SCOTTISH PATIENT SAFETY PROGRAMME 2008-2018

Transitions, Omissions and High Risk Medicine

WebEx Series 2018-2019

Insulin Safety in Acute Care
Presented by NHS Tayside and NHS Greater Glasgow & Clyde

Thursday 19 July 2018
3pm-4pm

@SPSPMedicines
#SPSPMeds

As part of Healthcare Improvement Scotland's ihub, SPSP activities support the provision of safe, high quality care, whatever the setting.

A few points for our WebEx today:

Please dial in on your phone:

0800 032 8069 and then use the pass code: 253 131 27#

If you are not presenting your phone is automatically on mute

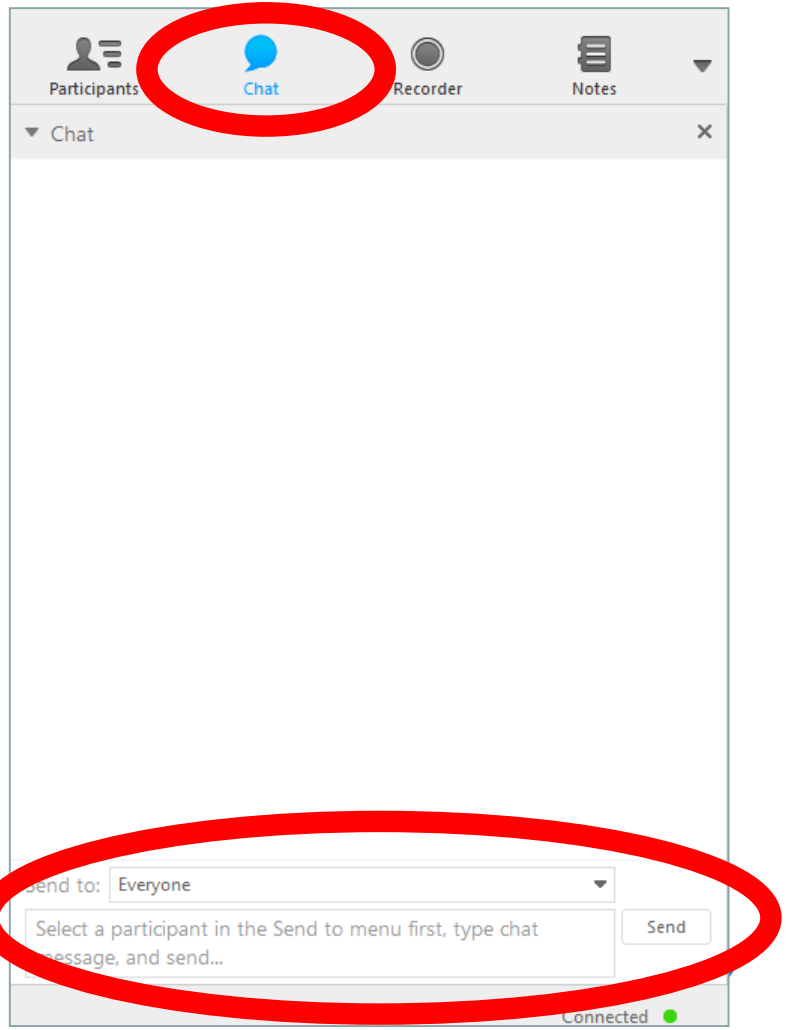
Phone lines will open at the end of the WebEx for Q and A with the presenters

Ten years of improving safety

To get involved in the conversation, please click on the Chat icon.

Select **Everyone** from the drop down menu, type your message then click send. Introduce yourself.

This WebEx is being recorded as a resource and will be available on the ihub website



Healthcare Improvement Scotland | ihub Enabling health and social care improvement

Meet the team

Arvind Veiraiah
National Clinical Lead

Lorraine Donaldson
Project Officer

Kirsty Allan
Administrative Officer

David Maxwell
Improvement Advisor

Polling Question 1

Which of the following professions best describes you?

a. Patient / Service User
b. Medical
c. Nursing
d. Pharmacy
e. Other (please type in chat box)

Ten years of improving safety

SPSP Medicines

Prepared by: Debbie Voigt, NHS Tayside

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NHS SCOTLAND

Insulin Safety in Acute Care

Debbie Voigt
Diabetes Specialist Nurse
NHS Tayside

Diabetes Specialist Nurse

National Lead (DSN) SDG inpatient diabetes

TREND-UK Advisor

Honorary Teaching Fellow
University of Dundee

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NHS Tayside

- ± 300 patients with diabetes in hospital beds
- 20-25% of in-patient population
- 40% ≥ 80 years of age
- Significant no. patients treated with steroid
- Hypoglycaemia ± 400 per month

Background: insulin prescribing improvement

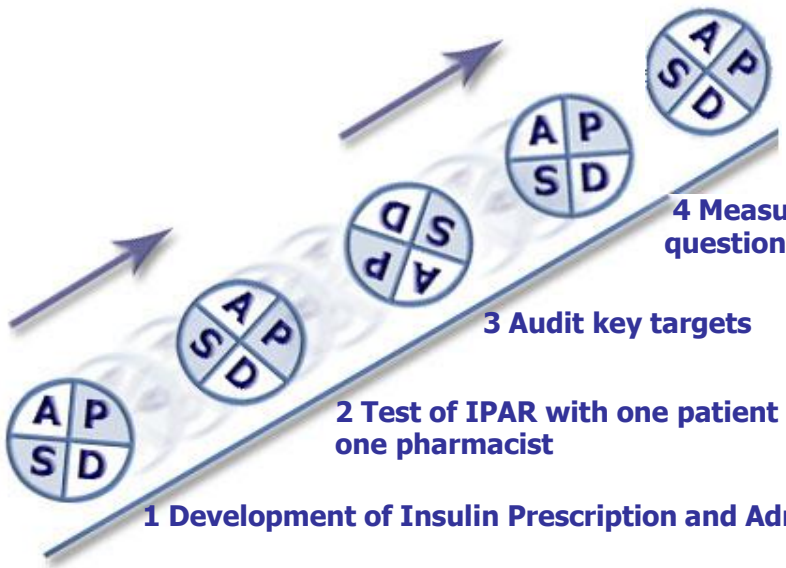
- Illegible handwriting
- Abbreviation of units ‘i u’ and ‘u’
- Insulin preparation spelling errors
- Insulin omission
- Transcribing errors
- Lack of knowledge about insulin
- Management of hypoglycaemia
- Management of hyperglycaemia

PDSA - Improve Insulin Prescribing in Hospital Wards

Safe legible, patient centered prescribing of insulin in hospital wards

Reduction in errors in prescribing process. Patient engagement and satisfaction

Improve the design of insulin prescription chart with insulin administration guideline



5 Identify learning need for using the IPAR using questionnaire

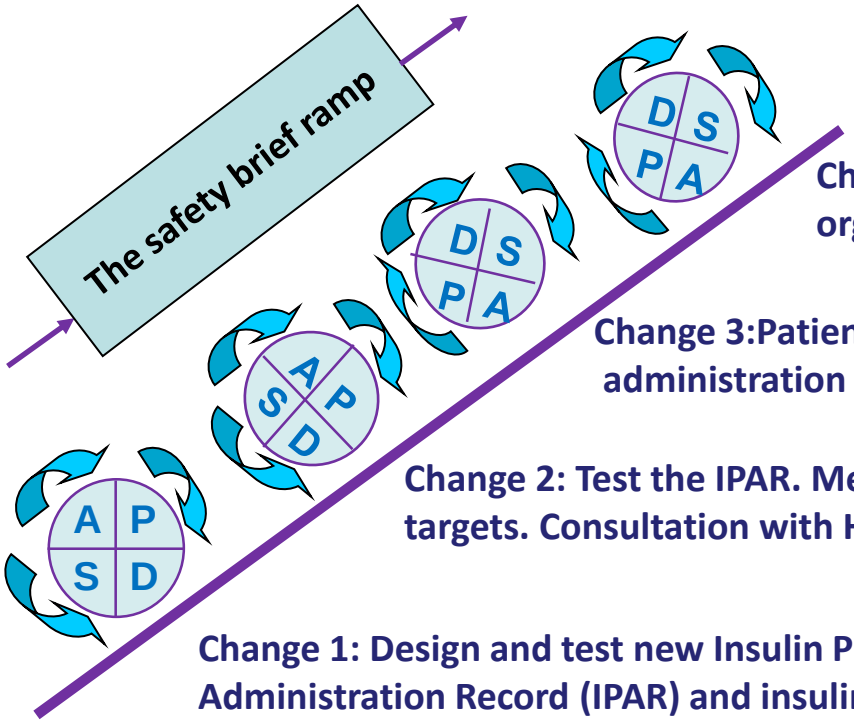
4 Measure healthcare satisfaction of IPAR using questionnaire

3 Audit key targets

2 Test of IPAR with one patient in one ward with one doctor, one nurse, one pharmacist

1 Development of Insulin Prescription and Administration Record (IPAR)

PDSA Ramp



Change 4: Implement across organisation

Change 3:Patient engagement using insulin administration assessment tool and guideline

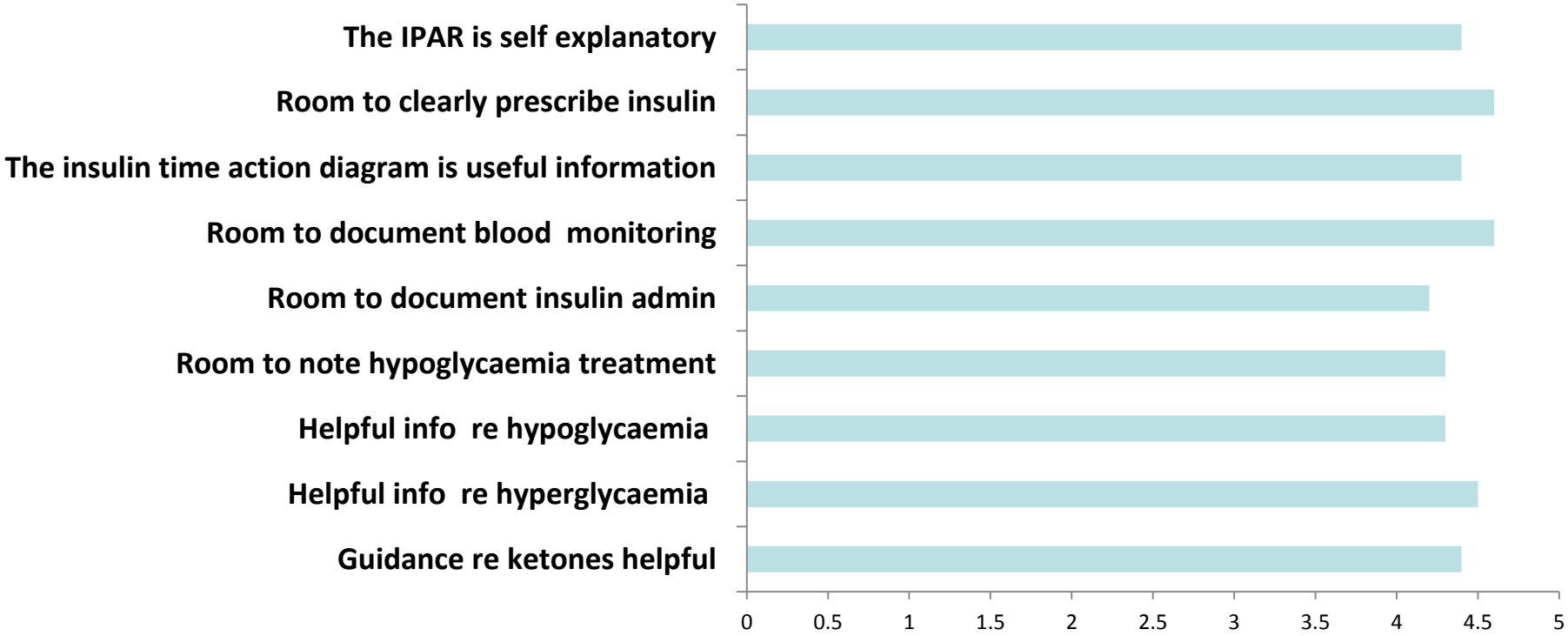
Change 2: Test the IPAR. Measure compliance with key targets. Consultation with HCP and patients

Change 1: Design and test new Insulin Prescription and Administration Record (IPAR) and insulin administration guideline

Staff satisfaction of IPAR

11 staff members in test ward provided staff satisfaction of the IPAR

0 strongly disagree – 5 strongly agree.



