Insulin master class- Insulin regimens: One Size Doesn’t Fit All

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Learning objectives

• At the end of this session you will:
• Have gained an understanding of current National and International insulin guidelines
• Be able to discuss factors that can assist the healthcare professional and the person living with diabetes in the various insulin treatment options and regimens available.
• Be aware of newer insulin preparations including biosimilar and high concentration insulin
• Be able to describe the risks and safety precautions required when using insulin.
Insulin 1922
Insulin

• Until the 1980s insulin was available in different “strengths” 40 or 80 strength
• Then came 100 units of insulin in 1ml (U100)
• Now new “different strengths” are back
• U200, U 300 and U500 insulin is available
How many people use insulin in the UK?

• 3.7 million) have diabetes, 8% -type 1 diabetes, 90% -type 2 diabetes
• 2% - other type of diabetes
• 20-30% are insulin treated
• Between 1991 and 2010, UK insulin users trebled in line with increasing numbers diagnosed with type 2 diabetes


National guidance on insulin use

SIGN 116, NICE Guidance for Type1 and type 2 and pregnancy are available – All are due to be updated
Individual preference EASD/ADA recommendations are current
• Glycaemic targets
• Lifestyle issues
• Dexterity
• Cost
• Family support
• Preconception and health beliefs
The six steps to insulin safety

**Humulin®**
Humulin® I
Humulin® M3
Humulin® S
Humalog® 100 units/mL
Humalog® 200 units/mL
Humalog® Mix25
Humalog® Mix50
Abasaglar

**Humalog®**
Humalog® 100 units/mL
Humalog® 200 units/mL
Humalog® Mix25
Humalog® Mix50

**Abasaglar**

**Actrapid®**
**Fiasp**

**Levemir®**
**NovoMix®** 30
**NovoRapid®**
**Tresiba®** 100 units/mL
**Tresiba®** 200 units/mL
**Xultophy®**

**Insuman® Basal**
**Insuman® Comb 15**
**Insuman® Comb 25**
**Insuman® Comb 50**
**Insuman® Rapid**
**Lantus®**
**Toujeo®**
**Apidra®**
**Insulin Lispro Sanofi**

**Hypurin® Porcine 30/70**
**Hypurin® Porcine**
**Isophane**
**Hypurin® Porcine Neutral**

**Semglee**
National guidance

NICE Guidance Type1 (NG 15) and Type 2 diabetes (NG 28), ADA 2019

• Insulin treatment of choice
• Glycaemic targets
• Lifestyle issues
• Dexterity
• Family support
• Preconception and health beliefs
Insulin types

- Short acting
- Ultra rapid acting
- Rapid acting
- Intermediate acting
- Long acting
- Pre-mixed insulin
Higher concentration insulin

- 200 units/mL
- 300 units/mL - Toujeo (Intermediate acting analogue)
- 500 unit/mL insulin (short acting) is used in some countries – each mark on the syringe is 5 units
Biosimilar Insulin

• A “biosimilar” is a biological copy that is not identical, but demonstrates similarity to the original product, in terms of quality, efficacy, and safety

• Biosimilar insulin is cheaper to develop than other analogue insulin
We know what insulin is available but what regimens should be used in individualised care?
• Aged 22 years
• Height 6 ft. 7 (200cm)
• Slim waist
• Exercises ++
• Develops type 1 diabetes
• What insulin regimen should be used?
• Which type of insulin is needed?
• What HbA1c targets are needed?
SIGN 116- Type 1 Diabetes

Recommends:
Intensive insulin therapy (part of a comprehensive support package).
Basal insulin analogues in those experiencing severe or nocturnal CSII therapy should be considered in patients that experience recurring episodes of severe hypoglycaemia.
NICE NG15- Type I diabetes and insulin in Adults

• MDI regimens are recommended

• Twice-daily mixed [biphasic], basal-only, or bolus-only regimens) are not recommended for adults with newly diagnosed type 1 diabetes.

• Twice-daily insulin detemir should be offered, unless the person is achieving their agreed target on an existing regimen, in which case that can be continued.

• Twice-daily basal insulin injection is not acceptable to the person, in which case once-daily insulin glargine or insulin detemir can be considered.

• If Insulin detemir is not tolerated, in which case once-daily insulin glargine can be considered.

• Other basal insulin regimens should be considered only if targets are not achieved
NICE NG 15 (2015) Type 1 diabetes and insulin

• A rapid-acting insulin analogue injected before meals is recommended, rather than rapid-acting soluble human or animal insulin.

• The routine use of rapid-acting insulin analogues after meals should be discouraged.

