



**Sharp HealthCare's
2016 Diabetes Conference**

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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

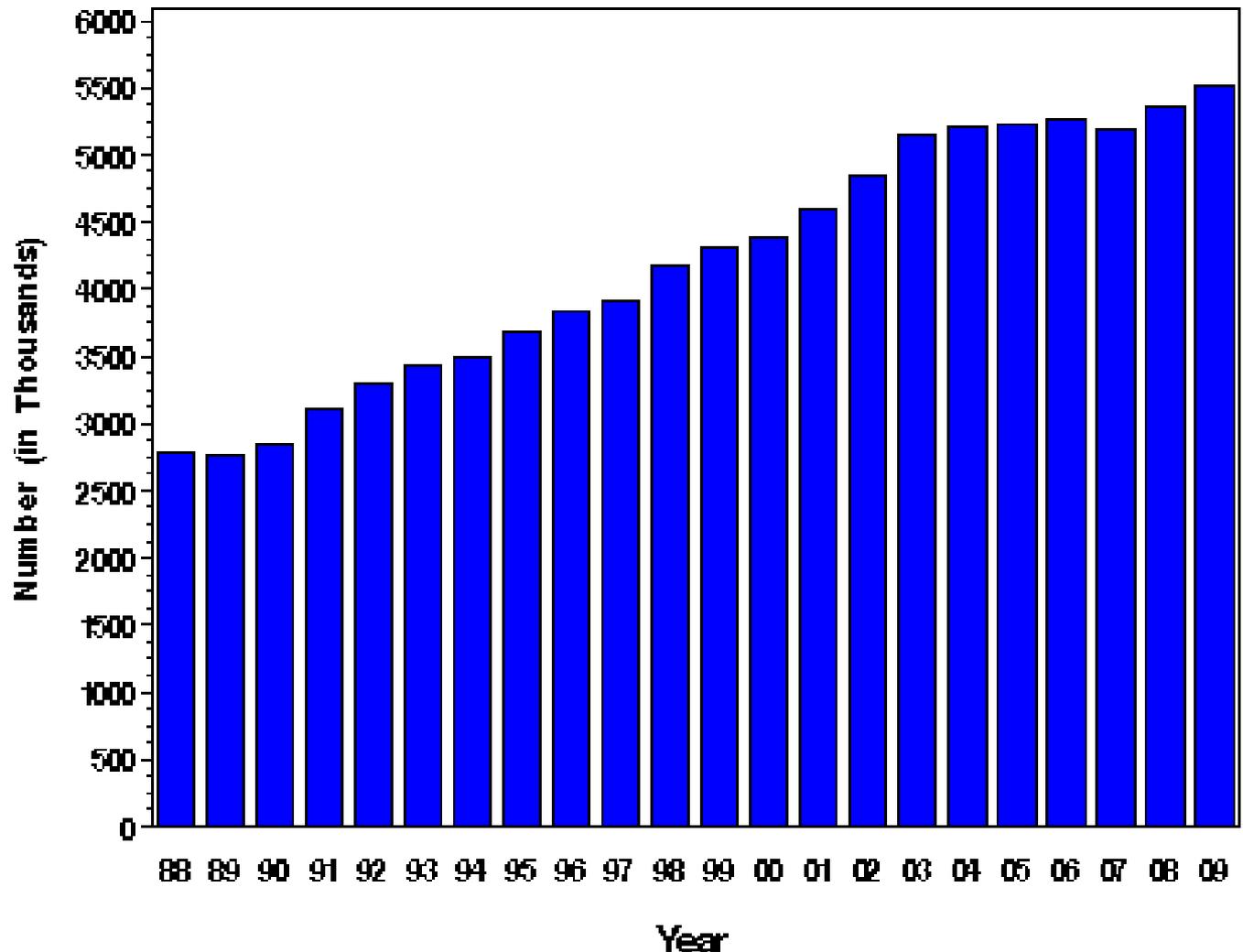
- Summarize the state and impact of diabetes as applied to the hospital setting.
- Discuss diabetes-related issues that greatest affect patient outcomes in the hospital setting.
- Demonstrate techniques the frontline healthcare staff can use to assist patient successfully manage their diabetes.

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 following³ diseases of the circulatory system but preceding disease of the respiratory and digestive system³
- Of total annual medical expenditures for diabetes (\$176 billion), about half is for hospital-related expenses²

