



Prescribing for people with type two diabetes, guidance,
clinical considerations and effects of the Covid pandemic

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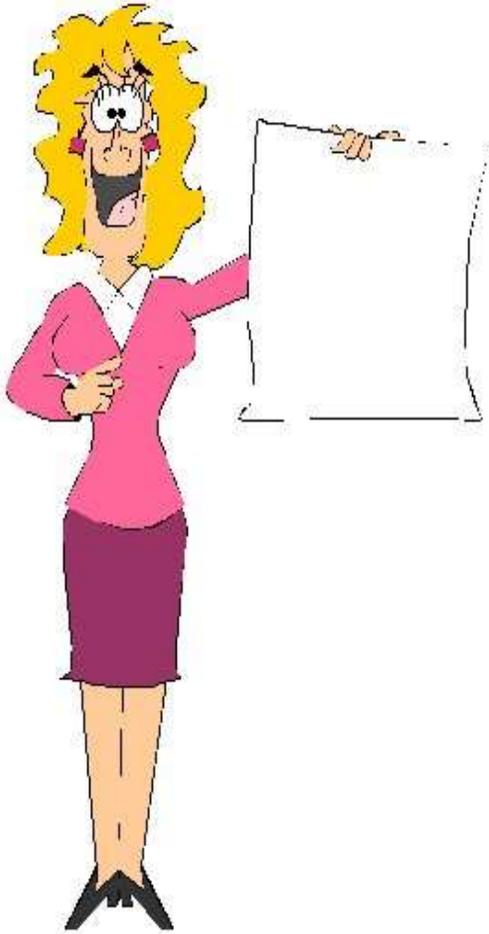
Consultant Nurse West London NHS Trust

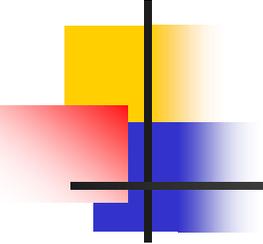
Nurse Prescribing; LSBU 31st May 2022

Aims and objectives

To be aware of:

- The implications of NICE update, NG 28, on type two diabetes
- How diet can lead to diabetes remission
- Medications used to treat type two diabetes
- How to intensify treatment
- How to use rescue therapy
- How to take account of the person's lifestyle and abilities when prescribing
- How nurses practicing at advanced level can improve patient care





Diabetes

- Diabetes is a chronic, metabolic disease characterized by elevated levels of blood glucose which leads over time to serious damage to the heart, blood vessels, eyes, kidneys and nerves. The most common is type 2 diabetes, usually in adults, which occurs when the body becomes resistant to insulin or doesn't make enough insulin.

WHO (2021a) Diabetes. World Health Organisation, Geneva.