Feedback from 100 healthcare professionals

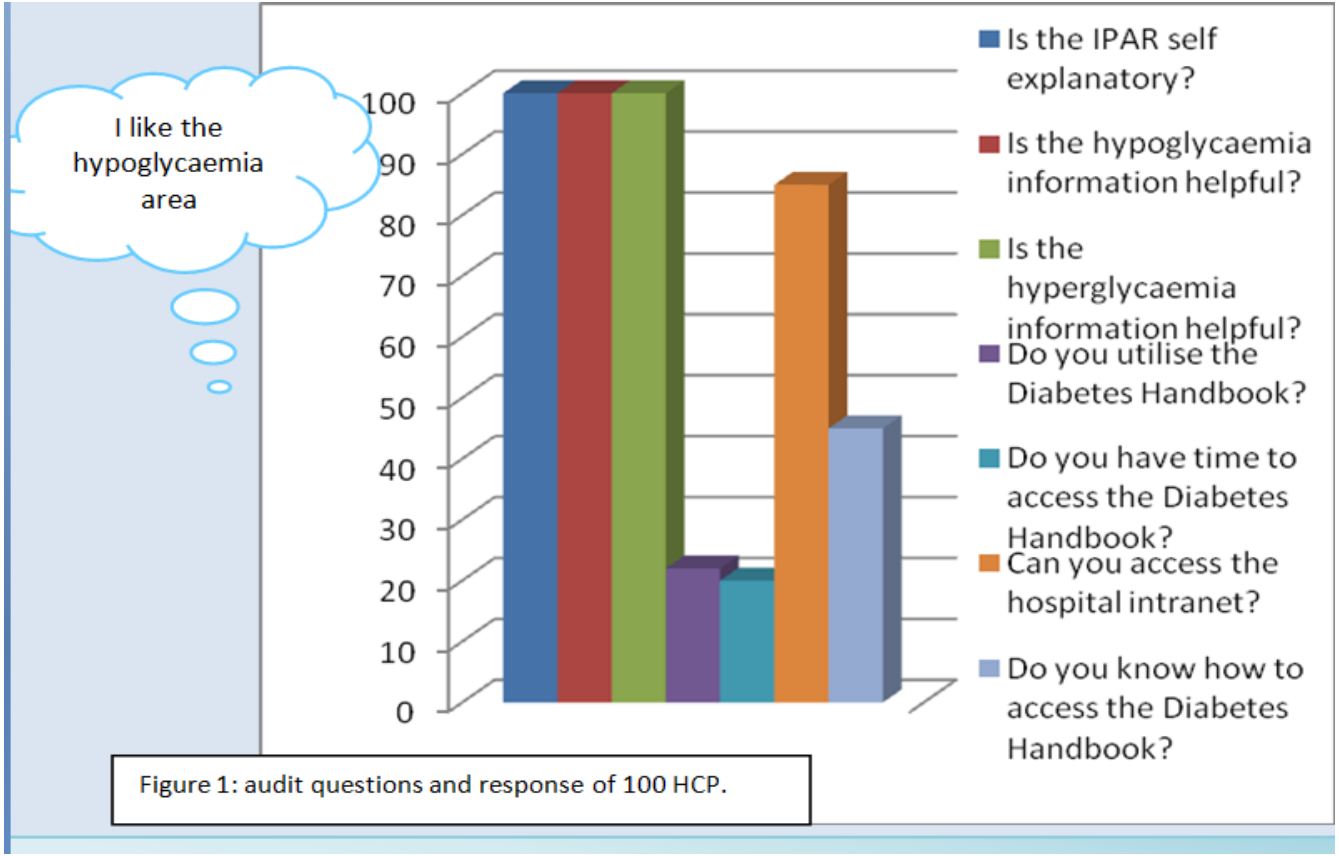


Figure 1: audit questions and response of 100 HCP.

ADULT INSULIN PRESCRIPTION AND ADMINISTRATION RECORD (IPAR)

Affix Patient Label

DATE:
Ward:
Hospital:
Chart No.

BARCODE

NHS Tayside

Prescribing subcutaneous insulin

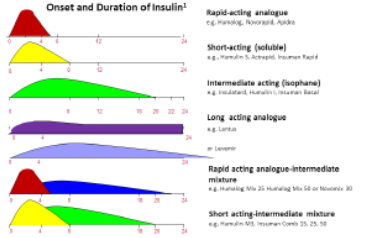
DO NOT USE abbreviations 'U' or 'IU' when prescribing insulin.

If the usual insulin regimen is unknown, do not omit insulin, but use a suitable substitute until insulin details are established use the diagram opposite to guide a suitable alternative preparation e.g.

- Prescribe once daily or twice daily isophane in the elderly
- Use short-acting/intermediate mixture twice daily in others
- Calculate dose as 0.3 units/kg/24hrs for those at risk of hypoglycaemia, 0.5 units/kg/24hrs if insulin resistant

Review monitoring results daily and adjust insulin if required to optimise blood glucose control to avoid hypoglycaemia and hyperglycaemia.

Only prescribe intravenous insulin in acutely unwell or fasting patients, or those who are unable to tolerate oral intake.



1. Schematic adapted and reproduced with permission from Figure 2.2 Kinmth AI and Bailey CJ. Type 2 Diabetes in Practice. The Royal Society of Medicine Press. London 2003 ISBN: 1853154822

Routine Subcutaneous Insulin Prescription Insulin device for self use.....

Start Date	Name of Insulin Preparation [in CAPITALS]	Dose	Time of Administration e.g. before breakfast e.g. at 22.00 hours	Prescribed by	Discontinued by Sign, date and draw a line through prescription
		units			
		units			
		units			
		units			
		units			
		units			
		units			
		units			
		units			
		units			
		units			
		units			
		Self-managed by Continuous Subcutaneous Insulin Infusion (CSII) Pump			

ONCE ONLY 'STAT' INSULIN DOSE PRESCRIPTION Caution: use with care - STAT doses of rapid acting insulin can precipitate hypoglycaemia

Date	Name of Insulin Preparation	Dose in Units	Time e.g. 09.00 hours	Prescribed by	Administered by	Time given	Reason for STAT dose
		units					
		units					
		units					

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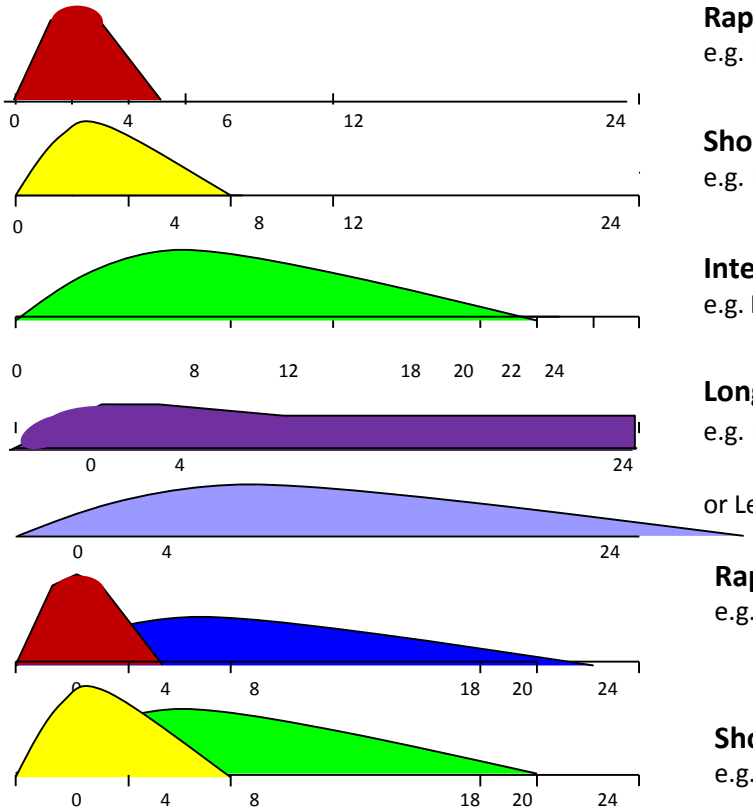
Onset and Duration of Insulin[1]



Rapid-acting analogue
e.g. Humalog, Novorapid, Apidra

Short-acting (soluble)
e.g. Humulin S, Actrapid, Insuman Rapid

Intermediate acting (isophane)
e.g. Insulatard, Humulin I, Insuman Basal

Long acting analogue
e.g. Lantus

or Levemir

Rapid acting analogue-intermediate mixture
e.g. Humalog Mix25, Humalog Mix50, Novomix 30

Short acting-intermediate mixture
e.g. Humulin M3, Insuman Comb 15, 25, 50

1.Krentz AJ and Bailey CJ. Type 2 Diabetes in Practice. The Royal Society of Medicine Press. London 2001. p12
These diagrams are **schematic only** and represent time action profiles. However, the **actual time action profile achieved can be variable** because of individual variations in absorption, timing and dose of insulin and condition of injection sites.