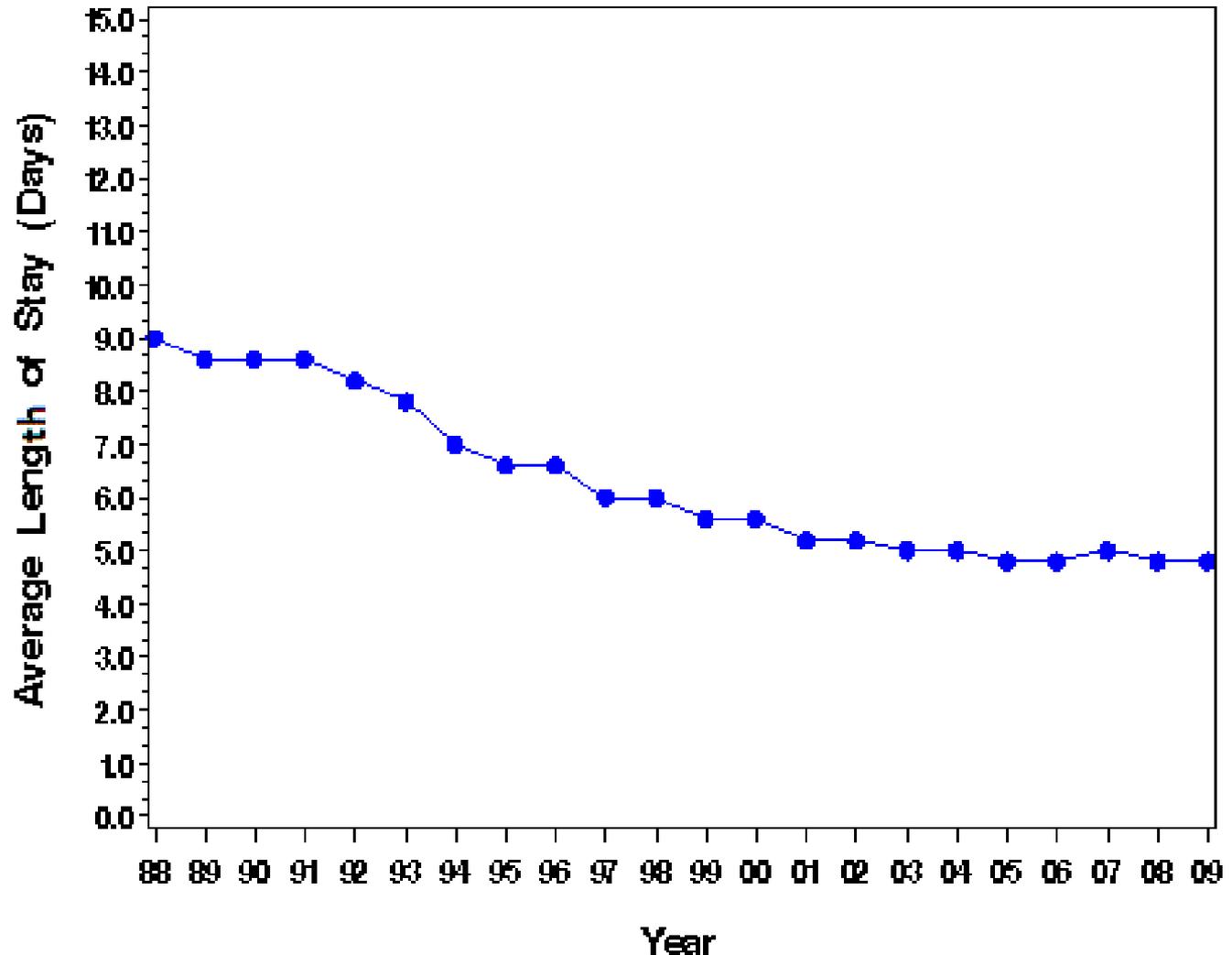
Current State: Hospital Dx of DM

- 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



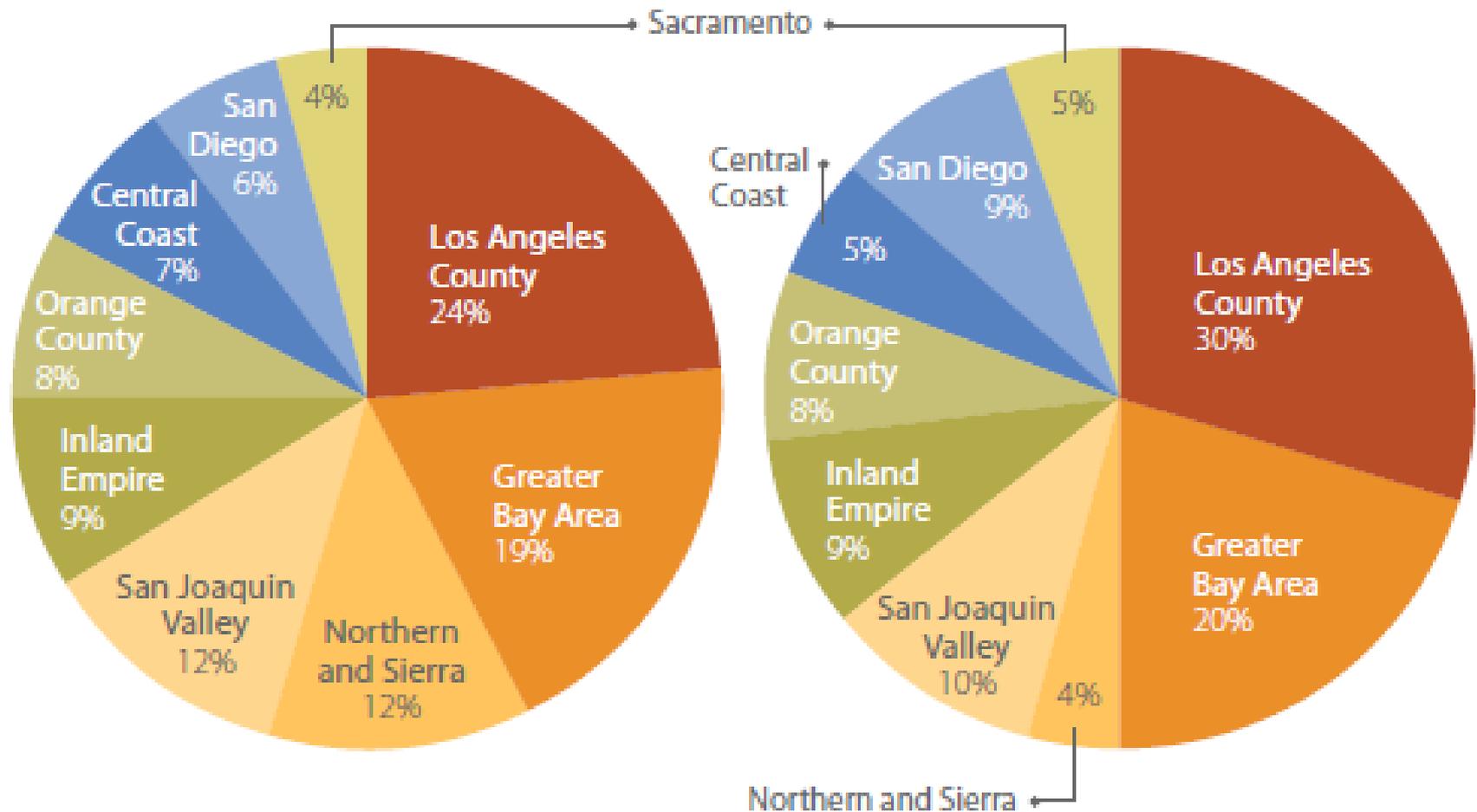
Current State: Hospitals and Beds

- 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)

