NOT-SO-SWEET!
THE STRAIGHT SCOOP ON DIABETES IN THE HOSPITAL SETTING

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Speaker Disclosure

- Tammy Swigert has no conflicts of interest to report in conjunctions with this presentation.
Learning Objectives

- Summarize the state and impact of diabetes as applied to the hospital setting.
- Discuss diabetes-related issues that greatest affect patient outcomes in the hospital setting.
- Demonstrate techniques the frontline healthcare staff can use to assist patient successfully manage their diabetes.
Current State

- About $\frac{1}{4}$ to $\frac{1}{3}$ of hospitalized patients have diabetes, according to most studies (“heavy users”)\(^1,2\)
- 11.5% of patients in 2010 had diabetes listed as the primary diagnosis of hospitalization. This is the second most common discharge diagnosis following\(^3\) diseases of the circulatory system but preceding disease of the respiratory and digestive system\(^3\)
- Of total annual medical expenditures for diabetes ($176\text{ billion}$), about half is for hospital-related expenses\(^2\)
Current State: Hospital Dx of DM

- From 1988 to 2009, the number of hospital discharges with diabetes as any-listed diagnosis increased from just under 2.8 million to more than 5.5 million.³
Current State: Length of Stay with DM

- Average LOS for someone with diabetes in 2009 was 4.8 days.
- Average LOS in 1988 was 9.0 days.\(^3\)
Current State: Hospitals and Beds

- In 2013, there were 5627 hospitals; (902,200 staffed beds) in the United States; \(^4\)
- Licensed beds in California is 80,905 (2010), with approximately 9% in the San Diego area.
- Licensed beds in San Diego area: approx 7281
- The national occupancy rate is uncertain, but occupancy rate for San Diego area is about 60% in 2010.
- This means, in the San Diego area, there may be about 4370 occupied beds on any given day with approx 1100 persons having diabetes.
GAC Hospitals and Licensed Beds (California, 2010)

General Acute Hospitals; n= 391

- Los Angeles County: 24%
- Greater Bay Area: 19%
- Northern and Sierra: 12%
- San Joaquin Valley: 12%
- Inland Empire: 9%
- Orange County: 8%
- Central Coast: 7%
- San Diego: 6%
- Sacramento: 4%

Licensed Beds; n=80,905

- Los Angeles County: 30%
- Greater Bay Area: 20%
- San Joaquin Valley: 10%
- Inland Empire: 9%
- Orange County: 8%
- Central Coast: 5%
- San Diego: 9%
- Sacramento: 5%
Licensed beds vs. Population Growth (California 2001-2010)

- Licensed beds in California declined by 3% while population rose by 8%.
- During same years, prevalence of diabetes in CA rose from 6.5% to 8.6% of all adults.
The rise in the median case mix index since 2001 indicates that patients admitted to acute care hospitals were sicker, on average, than those admitted in earlier years.
As of February, 2016, there were 19,283 Certified Diabetes Educators (CDEs) in the United States, 2,146 in California (far more than any other state).

It is estimated that about 20% of CDEs practice in a hospital, based on practice survey data. (For California that would be about 492 inpt CDEs)

That is 1.1 CDEs per hospital, or …

1 CDE for every 1 CDE for every 28.3 patients with diabetes (assuming 60% bed occupancy and 25% rate of diabetes in the hospital)

What does this mean?
Closing the Gap

- For all patients to be managed by a CDE, we would need FOUR times the number!
- Hospitals cannot bill for this service.
- Also, there is no legal ratio for CDEs or glycemic management experts like there is for nurse staffing.*
- Frontline staff (i.e. the bedside nurse) needs to have expertise in managing and educating patients about diabetes.

* California became the first state to establish minimum RN to patient ratios in 1999, with passage of AB 339. There have been some updates to the initial law: [https://www.cga.ct.gov/2004/rpt/2004-R-0212.htm](https://www.cga.ct.gov/2004/rpt/2004-R-0212.htm)
Inpatient Glycemic Control

#1: Inpatient Guidelines Exists

- 2009 Consensus Statement: American Diabetes Association (ADA) and American Association of Clinical Endocrinologists

- Insulin is preferred method of achieving glycemic control in the hospital

- Non-critical Care: Should include basal, prandial (meal), and correction (supplemental) insulin

- IV insulin often preferred in critical care units.

Insulin Profiles

The graph illustrates the plasma insulin levels over time for different types of insulin: Aspart, Lispro, Glulisine, Regular, NPH, Detemir, and Glargine. The X-axis represents time in hours, and the Y-axis represents plasma insulin level.
#2: Oral Agents: Limited Role

- Should be discontinued in most acute care cases.
- Metformin is contraindicated if contrast dye studies are being done.
- Sulfonylureas (i.e. glipizide, glyburide) can cause hypoglycemia if nutrition is variable (or NPO).
- Other side effects present with other oral treatments.
- Not as precise as insulin
- RNs play a role in helping patients understand

#3: Glycemic Targets Vary

- Critically ill patients (on IV insulin): 140 to 180 mg/dL; target less than 110 mg/dL not recommended for this population.
- Non-critically ill patients: premeal should be <140 mg/dL, random glucose <180 mg/dL.
- Higher targets may be appropriate for some populations (terminally ill, severe comorbidities, etc).
- Reevaluate dose if POC BG is consistently <100 mg/dL.