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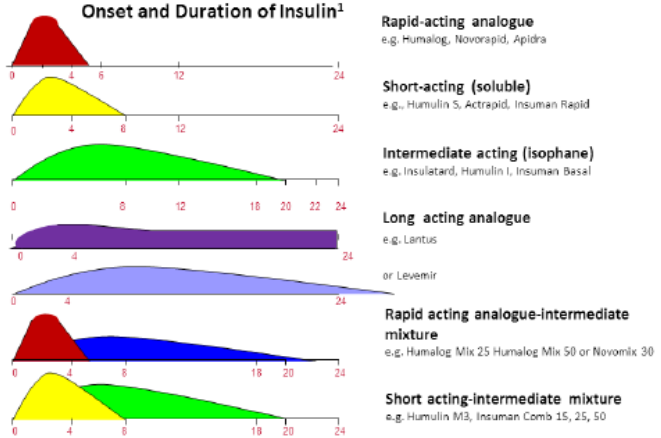

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Date	Name of Insulin Preparation	Dose in Units	Time e.g. 09.00 hours	Prescribed by	Administered by	Time given	Reason for STAT dose
		units					
		units					

Insulin Administration, Blood Glucose and Ketone Monitoring Record

See guidelines for hyperglycaemia and hypoglycaemia on reverse.
(BG Blood Glucose)

DATE	BREAKFAST			LUNCH			EVENING MEAL			SUPPERTIME		
TIME:												
Ketone urine/blood												
BG mmol/L												
BG < 4mmol/L												
Insulin name and dose in units			units units			units units			units units			units units
Given by												
Hypoglycaemia treatment BG rechecked by												
DATE	BREAKFAST			LUNCH			EVENING MEAL			SUPPERTIME		
TIME:												
Ketone urine/blood												
BG mmol/L												
BG < 4mmol/L												
Insulin name and dose in units			units units			units units			units units			units units
Given by												
Hypoglycaemia treatment BG rechecked by												
DATE	BREAKFAST			LUNCH			EVENING MEAL			SUPPERTIME		
TIME:												
Ketone urine/blood												
BG mmol/L												
BG < 4mmol/L												
Insulin name and dose in units			units units			units units			units units			units units
Given by												
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DATE	BREAKFAST			LUNCH			EVENING MEAL			SUPPERTIME		
TIME:												
Ketone urine/blood												
BG mmol/L												
BG < 4mmol/L												
Insulin name and dose			units			units			units			units

Insulin prescribing audit

1. Insulin prescribed clearly in capital letters
2. Insulin prescribed on main drug kardex
3. Insulin prescribed without abbreviation
4. Insulin administered at each time prescribed

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Insulin Prescribing Audit: 40 chart review

	FEB 2017	JUNE 2017	AUG 2017	SEPT 2017	NOV 2017	JAN 2018	APRIL 2018
Prescription legible	39	40	40	40	40	40	40
Preparation on TPAR	29	35	39	36	38	36	39
No abbreviation/units	37	40	40	40	40	40	40
Evidence of insulin admin. each time prescribed	27	40	39	37	37	35	37
Overall Compliance	**83%**	**95%**	**99%**	**96%**	**97%**	**94%**	**98%**

Hypoglycaemia management audit

In the event of hypoglycaemia (BG < 4 mmol/L in insulin/sulphonylurea treated patients):

1. Was appropriate treatment available in the ward?
2. Was appropriate treatment given to patient?
3. Was BG rechecked in 15 minutes?
4. Was diabetes management and medication reviewed?

KEY PERFORMANCE INDICATORS: Improvement is required if any of the questions below are answered NO

Insulin Prescribing:

1. Is insulin preparation prescribed using capital letters? Yes/No
2. Is insulin prescribed in the main prescription document? Yes/No
3. Is insulin dose prescribed without abbreviation 'u' or 'iu'? Yes/No
4. Has insulin been administered at each time prescribed? Yes/No

Hypoglycaemia Management (in the event of BG < 4mmol/L)

1. Is treatment for hypoglycaemia available in the ward? Yes/No
2. Was the appropriate treatment given to patient? Yes/No
3. Was blood glucose rechecked in 15 minutes? Yes/No
4. Has diabetes management and medication been reviewed? Yes/No

DATE	BREAKFAST			LUNCH			EVENING MEAL			SUPPERTIME		
TIME:												
Ketone urine/blood												
BG mmol/L												
BG < 4mmol/L												
Insulin name and dose in units			units			units			units			units
			units			units			units			units
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Hypoglycaemia treatment BG rechecked by												

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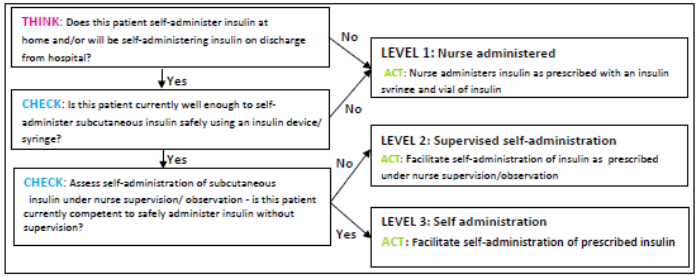
Insulin name and dose in units			units			units			units			units
			units			units			units			units

Subcutaneous Insulin Administration in Hospital Guideline



LEVELS	Checklists
Level 1 **Nurse administered** 	• Monitor blood glucose using quality controlled hospital meter • Ensure prescribed insulin is on the main drug chart and on the appropriate insulin prescription chart • Use an insulin syringe and a vial of insulin * see overleaf • Review glycaemic control daily with medical staff to assess efficacy of management • At discharge: ➢ Arrange appropriate support for insulin administration /refer to district nursing service ➢ Supply insulin syringes, prescribed insulin in a vial and appropriate sharps disposal
Level 2 **Supervised self-administration** 	• Monitor blood glucose using quality controlled hospital meter • Ensure prescribed Insulin is on the main drug kardex and on the appropriate insulin prescription chart • Provide sharps disposal unit and a safe repository for insulin storage in patient own drug (POD) locker • Observe and document all insulin administration • Review glycaemic control daily with medical staff to assess efficacy of management • Refer to Diabetes Specialist Nurse for education and follow up as required • Complete nurse patient partnership agreement overleaf • At discharge: ➢ Arrange ongoing support, supply pen needles, inform Diabetes Specialist Nurse Team
Level 3 **Self administration** 	Review daily, more often if clinically indicated. • Check the patient is currently well enough to self-administer insulin • Monitor blood glucose using quality controlled hospital meter • Review insulin management if blood glucose levels are not within 4 – 12 mmol/L. • Ensure prescribed Insulin is on the main drug kardex and on the appropriate insulin prescription chart • Provide sharps disposal unit and a safe repository for insulin storage in POD locker • Document all insulin administration • For antenatal women: Is blood ketone level < 0.6 mmol/L? • Complete nurse patient partnership agreement overleaf
LEVEL 3 **CSII** 	Continuous subcutaneous insulin infusion (CSII) is self managed by the patient Mealtime insulin/carbohydrate (CHO) ratio is ……units/……grams CHO ▶ The following should available for use in hospital: • A vial of prescribed insulin • Infusion sets and reservoirs for insulin pump • Spare batteries for insulin pump (supplied by pump manufacturer) • Blood ketone monitoring • Contact details for the diabetes team • Basal insulin and appropriate device incase conversion to subcutaneous insulin is necessary • Rapid acting insulin and appropriate device in the event of conversion to subcutaneous insulin ▶ Complete nurse patient partnership agreement overleaf

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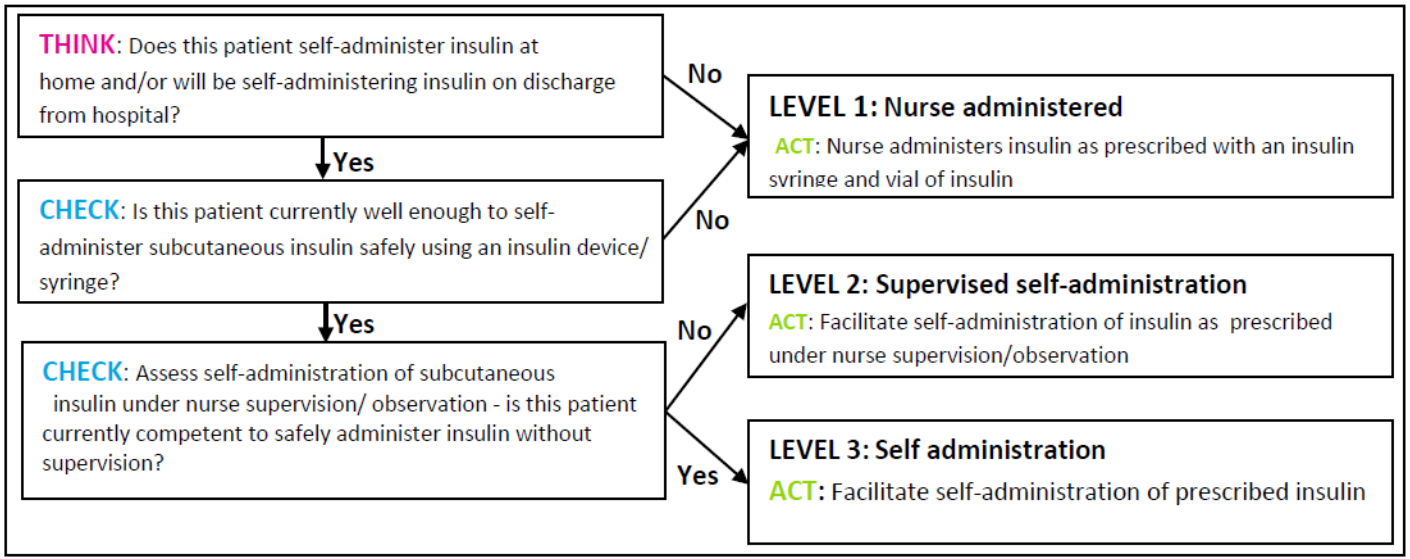
Subcutaneous Insulin Administration in Hospital Guideline



LEVELS	Checklists
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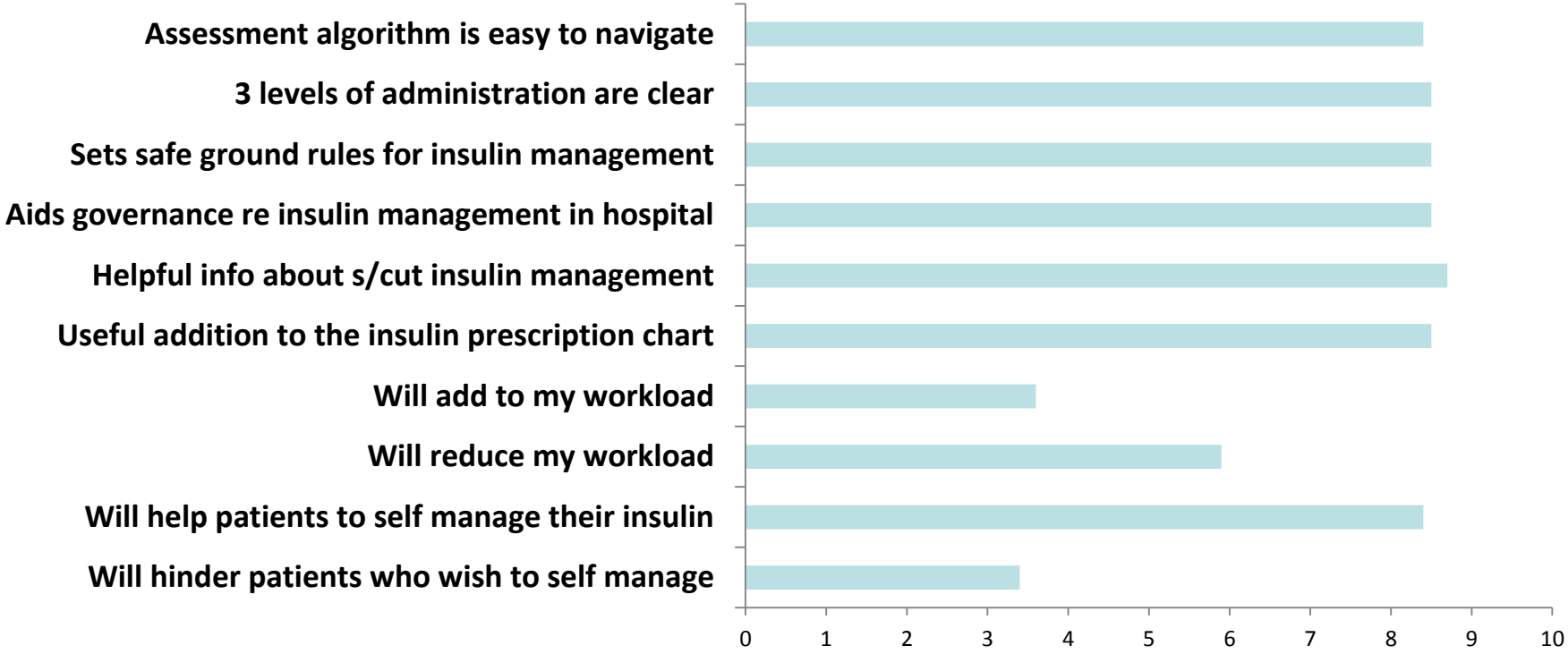
Feedback regarding insulin administration guidance

