

Hyperglycemia in the Clinic

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Conflicts of Interest

None

Objectives

- Identify methods of simplifying diabetes regimens in cases of non adherence
- Name at least 5 reasons for unexpected hyperglycemia
- Describe weight based method of insulin initiation
- Identify means of incorporating technology into the management of type 2 diabetes
- Identify and recognize features of secondary diabetes

46 yr old male

OJ is a 46 yr old man

- PMH
 - T2D (x 10 years) and schizophrenia
- HbA1c 9.2%
- DM Meds
 - Metformin
 - Saxagliptin
 - Insulin glargine, 50 units daily
 - Insulin Aspart, 15 units with meals
 - Pt reports routinely missing doses of insulin

◦SH Intermittently homeless

Exam

Glucose 219

Obese

BP 130/77; HR 66

Heart, lungs normal

Abd WC 45 inches

No skin lesions

AAO x 3; cognition intact

What should we do?

Check insulin injection technique

Simplify regimen

- Aspart 70/30
 - 63 units before breakfast
 - 32 units before dinner

Follow up

- HbA1c 7.8%
- No hypoglycemia detected



35 yr old male

SC is 35 yr old male PMH

- T1DM – well controlled
 - Mental handicap

 - Meds
 - Detimir 9 units BID
 - Aspart 1-8 units with meals
 - Correction aspart PRN
- Hb A1c 6.8%

Reasons for unexplained hyperglycemia

Infection

Pain

Stress

Acute MI

Change in physical activity

Further history

What questions shall we ask?

Is there a pattern to the hyperglycemia?

- Primarily elevated in morning?
 - Rule out nocturnal hypoglycemia
- Elevated primarily after meals?

Any signs of infection?

Change in mood, affect?

Insulin date?

