

Changing Ways: The importance of local factors in improving inpatient diabetes management

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Queensland Government

Queensland **Health**

Aim

QH Safe Medication Practice Unit project:

- To reduce the incidence of errors in insulin prescribing and administration
- Improve inpatient diabetes management

Background

Insulin is:

- Recognised internationally as a high risk drug¹
- Managed by relatively inexperienced clinicians

Also

- Increasing focus on inpatient glycaemic management ²
- Emerging evidence of importance in critical care and general ward environments ²

Background

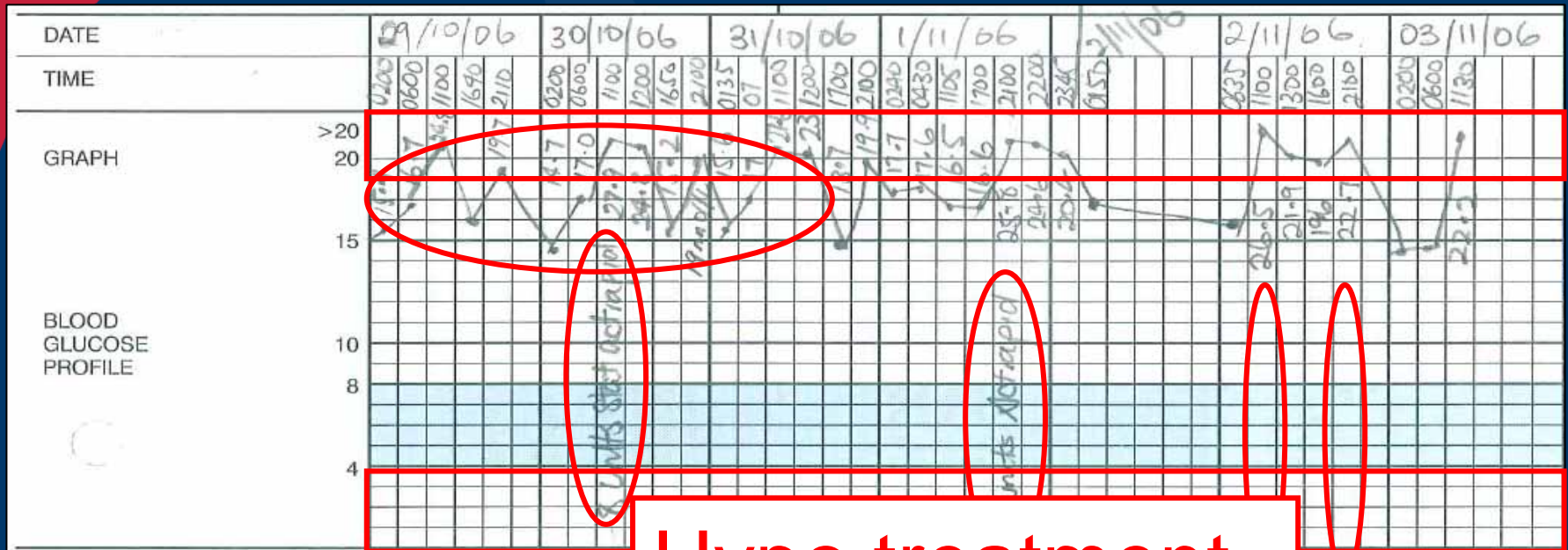
- Lack of link between insulin dose and BGL
 - May need to look in 3 places
- Non specialist and junior clinicians
 - Limited education on diabetes management
- Insulin accounts for ~15% of the most severe medication related incidents
- Standardisation and simplification of processes can help to reduce medication errors^{3,4}.

Local Audit Data

- Initial snapshot audit 118 inpatients receiving intravenous and/or subcutaneous insulin
- 4 Queensland public hospitals
- Bedside charts of inpatients having BGLs measured
- Risk score devised

- Subcutaneous Insulin
 - 63% outside the ideal range
- IV Insulin
 - 53% outside the ideal range

Current Practice



Hypo treatment

- No instructions on when to notify about BGLs $>x$ or $<y$
- No forcing function to encourage daily review
- No link between BGL and insulin dose
- No guidance about when or how to treat hypoglycaemia

What are we doing?