13 staff members provided feedback by rating 10 statements

0 strongly disagree – 10 strongly agree



DOB CHI

Barcode

Practical advice for administration of subcutaneous insulin

- Insulin pen devices and Continuous Subcutaneous Insulin Infusion pumps (CSII) are designed for 'self use' only.
- *Pen needles with automatic protective shields are available for use to reduce risk of needle stick injury.
- *Nurses should not administer insulin using an insulin device due to the risk of needle stick injury unless insulin safety pen needle is used.
- Do not extract insulin from prefilled insulin devices and cartridges with a syringe. This will damage the plunger mechanism. Also, if insulin is extracted from a pen device containing high strength insulin preparations (U200 per m/L and U300 per mL preparations) will lead to significant overdose.
- Patient's own insulin should be appropriately labelled with their name, DOB and CHI.
- Insulin pen needles and syringes should be used once only and disposed of in a sharps box.
- Cartridges are not interchangeable with different pen devices.
- Patient education must be facilitated if insulin device or insulin preparation is changed as devices often differ.
- **Refer to Diabetes Nurse Team as required**

Storage of insulin

- Identification of a safe insulin storage and sharps disposal is the responsibility of the registered nurse.
- Specific storage guidelines for each insulin preparation are available in the product package insert.
- 'In-use' prefilled insulin pen devices and cartridges can be stored at room temperature / in POD locker for a maximum of 28 days.
- Always document 'date of first use' on insulin vials and discard after 28 days.
- **Do not store 'in use' insulin devices in ward fridge** (there is a risk of cross infection if pens or devices are inadvertently used for more than one patient).
- Store **unopened** vials, pen devices and cartridges in the ward medicine fridge (2 – 8 ^{0}C).

Insulin storage: fridge audit

Fridge audit	Feb 2017	June 2017	Aug 2017	Nov 2017	Jan 2018	Mar 2018	May 2018	June 2018
No. fridges audited in NW	34	35	36	35	34	33	33	32
No. of fridges with 'in use' insulin pen devices	23	14	15	9	11	11	11	8
% with ‘in use’ insulin pen devices	68%	60%	58%	26%	32%	33%	33%	25%

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Insulin Pump therapy: Continuous Subcutaneous Insulin Infusion (CSII)

DTN UK
collaborate · evolve · support

CLINICAL GUIDELINE:
Guidelines for managing continuous subcutaneous insulin infusion (CSII, or 'insulin pump') therapy in hospitalised patients

Guideline for Monitoring and Managing Glycaemic Control for Adult In-patients with Diabetes

The recommended target blood glucose (BG) level is 6 -10 mmol/L with 4-12 mmol/L being acceptable (Joint British Diabetes Society). Blood ketone levels above 0.6 mmol/L are abnormal (blood ketone meter range is 0 - 8 mmol/L). Ketosis can occur at any BG level. Check ketones at diagnosis of diabetes and in patients who are acutely unwell. Always check for ketones in pregnant women who are acutely unwell irrespective of BG level.

Management of Hyperglycaemia

SITUATION

Blood glucose (BG) levels >10mmol/L increase the risk of osmotic symptoms of diabetes, dehydration and can delay healing. Hyperglycaemia can lead to Diabetic Ketoacidosis (DKA) or Hyperosmolar Hyperglycaemia Syndrome (HHS).

BACKGROUND

THINK of causes of high blood glucose levels, such as:

- Infection and/or stress response to illness
- Steroid therapy
- Nutrition e.g. supplements, naso-gastric feeding (NG) or dietary indiscretion
- Insulin and/or diabetes medication omission/inadequate dose
- Insulin or drug administration at an inappropriate time
- Insulin absorption problem e.g. technique/administration/injection site
- Pancreatic insufficiency/acute pancreatitis

ASSESSMENT

CHECK for potential cause of elevated BG levels i.e.

- Assess pattern of BG levels over the previous 48 hrs
- Check for signs of infection
- Check insulin/medication prescription, dose, time of administration, food intake, activity
- Check for factors which may affect insulin absorption
- Check credibility of BG monitoring e.g. hand washing prior to testing
- Check ability to self-manage insulin
- Check insulin delivery device
- If BG>15 mmol/L check ketone level to detect or exclude ketosis
- Ensure that patients using Continuous Subcutaneous Insulin Infusion (CSII) check pump function, pump programming, infusion set and its site.

RECOMMENDATION

ACT to address the cause(s) of hyperglycaemia

- If the trend of pre-meal BG levels is >10mmol/L, review medication and clinical status
- If ketone level is > 0.6mmol/L refer for medical review, consider increase in fluid and insulin
- Review and check BG and ketones 2 - 4 hourly until confirmed ketone free
- Consider adjustment of insulin /medication if steroid therapy is prescribed
- Increase frequency of BG monitoring following treatment change
- Adjust insulin/medication further on an ongoing basis as required
- Inform and agree all medication changes with patient/parent/carer
- Provide appropriate patient education and staff education as required
- Refer to the Diabetes Team for advice as required

Management of Hypoglycaemia

SITUATION

Blood glucose (BG) level <4mmol/L is a potentially dangerous side effect of insulin therapy and hypoglycaemic agents e.g. gliclazide, glipizide, glimepiride, glibenclamide. Hypoglycaemia is harmful and should be avoided. Prompt treatment is required in the event of hypoglycaemia – see below

BACKGROUND

THINK of the causes of low blood glucose levels, such as:

- Inadequate carbohydrate food intake
- Too much insulin and/or oral hypoglycaemic medication
- Reduction or withdrawal of steroid therapy
- Insulin absorption problem e.g. technique/administration/injection site
- Increased activity
- Renal or hepatic impairment or pancreatic insufficiency

ASSESSMENT

CHECK to identify the reason for hypoglycaemia:

- Assess pattern of BG levels e.g. over previous 48 hours
- Assess recent nutritional intake
- Identify the drugs prescribed that may precipitate hypoglycaemia
- Check insulin/medication prescription, dose, time of administration, food intake, activity
- Check for factors which may affect insulin absorption
- Check ability to self-manage medication if appropriate
- Increase frequency of BG monitoring following treatment change
- Check that patients prescribed insulin are educated in hypoglycaemia recognition and treatment

RECOMMENDATION

ACT immediately to treat hypoglycaemia with 15 - 20 grams of quick acting carbohydrate

- If patient is able to swallow – administer 15g of quick acting glucose e.g. 60 mL of Glucojuice
- If patient is confused or drowsy but able to swallow: administer 1-2 tubes of glucose gel
- If patient is unconscious/unable to swallow: administer IV Glucose 10% 150ml or 20% 75ml or 1mg IM Glucagon (adults)
- Note: Glucagon is not suitable in malnourished patients, in those with severe liver disease, in those treated with oral hypoglycaemic agents
- Provide complex carbohydrate snack promptly e.g. wholemeal bread/toast
- Observe and chaperone patient until recovery is complete
- Recheck BG in 15 minutes and repeat treatment if necessary
- Do not omit insulin: review and alter the insulin dose/oral hypoglycaemic medication administered before the episode of hypo if required
- Take appropriate action to prevent further hypoglycaemia
- Inform and agree any medication changes with patient/parent/carer
- Refer to the Diabetes Team for advice as required

BLOOD GLUCOSE MONITORING RECORD

For patients prescribed insulin use the Insulin Prescription and Administration Record (IPAR)

BARCODE

PATIENT ID LABEL

Ward

Hospital

Chart no.

DATE								
Time	Breakfast	Lunch	Tea	Supper	Breakfast	Lunch	Tea	Supper
Ketones urine/blood								
Blood glucose in mmol/L								
Hypoglycaemia Treatment								
BG rechecked by								

FOOT CPR

CHECK feet YES / NO
PROTECT feet neuropathy YES /NO
REFER if ulcer present YES /NO

Foot protection required: Yes / No

Foot referral made to ………………… ………………..date…………..

DATE												
Time	Breakfast	Lunch	Tea	Supper	Breakfast	Lunch	Tea	Supper	Breakfast	Lunch	Tea	Supper
Ketones urine/blood												
Blood glucose in mmol/L												
Hypoglycaemia Treatment												
BG rechecked by												

DATE												
Time	Breakfast	Lunch	Tea	Supper	Breakfast	Lunch	Tea	Supper	Breakfast	Lunch	Tea	Supper
Ketones urine/blood												
Blood glucose in mmol/L												
Hypoglycaemia Treatment												
BG rechecked by												

DATE												
Time	Breakfast	Lunch	Tea	Supper	Breakfast	Lunch	Tea	Supper	Breakfast	Lunch	Tea	Supper
Ketones urine/blood												
Blood glucose in mmol/L												
Hypoglycaemia Treatment												
BG rechecked by												

Troubleshooting guidelines

Quality controlled blood glucose meters should always be used in hospital by appropriately trained staff. Blood glucose (BG) levels should be checked on admission to hospital in all patients who are acutely unwell whether they are known to have diabetes or not. Aim for BG levels of 6-10 mmol/L (4-12mmol/L is acceptable) for in-patients with diabetes. BG testing four times per day is a minimal requirement during acute illness to detect risk associated with diabetes and its treatment. Refer to the Diabetes team for advice as required.

HYPERGLYCAEMIA MANAGEMENT

THINK BG levels >10mmol/L can cause osmotic symptoms of diabetes, dehydration and can delay healing. Hyperglycaemia can lead to Diabetic Ketoacidosis (DKA) in Type 1 diabetes or in susceptible Type 2 patients or Hyperosmolar Hyperglycaemia Syndrome (HHS).

THINK of the causes of hyperglycaemia including:

- Undiagnosed diabetes/stress response to illness
- Infection
- Pancreatic disease e.g. pancreatitis or post pancreatectomy
- Change in usual treatment e.g. stopping metformin in AKI
- Steroid therapy
- Nutrition e.g. supplements, naso-gastric (NG) feeding, parenteral nutrition (PN) or dietary indiscretion

CHECK Blood glucose (BG) and agree frequency of BG monitoring according to individual need

- Increase frequency of monitoring during illness
- Assess pattern and trends of BG levels
- Check BG up to four times daily in patients with pre existing diabetes receiving steroid therapy. In those with no preceding diabetes history test once daily e.g. before evening meal
- In patients receiving PN check BG at least twice in 24 hours, more frequently if hyperglycaemia develops or if the patient has pre existing diabetes
- Check diabetes medication prescription, dose and time of administration
- Check credibility of BG monitoring e.g. hand washing prior to testing
- Check for ketones during acute illness or vomiting if the patient is unwell
- In pregnancy check for ketones in all patients when acutely unwell and/or vomiting
- Review food intake and activity

ACT to identify and address the cause(s) of hyperglycaemia

- Ensure accurate patient identification and record and report results
- Consider the need for additional diabetes therapy e.g. during steroid therapy or enteral or parenteral feeding
- If the trend of pre-meal BG levels is >10mmol/L, review medication and clinical status
- If the ketone level is > 0.6 mmol/L refer for urgent medical review and increase fluid intake. Treatment with insulin may be required in ketotic patients
- Inform and agree any medication changes with patient/carer and provide appropriate information

HYPOGLYCAEMIA MANAGEMENT

THINK Blood glucose (BG) level <4mmol/L is a potentially dangerous side effect of insulin therapy and hypoglycaemic agents e.g. gliclazide, glipizide, glimepiride and, glibenclamide. Hypoglycaemia is associated with patient harm and is associated with an increased length of hospital stay.

