Patient-focused Insulin Safety

Objectives

- State concerns related to safe insulin use
- Identify implementation strategies to reduce hypoglycemia

Health Consequences of Hypoglycemia

- Insulin 2nd most frequent reported drug for serious or disabling adverse events reported to FDA[1]
- Seniors: Insulin 2nd most common drug associated with ER visits[2]

[1]Moore, et al Arch Int Med, 2007

[2]Budnitz, et al, Ann Int Med, 2007

Poor Provider Response to Insulin-Induced Hypoglycemia in Hospitalized Patients

- Retrospective analysis of response to insulin-induced hypoglycemia
  - Mean BG at the time of dextrose administration for hypoglycemia was 52 mg/dL (range 31-68)
  - While insulin dose was held at the time of the hypoglycemic episode in all 52 patients, changes were subsequently made in the treatment of only 40% patients

Garg R, et al. *J Hosp Med*. 2007;2:258-60.

VHA Insulin Subcommittee Goals

- Identify opportunities and drivers for future research, performance measures and clinical practice
- Develop consensus for Action Levels on inpatient blood glucose
- Facilitate development of standard evidenced-based protocols at medical centers
- Standardize data acquisition and reporting of hypoglycemia in ICUs and Acute Care for proper information capture
- Improve the quality and quantity of adverse reaction data related to insulin/hypoglycemia

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Committee Recommendations

- Action steps
  - Multidisciplinary Teams
  - Standardization of insulin protocols within facilities and across services
  - Look Alike, Sound Alike Insulins Identified as action plan
  - Special labeling U-500 Insulin
  - Pharmacy/Nutrition-Transport CPRS Linkages
  - Nutrition-insulin administration redesign
  - Education at transition points; inpatient to outpatient, starting insulin; emergency room

Pogach & Aron

Challenges

- How to encourage formation of multidisciplinary teams to address insulin safety in inpatient and outpatient settings? Leadership roles for Nursing, Nutrition and Pharmacy?
- How to determine prevalence of serious hypoglycemia in the hospital, nursing home, ambulatory care and home settings?
- How to learn from ongoing root cause analyses or best practices?
- Implement IT solutions-from Class III to Class I
- How to document education of veterans at transition points?

Pogach & Aron

Plans

- Incorporation of Inpatient Hypoglycemia into Guidelines
- Consideration of Directive vs. IL
- VACO Partnerships for Re-engineering Patient Care Services (FACs Hospitalists, Nutrition service, Endocrinology, Pharmacy Service); Office of Nursing Services; 10G (IPEC)

Plans

- IPEC to issue ICU, hospital ward reports (under development). Continued development of “glucometrics”
- Consideration of continuous and weighted measures for glycemic control in ambulatory care setting (PCS, QUERI and OQP)
- Submission of templates to VHA IT
- Development of In-patient glycemia e-mail group using Collage

Insulin Subcommittee Approach

- Determine what subgroups would benefit most from “tight” control of hyperglycemia in the hospital setting
  - e.g., SICUs, MICUs, non-acute Nursing Units
- Improve processes of care for delivery of insulin and coordination with nutrition
  - e.g. protocols for insulin infusions and subcutaneous injection; coordination with meals
- Metrics for hyperglycemia and hypoglycemia
  - Standardized definitions for monitoring and reporting

Identification of Causes of Hypoglycemia

- Mismatch of insulin or oral medication with meals
- Too much insulin or oral medication given
- Unexpected NPO status
- Patient didn't eat expected meal
- Transport off nursing unit/ward
- Stacking of insulin

Insulin Subcommittee Workgroups

- IPEC to lead on data acquisition/monitoring in ICUs
- IPEC, COMFAG and Hospitalist FAC to lead on identifying protocols, and automating them
- Collaboration with VA ADERS (PBM) to:
  - standardize definitions and reporting
  - dissemination of root cause analyses of serious hypoglycemic related events

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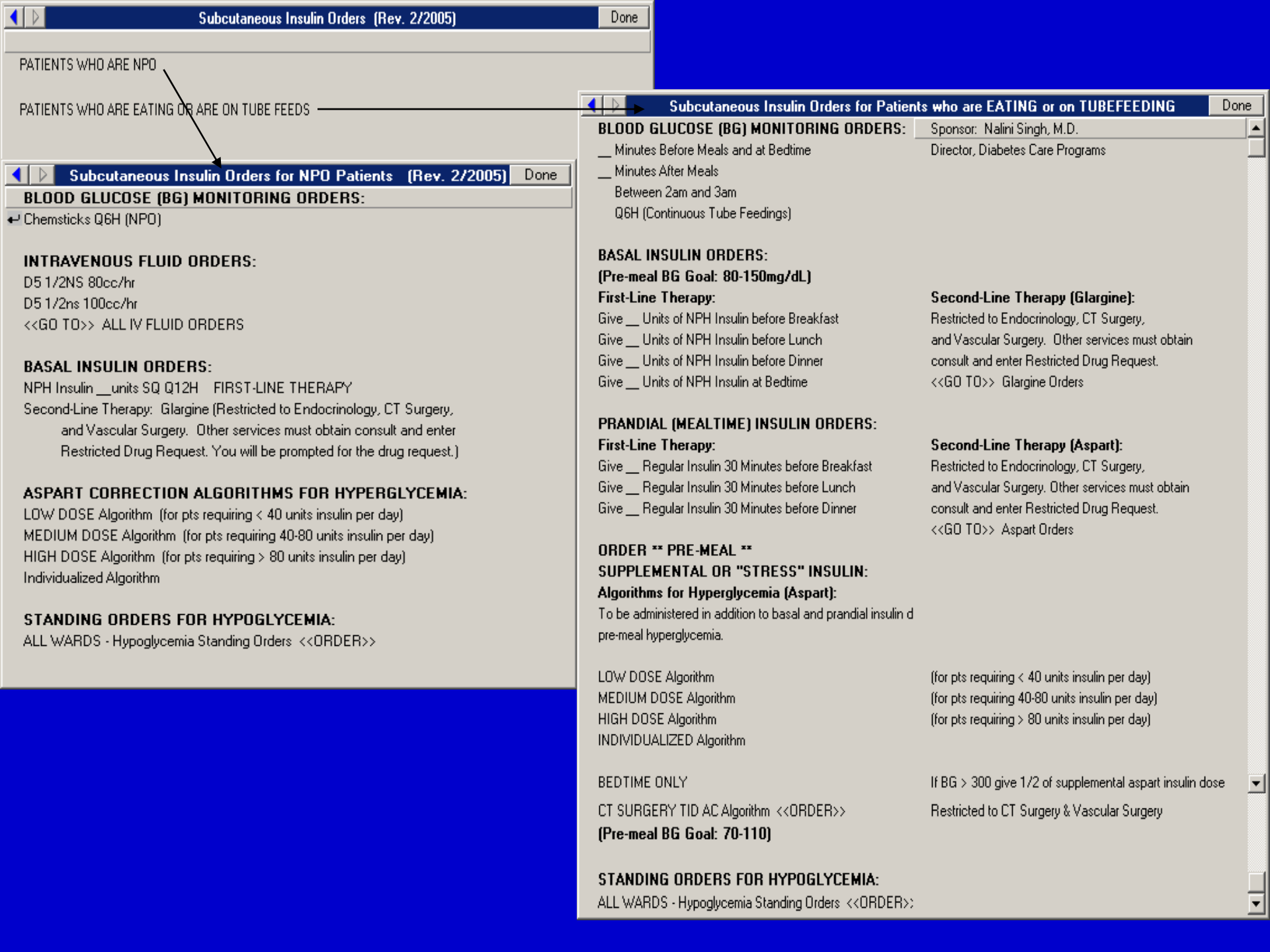
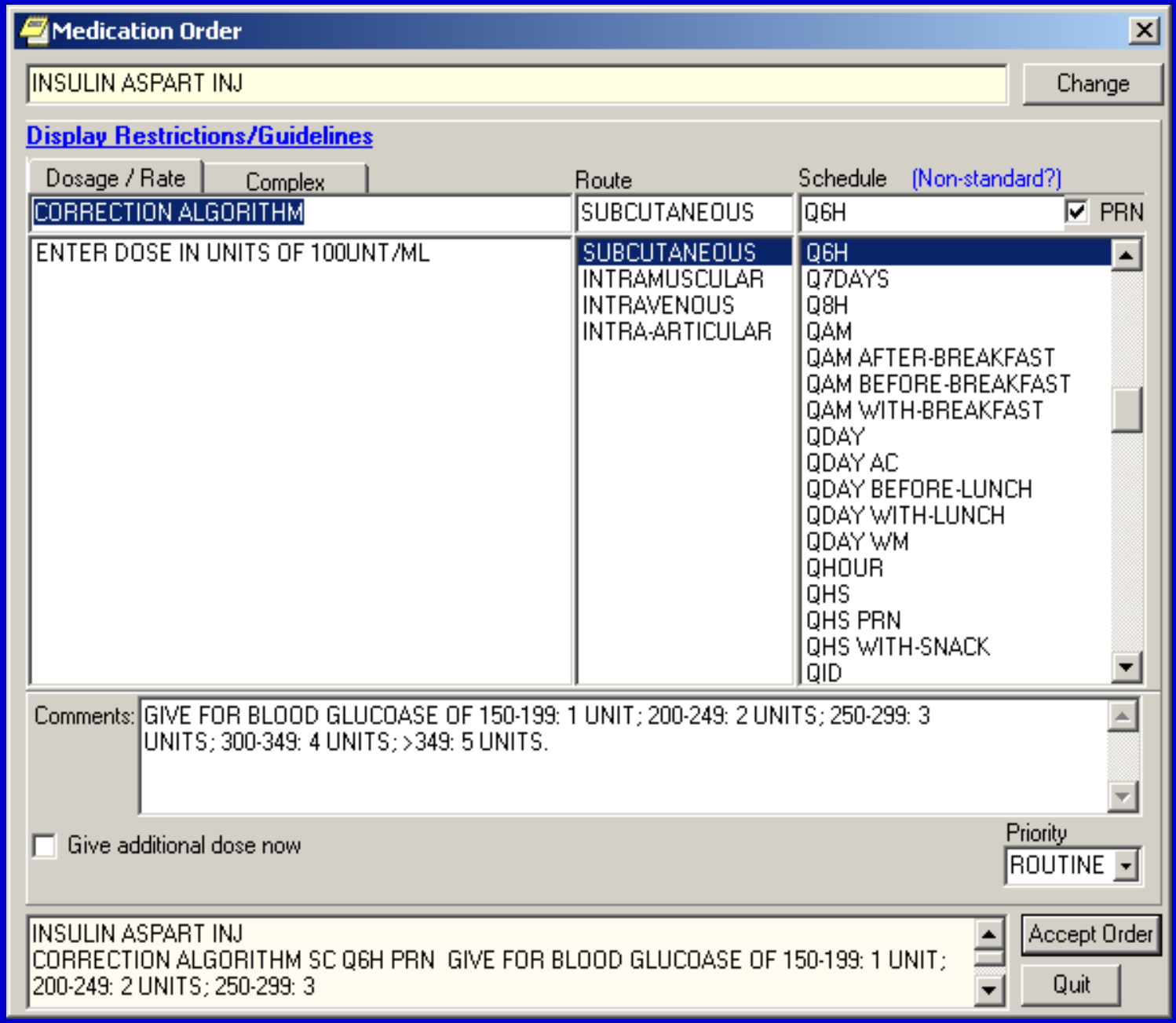
Insulin Subcommittee Workgroups