- Introducing statewide standardised forms to assist clinical staff
 - Linking all information required to manage Insulin therapy
 - OHAs still separate
 - Supported by bedside decision support

Process

- Expert reference group
 - Multidisciplinary
- Developed forms and decision support tools:
 - Safety prompts
 - Minimise human “interference”
- Trial in the “Real World”
 - Non experts

A tale of two sites

Site A

- Tertiary hospital, Vascular
 - Progressive ward
- Agreement to participate by Nurse Unit Manager and Medical staff
 - When approached by SMPU
- Training in use of new forms by external RN/CDE

A tale of two sites

Site B

- Regional hospital
- Established local working party
- Site recognised problems with insulin
 - Audit data supported need for change
 - Approached SMPU
- SMPU funded project officer (RN/CDE)
- Training by internal RN/ CDE

Satisfaction Surveys

Related to trial forms and their usage

Likert Scale

Site A

- 1. Strongly disagree (dissatisfaction with trial forms) to 4. Strongly agree (Preference for trial forms) (16/21)
- Response Rate 76%
- Minor preference for new forms
- Score 2.5
- Comments expressed dissatisfaction

Site B

- 1. Strongly disagree (dissatisfaction with trial forms) to 4. Strongly agree (Preference for trial forms) (44/70)
- Response Rate 63%
- Acceptance of new forms
- Score 3.15
- Feedback more positive

Qualitative Assessment (earlier version)

- Both sites
 - Form very busy - can be a little confusing
 - Form too big & cumbersome
- Initial reactions at site B
 - Big and complex at first use
 - Recognised the value
 - Marketed

BEDSIDE

INSULIN and

GLUCOSE

FORMS

Why the difference?

Site A

- Approached by **external** source
- **External** project officer
- **Minimal** senior clinician involvement

Site B

- **Local** decision to change with or without support of SMPU
- **Local** project officer
- Change **led** by senior medical and nursing clinicians

System Level Changes⁴

	Site A	Site B
Will	Central	Local
Ideas	Central	Central with Local Input
Execution	Central	Local with Central Input

Subcutaneous Form

Queensland Government **INSULIN SUBCUTANEOUS ORDER AND BLOOD GLUCOSE RECORD - ADULT** Facility/Service: Your Hospital Year: 20 08
 Queensland Health Ward/Unit: Medical Unit

PATIENT: ALISTAIR ANYWHERE
 2/5 Sunnyside St. ANYWHERE 4444
 Ph (h) 07 1234 5678
 Ph (m) 0412 345678
 MC: 123456789 ID: 3 Exp: 12/2010

Date: 15/9/08
 Change BGL frequency to: Standard 02:00 hrs Standard 02:00 hrs
 2hrs post-meal Other (specify): 2hrs post-meal Other (specify):
 Diet: Full Diet: Full

MONITORING AND RECORDING
 BGL (mmol/L) 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
 8.1 16.2 7.1 9.7 8.5 6.2 10.1 3.2 5.5 8.0 7.2

Initial BGL Frequency: Standard (Pre-meals and 21:00 hrs) 02:00 hrs
 2hrs post-meal Other

Special Instructions: *Over weekend call medical registrar for doses*

Insulin treatment prior to admission (if any):
 NovoRapid: 10 units at breakfast/lunch, 12 units at dinner
 Lantus: 22 units at bed-time

ADMINISTRATION RECORD
 Write insulin type: NovoRapid Lantus
 Check for all routine supplemental/variable/ stat orders

ROUTINE INSULIN ORDERS
 Mealtime insulin is given at start of meal
 Date: 15/9 16/9 17/9 18/9 /
 Meal 1 time: Breakfast
 Type of insulin: NovoRapid 14 16 8 18
 Meal 2 time: Lunch
 Type of insulin: NovoRapid 14 14 ph
 Meal 3 time: Dinner
 Type of insulin: NovoRapid 18 18 18
 Meal 4 time: Bed-time
 Type of insulin: Lantus 26 26 26

SUPPLEMENTAL / VARIABLE INSULIN ORDER
 Mealtime: With Meals
 Type of insulin: No
 Sliding scale insulin is NOT recommended as consider basal insulin needs