THINK of the causes of low blood glucose levels, including:

- Inadequate carbohydrate intake
- Too high a dose of oral hypoglycaemic medication or inappropriate time of administration
- Reduction or withdrawal of steroid therapy
- Patient fasting or receiving bowel preparation prior to an investigation or procedure
- Patient "nil by mouth" e.g. due to swallowing difficulty
- Patient with impaired renal or hepatic function

CHECK Blood glucose (BG) and report, record and always recheck BG level following hypoglycaemia treatment

- Establish the likely cause of hypoglycaemia and rectify
- Assess pattern and trends of BG levels
- Assess recent nutritional intake
- Identify the drugs prescribed that may precipitate hypoglycaemia, review dose and the time of administration
- Increase frequency of BG monitoring following treatment change

ACT immediately to treat hypoglycaemia with 15 - 20 grams of quick acting carbohydrate

- If the patient is able to swallow – provide 60 mL of Glucojuice
- If the patient is confused/ drowsy but able to swallow: administer 1-2 tubes of glucose gel
- If the patient is unconscious or unable to swallow: infuse 75 ml IV Glucose 20% or 150 ml IV
- Glucose 10%
- Remember that IM Glucagon1mg (adults) is not suitable in malnourished patients, in those with severe liver disease, or patients treated with some oral hypoglycaemic agents
- IV Glucose and/or Glucagon must be prescribed if used
- Provide a complex carbohydrate snack promptly e.g. wholemeal bread/toast
- Observe and chaperone patient until recovery is complete
- Confirm recovery by rechecking BG in 15 minutes and repeat treatment if necessary
- Review medication and take appropriate action to prevent further hypoglycaemia
- Inform and agree any medication changes with patient/parent/carer
- Provide appropriate patient and healthcare professional education as required
- Ensure the Hypo box is restocked and available in the ward at all times

CONTACT DETAILS FOR DIABETES TEAM (Monday – Friday 9 - 5 pm)
Ninewells: Specialist Registrar for Diabetes bleep 5416 Diabetes Specialist Nurse tel. ext. 36009 (24 hour answering machine available) bleep 4872
Perth Royal Infirmary Diabetes Specialist Nurses tel. ext. 13476 (24 hour answering machine available) bleep 5288
Diabetes information www.diabetes-healthnet.ac.uk

Treatment and Management of Hypoglycaemia in Adults with Diabetes Mellitus in Hospital

Hypoglycaemia Algorithm

Hypoglycaemia is a serious condition and should be treated as an emergency regardless of level of consciousness. Hypoglycaemia is defined as blood glucose of less than 4mmol/L in people treated with insulin therapy and hypoglycaemic agents such as gliclazide, glipizide, glimepiride. If blood glucose is not less than 4mmol/L, but the patient is symptomatic, give a small carbohydrate snack for symptom relief.

Mild hypoglycaemia	**Moderate** hypoglycaemia	**Severe** hypoglycaemia (or during fast)
Patient conscious, orientated and able to swallow and not fasting	**Patient conscious and able to swallow, but confused, disorientated or aggressive**	**Patient unconscious/fitting, very aggressive or nil by mouth (NBM)**
Give 15–20g of quick acting carbohydrate, for example: 5–7 Dextrosol® tablets or 4–5 Glucotabs® or 60ml Glucojuice® or 150–200ml pure fruit juice[1]	**If patient capable and co-operative; treat as for mild hypoglycaemia** If patient is not capable and co-operative but can swallow; give 1.5–2 tubes of glucose gel, for example Glucoboost® (squeezed into mouth between teeth and gums).	**Check ABC and contact doctor urgently** **Stop IV insulin (if infusing)** Give IV glucose over 10–15 minutes as: 75ml 20% glucose or 150ml 10% glucose or 1mg Glucagon IM once only[2,3]
Recheck blood glucose level after 10–15 minutes.	Recheck blood glucose after 10–15 minutes.	If blood glucose still < 4mmol/L after 10 minutes; repeat IV glucose.
If blood glucose still <4mmol/L and patient is able to swallow repeat treatment up to 3 times.	If blood glucose still <4mmol/L; repeat above up to 3 times. If ineffective, use 1mg Glucagon IM (once only)[2].	If IV insulin has been switched off, restart infusion once blood glucose is > 4mmol/L and consider a reduced hourly rate of insulin.
If blood glucose < 4mmol/L or deteriorating at any stage, call doctor and consider IV glucose (as for severe) or 1mg Glucagon IM (once only)[2,3].	If blood glucose < 4mmol/L or deteriorating at any stage, call doctor and consider IV glucose.	

Ongoing management once blood glucose level is above 4mmol/L

Give 20g of long acting carbohydrate, for example two biscuits / slice of bread / 200–300ml milk / or next meal (give 40g if IM Glucagon has been used). If NBM, once blood glucose > 4mmol/L, give 10% glucose infusion at 100ml/hour (less in patients with renal/cardiac disease) until no longer NBM or reviewed by doctor. Patients with enteral feeding tube. Give 20g quick acting carbohydrate via enteral tube, for example 50–70ml Ensure Plus® or 60ml Glucojuice®*, then flush. Check blood glucose after 10–15 minutes. Repeat treatment up to 3 times or use IV glucose if needed. If IV insulin has been switched off, restart when Blood glucose is > 4mmol/L with concurrent IV glucose. Review the indication and need for ongoing insulin management. Continue regular capillary blood glucose monitoring for 24–48 hours. Provide hypoglycaemia education or refer to the diabetes team. **RESTOCK THE HYPO BOX.**

Caution
High concentration of IV glucose (50% glucose) is not recommended due to risk of extravasation.

[1] Avoid fruit juice in patients with renal failure.
[2] Glucagon may take up to 15 minutes to work and may be ineffective in undernourished patients, in severe liver disease and in repeated hypoglycaemia.
[3] Do not use Glucagon in oral hypoglycaemia agent induced hypoglycaemia.

Do not omit insulin, consider the cause of hypoglycaemia, treat and administer insulin as usual after dose review. Insulin omission can lead to diabetic ketoacidosis (DKA). Prevent further hypoglycaemia – review prescription for insulin and/or oral hypoglycaemia agent and adjust dose(s) if necessary.

* Updated April 2017 to remove Lucozade due to revised glucose content

diabetes thinkcheckact

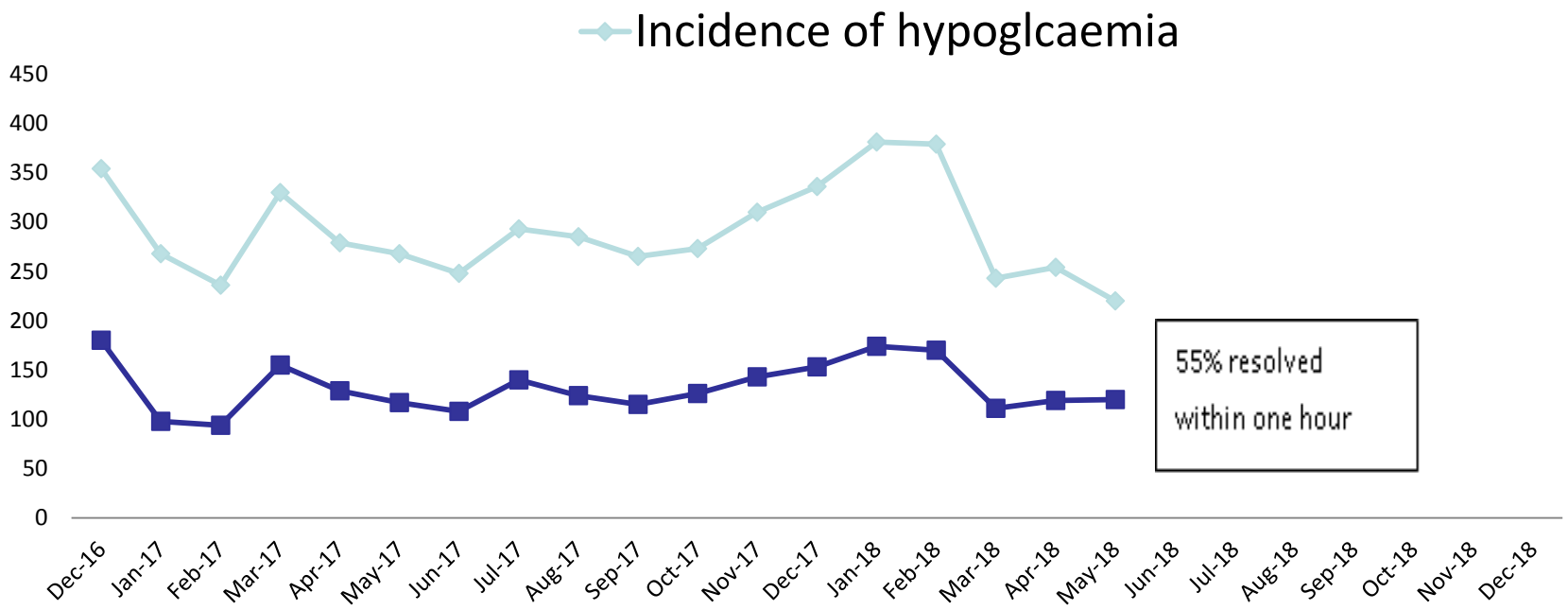
NHS SCOTLAND

Hypo boxes in every ward and department

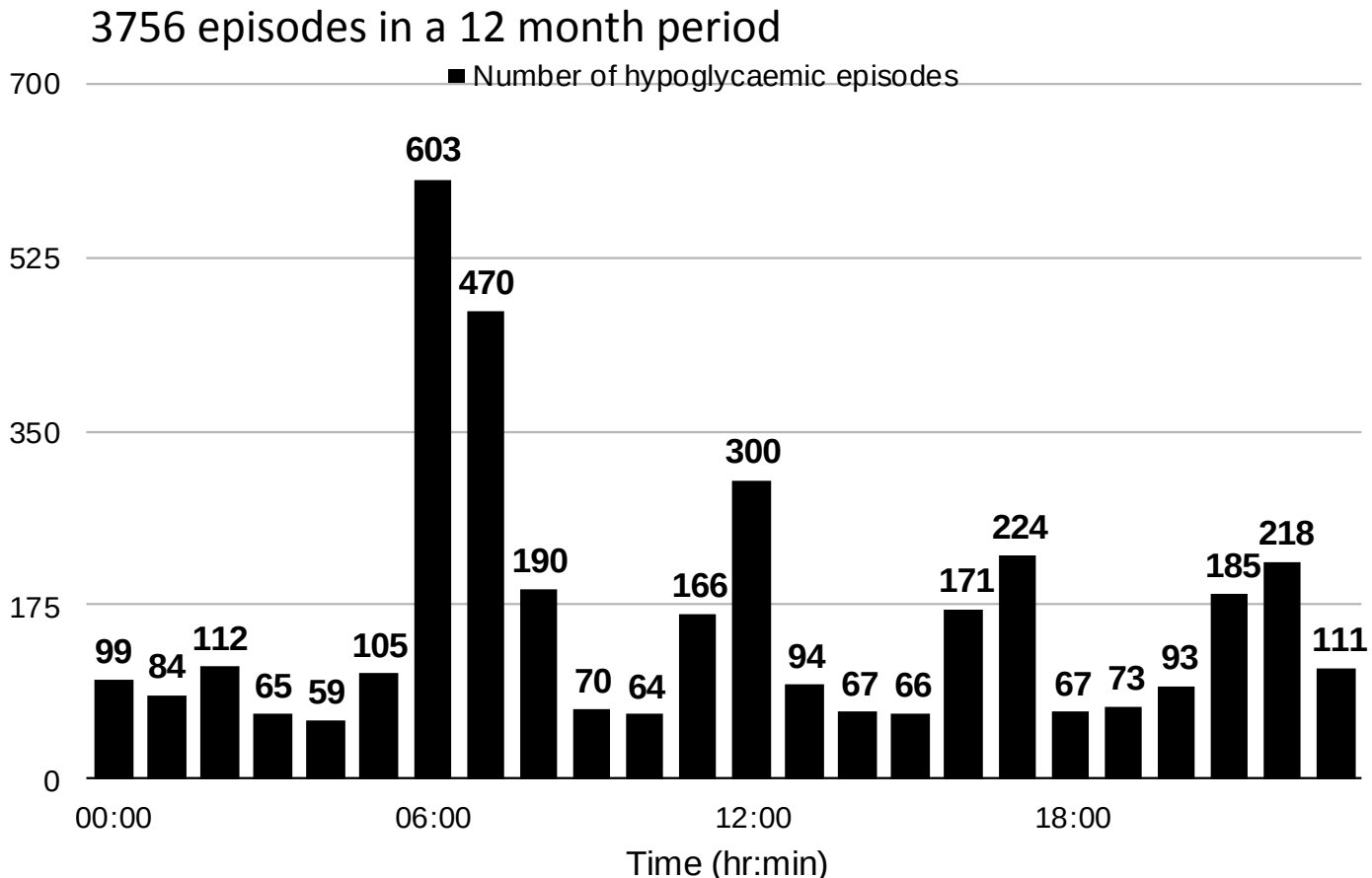
What does the data tell us?