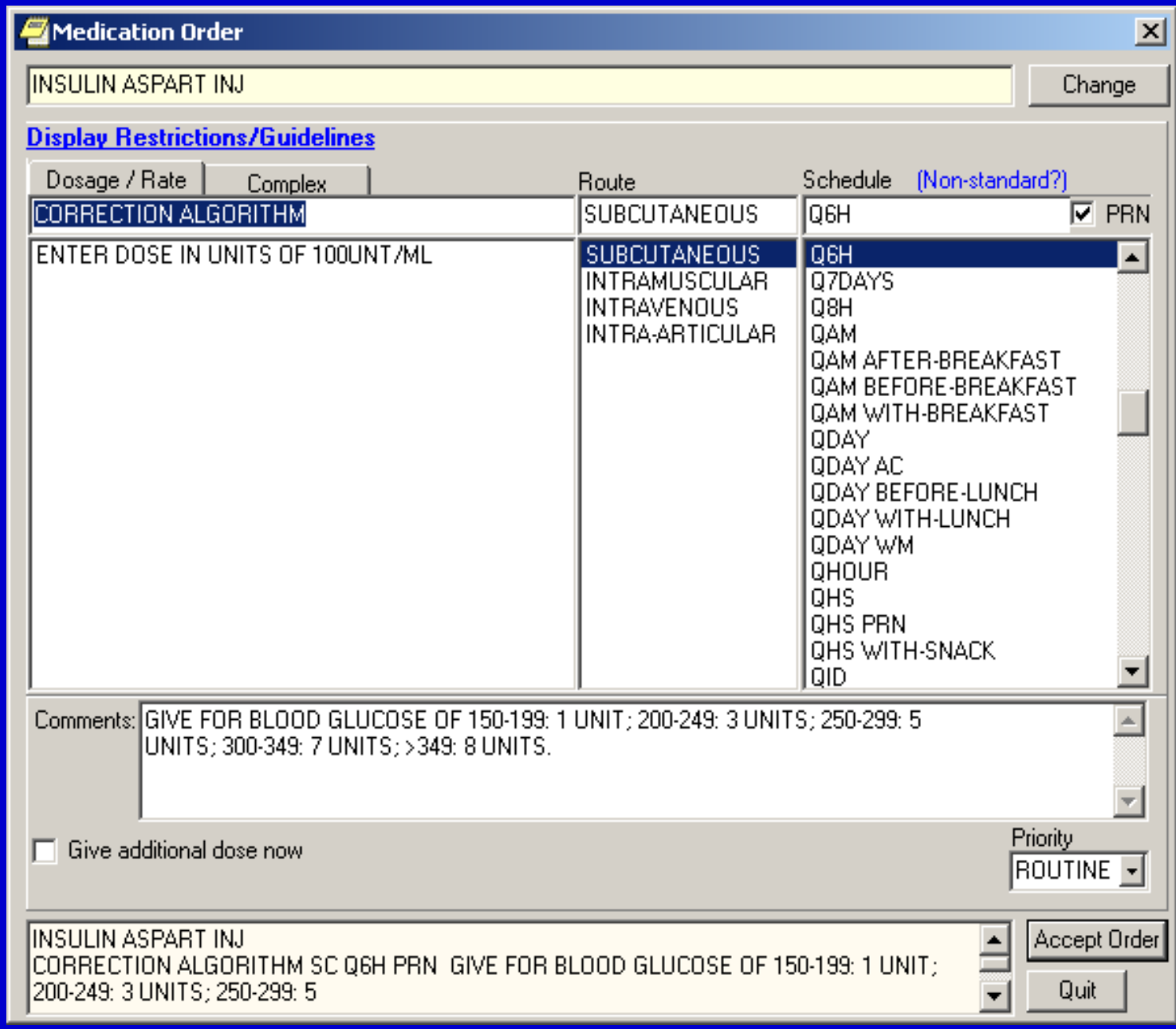
- Nursing, Nutrition, and Pharmacy Services to recommend policy development on re-engineering of technology for:
  - data acquisition
  - basal, nutritional and correction insulin delivery
  - appropriate recognition and treatment of hypoglycemia
  - meal plan composition, food delivery,
  - CPRS safety features (e.g. links between pharmacy package and nutrition package).

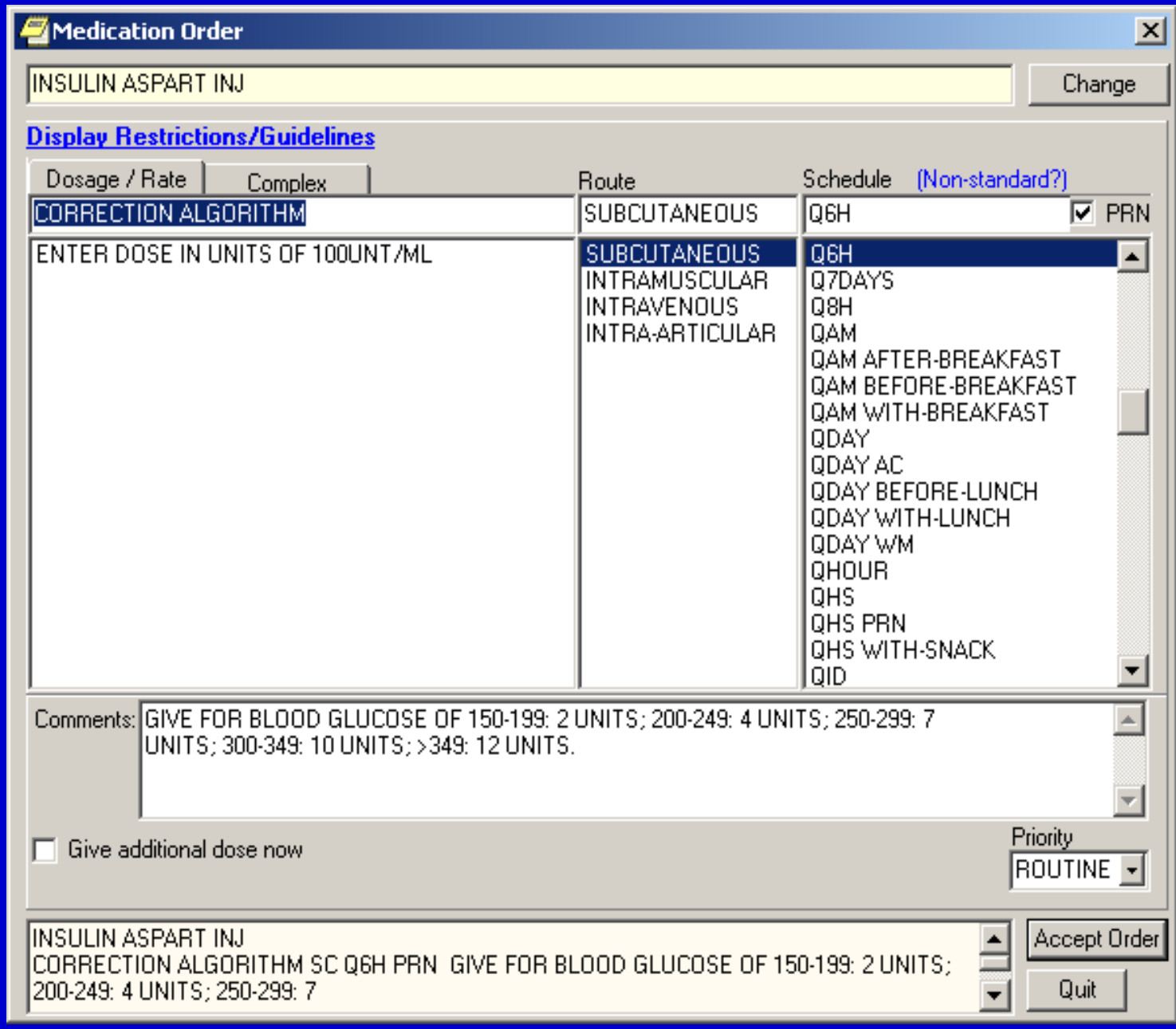
Protocol Development

- To be housed on the IPEC Website
- Web based data entry?
- Content will include:
  - VA Developed protocols for glycemic control
    - (e.g. Iowa City VAMC ICU protocol, Dayton VAMC/Yale insulin protocol, Puget Sound VA, etc)
  - Non-VA Web link resources (with disclaimer)
    - American Association of Clinical Endocrinologists
      - www.aace.com
    - Society of Hospital Medicine
      - www.hospitalmedicine.org/ResourceRoomRedesign/GlycemicControl.cfm


