Module B
Treating Diabetes

2 Injectable therapies

Learning outcomes

Provide an overview of injectable therapies used in the management of diabetes

To identify safety issues relating to the use of insulin and GLP-1 receptor agonists

Treatment of diabetes -1

Treatments for diabetes usually depends on:

- The type of diabetes – type 1 or type 2.
- How long the individual has had diabetes.
- How well their diabetes is controlled.
- Whether any diabetes related complications exist that influence treatments given, e.g. renal (kidney) impairment

Treatment of diabetes -2

- Treatments for diabetes have been developed in order to reduce blood glucose and thus reduce the risk of long-term complications such as chronic kidney disease, foot ulceration and amputation and diabetes-related blindness.
- Important elements of a diabetes treatment programme are a healthy diet and regular exercise.
- People with type 1 diabetes will need to take insulin only and those with type 2 diabetes will need oral or injectable non-insulin treatments and/or insulin.

Type 1 diabetes

- People with type 1 diabetes need insulin to sustain life and have to take injections every day as they are unable to produce insulin of their own.
- Insulin is usually given twice daily or more intensively, for example, by using a multiple dose regime which may mean they take 4 or more injections a day or use an insulin pump.
- In type 1 diabetes, insulin must never be discontinued.

Type 2 diabetes - 1

- Preventing type 2 diabetes is helped by developing a good exercise culture when you are young.
- People with type 2 diabetes produce some insulin but it may not have its full effect because of insufficient quantities and/or insulin resistance.
- Initial treatment of type 2 diabetes is diet and exercise but as the condition usually progresses, other medications are added systematically into their treatment plan.
- This process may take several years.

Type 2 diabetes - 2

- GLP-1 receptor agonists are one of these medications. They are given twice daily, once daily or by weekly injection. GLP-1s are recommended in people who are very overweight (BMI > 35kg/m^2) or have sleep apnoea, or when other oral treatments fail to achieve targets.
- Treatments in this class include: liraglutide, exenatide
- The use of a GLP-1 may:
  - Lead to weight loss
  - Improve HbA1c
  - Reduce appetite
  - Lead to a feeling of satiety
- The main side effect is nausea/vomiting

Goals of insulin therapy

- To be part of an individualised approach to care
- To increase the chances of improving diabetes control and reduce symptoms of high glucose levels
- To reduce the complications of diabetes by improving diabetes control
- To maintain the highest level of wellbeing and quality of life

From: AbdelHafiz AH. Insulin therapy. In: Sinclair AJ et al. Diabetes in Old Age, 4th Edition, Wileys & Sons, 2017

Insulin

- There are many types of insulin produced in different strengths and forms of delivery such as vials, insulin cartridges and prefilled pen devices.
- If a resident takes insulin it is vital to know the exact type of insulin used, what dose should be given, and how and when it should be given safely.

Insulin Regimens for Care Homes

Background

- There has been little research studying insulin therapy in care home residents
- This lack of research inevitably has led to a lack of consistency in guidance on how best to use insulin within these settings.
- A former practice of using ***sliding scale insulin*** was shown to be ineffective and even dangerous and is not advocated.

Insulin regimens

Various regimens are possible including the use of pre-mixed intermediate-acting and short-acting insulins.

However, a reasonable and less complex approach to treatment with insulin appears to be:

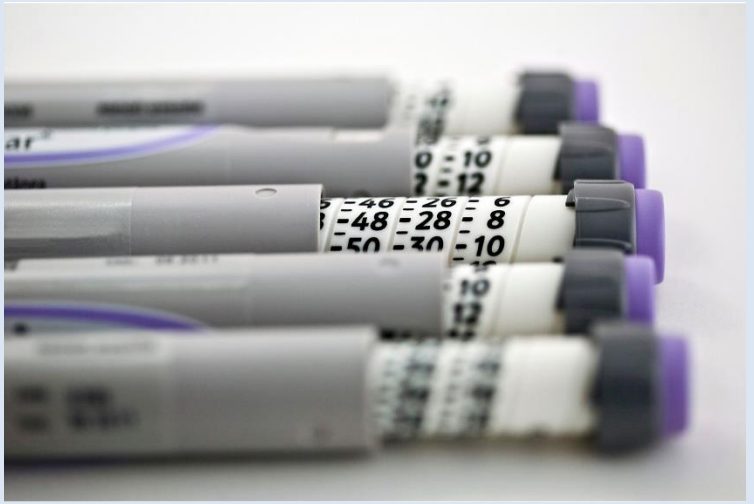
- For type 2 diabetes, a once-daily or twice-daily long-acting basal insulin analogue (e.g. determir, glargine, degludec) - 24-hour action and 'peakless' profile: reduces risk of hypoglycaemia
- This can be combined if necessary with a short-acting insulin analogue (e.g. lispro, aspart, glulisine) at meal times depending on the goals of treatment for the individual resident with diabetes.
- For type 1 diabetes, a basal-bolus regimen can be initially considered