<https://www.who.int/news-room/fact-sheets/detail/diabetes>

Diabetes spiraling out of control

Globally 6.7 million
deaths in 2021



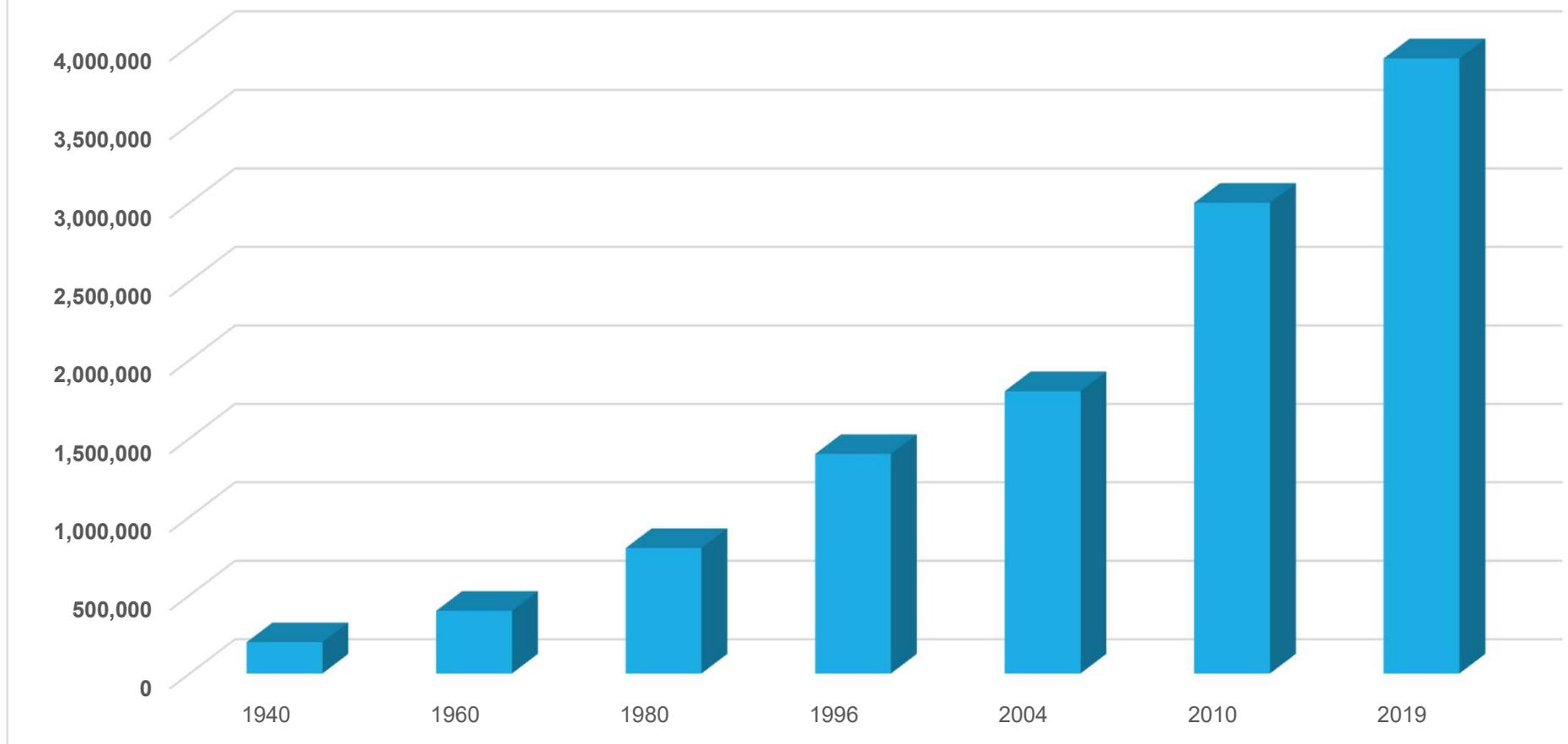
In Europe 1.1 million
deaths in 2021



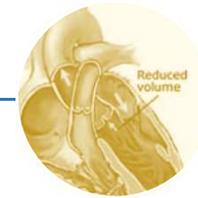
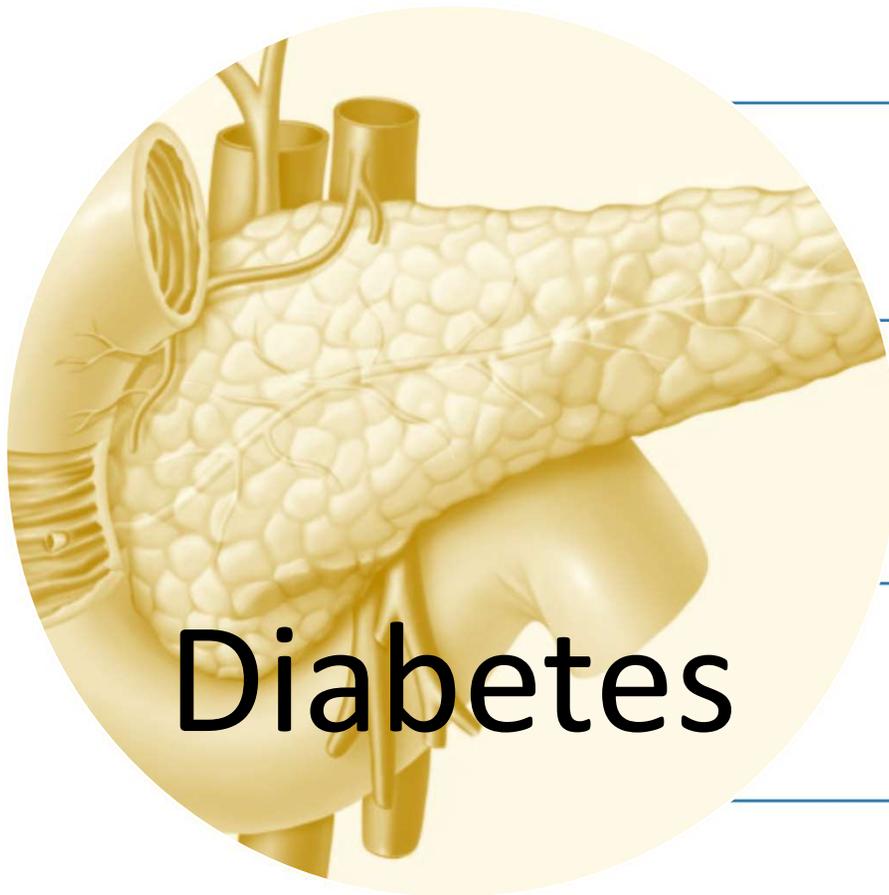
In Europe 61 million
people affected