Subcutaneous Insulin Orders (Rev. 2/2005)
Done
PATIENTS WHO ARE NPO
PATIENTS WHO ARE EATING OR ARE ON TUBE FEEDS
Subcutaneous Insulin Orders for NPO Patients (Rev. 2/2005)
Done
BLOOD GLUCOSE (BG) MONITORING ORDERS:
Chemsticks Q6H (NPO)
INTRAVENOUS FLUID ORDERS:
D5 1/2NS 80cc/hr
D5 1/2ns 100cc/hr
<<GO TO>> ALL IV FLUID ORDERS
BASAL INSULIN ORDERS:
NPH Insulin __units SQ Q12H FIRST-LINE THERAPY
Second-Line Therapy: Glargine (Restricted to Endocrinology, CT Surgery, and Vascular Surgery. Other services must obtain consult and enter Restricted Drug Request. You will be prompted for the drug request.)
ASPART CORRECTION ALGORITHMS FOR HYPERGLYCEMIA:
LOW DOSE Algorithm (for pts requiring < 40 units insulin per day)
MEDIUM DOSE Algorithm (for pts requiring 40-80 units insulin per day)
HIGH DOSE Algorithm (for pts requiring > 80 units insulin per day)
Individualized Algorithm
STANDING ORDERS FOR HYPOGLYCEMIA:
ALL WARDS - Hypoglycemia Standing Orders <<ORDER>>
Subcutaneous Insulin Orders for Patients who are EATING or on TUBEFEEDING
Done
BLOOD GLUCOSE (BG) MONITORING ORDERS:
Sponsor: Nalini Singh, M.D.
Director, Diabetes Care Programs
__ Minutes Before Meals and at Bedtime
__ Minutes After Meals
Between 2am and 3am
Q6H (Continuous Tube Feedings)
BASAL INSULIN ORDERS:
(Pre-meal BG Goal: 80-150mg/dL)
First-Line Therapy:
Give __ Units of NPH Insulin before Breakfast
Give __ Units of NPH Insulin before Lunch
Give __ Units of NPH Insulin before Dinner
Give __ Units of NPH Insulin at Bedtime
Second-Line Therapy (Glargine):
Restricted to Endocrinology, CT Surgery, and Vascular Surgery. Other services must obtain consult and enter Restricted Drug Request.
<<GO TO>> Glargine Orders
PRANDIAL (MEALTIME) INSULIN ORDERS:
First-Line Therapy:
Give __ Regular Insulin 30 Minutes before Breakfast
Give __ Regular Insulin 30 Minutes before Lunch
Give __ Regular Insulin 30 Minutes before Dinner
Second-Line Therapy (Aspart):
Restricted to Endocrinology, CT Surgery, and Vascular Surgery. Other services must obtain consult and enter Restricted Drug Request.
<<GO TO>> Aspart Orders
ORDER ** PRE-MEAL **
SUPPLEMENTAL OR "STRESS" INSULIN:
Algorithms for Hyperglycemia (Aspart):
To be administered in addition to basal and prandial insulin d
pre-meal hyperglycemia.
LOW DOSE Algorithm
(for pts requiring < 40 units insulin per day)
MEDIUM DOSE Algorithm
(for pts requiring 40-80 units insulin per day)
HIGH DOSE Algorithm
(for pts requiring > 80 units insulin per day)
INDIVIDUALIZED Algorithm
BEDTIME ONLY
If BG > 300 give 1/2 of supplemental aspart insulin dose
CT SURGERY TID AC Algorithm <<ORDER>>
Restricted to CT Surgery & Vascular Surgery
(Pre-meal BG Goal: 70-110)
STANDING ORDERS FOR HYPOGLYCEMIA:
ALL WARDS - Hypoglycemia Standing Orders <<ORDER>>


Medication Order
INSULIN ASPART INJ
Change
Display Restrictions/Guidelines
Dosage / Rate
Complex
Route
Schedule
(Non-standard?)
CORRECTION ALGORITHM
SUBCUTANEOUS
Q6H
PRN
ENTER DOSE IN UNITS OF 100UNT/ML
SUBCUTANEOUS
INTRAMUSCULAR
INTRAVENOUS
INTRA-ARTICULAR
Q6H
Q7DAYS
Q8H
QAM
QAM AFTER-BREAKFAST
QAM BEFORE-BREAKFAST
QAM WITH-BREAKFAST
QDAY
QDAY AC
QDAY BEFORE-LUNCH
QDAY WITH-LUNCH
QDAY WM
QHOUR
QHS
QHS PRN
QHS WITH-SNACK
QID
Comments:
GIVE FOR BLOOD GLUCOASE OF 150-199: 1 UNIT; 200-249: 2 UNITS; 250-299: 3 UNITS; 300-349: 4 UNITS; >349: 5 UNITS.
Give additional dose now
Priority
ROUTINE
INSULIN ASPART INJ
CORRECTION ALGORITHM SC Q6H PRN GIVE FOR BLOOD GLUCOASE OF 150-199: 1 UNIT; 200-249: 2 UNITS; 250-299: 3
Accept Order
Quit


Medication Order
INSULIN ASPART INJ
Change
Display Restrictions/Guidelines
Dosage / Rate
Complex
Route
Schedule
(Non-standard?)
CORRECTION ALGORITHM
SUBCUTANEOUS
Q6H
PRN
ENTER DOSE IN UNITS OF 100UNT/ML
SUBCUTANEOUS
INTRAMUSCULAR
INTRAVENOUS
INTRA-ARTICULAR
Q6H
Q7DAYS
Q8H
QAM
QAM AFTER-BREAKFAST
QAM BEFORE-BREAKFAST
QAM WITH-BREAKFAST
QDAY
QDAY AC
QDAY BEFORE-LUNCH
QDAY WITH-LUNCH
QDAY WM
QHOUR
QHS
QHS PRN
QHS WITH-SNACK
QID
Comments:
GIVE FOR BLOOD GLUCOSE OF 150-199: 1 UNIT; 200-249: 3 UNITS; 250-299: 5 UNITS; 300-349: 7 UNITS; >349: 8 UNITS.
Give additional dose now
Priority
ROUTINE
INSULIN ASPART INJ
CORRECTION ALGORITHM SC Q6H PRN GIVE FOR BLOOD GLUCOSE OF 150-199: 1 UNIT; 200-249: 3 UNITS; 250-299: 5
Accept Order
Quit


Medication Order
INSULIN ASPART INJ
Change
Display Restrictions/Guidelines
Dosage / Rate
Complex
Route
Schedule
(Non-standard?)
CORRECTION ALGORITHM
SUBCUTANEOUS
Q6H
PRN
ENTER DOSE IN UNITS OF 100UNT/ML
SUBCUTANEOUS
INTRAMUSCULAR
INTRAVENOUS
INTRA-ARTICULAR
Q6H
Q7DAYS
Q8H
QAM
QAM AFTER-BREAKFAST
QAM BEFORE-BREAKFAST
QAM WITH-BREAKFAST
QDAY
QDAY AC
QDAY BEFORE-LUNCH
QDAY WITH-LUNCH
QDAY WM
QHOUR
QHS
QHS PRN
QHS WITH-SNACK
QID
Comments:
GIVE FOR BLOOD GLUCOSE OF 150-199: 2 UNITS; 200-249: 4 UNITS; 250-299: 7 UNITS; 300-349: 10 UNITS; >349: 12 UNITS.
Give additional dose now
Priority
ROUTINE
INSULIN ASPART INJ
CORRECTION ALGORITHM SC Q6H PRN GIVE FOR BLOOD GLUCOSE OF 150-199: 2 UNITS; 200-249: 4 UNITS; 250-299: 7
Accept Order
Quit

Limitations

- Local VA facilities will need to be encouraged to do a local needs assessment
- Currently the IPEC Clinical Tools website is difficult to access
- Non-VA web resources may contain information that is not reliable

Systems Redesign:
Nursing, Nutrition, and Pharmacy Services

- Change PBM formularies to allow for glargine/detemir in the inpatient setting
- Short acting insulin for administration at the time of meals
- Consistent carbohydrate (CHO) meal plan orders, e.g. 60, 75, 90 Gm CHO
- CPRS Re-engineering
  - Linkage between Pharmacy and Nutrition Packages; alert for NPO or change in orders
  - Flag for patients who are type 1 (ketosis prone)
  - Glucose monitor-CPRS interface