Insulin pumps – usually used in type 1 diabetes according to strict NICE criteria, and unlikely to be used or appropriate in residents with diabetes. See: https://cks.nice.org.uk/insulin-therapy-in-type-1-diabetes#!scenario

Insulin

The **Right** Insulin should always be given:

- In the **Right** Way
- In the **Right** dose
- At the **Right** Time
- By the **Right** person
- To the **Right** resident



For storage & disposal aspects of insulin in the care home, consult your manager: all insulin needles/syringes must be disposed of after use; for insulin pens, consult your manager

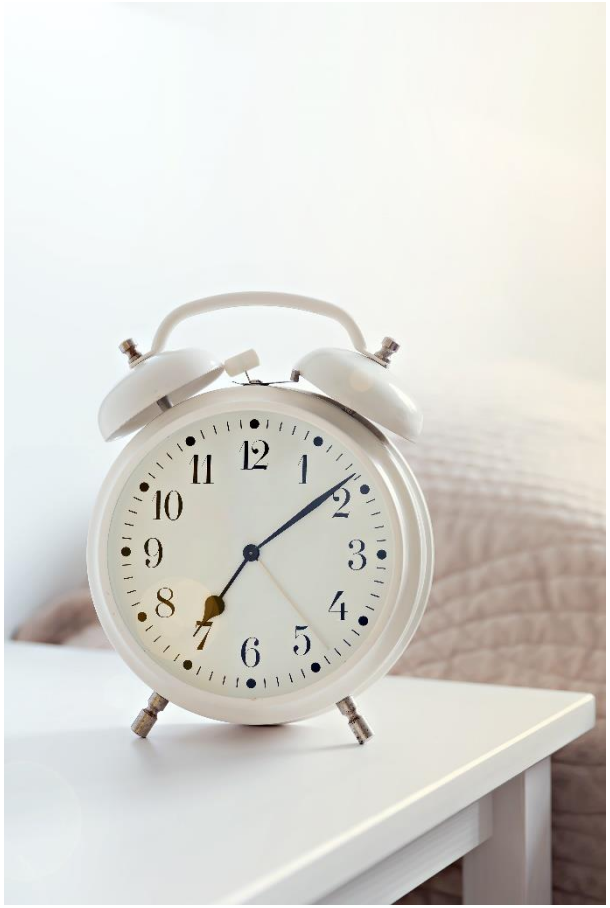
Treating the right resident with insulin

*NHS Health Education England: Safe Use of Insulin: https://www.e-lfh.org.uk/programmes/safe-use-of-insulin/

The Right insulin	The Right way	The Right dose	The Right time	The Right person
Clear record of: name strength delivery details (e.g. insulin pen) Check resident ID badge to ensure it is the right resident Check with another healthcare professional if in doubt	Use the correct insulin device Never draw up insulin from cartridge into pen Rotate sites of injection 5 or 6 mm length needles do not need skin pinching - a 8mm needle **does**	Insulin is given in 'units' Insulin is prescribed by a doctor or nurse prescriber **NEVER** abbreviate 'Units' to 'U' - risk of **ERROR** in dosing Always check prescribed dose when using a pre-filled pen	Always check the timing of the insulin to be given in relation to meals and bedtime	Encourage all capable residents to manage their own insulin injections Only suitably trained and competent healthcare professionals should administer insulin All those who administer insulin to a resident should have received local training or the national safe use of insulin e-learning module*

Blood glucose testing for those on Insulin

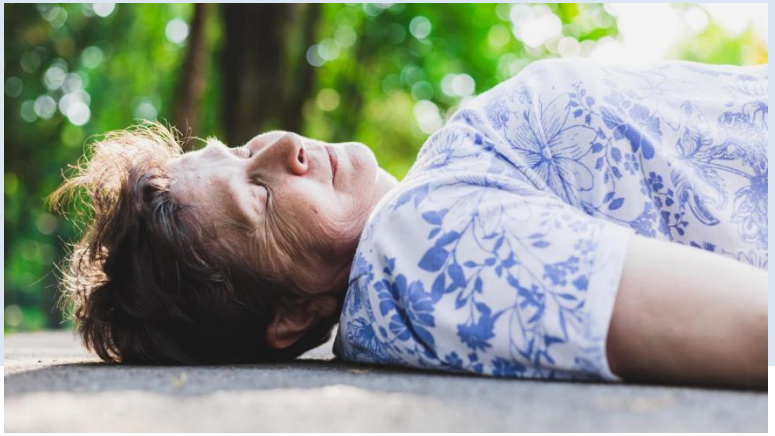
- Where insulin is used blood glucose should be monitored at least twice a day in people with good control at regular times if possible
- However, many factors may influence these times: a change in the routines at the care home, non-availability of staff, resident becoming ill, etc.
- Testing should be more frequent often in those where there is poor diabetes control or a risk of hypoglycaemia.