Diabetes in UK: A growing problem

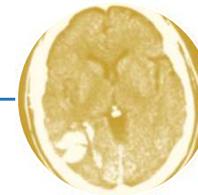
Prevalence of diagnosed diabetes in UK 1940 -2020



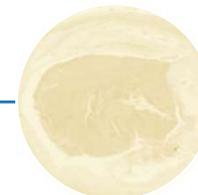
Complications of diabetes (weekly figures)



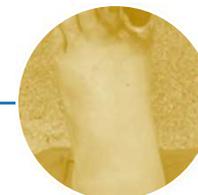
Heart failure
2,000 cases



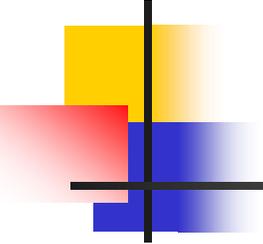
Strokes
680



Myocardial
infarctions 530



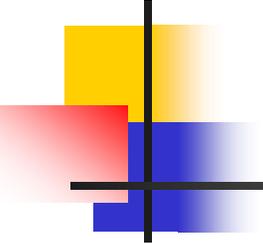
Amputations
169



Further complications of diabetes

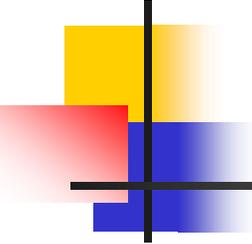
Elevated blood glucose levels cause lack of energy, lack of reserves and increased risk of tissue damage.

People who develop type two diabetes under the age of 40 are more likely to experience rapid deterioration in pancreatic function and have a greater incidence of adverse outcomes



More complications

- Problems with vision, circulation, increased risk of heart disease, stroke, dementia, nerve damage and sexual difficulties
- Microvascular disease affecting the eyes, nerves and kidneys.
- Macrovascular disease leading to cardiovascular disease (CVD), cerebrovascular disease and lower extremity artery disease.
- Increased risk of dementia



Economic and human costs of diabetes

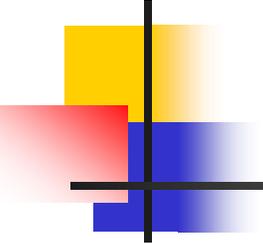
4 million people
with diabetes
13.6 million at risk
of diabetes



10 billion pounds
NHS spend

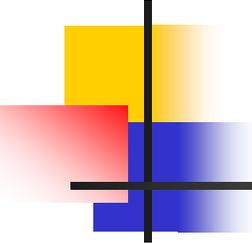


Occupy 14-30% of
hospital beds, 74%
increased risk
acute admission
and 25% risk
readmission



Diabetes prevention programmes

- **13.6 million** people in the UK are at increased risk of diabetes
- NHS diabetes prevention programmes offer intensive behavioural intervention and set goals for weight loss, diet and physical activity.
- Open to people aged 18-79, do not have diabetes currently and have received a score of 16 or over when using the know your risk tool.