Immediate Next Steps

- Discussion Among Field Advisory Committees, especially:
  - Endocrinology, Nutrition, Nursing
  - Chiefs of Medicine, Surgery
  - Hospitalists
- Encourage a local “champion” to drive local improvement
- Requests to IT/CPRS

Perceived Barriers to Management of Inpatient Hyperglycemia

- Knowing what insulin type or regimen works best
- Unpredictable timing of patient procedures
- Risk of causing patient hypoglycemia
- Knowing how to adjust insulin
- Unpredictable changes in patient diet and mealtimes
- Knowing best options to treat hyperglycemia
- Glucose management not adequately addressed on rounds
- Patient not in hospital long enough to control glucose adequately
- Lack of guidelines on how to treat hyperglycemia
- Preferring to defer management to outpatient care or to another specialty
- Knowing how to start insulin
- Knowing when to start insulin

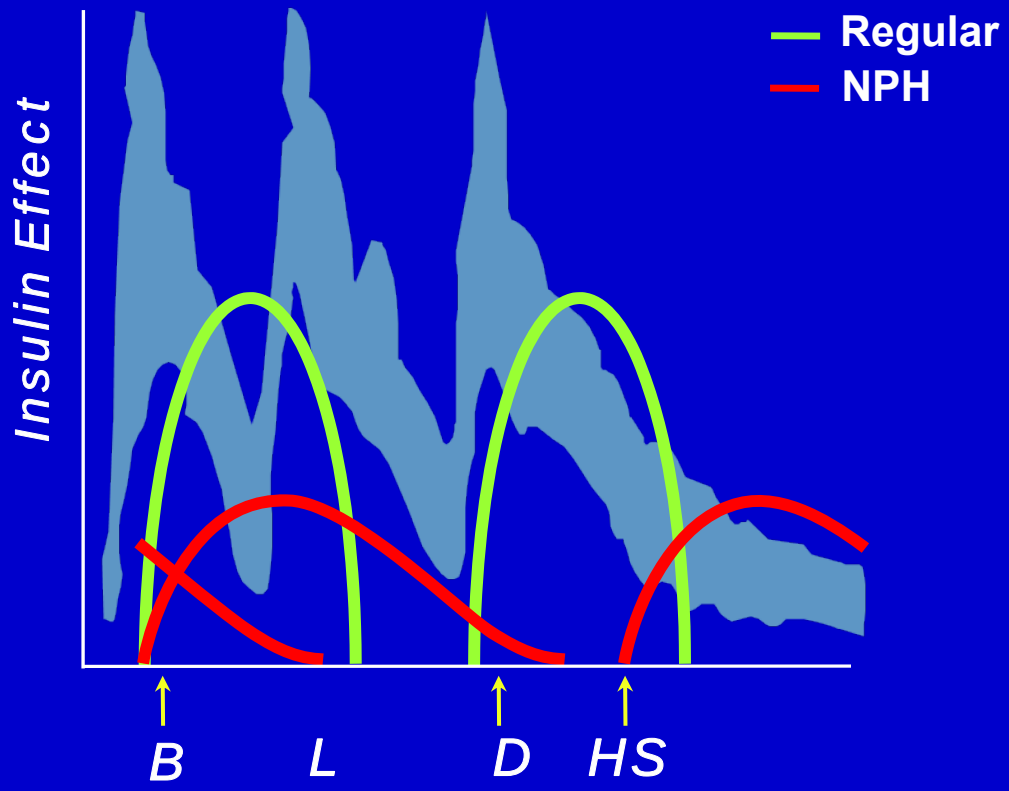
Cook CB, et al. *Endocr Pract* 2007;13:117-125.

General Principles

- Pt's home regimen should be continued or may need to be modified to improve glycemic control.
- Caloric intake is controlled in hospital
- Insulin requirements ↑ with stress and ↓'d physical activity
- In future, more inpts will be treated with insulin

Multiple Daily Injections (MDI)
NPH + Regular

NPH at AM and HS + Regular AC

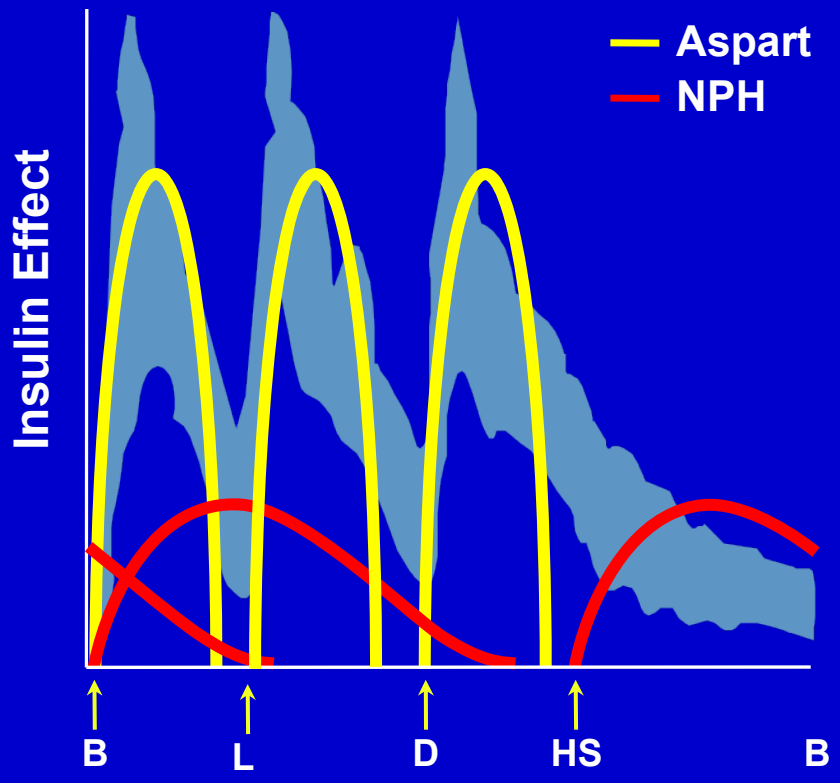


Insulin Tactics

Multiple Daily Injections (MDI)

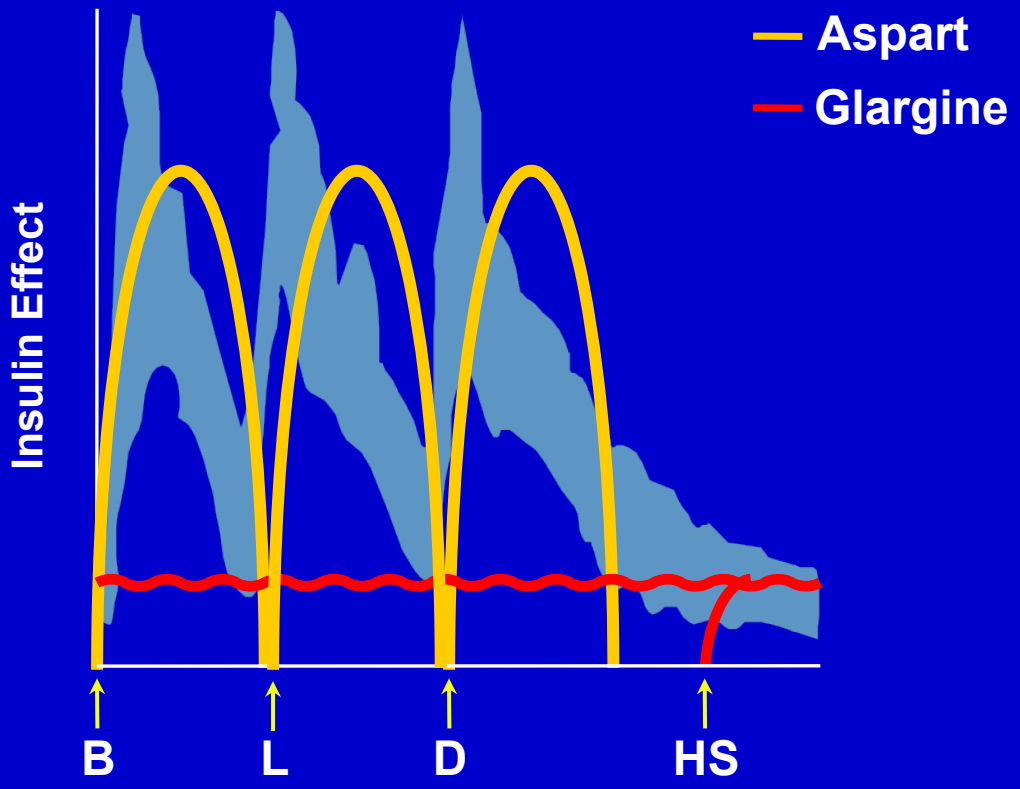
NPH + Mealtime Aspart

NPH at AM and HS + Aspart AC



Physiologic Insulin Delivery

Glargine at HS + Premeal Aspart



All these regimens require:

- On-time consistent delivery of basal insulin
  - NPH a bkfst and @HS, OR glargine/detemir insulin q 24 h (same time)
- Synchronization of CBGM, prandial/mealtime insulin, and meals (or tube feeds)
  - CBGM → SQ insulin → meal
  - Regular insulin 30” ac, or lispro/aspart insulin 10” ac
  - On-time meal delivery
- Education of providers and patients about insulin