Main side effects -Insulin

Side effects:

- Some patients may experience some stinging or bruising at the injection site.
- The main side effect is **hypoglycaemia**, particularly in older people who may not eat as much or as regularly.
- Hypoglycaemia can lead to drowsiness or even loss of consciousness



GLP-1 receptor agonists (GLP-1 RAs)

- This type of medication is also injected and works by increasing the levels of hormones called ‘incretins’.
- These hormones help the body to produce more insulin only when needed and reduce the amount of glucose being produced by the liver when it is not needed
- GLP-1 RAs are only used in people with type 2 diabetes, who are markedly overweight or when other treatments are not tolerated.
- GLP-1 RAs carry a low risk of hypoglycaemia unless they are used in combination with a sulphonylurea or insulin.

GLP-1 RAs

- **There is limited evidence of use of GLP-1 RAs in residents with diabetes**
- The use of a GLP-1 RA in a resident with diabetes should only be undertaken with the full agreement of the doctor (GP) and resident (or family) as side-effects can be a problem
- Once started, a worthwhile improvement in diabetes control should be demonstrated within 3-6 months of its use.
- Blood glucose needs to be checked regularly particularly if combined with another glucose-lowering agent to avoid hypoglycaemia.

GLP-1 receptor agonists

There are five different GLP-1 RAs on the market

- Exenatide (Byetta) – twice daily
- Modified release Exenatide (Bydureon) – weekly
- Liraglutide (Victoza) – daily
- Lixisenatide (Lyxumia) – daily
- Dulaglutide (Trulicity) – weekly
- Semaglutide (Ozempic) – weekly (a new oral preparation is now available)

GLP-1 receptor agonists

GLP-1 RAs should not be used in children, women of child-bearing age or those adults with:

- Type 1 diabetes
- A history of pancreatitis
- A history of inflammatory bowel disease and diabetic gastroparesis
- GLPs are not recommended for those with severe renal impairment (eGFR <30 ml/min/1.73 m^2) and a dose reduction is required in moderate impairment (eGFR 31-59 ml/min/1.73 m^2 -except liraglutide) – please consult with your GP or community diabetes nurse for advice if any of your residents with diabetes are taking this medication.

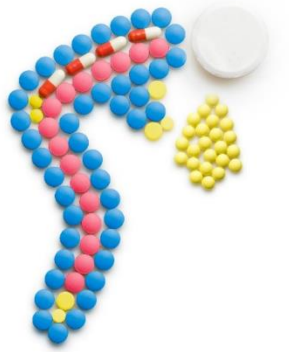
GLP-1 receptor agonists

The use of GLP-1 RAs in residents with diabetes should only be considered with the approval of the GP or diabetes team providing advice.

The potential side-effects can limit the use of these treatments in residents with diabetes.

The **side effects of GLP-1 treatment** include:

- Short-term nausea and/or vomiting
- Diarrhoea
- Abdominal discomfort
- Decreased appetite
- Acute pancreatitis



GLP-1 receptor agonists

- Consult the **table** in the **next slide** on how GLP-1 RAs fit into the scheme of managing older people with diabetes.
- Injection technique is the same as in insulin use (subcutaneous route), there should be rotation of injection sites; needles should be discarded and placed in a sharps bin after each injection
- Seek immediate advice from a GP or community nurse if the resident taking a GLP-1 RA experiences any worrying side-effects of treatment such as severe abdominal pain.

Evidenced-Based Strategies for Glucose Lowering Treatment in Older People – a 3 step process

Key Steps

1st Step:

Mettformin is the first line of treatment after lifestyle – *caution in severe renal impairment; consider low hypo potential SU or DPP4 inhibitor if MF contraindicated*

2nd Step:

*All other oral agents can be used (**e.g. DPP4-I or SU or SGLT2-Inhibitor**) depending on clinician choice, renal function, frailty status, risk potential for hypoglycaemia, economic considerations (q.v. sulphonylureas – use of gliclazide); if patient is markedly obese (>35) consider GLP-1 agonist; if all OHAs are not tolerated consider long-acting basal insulin or GLP-1 agonist*

3rd Step:

Add in basal insulin or a pre-mixed insulin, or a GLP-1 agonist

Sinclair AJ et al. EDWPOP 2011;Kirkman MS et al, AGS Consensus 2012; Sinclair AJ, Dunning, T, Colagiuri, IDF Global Guidance, 2013; SInzucchi SE et al. ADA-EASD Consensus Statement, 2015, Diabetologia; Turnheim K, Exp Gerontol 2004; Neumilleer JJ & Setter SM, Am J Pharmacother 2009; Heller SR, Pratley Re, Sinclair A et al, Diabetes Obes Metab 2018; Liu J, Wang LN, Cochrane database 2017; Schernthaner G, Schernthaner-Reiter MH, Diabetologia 2018

Key Considerations

- Have a 'risk to benefit' conversation
- Estimate likelihood of worsening renal or hepatic function
- Estimate risk of hypoglycaemia
- Try not to put HbA1c at the heart of your planning – *consider quality of life and minimising vascular risk as your main priorities*

Cautions in Moderate to Severe Frailty

Consider a **glinide** if eating patterns are irregular (short duration/rapid onset of action) or cognitive impairment;

Avoid a SGLT2-Inhibitor in view of weight loss, dehydration, toe amputations;

Caution with a GLP-1 agonist (weight loss, anorexia) but as part of a glucose-dependent strategy may reduce hypoglycaemia rate;

Pioglitazone: caution with side effects but may be of value in those with high stroke and macrovascular risk

Explanatory Note: as before, this is the scheme for clinicians (FYI) for older people with diabetes and may not be entirely appropriate for residents with diabetes. The third step here is usually insulin treatment

Key messages

KM

To identify safety issues relating to the use of insulin and GLP-1 receptor agonists

KM

All healthcare staff administering insulin or GLP-1 RAs in any clinical setting must have received appropriate training and have been assessed for competency in carrying out these roles.

KM

Without further evidence/guidance, the use of GLP-1 RAs should only be considered in residents with type 2 diabetes after discussion with the specialist nurse or doctor (GP).

Questions

Q1. Who needs to take insulin?

- A. Everyone with type 1 diabetes
- B. Everyone with type 2 diabetes
- C. Those with type 2 diabetes whose condition has progressed beyond diet, exercise and oral glucose-lowering medications
- D. A and C

Questions

Q1. Who needs to take insulin?

- A. Everyone with type 1 diabetes
- B. Everyone with type 2 diabetes
- C. Those with type 2 diabetes whose condition has progressed beyond diet, exercise and oral glucose-lowering medications
- **D. A and C**

Questions

Q2. Where insulin is used, when should blood glucose be monitored?

- A. At least twice a day for those whose diabetes is well controlled
- B. More often than twice a day for those at risk of poor diabetes control or hypoglycaemia
- C. Weekly
- D. Not at all
- E. A and B

Questions

Q2. Where insulin is used, when should blood glucose be monitored?

- A. At least twice a day for those whose diabetes is well controlled
- B. More often than twice a day for those at risk of poor diabetes control or hypoglycaemia
- C. Not at all
- **D. A and B (preferably according to staffing resources and support available)**

Questions

Q3. There are different types of insulin, and different situations in which they should be used. As a general rule, which residents with diabetes should not take a GLP-1?

- A. People with type 2 diabetes
- B. Those with a history of pancreatitis
- C. People with type 1 diabetes
- D. A and B
- E. B and C

Questions

Q3. There are different types of insulin, and different situations in which they should be used. As a general rule, which residents with diabetes should not take a GLP-1?

- A. People with type 2 diabetes
- B. Those with a history of pancreatitis
- C. People with type 1 diabetes
- D. A and B
- **E. B and C**

Questions

Q4. In type 1 diabetes, treatment with insulin:

- A. Can be discontinued temporarily when unwell
- B. Can be replaced with oral glucose-lowering therapy if diabetes control is good
- C. Should never be discontinued

Questions

Q4. In type 1 diabetes, treatment with insulin:

- A. Can be discontinued when unwell
- B. Can be replaced with oral glucose-lowering therapy if diabetes control is good
- **B. Should never be discontinued**

Questions

- Q5. Healthcare assistants should only give insulin:

- A. If no one else is available
- B. If it stated on the prescription chart for the resident
- C. After completing formal training from a competent health professional
- D. After completing formal training from a competent health professional and after agreement with their care home manager and local healthcare team

Questions

- Q5. Healthcare assistants should only give insulin:

- A. If no one else is available
- B. If it stated on the prescription chart for the resident
- C. After completing formal training from a competent health professional
- **D. After completing formal training from a competent health professional and after agreement with their care home manager and local healthcare team**

Further Reading

- Diabetes UK. Diabetes treatments. Available at:

https://www.diabetes.org.uk/Diabetes-the-basics/Diabetes-treatments

Learning completed