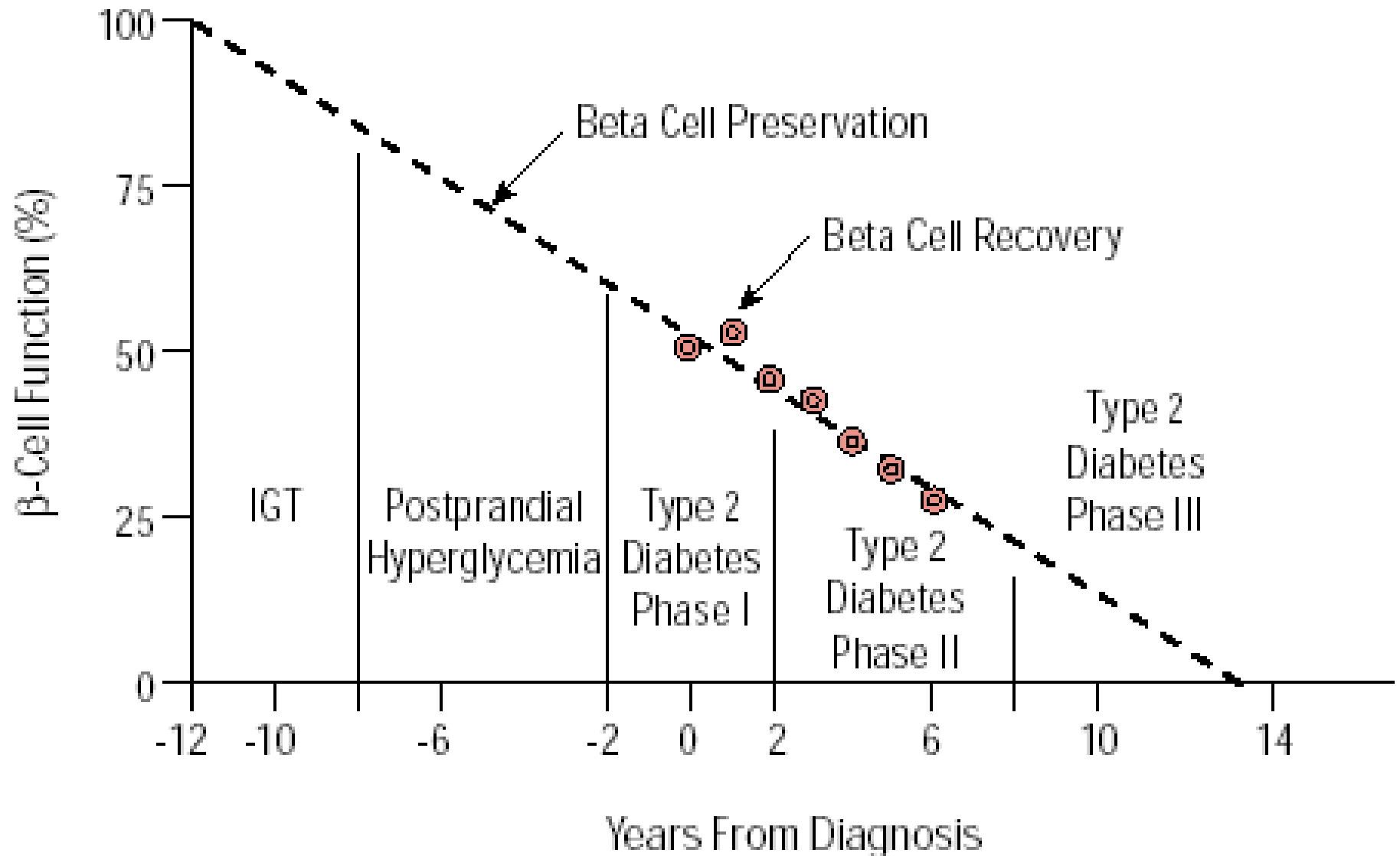
60 yr old male

PMH CAD, Depression, Hyperlipidemia, T2DM, obesity

T2D >10 years

- Glucose well controlled on 4 oral meds
- Today reports glucose has been consistently >200
- HbA1c 8.7% today