Inpatient Hypoglycemia Nursing Journal Club Review

By
ONS Metabolic Syndrome/Diabetes FAC
2009

Objectives

- Review current evidence based findings for inpatient glycemic target levels
- Analyze the evidence based literature on hypoglycemia prevention

Conditions Creating High Risk for Hypoglycemia in Patients Receiving Scheduled Insulin

- Sudden NPO status or decreased oral intake
- Enteral feeding discontinued
- TPN or iv dextrose discontinued
- Premeal insulin given and meal not eaten
- Unexpected transport from nursing unit after rapid-acting insulin given
- Reduction in corticosteroid dose

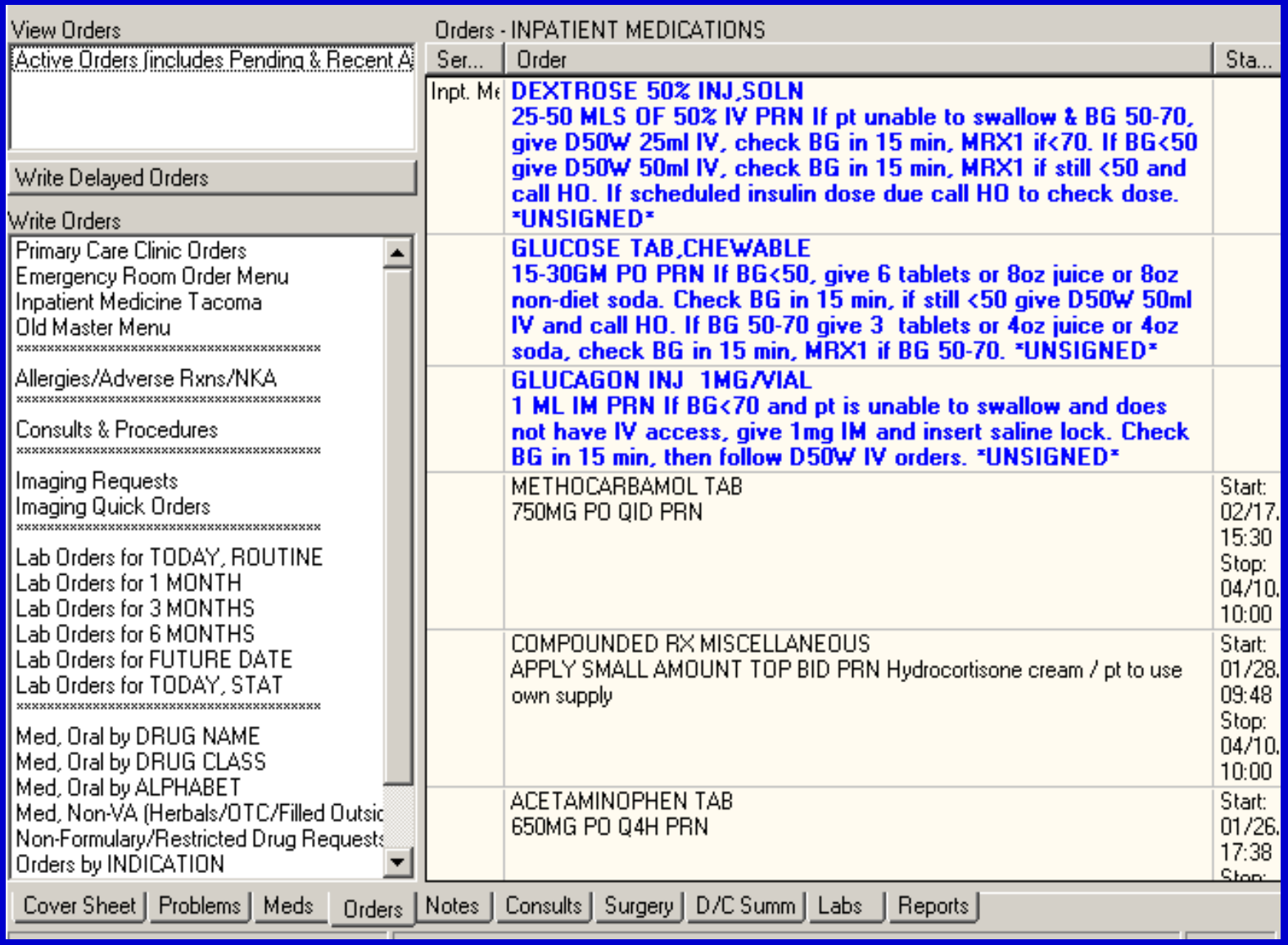
Clement S et al. Management of Diabetes and Hyperglycemia in Hospitals. Diabetes Care 2004; 27(2): 553-591.

Order Details - 25579164;1

Order:
Standing Orders for Hypoglycemia
If BG is 50-70 mg/dl:
1) Treat with 15 grams of carbohydrates (three 5 glucose tabs or non-diet soda) OR, if patient is unable to swallow, administer 25ml of 50% dextrose IV or, if no IV access, glucagon 1mg IM and insert saline lock.
2) Check BG in 15 minutes, and if not above 70 mg/dl, repeat treatment.
3) If standing dose of basal and/or prandial insulin is due, call physician to confirm dose(s).

If BG is less than 50 mg/dl:
1) Treat with 30 grams of carbohydrates (8oz OJ or non-diet soda) OR, if patient is unable to swallow, administer 50ml of 50% dextrose IV or, if no IV access, glucagon 1mg IM and insert saline lock.
2) Check BG in 15 mimnutes:
If repeat BG 50-70 mg/dl, follow procedure in #1.
If repeat BG less than 50 mg/dl, administer 50ml of 50% dextrose IV* and call physician.
3) If standing dose of basal and/or prandial insulin is due, call physician to confirm dose(s).

Print Close


View Orders
Active Orders (includes Pending & Recent A
Write Delayed Orders
Write Orders
Primary Care Clinic Orders
Emergency Room Order Menu
Inpatient Medicine Tacoma
Old Master Menu
****
Allergies/Adverse Rxns/NKA
****
Consults & Procedures
****
Imaging Requests
Imaging Quick Orders
****
Lab Orders for TODAY, ROUTINE
Lab Orders for 1 MONTH
Lab Orders for 3 MONTHS
Lab Orders for 6 MONTHS
Lab Orders for FUTURE DATE
Lab Orders for TODAY, STAT
****
Med, Oral by DRUG NAME
Med, Oral by DRUG CLASS
Med, Oral by ALPHABET
Med, Non-VA (Herbals/OTC/Filled Outsic
Non-Formulary/Restricted Drug Requests
Orders by INDICATION
Orders - INPATIENT MEDICATIONS
Ser...
Order
Sta...
Inpt. Me
DEXTROSE 50% INJ,SOLN
25-50 MLS OF 50% IV PRN If pt unable to swallow & BG 50-70, give D50W 25ml IV, check BG in 15 min, MRX1 if<70. If BG<50 give D50W 50ml IV, check BG in 15 min, MRX1 if still <50 and call HO. If scheduled insulin dose due call HO to check dose. *UNSIGNED*
GLUCOSE TAB,CHEWABLE
15-30GM PO PRN If BG<50, give 6 tablets or 8oz juice or 8oz non-diet soda. Check BG in 15 min, if still <50 give D50W 50ml IV and call HO. If BG 50-70 give 3 tablets or 4oz juice or 4oz soda, check BG in 15 min, MRX1 if BG 50-70. *UNSIGNED*
GLUCAGON INJ 1MG/VIAL
1 ML IM PRN If BG<70 and pt is unable to swallow and does not have IV access, give 1mg IM and insert saline lock. Check BG in 15 min, then follow D50W IV orders. *UNSIGNED*
METHOCARBAMOL TAB
750MG PO QID PRN
Start: 02/17. 15:30 Stop: 04/10. 10:00
COMPOUNDED RX MISCELLANEOUS
APPLY SMALL AMOUNT TOP BID PRN Hydrocortisone cream / pt to use own supply
Start: 01/28. 09:48 Stop: 04/10. 10:00
ACETAMINOPHEN TAB
650MG PO Q4H PRN
Start: 01/26. 17:38
Cover Sheet
Problems
Meds
Orders
Notes
Consults
Surgery
D/C Summ
Labs
Reports

NPO Patients

- If the patient is made NPO:

  Give ½ of the basal insulin dose and

  HOLD the mealtime insulin, and Continue the correction dose.

  Monitor BG Q 6 hours and give corrective insulin as needed.

  Resume the previous regimen once the patient is eating again.

CASE

- JT is a 70 yo man with DM and CAD hospitalized with CHF. He is put on an sliding scale regimen with R insulin (201-250 4 units; 251-300 6 units; 301-350 8 units; 351-400 10 units, >400 10 units).
- His CBGM at 0530 is 450 mg/dL. He gets 12 units R.
- His CBGM at 0830 is 385 mg/dL. He gets 10 units R.
- His CBGM at 1130 is 252 mg/dL. He gets 6 units R.
- At 1500 he feels dizzy, shaky, and sweaty. His CBGM is 40 mg/dL.