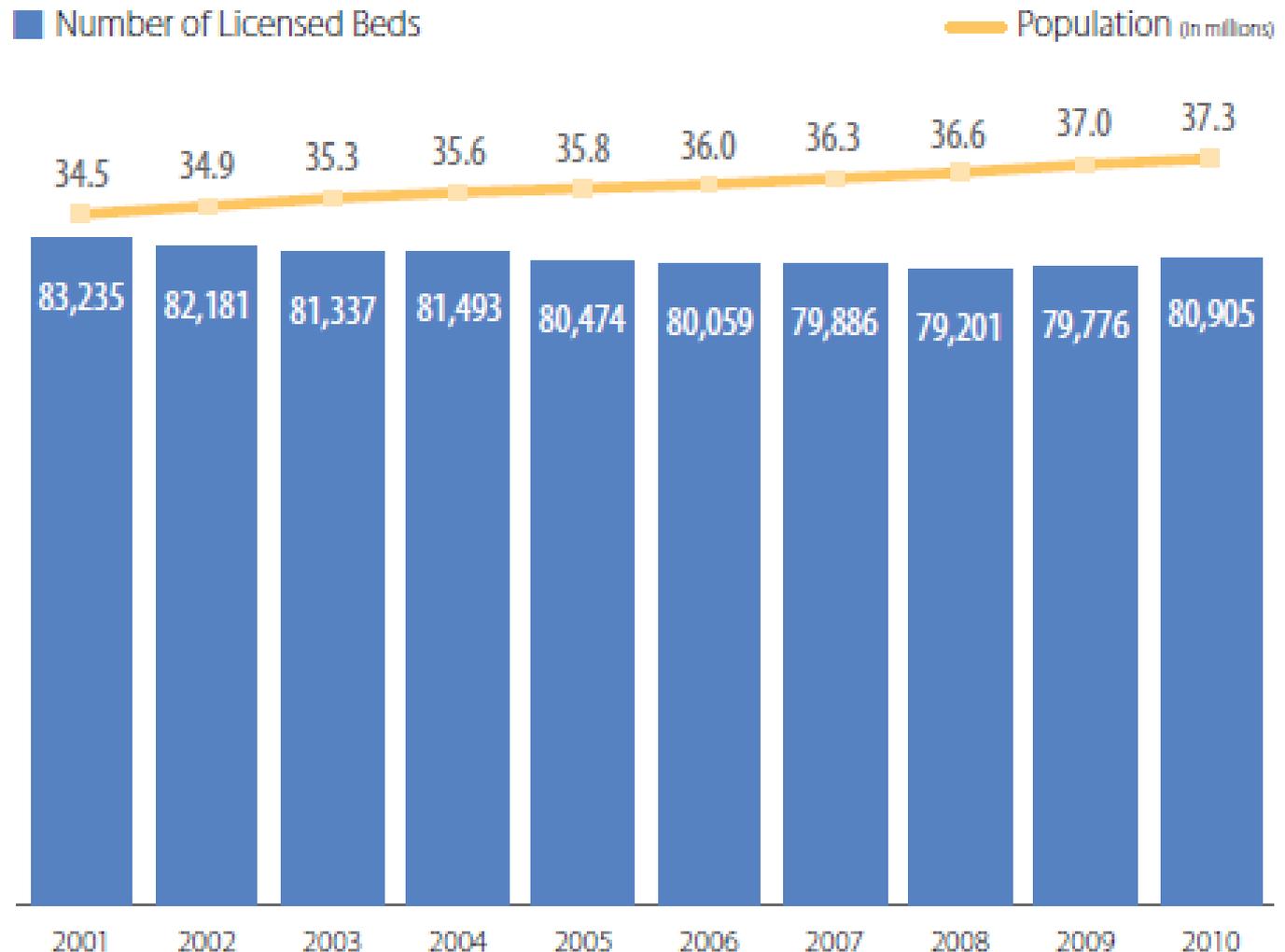
General Acute Hospitals; n= 391

Licensed Beds; n=80,905



Licensed beds vs. Population Growth (California 2001-2010)

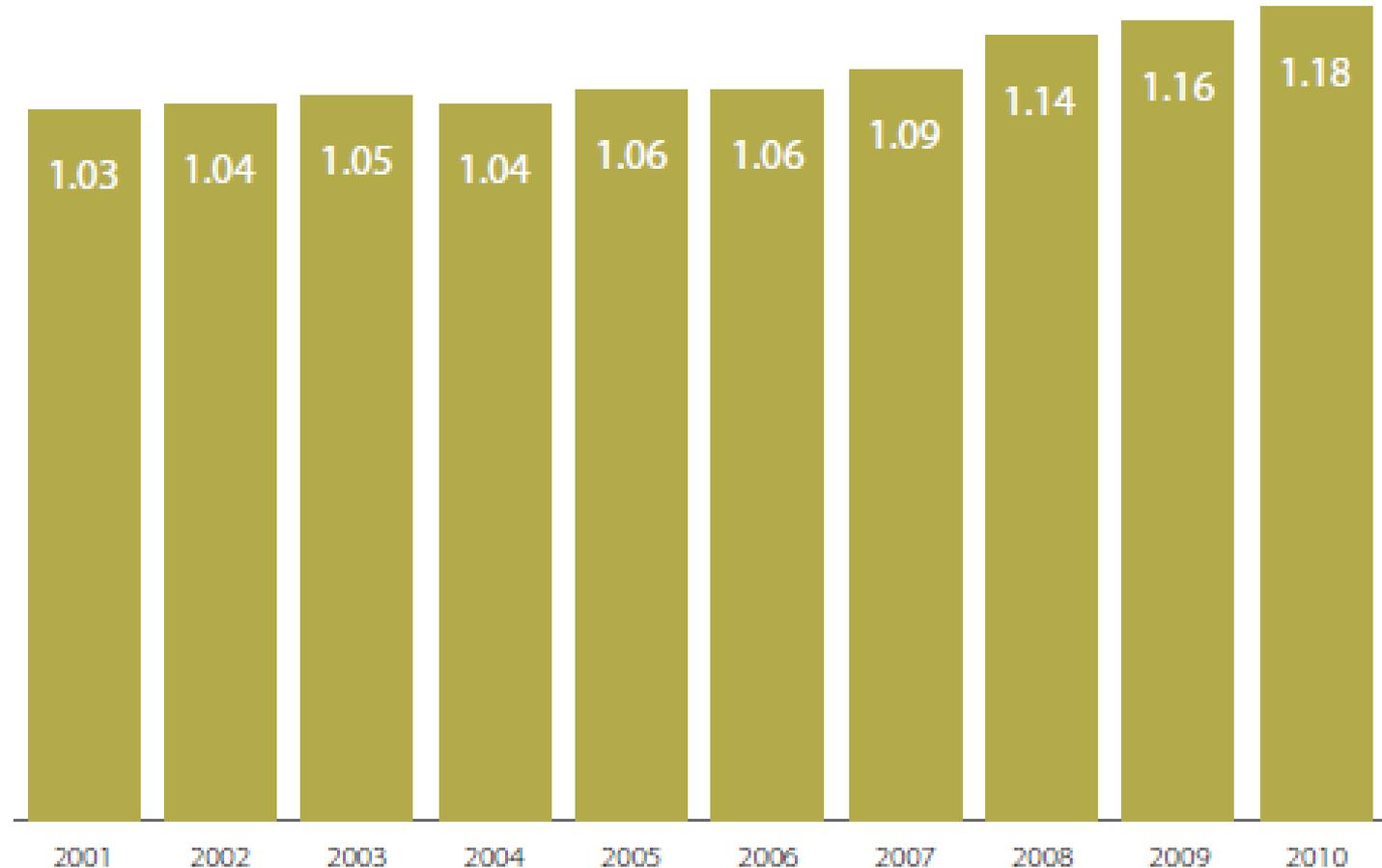
- Licensed beds in California declined by 3% while population rose by 8%
- During same years, prevalence of diabetes in CA rose from 6.5% to 8.6% of all adults.



Inpatient Acuity: California 2001-2010

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.