Comments: Hypo treated per protocol

Prescriber Signature: J. Bloggs

Notes: Ceased, commence IV Insulin

Communicative

Safety Features Incorporated:

- Units pre-printed
- Notification prompts for BGLs outside target range
- Route clearly identified
- Special instructions
- Frequency of BGL monitoring
- Prior insulin treatment
- Active discouragement of stand alone subcutaneous sliding scale
- Insulin associated with meals

Administrative

Prescribing

Intravenous Form

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INSULIN INTRAVENOUS INFUSION ORDER AND BLOOD GLUCOSE RECORD

PATIENT: ALISTAIR
2/5 Sunnyside St
ANYWHERE
Ph: 07 55 1234 5678

Facility: Your Hospital
Ward: Medical Unit
First Prescriber to Print Patient Name and Check Label Correct: Alistair

BGL Frequency: Hourly 2 hourly*
*only if BGL is within target range for at least 2 consecutive readings

Special instructions: Call medical registrar

2007 Day/Mo: 22/3

BGL Record (mmol/L)

Notify MO if:
- BGL < 5 mmol/L
- BGL > 15 mmol/L
- 3 consecutive BGL readings > 10 mmol/L
- If BGL < 4 mmol/L treat hypoglycaemia

Insulin infusion rate (units/hr): 0.5 2 2 3 4 8 0 2 2 2

Meal/ Snack bolus

RECOMMENDED INITIAL INSULIN INFUSION RATES FOR ADULTS ONLY (prescribe below):
0-5 mmol/L: 0.5 units/hr
5.1-7 or 7.1-10 or 10.1-15 or 15.1-20 or >20: 1 units/hr

DATE/START TIME	22 / 3 06:00	22 / 3 09:00	22 / 3 12:00
BGL range (mmol/L)	0-5	5.1-7 or 7.1-10	10.1-15
Initial Infusion Rate	0.5 units/hr	1 units/hr	1 units/hr
Revised Infusion Rate	1 units/hr	3 units/hr	2 units/hr
2nd Revised Infusion Rate	1 units/hr	3 units/hr	3 units/hr
Meal/ Snack Bolus (if required)	Meal bolus: Snack bolus: Meal bolus: Snack bolus: Meal bolus: Snack bolus:	Meal bolus: Snack bolus: Meal bolus: Snack bolus: Meal bolus: Snack bolus:	Meal bolus: Snack bolus: Meal bolus: Snack bolus: Meal bolus: Snack bolus:
Dr Signature	<i>A. Doctor</i>	<i>A. Doctor</i>	<i>A. Doctor</i>
Print Name	A. Doctor	A. Doctor	A. Doctor

50 units Actrapid® Insulin + 50 5mL Sodium Chloride 0.9%
50 units Actrapid® Insulin + 45 5mL Sodium Chloride 0.9%
50 units Actrapid® Insulin + 45 5mL Sodium Chloride 0.9%

Communication

Monitoring

Administration

Prescribing

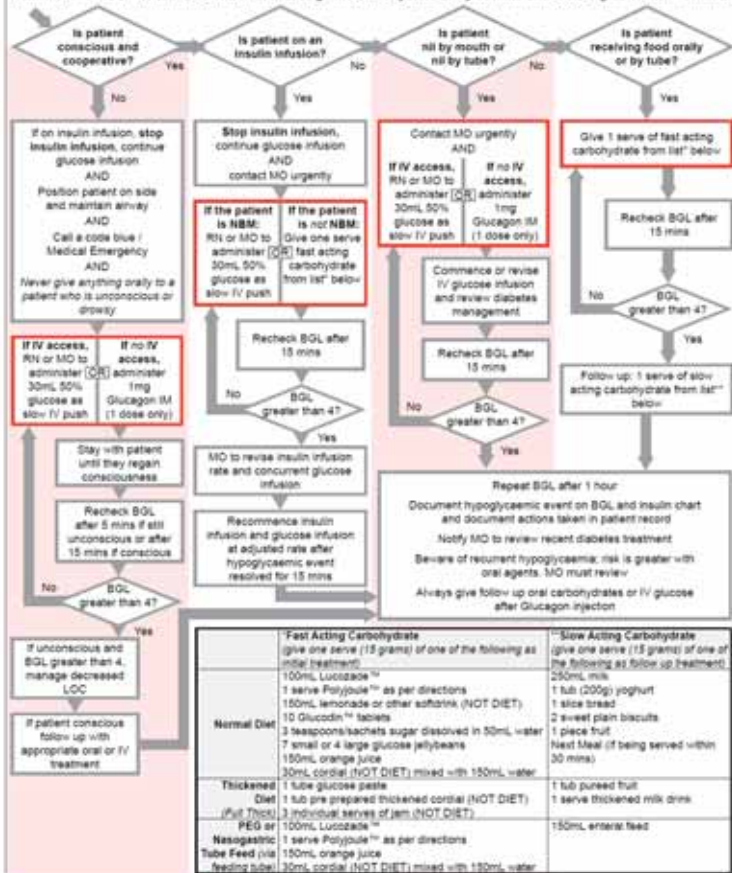
- Safety Features Incorporated:**
- Promoting hourly BGL monitoring
 - Pre-printed BGL ranges
 - Recommended initial insulin infusion rates
 - Standard concentration syringe