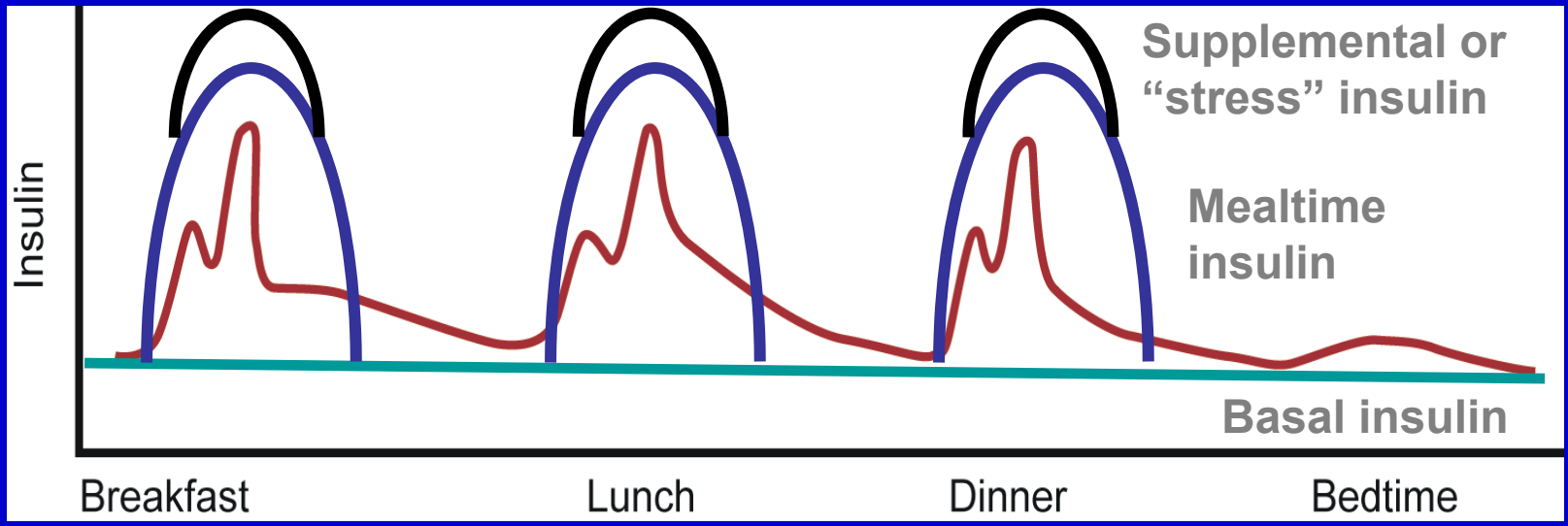
Problem

- Giving R insulin q 3 hrs (peaks in 2-4 hrs and lasts 6-8 hrs) by sliding scale leads to “stacking” of insulin & hypoglycemia.

Solution

- Eliminate insulin sliding scale.
- Introduce concepts of basal and prandial (mealtime) insulin.

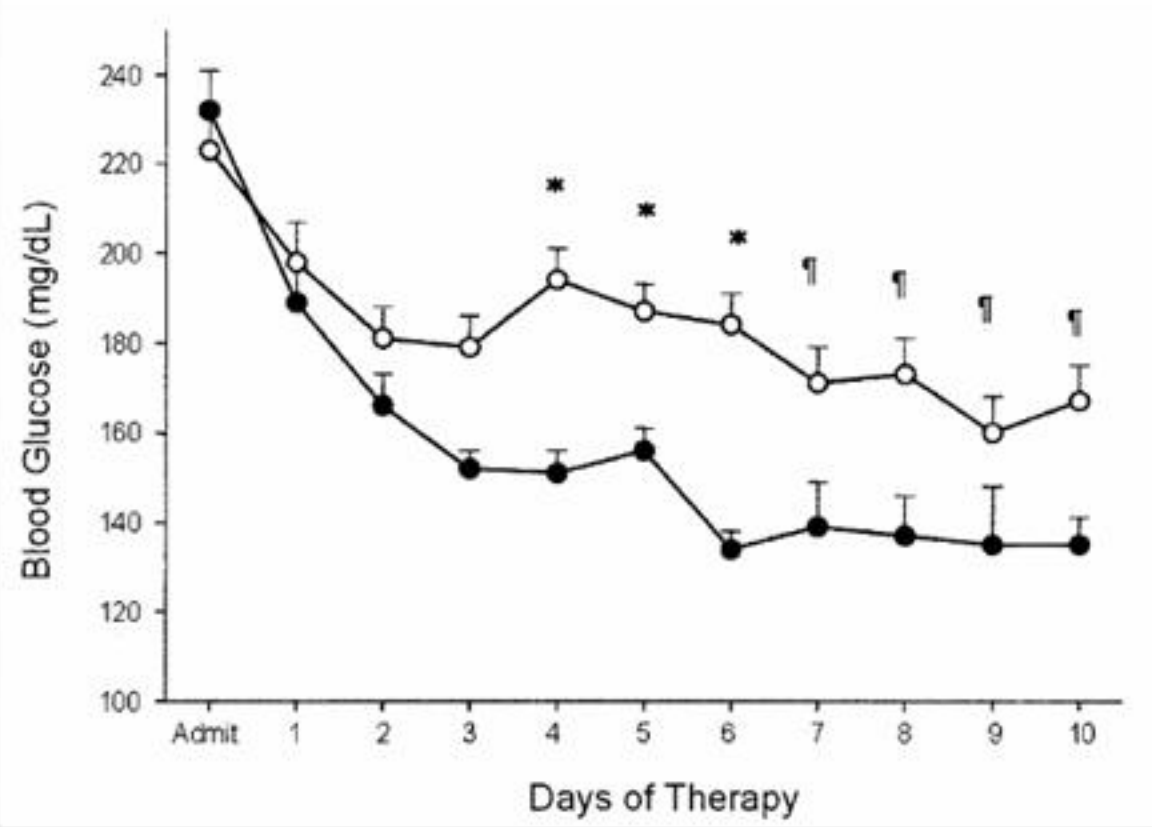
Maintaining physiologic insulin delivery in the hospital



Problem: Managing DM with Sliding Scale Insulin Only

Problems	Explanation
Reactive, not proactive	Dosing based on inadequacy of previous dose
Goal is hyperglycemia	Starts at 200mg/dl
Does not account for previous regimen	“one size fits all”
Rarely reevaluated	Pt’s glucose control is rarely reevaluated
Little to no clinical thinking	Without clinical basis, endpoints, lack critical thinking
No basal insulin	Fasting, postprandial, nocturnal, and inter-meal glucose control

Basal-Bolus Insulin Regimen is Preferred Over Sliding Scale Insulin in the Management of Non-Critically Ill, Hospitalized Patients with Type 2 Diabetes



- ● Basal bolus insulin with glargine + glulisine
- ○ Sliding scale insulin

* *P* < 0.01

¶ *P* < 0.05

Umpierrez GE, et al. *Diabetes Care*. 2007;30:2181-6.

Solution

- Eliminate insulin sliding scale.
- Introduce concepts of basal and prandial insulin.
- Can add a “supplemental insulin scale” to standing meal insulin (this is different from managing DM using sliding scale only)
  - Supplemental insulin = “stress” insulin
  - Short acting insulin given before meals = meal insulin + supplemental insulin

Solution

- Standardization of documentation
  - If doses of meds are omitted or changed, physician should be notified & a brief note made for documentation.
  - We may need to work on better ways of documenting CBGMs and insulin doses.

Solution

- Patient empowerment
  - Patients on intensive insulin regimens should be able to manage them in the hospital (QA issues to be worked out).
  - Patients should be able to remind RNs if their insulin doses are due.

Components for Safe Diabetes Self-Management in the Hospital

- Do simultaneous lab-measured capillary or venous blood test and pt-performed CBGM. CBGM should be within 15% of lab value.
- Demonstration that the pt can self administer insulin accurately.
- Pt is alert and able to make appropriate decisions on insulin dose.
- All insulin administered by pt and nurse is recorded in the medical record.
- Physician writes order that the patient may perform insulin self-management

Clement S et al. Management of Diabetes and Hyperglycemia in Hospitals. Diabetes Care 2004; 27(2): 553-591.

Should We Add to or Expand Our Admission Diabetes Assessment?

- Document type, duration of DM, and current Rx
- Assess pt's need for diabetes & nutrition education
- Assess of patient's "competency" to perform SMBG
- Determine need for meter/meter teaching
- Assess patient's "competency" to manage diabetes medications and/or insulin
- Check recent A1c

Transition to Discharge

- Does patient have a meter for home use? If not arrange for one
- Does patient know how to inject insulin and how to prevent and to treat HYPOGLYCEMIA?
- Is the patient clear about the diabetes therapy after D/C? Arrange for a home care f/u visit to assure patient safety
- Does the patient need more diabetes education? Refer for further education
- Does the patient have appropriate outpatient F/U appointment with primary care or specialist?

SYNCHRONIZATION OF FS, INSULIN, MEALS

ON-TIME MEALS

ON-TIME INSULIN

What does it take to achieve excellent glycemic control for hospitalized dm patients?