MEDIAN CASE MIX INDEX*



Current State: Certified Diabetes Educators

- 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>

Inpatient Glycemic Control

REVIEW

Reference: Horton, WB and Subauste, JS. (2016). Top ten things to know about inpatient glycemic control. American Journal of Medicine, 129, 2: Horton, W.B. (2016). 139-142

THE AMERICAN
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Top 10 Facts to Know About Inpatient Glycemic Control



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ABSTRACT

Uncontrolled hyperglycemia in hospitalized patients with or without a previous diagnosis of diabetes is associated with adverse outcomes and longer lengths of hospital stay. It is estimated that one-third of hospitalized patients will experience significant hyperglycemia, and the cost associated with hospitalization for patients with diabetes accounts for half of all health care expenditures for this disease. Optimizing glycemic control should be a priority for all health care providers in the inpatient setting. Appropriate management strategies should include identification of appropriate glycemic targets, prevention of hypoglycemia, initiation of appropriate basal-plus-bolus insulin regimens, and planning for the transition from inpatient to outpatient therapy before hospital discharge.

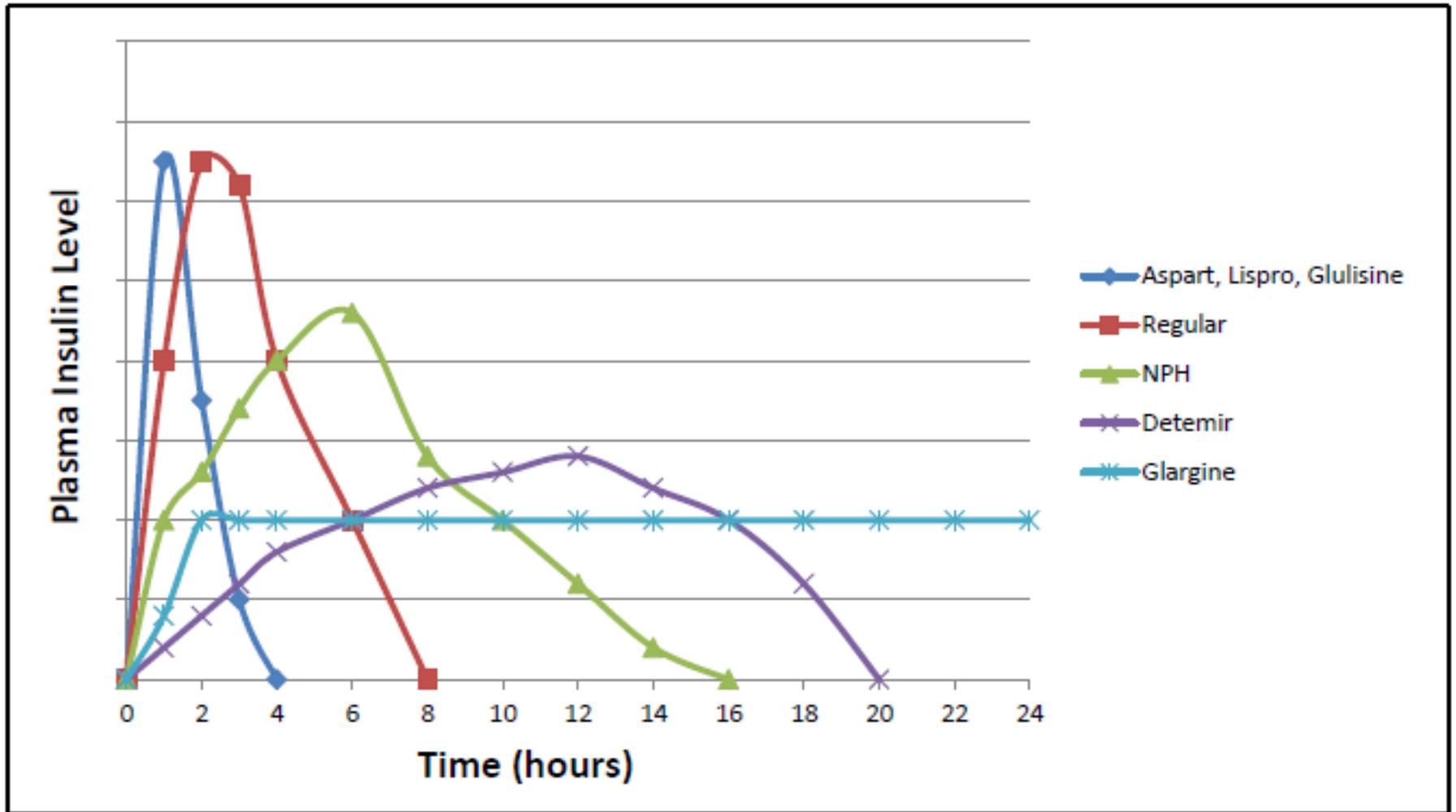
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KEYWORDS: Hyperglycemia; Hypoglycemia; Insulin

#1: Inpatient Guidelines Exists

- 2009 Consensus Statement: American Diabetes Association (ADA) and American Association of Clinical Endocrinologists₂
- 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



