely that in-hospital use of ACEI/ARB was associated with an increased mortality risk.

Extra Slides

Take Care of Yourself

Care giving professionals are inclined to focus on others

Works in normal situations, but not when under stress

Care for yourself, so you can care for others

Sleep well, eat well, move, laugh

Plan for connection daily

Exhale with long slow breaths that calm body down (activates parasympathetic nervous system)

Treating others with **kindness and respect** is necessary for our ongoing health and safety.

We are all in this together.

Safer Arrivals and Departures to and from Work During COVID-19

Before work
- Eat well, drink well
- Come to work without belts, jewelry, and anything that cannot be high temperature washed at home every night
- Come to work clean shaven and without make-up
- Protect your skin with hand cream that is free of irritants like retinol or those labeled "anti-aging." And consider fragrance-free products with dimethicone, polyuronic acid or shea butter

At work
- Change into clean scrubs upon arrival and leave your street clothes in a non-patient care area
- Clean your hands and wear a procedural mask in patient care areas
- Avoid touching your face and minimize unnecessary contact with equipment, door handles, keyboards, etc.
- Clean your hands often
- Stay 6 feet from other people during work, breaks, and meals
- Check in with your team often
- Change scrubs after interactions with patients that may have led to contact with droplets or other bodily fluids
- Follow PPE guidance for donning and doffing
- Clean your hands before leaving a patient care area, and remove scrubs before leaving
- Sanitize your stethoscope, badge, pager, etc.
- Shower at work, if possible
- Leave your scrubs in the designated bin
- Leave in your street clothes

At home
- Leave your shoes outside
- Shower before interacting with anyone if you didn't at work
- Wash everything you wore to work at high temperature
- Limit screen time
- Get outside for sunshine
- Eat well, drink well
- Sleep

Getting the Job Done

- Ideas from the trenches – expand the team
  - **Use of sidelined staff & others for outreach** to patients
    - Cardiology practice using radiology staff to contact patients, explain need for precautions, teach how to use tele-visit technology before their tele-visit
    - FQHC using dental services staff to do patient outreach & education around precautions and remote care (how "appointments" will work – who calls who, etc.)
    - Public Health hot-line using retired firemen, retired deputies, EMT & MA students & others to explain/provide details how to avoid exposure, quarantine, isolation, etc.
    - Utilize Community Health Workers for outreach during the COVID19 crisis
  - Hand-off clinical issues to appropriate care team members
    - Needed prescriptions, medical questions or more detailed instructions
  - **Create a script & checklist** for those doing the outreach
  - E-mail/mail/text written info to patients -
    - IHS Division of Diabetes website resource - **Pictures of recommendations to prevent exposure** – **critical messaging**
      - Arrange for hand sanitizer and/or bleach solution if access to water is issue
    - **Phone numbers for help or what to do if no phone**
    - Lists & instructions for **diabetes sick-day prep** such as fluids & 15-gram carb items

Assessing Risk- A Warning about Obesity

- Among 383 patients from Shenzhen, China with COVID-19, overweight was associated with an 86% higher, and obesity with a 142% higher, risk of developing severe pneumonia compared with patients of normal weight.

- Among 4,103 patients with COVID-19 at an academic health system in New York City, BMI >40 kg/m2 was the second strongest independent predictor of hospitalization, after old age

- Among 124 patients w COVID-19 at a university hospital in Lille, France, the need for invasive mechanical ventilation was associated with a BMI ≥35 kg/m2, independently of other comorbidities