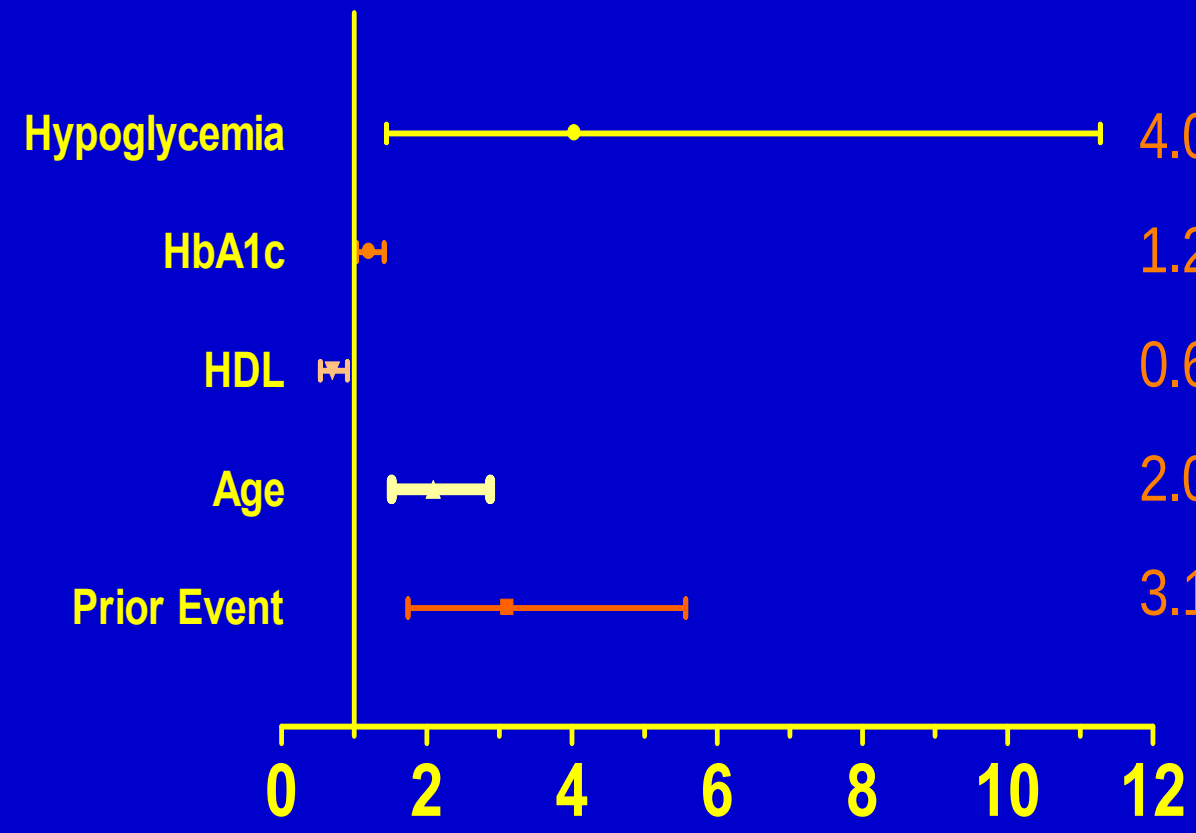
EMPOWERED PATIENTS

PROVIDER EDUCATION

Commitment

COMMUNICATION

Predictors of CV Death



	Hazard Ratio (HR Lower CL, HR Upper CL)	P Value
Hypoglycemia	4.042 (1.449, 11.276)	0.01
HbA1c	1.213 (1.038, 1.417)	0.02
HDL	0.699 (0.536, 0.910)	0.01
Age	2.090 (1.518, 2.877)	<0.01
Prior Event	3.116 (1.744, 5.567)	<0.01

Duckworth et al. VADT. ADA June, 2008

Intensive Control Patient Safety Concerns in Ambulatory Care

- Generalization to individuals with multiple complex conditions who would have been excluded from studies
- Multiple medications in persons with co-existing illness
- No system monitoring system for hypoglycemia
- A1c of 7% can represent range of 6.5 to 7.5% in practice in commercial laboratories:
- Confusion of measures with guidelines

Practicum For RNs and LPNs Taking Care of Patients With Diabetes

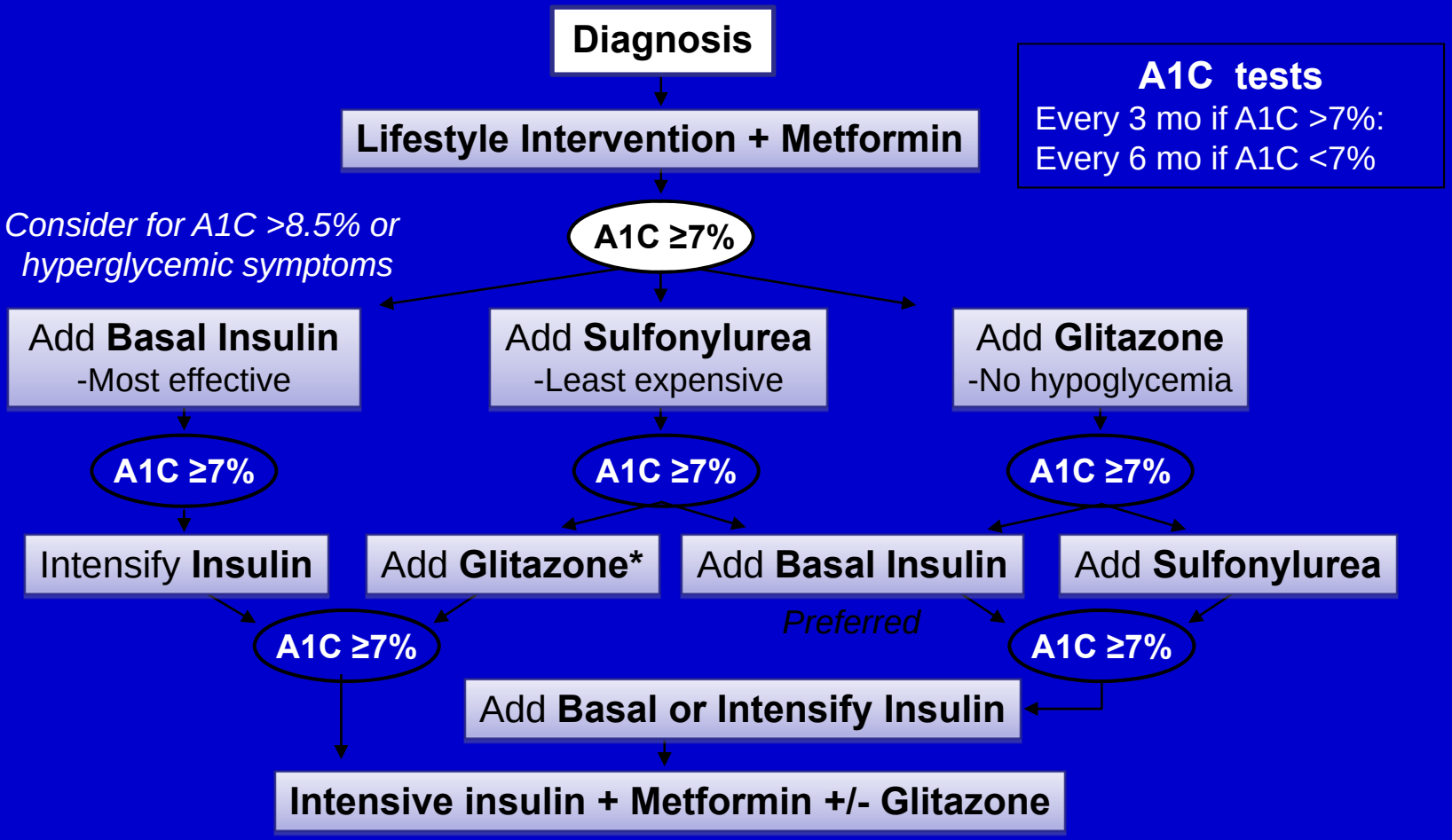
Module 1: Basic Facts about Diabetes

Department of Veterans Affairs
Puget Sound
Health Care System
American Lake & Seattle
Diabetes Care Team