#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

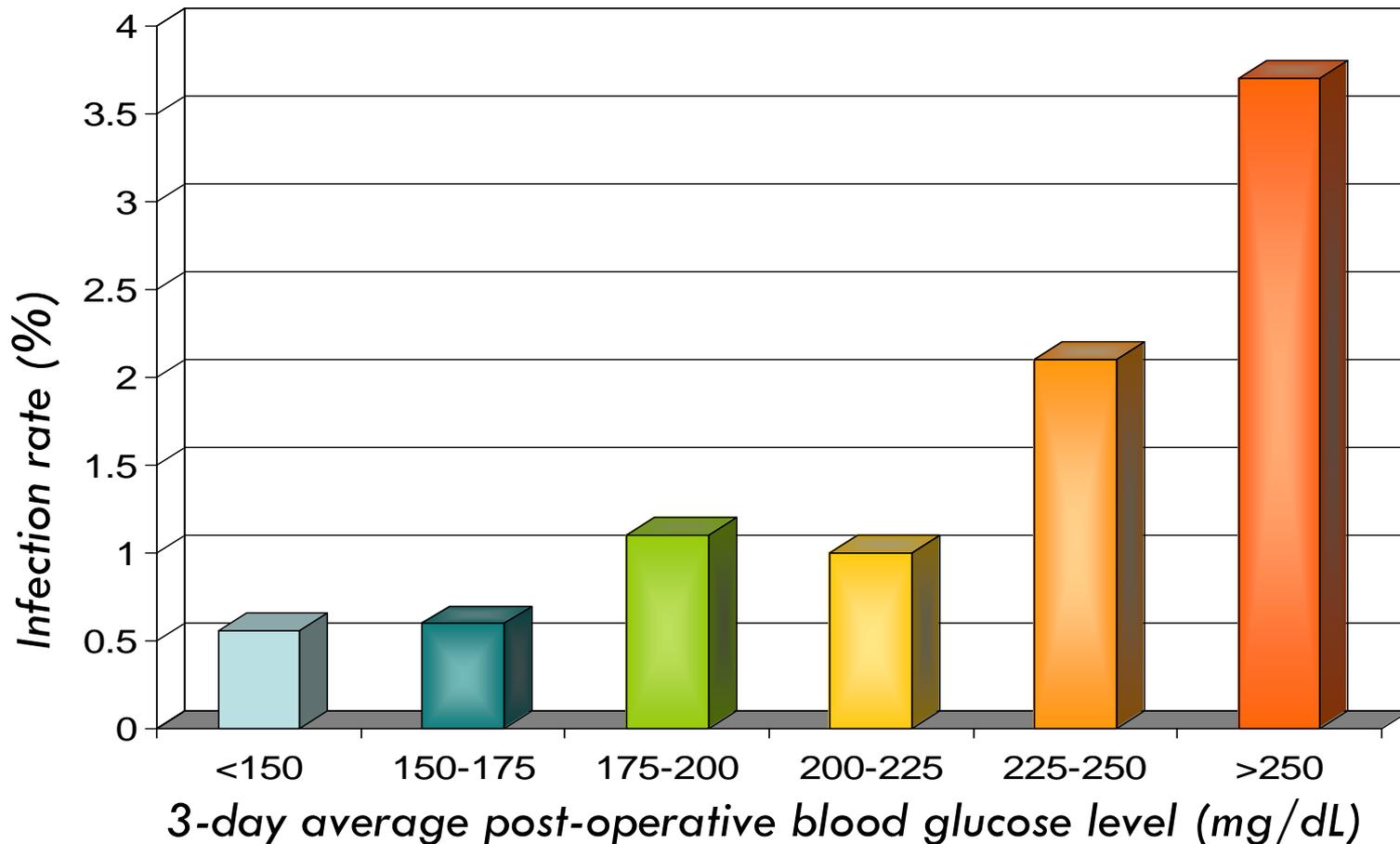
- POC testing recommended as best method to guide glycemic management
- POC orders should match with patient nutritional status
- Hypoglycemia is associated with longer length of stay, higher costs, and increased mortality
- Timing of meal insulin is crucial (a leading cause of iatrogenic hypoglycemia) 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)₁₁:
 - ▣ 4864 open-heart surgery patients,
 - ▣ IV insulin used to control BG
 - ▣ Reduced deep sternal wound infections by 66%
 - ▣ Net savings of \$4638/patient