diabetes thinkcheckact

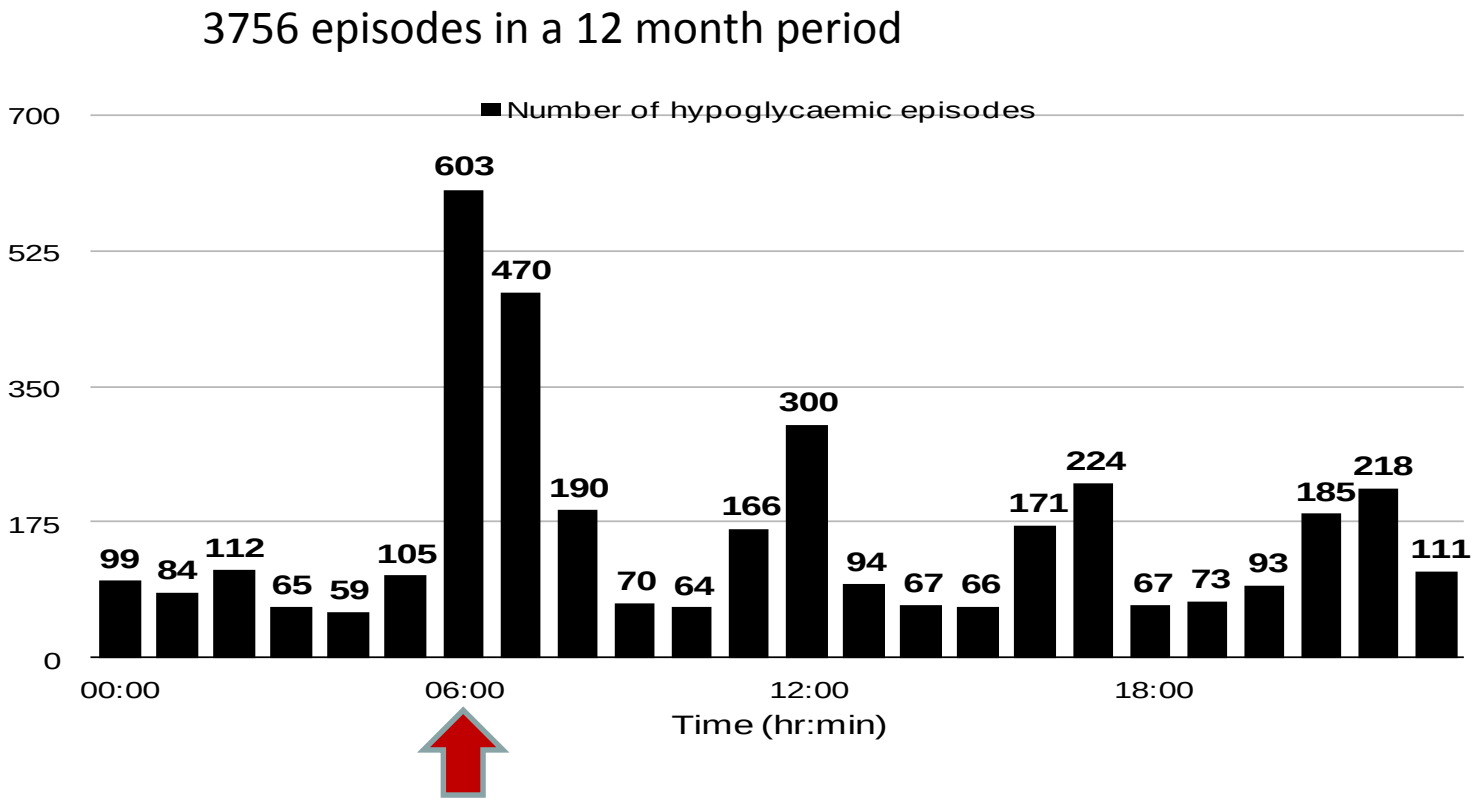
Hypoglycaemia Data NW



Learning from others.....



Time of hypoglycaemia

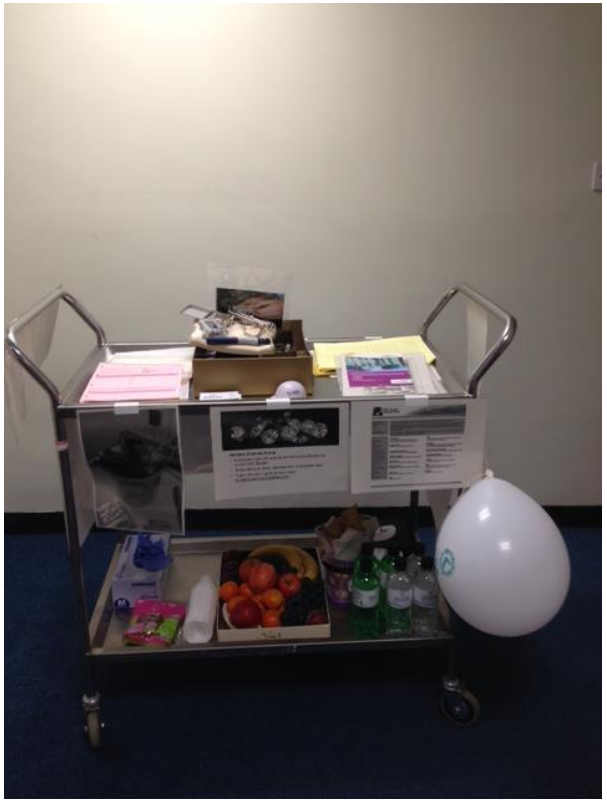


First thing in the morning

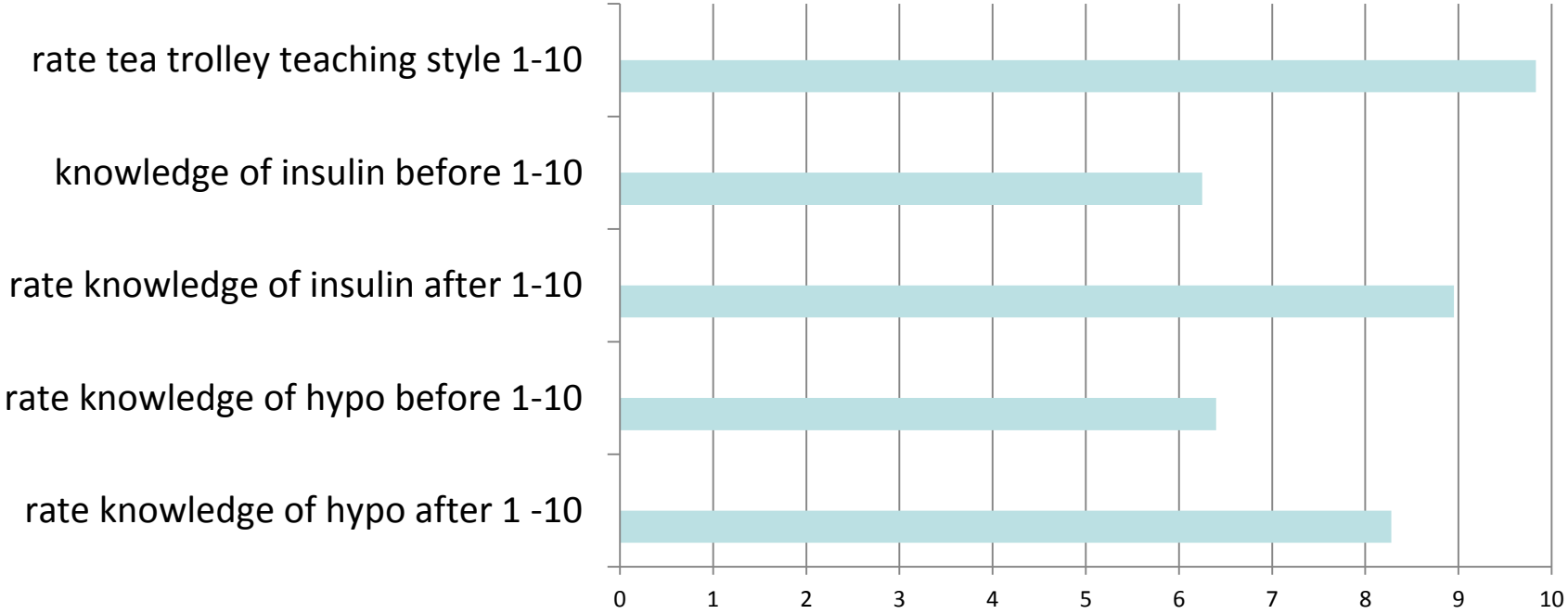
Ongoing work

- Striving to get the basics right
- Promoting Diabetes think check act elearning/tool kit
- Networking to share ideas
- DATIX – adverse drug event: hypoglycaemia
- Educating non specialists – trolley rounds proving popular.....