Resources

An online BMI calculator is available at:

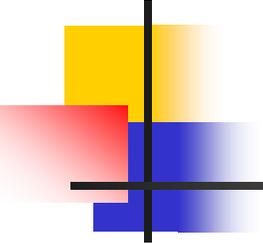
<https://www.nhs.uk/live-well/healthy-weight/bmi-calculator/>

Diabetes risk calculator

<https://preventing-diabetes.co.uk>

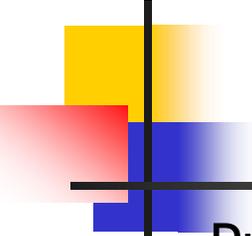
Link to registering for the diabetes prevention programme

<https://preventing-diabetes.co.uk/know-your-risk-dtc/register/>



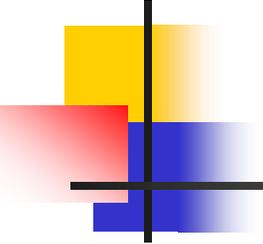
Diagnosing diabetes

- If a person has clinical features of type two diabetes, a HbA1c or fasting plasma glucose (FPG) can be taken.
- HbA1c greater than 48mmol/mol or a FPG greater than 7mmol indicative diabetes. Tests should be repeated to confirm the diagnosis.
- HbA1c can be used to diagnose Type 2 diabetes due to increase convenience for the patient, reduced need for fasting, and reduced dietary preparation



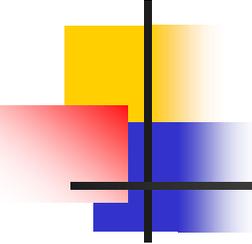
HbA1c not suitable

- Pregnancy
- Rapid onset of diabetes –HbA1c lags.
- Suspected type 1 diabetes – rapid onset of symptoms, weight loss, ketosis
- Children – because most will have type 1 diabetes.
- High dose steroids
- After pancreatitis or pancreatic surgery.
- Conditions with reduced RBC survival may lower HbA1c:
These will normally be detected by the lab, including sickle trait, sickle disease or thalassaemia
- Renal dialysis patients have a markedly reduced HbA1c especially if treated with erythropoietin.



Oral glucose tolerance test

- An oral glucose tolerance test (OGTT) may be used in certain circumstances. A OGTT test is completed over a two hour period whereby the patient will have their blood glucose levels taken by a venous blood sample, followed by drinking a measured amount of glucose, the venous blood glucose sample will be repeated two hours later. If the blood glucose levels is great than 11mmol/L two hours after the test is completed this is diagnostic of diabetes



Dietary treatment of type two diabetes: A revolutionary approach

Type two diabetes has been described as “a collision between thrifty genes and an affluent society”.

- Dietary interventions that lead to weight loss can enable many people with type two diabetes to go into remission. NHS England is rolling out a ground breaking programme to treat type two diabetes. The programme provides people with access to a meal replacement programme “soups and shakes” for three months. These provide around 900 calories daily. The programme will provide ongoing support from clinicians and coaches to enable people to maintain healthy lifestyles.
- Groop LC, Tuomi T. Non-insulin-dependent diabetes mellitus--a collision between thrifty genes and an affluent society. *Ann Med.* 1997 Feb;29(1):37-53. doi: 10.3109/07853899708998742. PMID: 9073323.

Rescue therapy

For symptomatic hyperglycaemia, consider insulin or a sulfonylurea and review when blood glucose control has been achieved.

Assess HbA_{1c}, cardiovascular risk and kidney function

For information on using SGLT2 inhibitors for people with type 2 diabetes and chronic kidney disease see the section on diabetic kidney disease in the full guideline.

Consider

- DPP-4 inhibitor ('gliptin') or
- Pioglitazone or
- Sulfonylurea
- An SGLT2 inhibitor ('flozin') for some people:
 - Canagliflozin (TA390)
 - Dapagliflozin (TA390)
 - Empagliflozin (TA390)
 - Ertugliflozin (TA572)

NICE technology appraisals recommend SGLT2 inhibitors as monotherapy options in people:

- who cannot have metformin
- for whom diet and exercise alone do not provide adequate glycaemic control.

The SGLT2 inhibitors are recommended only if a dipeptidyl peptidase-4 (DPP-4) inhibitor would otherwise be prescribed and a sulfonylurea or pioglitazone is not appropriate.

In February 2022, using ertugliflozin to reduce cardiovascular risk when blood glucose is well controlled was off label. See NICE's information on prescribing medicines.