Decision Support

Hypoglycaemia Management in Diabetes: BGL Less than 4mmol/L

If patient cannot or will not take oral carbohydrates, use intravenous glucose.

Remember - Rule of 15: Test BGL and treat with 15 grams carbohydrate every 15 mins until BGL is greater than 4mmol/L.



- Ensure this flowchart is being followed
- Assess patient – provide basic and advanced life support if required
 - Review diabetes management for causes of hypoglycaemia and correct avoidable causes.
- If the cause is identified and corrected, insulin dose adjustment is not required unless hypoglycaemia recurs.
- If the cause is not corrected
 - hypoglycaemia has occurred within 2 hours after mealtime insulin? Reduce the dose of that mealtime insulin by 20% the following day.
 - otherwise decrease daily basal insulin dose by 20%.
- If on insulin, do not withhold subsequent mealtime or basal insulin after treated hypoglycaemia.
- If on sulphonylurea obtain specialist advice on management
 - Monitor BGL hourly for 4 hours and 4 hourly for 24 hours after last hypoglycaemic episode.
 - If recurrent hypoglycaemia commence IV glucose, (starting to BGL > 4 mmol/L).
 - Withhold oral hypoglycaemic treatment until recovered and review whether further therapy is contraindicated.

Future Directions

- Prescribing guidelines and key administration messages
 - Improved glucose control with a standard approach has recently been demonstrated ⁵
- Continue to implement
- Continue to evaluate
 - Adverse events and documentation
 - Improvements in glucose control
- “Glucometrics” ⁶
 - Method of assessing inpatient glucose control

The lesson to share! or “Where we’ll START next time.....”

- Harness local enthusiasm
- Engage good people
- Need for change
 - Recognised by site
 - Backed up by evidence
- Senior clinical involvement
- Willing early adopters
- Marketing!

Conclusion

- Standardised form usage with safety prompts will go some way to improving management
- Education regarding management of diabetes is needed in all clinical streams and at all levels

References

- ¹Institute for Safe Medication Practices, 2007 cited online at <http://www.ismp.org/Tools/default.asp>
- ² Inpatient Diabetes and Glycemic Control: A Call to Action Conference, 2006. Consensus Development Conference, Conference Recommendations: Position Statement.
- ³Australian Council for Safety and Quality in Health Care. Second National Report on Medication Safety, 2002. Commonwealth Department of Health. Canberra.
- ⁴Federico, F, Preventing Harm from High Alert Medications, 2007. The Joint Commission Journal on Quality and Patient Safety. Vol 33, No 9 September
- ⁵**R**andomized Study of **B**asal **B**olus Insulin Therapy in the Inpatient Management of Patients with **T**ype **2** Diabetes (**R**ABBIT **2** Trial) Umpierrez G, Smiley D, Zisman A, Prieto L, Palacio A, Ceron M, Puig A, Mejia R: Diabetes Care Volume 30, Number 9, September 2007
- ⁶Goldberg P, Bozzo J, Thomas P, Mesmer M, Sakharova O, Radford M, Inzucchi, S: “Glucometrics”- Assessing the Quality of Inpatient Glucose Management. Diabetes Technology & Therapeutics 2006; Volume 8, Number 5: 560-569