• If the person has a strong preference for an alternative mealtime insulin, they should be offered their preferred insulin.

If a multiple daily injection basal–bolus insulin regimen is not possible and a twice-daily mixed insulin regimen is preferred:

• A twice-daily human mixed insulin regimen should be considered for most people. If persistent hypoglycaemia consider using an analogue insulin.
HbA1c and blood glucose targets (Type 1 diabetes)

• Fasting plasma glucose level of 5–7 mmol/L on waking.
• Plasma glucose level of 4–7 mmol/L before meals at other times of the day.
• Support adults with type 1 diabetes to aim for a target HbA1c level of 48 mmol/mol (6.5%) or lower, to minimize the risk of long-term vascular complications.
• Ensure that aiming for the HbA1c target is not accompanied by problematic hypoglycaemia.
Continuous subcutaneous insulin infusion or ‘insulin pump’ therapy
NICE Guidance

Recommended therapy for adults and children >12 years when;
• All attempts to achieve HbA1C on MDI result in disabling hypoglycaemia (this may be unpredictable, cause anxiety or reduced quality of life)
• HbA1C remained high >69mmol/mol (8.5%) despite high level of care

Or <12 years when;
• MDI impractical or inappropriate
• It is also recommended all individuals with diabetes have a trial with MDI between the ages of 12-18 years

CSII is not recommended by NICE for the treatment of type 2 diabetes
NICE Recommendation
(Specialist Teams)

• CSII therapy should be initiated only by a trained specialist team comprising:
  - A physician with a specialist interest in insulin pump therapy
  - A diabetes specialist nurse
  - A dietitian
• People wanting to use an insulin pump must be using a basal bolus regimen and have attended a carbohydrate counting course
• They must be willing to do multiple blood glucose testing each day if they use CGMS/Flash glucose monitoring devices
Superhero with type 2 diabetes

- Aged 40 years
- Given up his super hero work
- Depressed
- Weight now 162 KG
- Little exercise
- Central obesity
- Type 2 diabetes
- On maximum Metformin
- Osmotic symptoms and needs insulin
- Which regimen should he use?
ADA/EASD Consensus Guidelines 2018
davies m et al. diabetes care 2018; 41: 2669-2701.
Type 2 diabetes and blood glucose targets

HbA1c:
• 53 mmol/mol at diagnosis
• 58 mmol/mol for ongoing care once on Metformin plus
• Clinical targets should be individualised
Helen Parr (Elastigirl)

- 38 years old
- Mum to 3 children
- What if she had type 1 diabetes?
- Consider what insulin regimen would she need?
- What HbA1c targets and BG readings are needed in pregnancy
NICE NG3 (2015)

• HbA1c target of < 48 mmol/mol
• A fasting plasma glucose level of 5–7 mmol/litre on waking and
• A plasma glucose level of 4–7 mmol/litre before meals at other times of the day.
• Risk of hypoglycaemia is high and particularly in 1\textsuperscript{st} trimester
Diabetes and CKD
NICE NG182 (2014)
Insulin and CKD

• Insulin requirements in individuals with type 2 diabetes and diabetic nephropathy may increase in the early stages of CKD as a result of insulin resistance.

• However as renal function deteriorates and because the kidney excretes insulin, the doses of insulin may need to be reduced to minimise the risk of hypoglycaemia; because insulin has a longer profile when CKD slows down excretion.

• In people using insulin therapy with CKD 3b or below and where the HbA1c is 58 mmol/mol or below, consider dose reduction (Winocour et al 2018).
Frailty
Frailty Guidance

• The fit older adult with diabetes – 53 -58 mmol/mol
• Moderate – severe frailty- 58-64 mmol/mol
• Severe frailty - cautious use of insulin and metformin mindful of renal function.
• Very severe frailty- 64 mmol/mol -70mmol/mol and withdraw sulfonylureas and short-acting insulin because of risk of hypoglycaemia and
• Review timings and suitability of NPH insulin with regard to risk of hypoglycaemia.

End of life care and insulin

- Do NOT stop insulin in people with type 1 diabetes
- In type 2 diabetes insulin can often be significantly reduced or stopped
- Aim for blood glucose readings 6-15 mmol/L and no symptoms
Useful resources
References


- Gov.UK (2019) GLP-1 receptor agonists: reports of diabetic ketoacidosis when concomitant insulin was rapidly reduced or discontinued. https://www.gov.uk/drug-safety-update/glp-1-receptor-agonists-reports-of-diabetic-ketoacidosis-when-concomitant-insulin-was-rapidly-reduced-or-discontinued