Portland Diabetic Project (2004)₁₁

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

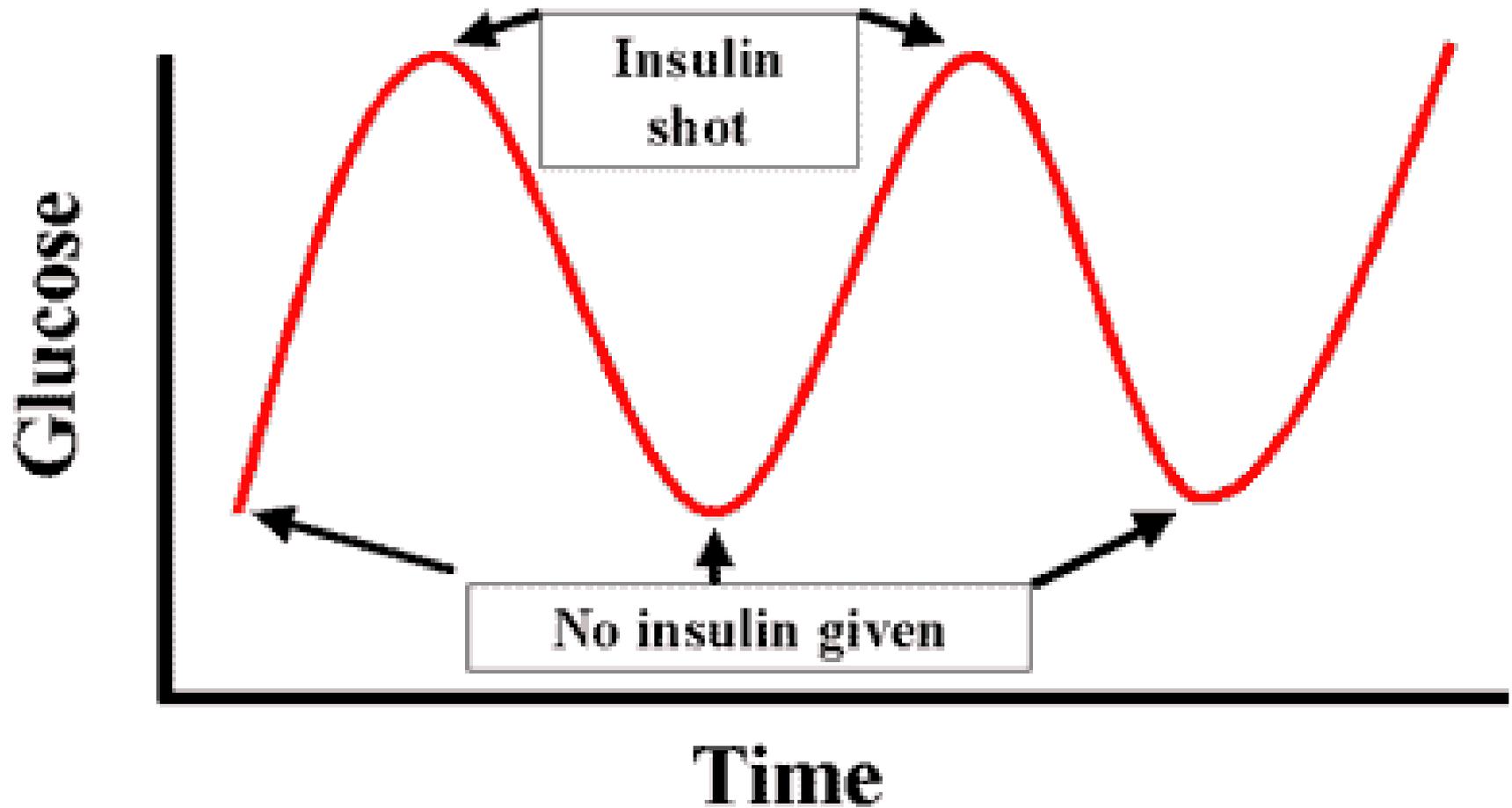


#7: “Sliding Scale” NOT Recommended

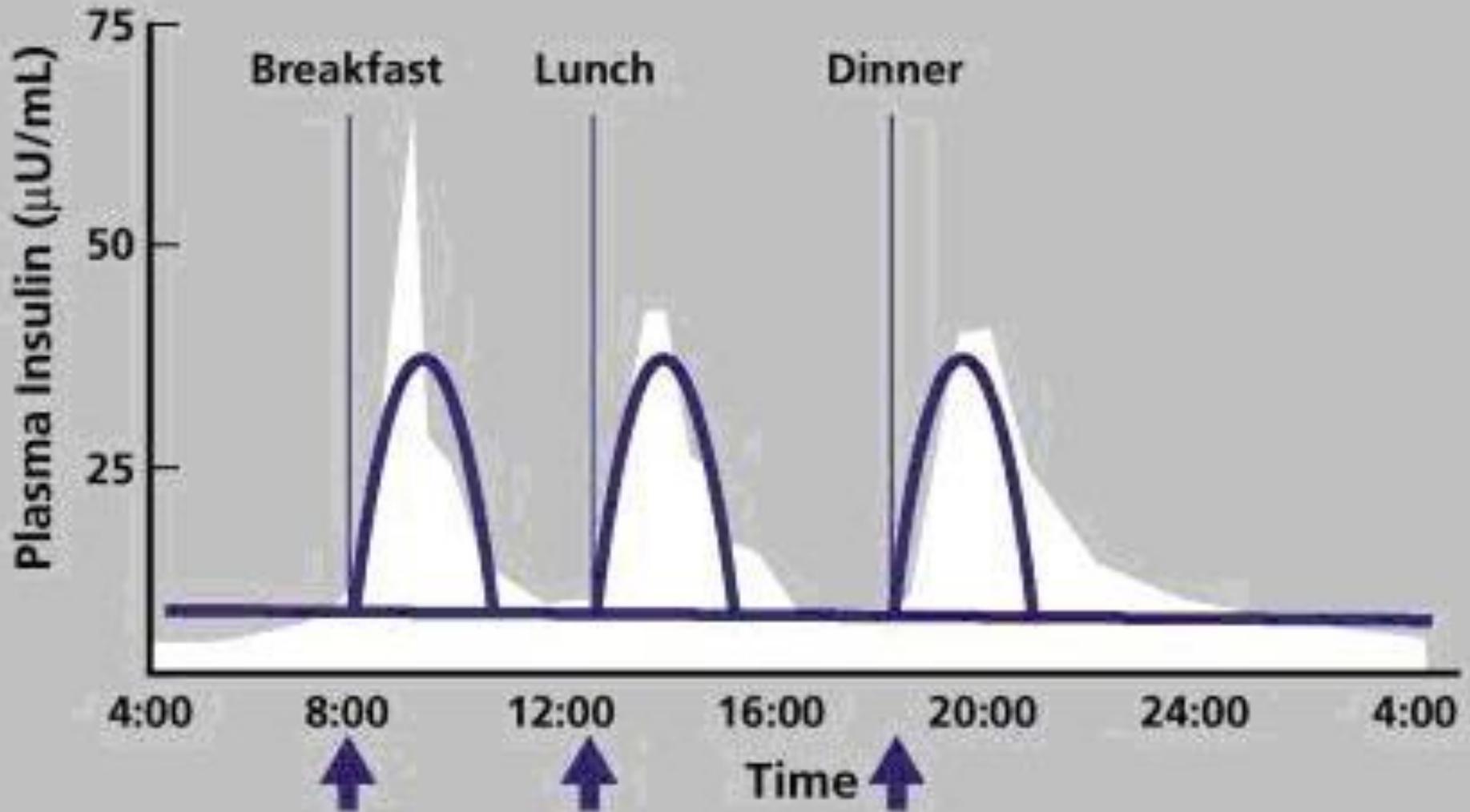
- ❑ Sliding scale alone is reactive; treats only after the unwanted result occurs.
- ❑ Insufficient to achieve glucose targets
- ❑ Basal/bolus regimens mimic normal pancreas physiology
- ❑ Reduces hyperglycemia (66% vs. 38%) as well as variability
- ❑ NOT necessarily easy; depends on whole team!
- ❑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

Reference #10: Horton, W.B. and Subauste, J.S. (2016).

Sliding Scale: Roller Coaster Effect



Ideal Insulin Replacement Pattern



#8: Clinicians Can Safely Dose Insulin

- 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.

Reference #10: Horton, W.B. and Subauste, J.S. (2016).

#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
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#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.

Patient Education: Survival Skills

- 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

1. Umpierrez, G.E., Smiley, D., Zisman, A. & Prieto, L.M. (2007). Randomized study of basal-bolus insulin therapy in the inpatient management of patients with type 2 diabetes (RABBIT 2 Trial). *Diabetes Care*, 30(9), 2181-2186.
2. Moghissi, E.S. et al (2009). American Association of Clinical Endocrinologists and American Diabetes Association consensus statement on inpatient glycemic control. *Diabetes Care*, 23(6), 1119-1131.
3. Centers for Disease Control and Prevention (2016). Diabetes Data and Trends. Website. Accessed Sept 25, 2015 from http://www.cdc.gov/diabetes/statistics/hospitalization_national.htm