Figure 1.
Stages of Type 2 Diabetes



Insulin initiation

Weight based dose

- BW in Kg x 0.2
 - 112 kg x 0.2 = 22 units of basal insulin

Consider c peptide with glucose prior to insulin initiation

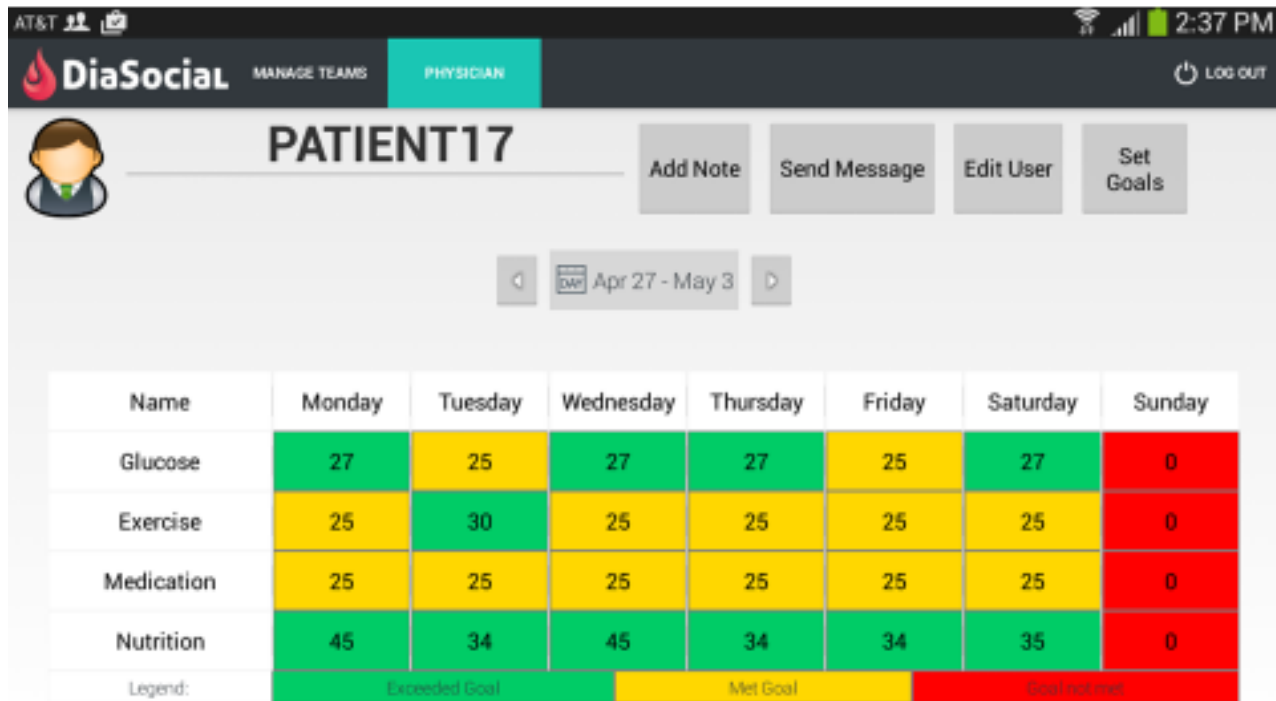
mHealth

- Low cost
- Improves communication with care team
- Personalized 'coaching'
- Improves glycemic control¹
 - Effect size 0.5-1% reduction in HbA1c
 - Younger patients benefit more
 - 14 studies, ~1600 patients
- But still some inconsistency in findings²
 - Might work better for some than others



¹Hou et al 2016 *Diabetes Care*; ²Hamine et al 2015 *JMIR*

DiaSocial App



Regulatory Mode

- Two distinct motivational orientations³
- Locomotion
 - “Just do it”
- Assessment
 - “Do it right”
- Measured with modified 6-item scales

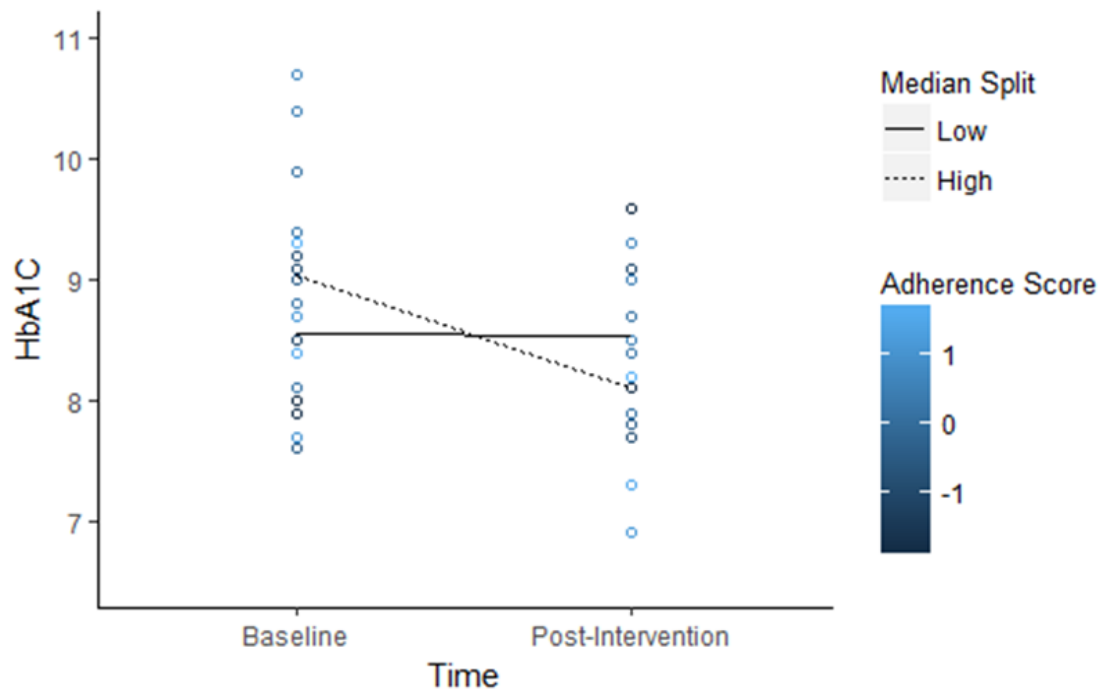
³Kruglanski et al 2000 *JPSP*

Regulatory Mode Scale Items

Locomotion Items	Assessment Items
1. I feel excited just before I am about to reach a goal.	1. I never evaluate my social interactions with others after they occur. (R)
2. I enjoy actively doing things, more than just watching and observing.	2. I spend a great deal of time taking inventory of my positive and negative characteristics.
3. I am a “doer”.	3. I like evaluating other people’s plans.
4. When I decide to do something, I can’t wait to get started.	4. I often compare myself with other people.
5. I am a “low energy” person. (R)	5. I often critique work done by myself or others.
6. Most of the time my thoughts are occupied with the task I wish to accomplish.	6. I am a critical person.