- 42.4% of US adults have obesity – all age groups
  - 48.1% of American Indian/Alaska Native adults (over 18)
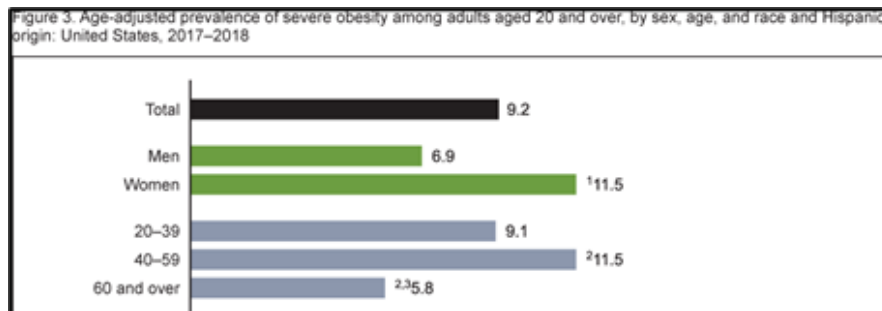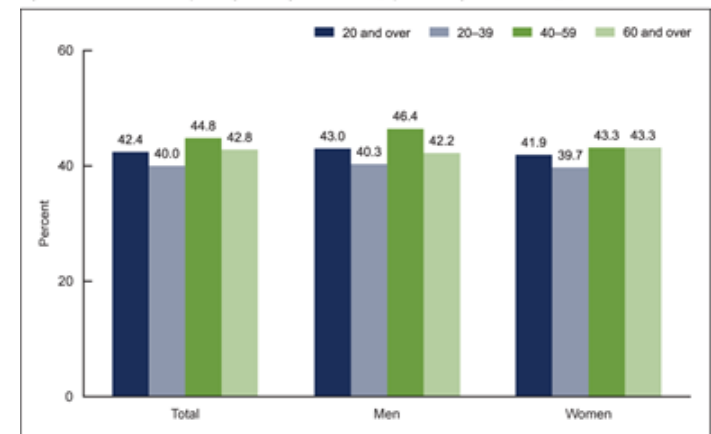
- 9.2% of US adults have severe obesity

Figure 3. Age-adjusted prevalence of severe obesity among adults aged 20 and over, by sex, age, and race and Hispanic origin: United States, 2017–2018

	Percent
Total	9.2
Men	6.9
Women	¹11.5
20–39	9.1
40–59	²11.5
60 and over	²,³5.8

Figure 1. Prevalence of obesity among adults aged 20 and over, by sex and age: United States, 2017–2018

	20 and over	20–39	40–59	60 and over
Total	42.4	40.0	44.8	42.8
Men	43.0	40.3	46.4	42.2
Women	41.9	39.7	43.3	43.3

Added Vulnerabilities for PWD

- 89.0% were overweight or had obesity,
  - 27.6% were overweight (BMI of 25.0 to 29.9 kg/m2)
  - **45.8%** had **obesity** (BMI of 30.0 to 39.9 kg/m2)
  - **15.5% had extreme obesity** (BMI of 40.0 kg/m2 or higher).
- 15% were current **smokers** – *22.5% AI/NA*
- **68.4%** had **Hypertension** (High Blood Pressure)
- 37% had **chronic kidney disease** (stages 1 through 4)
  - < 25% with moderate to severe chronic kidney disease (stage 3 or 4) were aware of their condition - **>75% unaware/untreated**

Covering Meal Carbs

- The **insulin-to-carb ratio (ICR)** is a way to get the right amount of insulin for the carbohydrates in a meal (or snack) –
    - it means the patient will take *1 unit of insulin for a certain amount of carbohydrate*
    - Even if eating **fixed amounts of carb** at a meal – need to have appropriate ICR for the **fixed meal insulin dose**

- E.g. - If the insulin-to-carb ratio (ICR) is 1 unit of insulin for every 10 grams of carbohydrate (written 1:10) - will take 1 unit of insulin for every 10 grams of carbohydrate eaten – if eat 60 grams will take 6 units
    - If ICR is 1:15 – will take 1 unit for every 15 grams of carb eaten
        - If eat 60 grams of Carb will take 4 units
    - For fixed meal doses – e.g. patient eats ~45 grams of carb each meal and weighs ~120# with estimated ICR of 1:15 - will take 3 units with each meal
    - Or if patient eats 30g Carb with Breakfast, 45 grams with Lunch & 60 grams with Dinner – would take 2u with B, 3u with L and 4 units with D

Estimating an Insulin to Carb Ratio

Based on Total Daily Dose

- 8—11 units 1:50
- 12—14 units 1:40
- 15—18 units 1:30
- 19—21 units 1:25
- 22—27 units 1:20
- 28—35 units 1:15
- 36—45 units 1:12
- 46—55 units 1:10
- 56—65 units 1:8
- 66—80 units 1:6
- 81—120 units 1:5
- >120 units 1:4