4. Centers for Disease Control and Prevention (2013). Trend Tables: Health, United States, 2013. Accessed May 10, 2014 from <http://www.cdc.gov/nchs/data/hus/2013/107.pdf>
5. American Association of Diabetes Educators (2009). Diabetes education fact sheet. Accessed June 30, 2014 from https://www.diabeteseducator.org/export/sites/aade/resources/pdf/Diabetes_Education_Fact_Sheet_2009.pdf

References, cont'd.

6. California Healthcare Foundation (2013): California Healthcare Almanac. California Hospitals: Buildings, Beds, and Business. Accessed Sept 25, 2016 from:
<http://www.chcf.org/~media/MEDIA%20LIBRARY%20Files/PDF/PDF%20OC/PDF%20CaliforniaHospitals2013.pdf>
7. California diabetes statistics: http://diabetescoalitionofcalifornia.org/wp-content/uploads/2013/11/CDP_Fact_Sheet_2012-1.pdf
8. NCBDE: Count by State of Health Professionals Holding the Certified Diabetes Educator Credential, 2016. Accessed Sept 25 from
<http://www.ncbde.org/assets/1/7/StateCount0216.pdf>
9. Martin, A.L., Warren, J.P., & Lipman, R.D. (2013). The landscape for diabetes education: Results of the 2012 AADE National Diabetes Education Practice Survey. *The Diabetes EDUCATOR*, 39(5), 614-622.
10. Horton, WB and Subauste, JS. (2016). Top ten things to know about inpatient glycemic control. *American Journal of Medicine*, 129, 2: Horton, W.B. (2016). 139-142.

References, cont'd.

11. Furnary, AP, Wu, Y, Bookin, S.O. (2004). Effect of hyperglycemia and continuous intravenous insulin infusions on outcomes of cardiac surgical procedures: the Portland Diabetic Project. *Endocrine Practice*, 10(supplement 2): 21-33.

Questions?

Thanks for your attention!