#4: Prevent/Address Hypoglycemia

- Defined as BG <70 mg/dL
- Most vulnerable hospital populations: elderly, severely ill, renal-impaired, hypoglycemic unaware
- Hypoglycemia is associated with longer length of stay, higher costs, and increased mortality
- Timing of meal insulin is crucial (a leading cause of iatrogenic hypoglycemia)
- Treatment considerations: carbs (vs. meal)

#5: Sync POC testing with Food

- POC testing recommended as best method to guide glycemic management
- POC orders should match with patient nutritional status
- Hypoglycemia is associated with longer length of stay, higher costs, and increased mortality
- Timing of meal insulin is crucial (a leading cause of iatrogenic hypoglycemia) For eating patients, POC testing recommended at AC (within short time) and HS
- For NPO/TPN/TF patients: Q4-6 hours
- IV insulin: Q1-2 hours

#6: Controlling BG saves Money

- Tight glycemic management is NOT easy. Why not just use sliding scale?
- Benefit outweighs cost (studies show)
- Reduced morbidity and mortality; reduced length of stay, lower rates of site infections
- Example: Portland Diabetic Project (2004)\textsuperscript{11}:
  - 4864 open-heart surgery patients,
  - IV insulin used to control BG
  - Reduced deep sternal wound infections by 66%
  - Net savings of $4638/patient

Rates of Deep Sternal Wound Infection in 4864 Patients with Diabetes who Underwent an Open Heart Surgical Procedure

Infection rate (%)

3-day average post-operative blood glucose level (mg/dL)
#7: “Sliding Scale” NOT Recommended

- Sliding scale alone is reactive; treats only after the unwanted result occurs.
- Insufficient to achieve glucose targets
- Basal/bolus regimens mimic normal pancreas physiology
- Reduces hyperglycemia (66% vs. 38%) as well as variability
- NOT necessarily easy; depends on whole team!
- Officially endorsed by ADA in 2014.

Sliding Scale: Roller Coaster Effect
Ideal Insulin Replacement Pattern

![Graph showing plasma insulin levels at different times of the day with peaks at breakfast, lunch, and dinner.](image-url)
Has long been a concern over starting insulin naïve patients on a basal/bolus regimen.

Evidence based guidelines suggest weight based dosing while considering the patients likely level of insulin resistance.

- Less resistant/more sensitive: leaner, renal issues, etc.
- Higher resistance: obese, steroid therapy, failure on oral meds with high A1C, etc.

0.3 to 0.8 units/kg/day; divide this evenly between basal and bolus (three meal doses); add correction as needed.

#9: Special Clinical Situations

- Type 1 DM patients: Require basal plus meal; do NOT hold basal for NPO, BG status

- Insulin Pump patients: consideration to allowing pt to continue on pump. RNs need to document accordingly, per institution policy

- TPN/Tube Feed Patients: likely require insulin. Can be basal/bolus, combination insulin or in the bag.

- Glucocorticoids: basal/bolus regimen with increase in bolus doses; proactively decrease when tapering steroid to prevent hypoglycemia.

#9: Consider Special Clinical Situations

- **Type 1 DM patients**: Require basal plus meal; do NOT hold basal for NPO, BG status.
- **Insulin Pump patients**: Consideration to allowing pt to continue on pump. RNs need to document accordingly, per institution policy.
- **TPN/Tube Feed Patients**: Likely require insulin. Can be basal/bolus, combination insulin or in the bag.
- **Glucocorticoids**: Basal/bolus regimen with increase in bolus doses; proactively decrease when tapering steroid to prevent hypoglycemia.

#10: Prepare for Transition/Discharge

- **Education**
  - **Survival skills:** Focus on those things that are essential
  - **Method:** Short lessons, repeated throughout stay
  - **Hand-on/demonstration:** when possible

- **Team Approach**

- **Follow-up Care/Education:** recommendation is within one month

- **Coordination is very important.**

Survival Skills: What does the patient need to know to be safe until his/her follow-up visit? (You can’t expect to teach — or them to learn — it all!)

- Medication administration (i.e. how to take insulin)
- Monitoring blood glucose (and what the numbers mean)
- Hypoglycemia: recognition, prevention, treatment
- Nutrition basics (What should I eat?)
- When to seek emergency treatment
- Others: diagnosis, A1c, immunizations, eye exam, etc.
- Follow-up specifics (care, diabetes education, etc.).
Challenges for Hospital Staff

- Patient readiness to learn
- Patient attention span
- Preconceived ideas
- Other patient barriers
- Time is limited
- Discharge orders change
- Specialty knowledge level: Standards keep changing; how do you keep up?
- Confidence level
References


References, cont’d.


Questions?

Thanks for your attention!