Insulin Safety Week May 2018

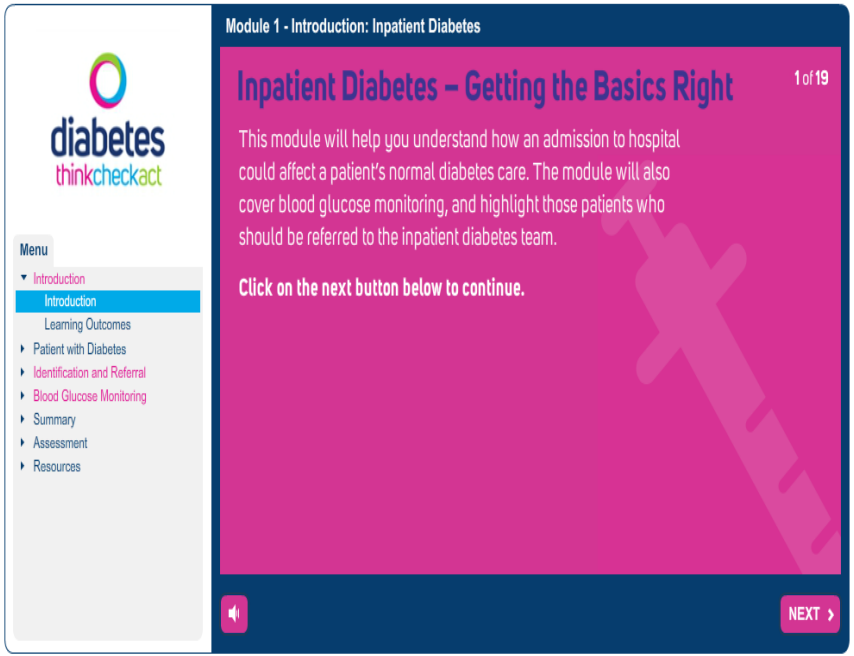


Feedback from 145 staff members from tea trolley teaching



Diabetes Think Check Act eLearning modules

- Getting the basics right
- Insulin administration
- Treatment and prevention of hypoglycaemia
- Insulin management
- Intravenous insulin
- CPR for Feet



Diabetes Diamond Group

- Interested and enthusiastic healthcare professionals across NHS Tayside
- Networking to drive improvement in diabetes care
- Monthly meetings
- MCN assist with communication and managing the mailing list

Key Learning Points

Adverse events are under reported

Measurement/audit data are key to evidencing harm and measuring improvement

Insulin safety must take cognisance of patients, staff and the risk of complaints/litigation

Every Person Every Time
SCOTTISH PATIENT SAFETY PROGRAMME
2008-2018
Ten years of improving safety

SPSP Medicines

Prepared by: Dr Steve Cleland, NHS Greater Glasgow & Clyde

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Scottish Patient Safety Programme 2008-2018
Ten years of improving safety

Presenter

Dr Steve Cleland

BSc, MBChB, PhD, FRCP(Glasg)

Consultant Diabetologist

Chair GGC Diabetes MCN Inpatient Subgroup

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INSULIN SAFETY

At the tipping point

The tip of the iceberg

Top ten tips

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Prevalence of Inpatient Diabetes in Greater Glasgow & Clyde

Snapshot audit for the QEUH campus (1,655 beds) on 6th April 2017 revealed 346 patients with Diabetes, including 33 with Type 1 Diabetes, giving an overall prevalence of 20.9%

Some areas predictably had higher prevalence eg

IP Specialty	Number of beds	Number of patients with Diabetes	Prevalence of Diabetes
Renal	74	33	45%
Vascular Surgery	42	26	62%
Respiratory	112	40	36%
Geriatrics	210	80	38%

Insulin as a high risk medicine in Greater Glasgow & Clyde: Story so far

Datix audit of insulin errors in GGC Jan-June 2016

- 34 errors
- Mainly insulin omission, incorrect dose or incorrect administration

Review of 8 SCIs related to insulin errors Feb 2016 – July 2017 in GGC

- 4 inpatient DKAs (surgical wards)
- 4 severe hypos (2 deaths) (DME & Paeds)
- Significant knowledge gaps identified – nursing and medical


TIPPING
POINT

Ten years of improving safety

Insulin as a high risk medicine in Greater Glasgow & Clyde: Challenges

- Lack of education
  - Insulin prescription and dose adjustment (medical)
  - Insulin administration (nursing)
- Ineffective implementation of Diabetes ThinkCheckAct
- Increasing use of pen insulin, including concentrated insulin
- No established patient self-administration pathway
- Poor roll-out of capillary blood ketone testing
- Lack of resource for use of linked IT systems to target high risk patients

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Patient quotes

“Some of the nurses had no idea how to work my insulin pen!”

“I told them I was having a hypo but nobody seemed to be listening”

“When it comes to my glucose control in hospital, I feel very vulnerable and anxious. I just don’t have confidence in the system!”

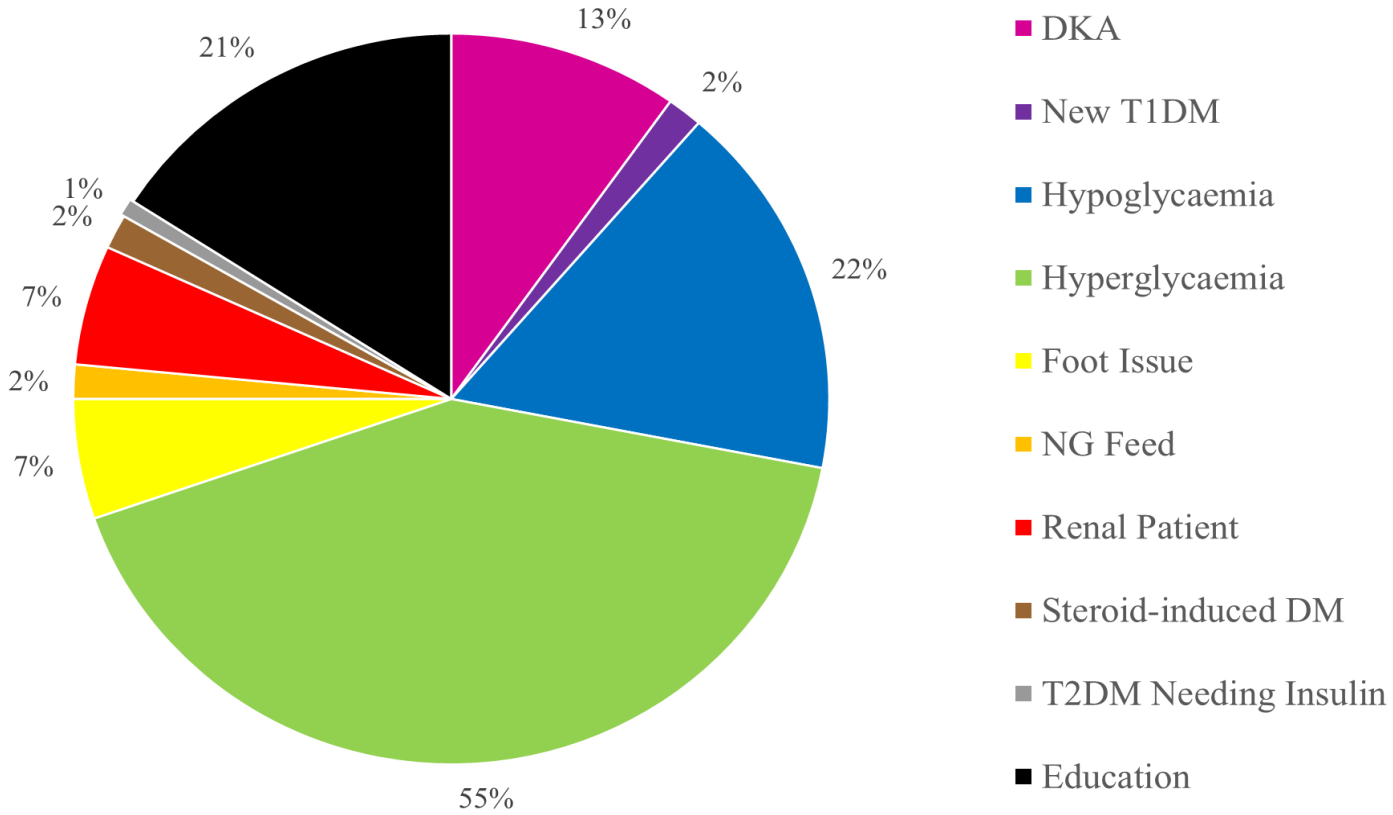
“Meal timings and lack of detail about meal content, carbs etc, is a complete nightmare for someone on insulin”

Innovation

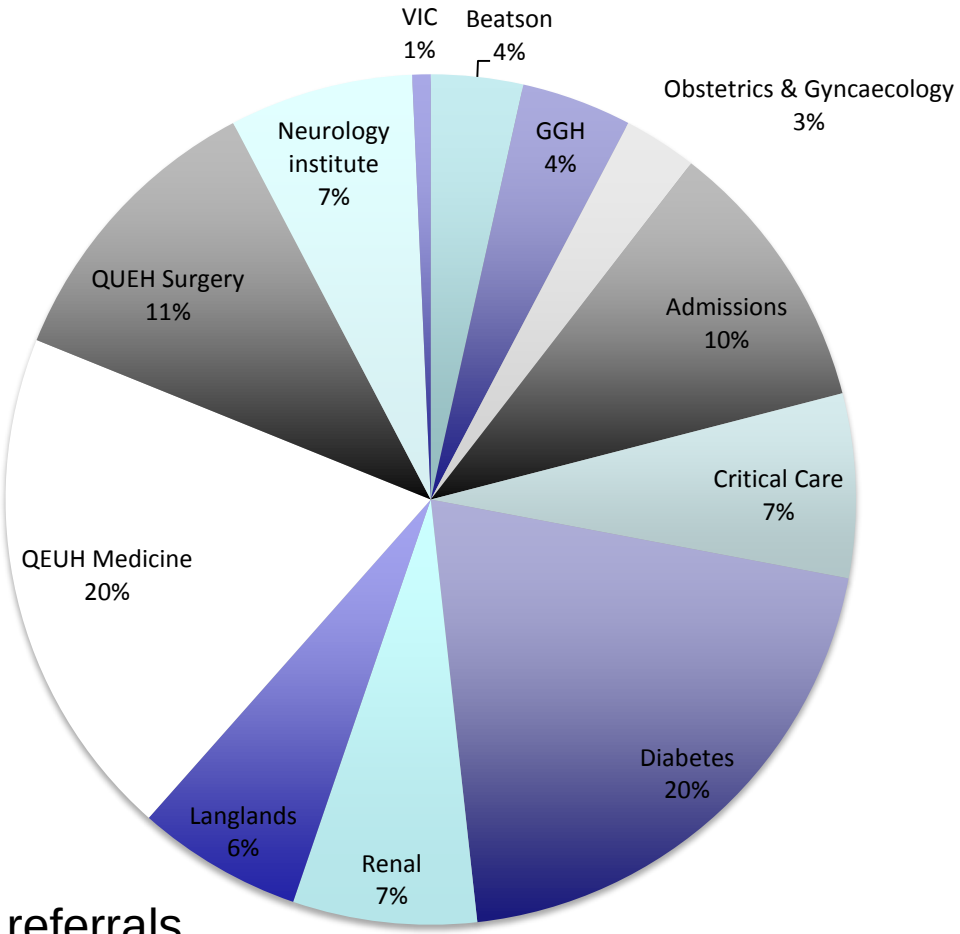
- Trakcare referrals for inpatients with Diabetes
- Diabetes ‘Team of the Week’: Consultant, SpR & DSN
- Response times excellent, mostly same day, within 1-2 hours if urgent
- Referral criteria adapted from Diabetes ThinkCheckAct