Based on the 500 Rule

Based on Body Weight

- <60 lb. 1:30
- 60—80 lb. 1:25
- 81—100 lb. 1:20
- 101—120 lb. 1:18
- 121—140 lb. 1:15
- 141—170 lb. 1:12
- 171—200 lb. 1:10
- 201—230 lb. 1:8
- 231—270 lb. 1:6
- >270 lb. 1:5

Fails to consider body composition & insulin resistance

Correction Bolus (Supplement)

◆ Must determine the decrease in glucose from 1 unit of rapid-acting insulin

◆ This number is known as the correction factor (CF)

◆ Use the 1700 rule or weight to estimate the CF

◆ CF = 1700 divided by the total daily dose (TDD)

   (eg. if TDD = 50 units, then CF = 1700/50 = ~30, meaning 1 unit of glucose will lower the BG ~30 mg/dL)

◆ CF = 3000 divided by weight in kg

1700 Rule* to Calculate the Sensitivity Factor

- Divide: 1700 by Total Daily Insulin to estimate the Sensitivity Factor (SF) /Correction Factor (CF)
  - Example: 14 units basal insulin + 16 units bolus insulin = 30 units total daily insulin
  - 1700/30 = 50.
- This Correction Factor means that 1 unit of insulin will lower blood glucose by approximately 50mg/dl.

- HOW TO USE THE CORRECTION FACTOR TO CALCULATE A CORRECTION DOSE:
- **Correction Dose Formula**:
  - (Current BG) - (Target BG)/CF = Correction dose
  - Example: Current BG = 200 mg/dl, Target BG = 100 mg/dl, Correction Factor or Sensitivity Factor = 50
  - So, 200-100/50 = 100/50 = 2.0 units of insulin for a Correction dose
- If numeracy / math challenged: provide **range**
  - e.g. 151-200 - 1unit; 201-250 - 2units, 251-300 – 3units, 301-350- 4u, etc

*Alternative Methods for Estimating the Sensitivity Factor

- Some Health-care professionals use the "1500 rule" to calculate insulin sensitivity factor for people who use Regular (short-acting) insulin. The 1500 rule works as follows: Divide 1500 by the total daily dose of insulin, in units.

- Some HCPs use the "1800 rule" to calculate insulin sensitivity factor for people who use the rapid-acting insulin analogs lispro (brand name Humalog), aspart (NovoLog), and glulisine (Apidra).

Correction Bolus Formula

$$\frac{\text{Current BG} - \text{ideal BG}}{\text{Glucose correction factor}}$$

Example:

- Current BG: 250 mg/dL
- Ideal BG: 100 mg/dL
- Glucose Correction Factor: 30 mg/dL

$$\frac{250 - 100}{30} = 5.0 \ U$$

Provide PWD with a Personal Plan to Protect

- Prevent exposure – make it personal – "it's about you"

- Prepare – needed supplies, phone numbers, instructions

- Plan – an anchor in uncertainty

- Proactive care of diabetes if patient develops COVID 19 –
  - help prevent
    - low blood sugar
    - dehydration
    - Hyperglycemia, glucotoxicity and/or DKA
  - monitoring of diabetes & COVID19

- Creativity required – this is not business as usual – be open to using new and/or different approaches, resources, personnel

 "Start where you are. Use what you have. Do what you can." A. Ashe

[IHS COVID-19 Resource](#) webpage COVID-19 Patient Education Resources:

- [What Tribal Members need to know about COVID-19](#) [PDF - 213 KB]
- [How to Prevent the Spread of Coronavirus (COVID-19) in the Home](#) [PDF - 2 MB]
- [Elder Mental Health During COVID-19](#) [PDF - 3 MB]
- [Tips for Elders and Their Caregivers](#) [PDF - 376 KB]

- **Share simple facts about the COVID-19 outbreak, including symptoms, treatment, and effective strategies to reduce risk of infection in words older people can understand.**
  - Consider whether they have cognitive impairments when speaking about risk.
- Communicate instructions in a clear, concise, and respectful way.
  - Information may be displayed in writing or pictures.
- **Engage families with information** and help them practice prevention measures such as handwashing.
- **Contact elders via landline phones.**
  - Encourage family or friends to call their elders regularly and teach elders how to use video (chat).

Resources

https://www.acponline.org/clinical-information/clinical-resources-products/coronavirus-disease-2019-covid-19-information-for-internists

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