PBM Bulletin on Glyburide

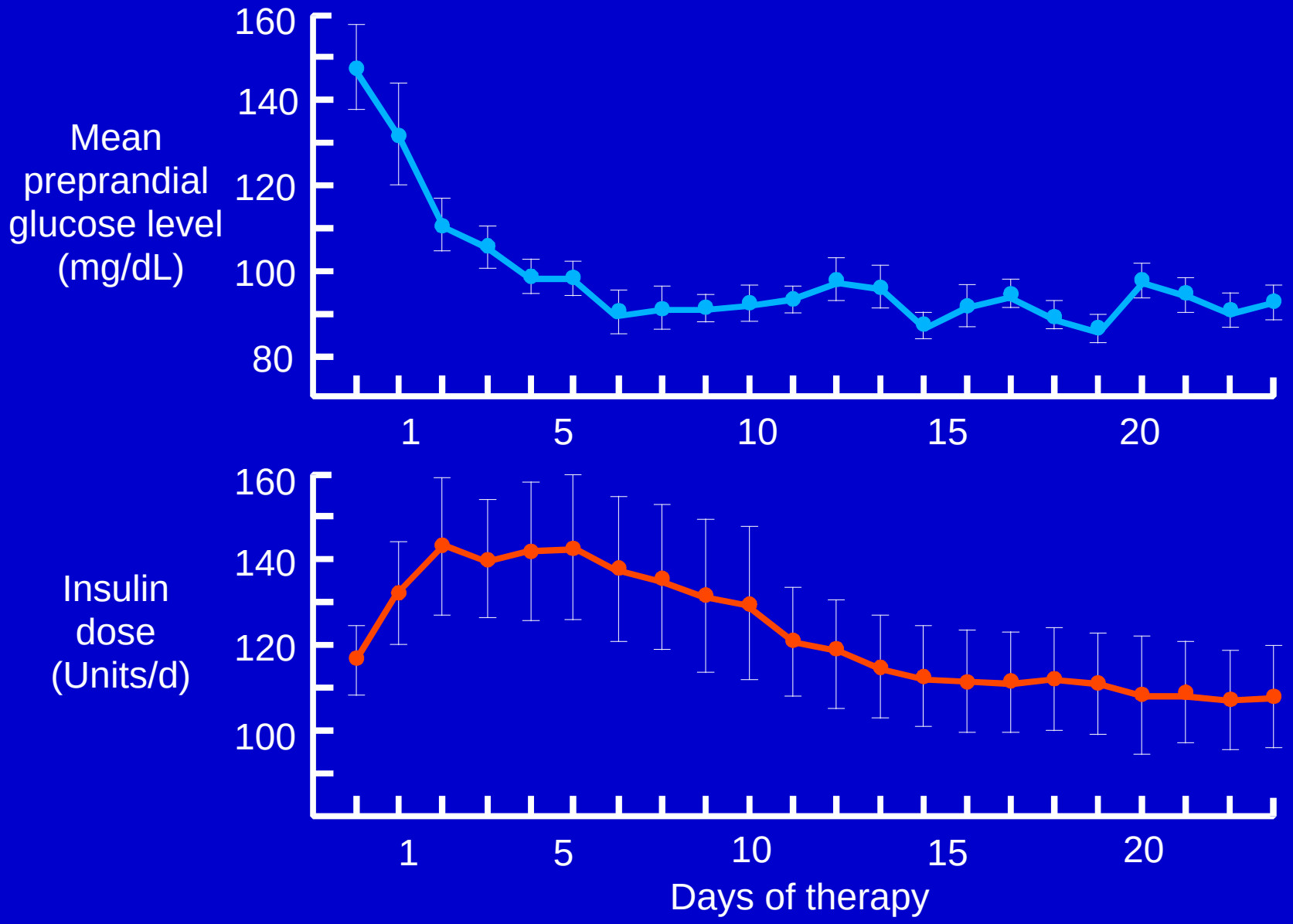
- 2nd bulletin
- Use of glyburide in pts >65 yoa and elevated creatinie
- Compared change from 1st bulletin

ADA/EASD Consensus Algorithm for Management of Type 2 Diabetes



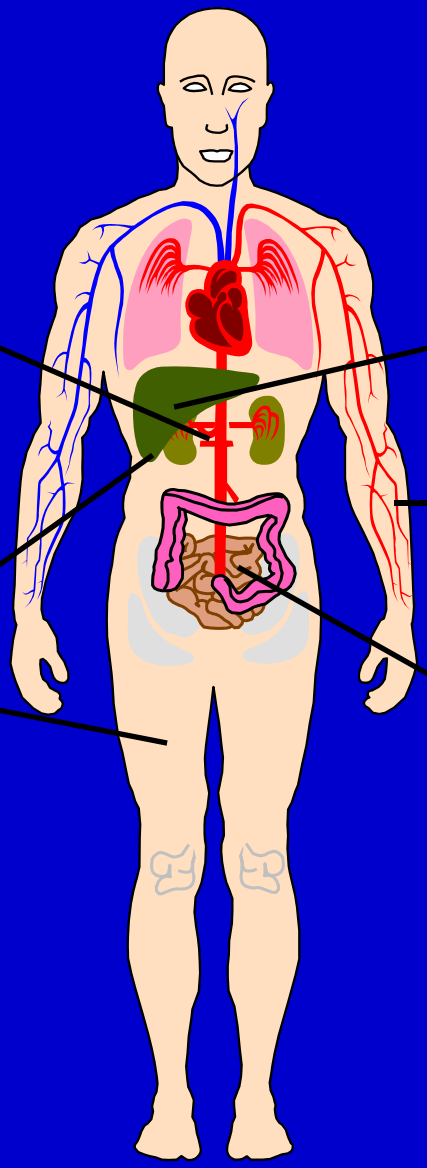
Nathan DM et al. *Diabetes Care*. 2006;29:1963–1972.
Nathan DM et al. *Diabetes Care.* 2008;31:173–175.

Insulin Requirements in Type 2 Diabetes



Garvey WT et al. *Diabetes.* 1985;34:222-234.

Pharmacological Therapy



Sulfonylureas/Meglitinides: stimulate insulin secretion

Incretins, increase insulin, Gastric emptying, decrease Glucagon, increase satiety

Insulin: promotes glucose disposal and inhibits hepatic glucose production

Amylin, slows gastric emptying, suppresses glucagon

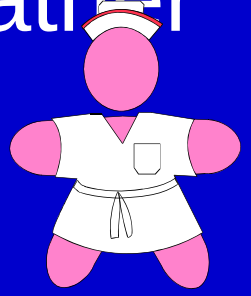
Biguanide (metformin): reduces hepatic glucose production

Thiazolidinediones (pioglitazone): increase peripheral glucose utilization

Alpha-glucosidase Inhibitors (acarbose): slow carbohydrate absorption

Exercise/Activity: Guidelines

- Always warm up and cool down
- Don’t inject insulin into a limb that will be exercising
- Avoid becoming exhausted
- Don’t exercise in extreme weather



Exercise/Activity: Guidelines

- Hypoglycemia - carry fast-acting CHO, medical ID
- Hyperglycemia → DKA - type 1, don't exercise if glucose >300 mg/dl
- Sensory peripheral neuropathy
  - Wear well fitted footwear
  - Examine feet closely
- Retinopathy - avoid exercises that put pressure on eyes.

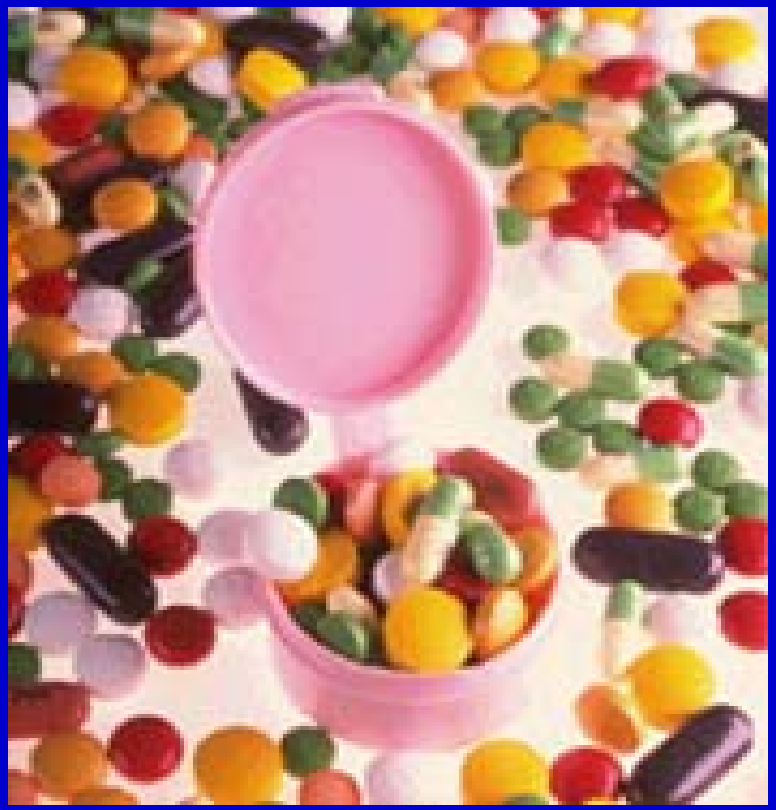
Putting it Together

Week Starting: November 9

Day	Breakfast	Lunch	Dinner	Bedtime	Comments
Sun	84	77	114	78	
Mon					
Tues	150	55	200	180	walked
Wed	140	60	180	160	walked
Thurs					
Fri	140 / 100				
Sat					

Insulin regimen: Regular and NPH before breakfast and dinner

People don't follow clinicians' advice and recommendations



- 50% don't follow long term medication regimens
- > 80% don't follow advice to change health behaviors
- 20 to 30% don't complete curative medication regimens

(Hayes et al, 1979; Meichenbaum and Turk, 1987; DiMatteo et al, 1994; Clark & Becker, 1998)

The Greyhound Paradigm

Leave the driving to us

The Hertz Paradigm

Let us put you in the driver's seat

Healthy eating
Being active
Monitoring
Taking medication
Problem-solving
Healthy coping
Reducing risks

(Source: AADE, The Diabetes Educator, Sept/Oct, 2003)

Discover and discuss the *patient's* conviction

- How important is this change to you?
- How committed are you to making this change?

Assessing Conviction: Scaling

"On scale of 0 - 10, how convinced are you that it is important to increase your activity level?"

Not at all convinced 0 1 2 3 4 5 6 7 8 9 10 **Totally convinced**

Responses

"Oh, a 4."

"I'm curious, what led you to say 4 and not zero"?

"What would have to happen to make it to a 6?"

Discover and discuss the *patient's* confidence

- ***"How confident are you that you can make this change?"***
- ***"How likely do you think it is that you will make this change?"***

Assessing Confidence: Scaling

"On scale of 0 - 10, how confident are you that you can exercise regularly?"

Not at all confident

Totally confident

Responses

"Oh, a 6."
"What led you to rate your confidence a 6?"
"What would you need to get to a 7 or 8?"
"What could I do to help you to feel more confident?"

Questions? Discussion