1. **<u>THINK</u> of the risks associated with Diabetes and illness during hospital admission**
2. **<u>CHECK</u> referral criteria for Inpatient Diabetes Team**
    1. New diagnosis of Type 1 Diabetes
    2. Diabetic Ketoacidosis (DKA)
    3. Hyperglycaemic Hyperosmolar State (HHS)
    4. Recurrent or severe hypoglycaemia
    5. Active foot ulceration
    6. Hyperglycaemia, where attempts at treatment titration is unsuccessful
    7. Requiring insulin initiation
    8. Pregnancy
    9. Parenteral or enteral feeding
    10. Intravenous insulin > 48 hours
    11. Using continuous subcutaneous insulin infusion pump
3. **<u>ACT</u> by submitting an Inpatient Diabetes Trakcare referral**

diabetes
thinkcheckact

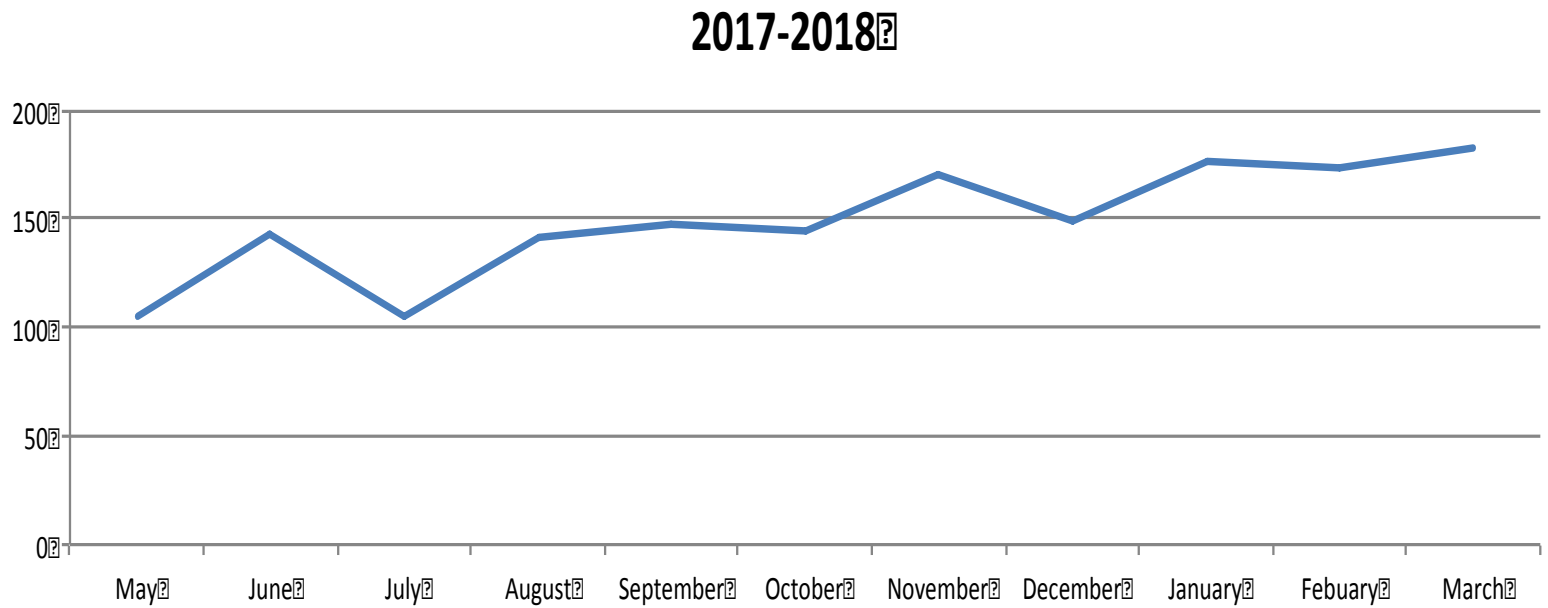


Reasons for Trakcare referrals



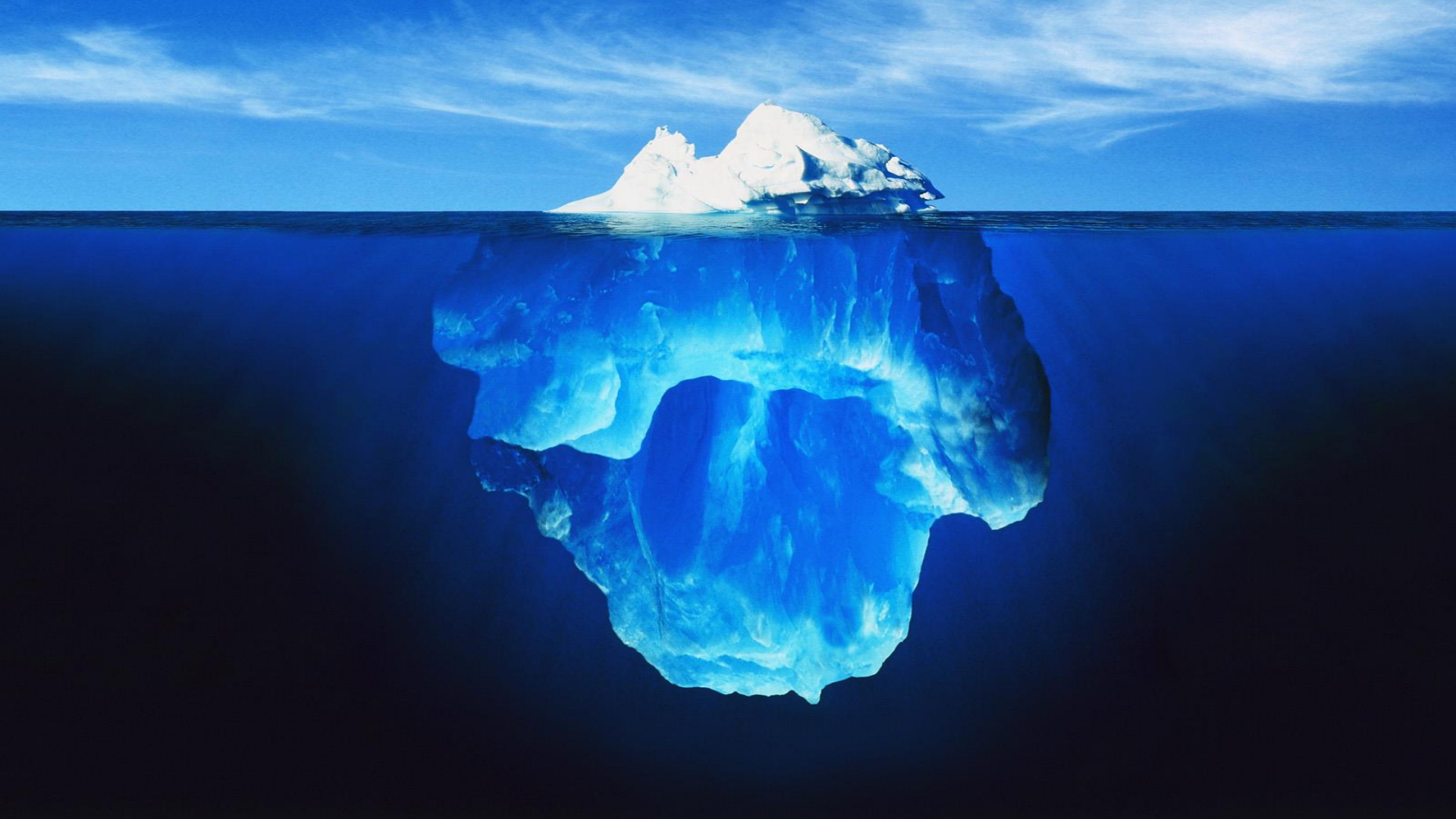
Source of Trakcare referrals

Referrals have increased by 80% in past year



Data outcome measurements

- Hypoglycaemia
- Effective treatment of hypoglycaemia
- Time in range
- Glucose variability
- Length of stay
- Patient surveys
- Staff surveys



Further innovation

- Education
  - Insulin prescription and dose adjustment (mandatory Dr e-induction)
  - Pens / safety needles / ‘top ten tips’ (nurses – rolling programme)
- Hypobox check and audit
- Implementation of new VRIII pathway in GGC
- Pilot of insulin self-administration pathway (based on Tayside model)
- Phased inplementation of capillary blood ketone testing (high prev areas)
- Pilot of linked IT systems to proactively target high risk patients

TOP 10 TIPS:

Insulin safety ‘top ten tips’

1. **Always check type of insulin, dose and frequency of administration with at least 2 sources (eg ECS and patient)**
2. **If patient uses pen insulin, prescribe pen insulin, and administer pen insulin**
3. **Use pen safety needles (ensure appropriate training)**
4. **Always prescribe on Insulin Prescription Charts with ’units’ pretyped. Never write U or IU after the number!**
5. **Be aware that changes in patient’s condition may affect insulin requirement (nutrition, steroids, sepsis, renal function) and adjust doses as necessary (target pre-breakfast and pre-evening-meal CBG 6-10 mmol/l)**

Insulin safety ‘top ten tips’

6. **Continue basal / long-acting background insulin in a Type 1 patient, even if fasting or NBM (dose may need adjusted)**
7. **Ensure that basal insulin has been given before discontinuing intravenous insulin**
8. **If a patient on an insulin pump is admitted and unable to self manage, remove pump and start variable-rate intravenous insulin infusion (VRIII)**
9. **Be aware of concentrated pen insulins (Tresiba 200units/ml, Toujeo 300units/ml, Humalog200units/ml). Never draw insulin from a pen with a syringe!**
10. **Be aware of Xultophy (Tresiba100units/ml + Liraglutide, fixed combination). Advise temporary switch to Tresiba100units/ml as inpatient (‘dose steps’ = units)**

Successes and Challenges

- Successes
  - Awareness raising of insulin safety issues at high level
  - Implementation of Trakcare referrals
  - Consensus, pilot and impending implementation of VRIII pathway
  - Mandatory insulin safety module on Junior Docs e-induction
  - Hypobox awareness and appropriate use
  - Ketone testing – steady progress
- Challenges
  - How to engage busy nurses in insulin safety education
  - Lack of staff resource to utilise available linked IT systems

Key Points for Sharing:

A series of datix insulin errors and serious clinical incidents have been **the tipping point** for insulin safety awareness raising in GGC

Attempts to respond to this have been challenging within a neutral budget resource and responding to referrals is only **the tip of the iceberg** of inpatient insulin issues

'Education, education, education' is a key message and we are exploring innovative methods of upskilling HCPs involved in insulin prescription and administration, including the **'top ten tips'** campaign

Areas we would like to learn from others:

How best to reach ward nurses for insulin education?

Insulin self-administration protocol experience?

How best to utilise the linked IT systems to identify high risk patients?


QUESTIONS?

WebEx Series

- Patient empowerment
- Education
- QI support
- Work processes
- Recognition for excellence
- Digital [IT] systems

SCOTTISH PATIENT SAFETY PROGRAMME 2008-2018

Ten years of improving safety

Webex Series 2018/2019			
Date	**Time**	**Presenters**	**Topic**
Thursday 16th August	3pm – 4pm	Northern Ireland	SMAC2 and MITS – supervision for safer prescribing
Thursday 20th September	3pm – 4pm	SPSP Medicines	Bleeds associated with medicines use
Thursday 18th October	3pm – 4pm	NHS Greater Glasgow & Clyde, NHS Western Isles and NHS Orkney	Omitted Medicines - EiC

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SCOTTISH PATIENT SAFETY PROGRAMME 2008-2018

EVERY PERSON EVERY TIME

Transitions, Omissions and High Risk Medicine

WebEx Series 2018–2019

SMAC2 and MITS –
supervision for safer prescribing
Northern Ireland

Thursday 16 August 2018
3pm–4pm

@SPSPMedicines
#SPSPMeds

As part of Healthcare Improvement Scotland's ihub, SPSP activities support the provision of safe, high quality care, whatever the setting.

See you on 16th August…….

spsp-medicines.hcis@nhs.net

http://ihub.scot/spsp/medicines/

 @SPSP Medicines

Looking forward
to welcoming you to...

NHS SCOTLAND 70 YEARS #nhsscot70

Glasgow 2019
FORUM