Change in HbA1c

- Better outcomes for people who used the app more



PLoS One. 2018 Mar 7;13(3):e019280

Remote monitoring

CPT Codes

- 99091

- American Diabetes Association (endorsed)
 - GlucoseZone

- FDA approved
 - BlueStar

CM

CM is a 42 yr old female

- PMH T2D (x 10 years), HTN, PCOS
- Meds
 - Basal/bolus insulin
 - Weekly GLP-1 agonist
 - Metformin
 - Spironolactone
- HbA1c 8.2%
- Physical Exam
 - Thin arms/legs
 - Round belly, no stretch marks
 - No bruising, skin tear

Secondary Diabetes

- Hemochromatosis
- Endocrinopathies
 - Acromegaly
 - Cushing Disease
 - Pheochromocytoma
 - Glucagonoma
 - Others
- Medications
 - Tacrolimus
 - mTOR inhibitors
 - Atypical antipsychotics
 - Clozapine, olanzapine
 - Others
- Infection/inflammation



Secondary Diabetes

Hemochromatosis

- transferrin saturation
 - >60% men
 - >50% women

■ Autosomal recessive

- Most common *HFE* gene
 - 10% Caucasians heterozygotes
 - 1/200 homozygous

■ Typical signs

- Abnormal LFT
- Weak lethargic
- Skin hyperpigmentation

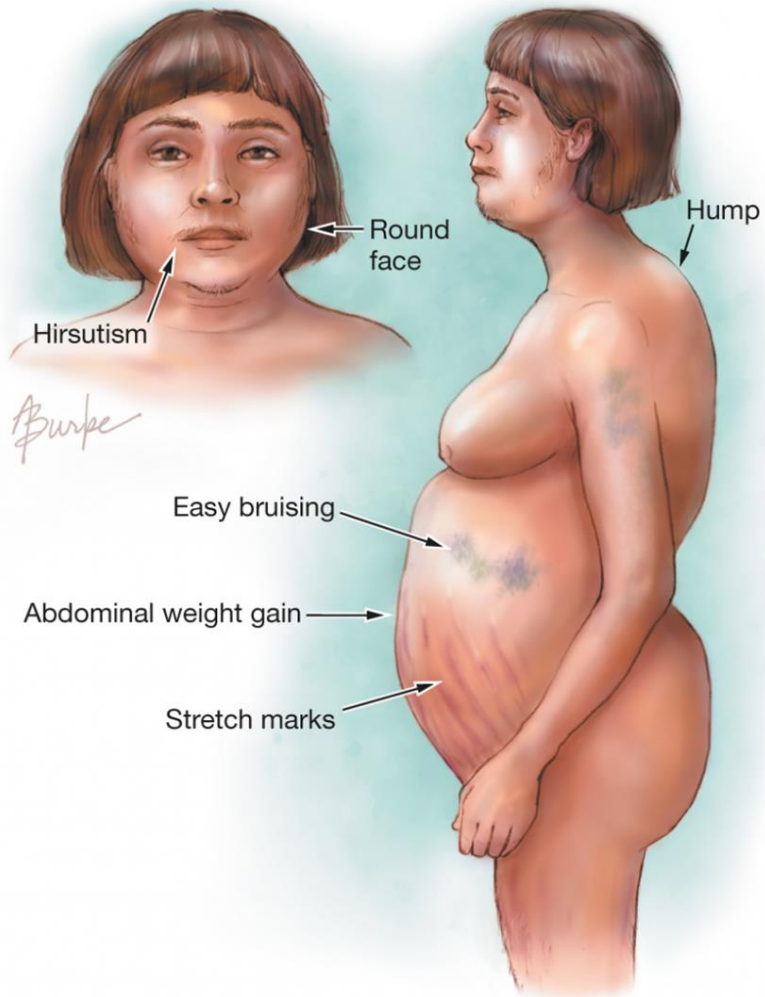
Arthralgia

Diabetes mellitus

Male impotence

ECG abnormal

Signs and symptoms of Cushing syndrome



SCREENING FOR CUSHINGS

Midnight salivary cortisol x 2

Overnight 1mg dexamethasone suppression test

24 hour urine cortisol

Conclusions

Simplify diabetes regimens when possible

Rule out unexpected causes of hyperglycemia

Check insulin dates/quality

Utilize weight based dosing when initiating insulin

Utilize technology to improve diabetes outcomes

Rule out secondary causes of diabetes