Not at high risk of CVD

Offer

- Metformin or if GI disturbance
- Metformin MR

If metformin contraindicated

Offer

- SGLT2 inhibitor alone

Chronic heart failure or established atherosclerotic CVD

Offer

- Metformin or if GI disturbance
- Metformin MR and as soon as metformin tolerability is confirmed, offer
- SGLT2 inhibitor ('flozin') with proven cardiovascular benefit

If metformin contraindicated

Start metformin alone to assess tolerability before adding an SGLT2 inhibitor

High risk of CVD
QRISK2 of 10% or higher

Offer

- Metformin or if GI disturbance
- Metformin MR and as soon as metformin tolerability is confirmed, consider
- SGLT2 inhibitor ('flozin') with proven cardiovascular benefit

If metformin contraindicated

Consider

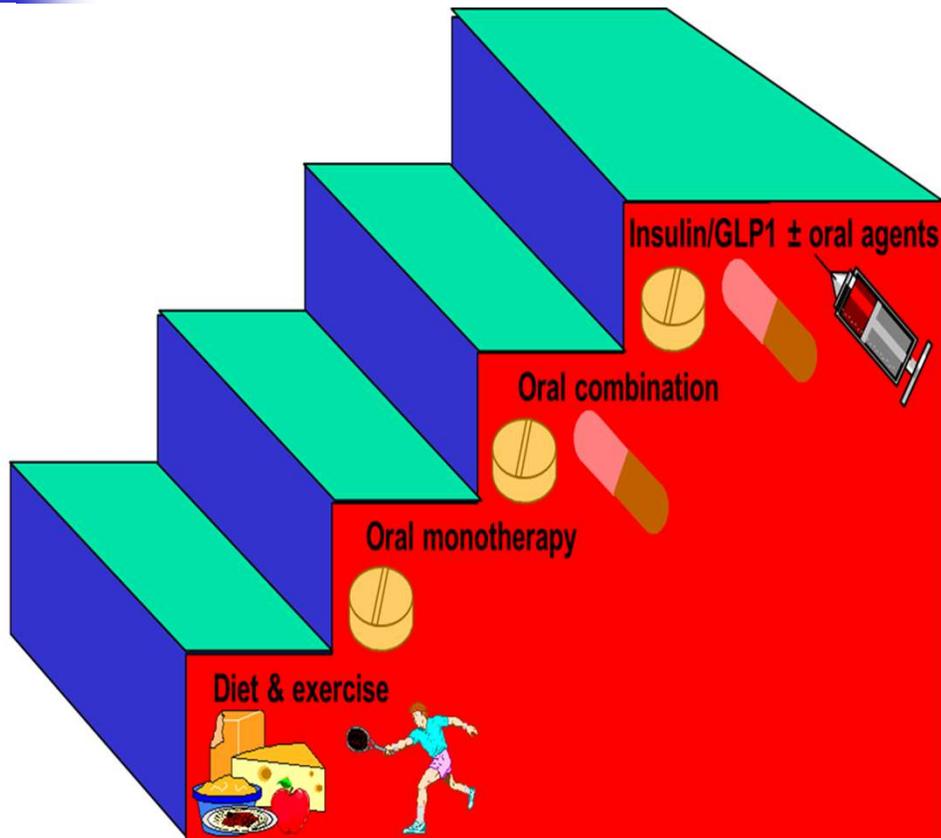
- SGLT2 inhibitor alone

Person's HbA_{1c} not controlled below individually agreed threshold, or the person develops CVD or a high risk of CVD

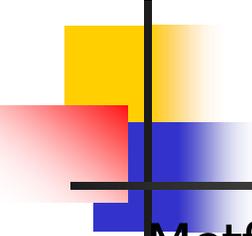
See Algorithm 2: How to choose further medicines

Established atherosclerotic CVD includes coronary heart disease, acute coronary syndrome, previous myocardial infarction, stable angina, prior coronary or other revascularisation, cerebrovascular disease (ischaemic stroke and transient ischaemic attack) and peripheral arterial disease.

Medication: A stepwise approach



- Classes of medication used to treat type two diabetes are:
- Biguanides
- SGLT2 inhibitors
- DPP-4 inhibitors
- Glitazones
- Sulphonylureas
- Glucagon-like Peptide 1 Receptor Agonists (GLP-1)

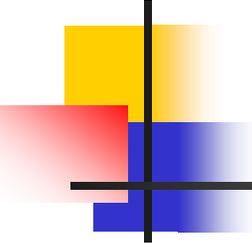


Biguanides

Metformin is a biguanide. It was developed from lilacs and used in herbal medicines for centuries. Normally used as first line treatment in type two diabetes. It reduces the amount of glucose released by the liver and enables cells to take in insulin by reducing insulin resistance. It also helps to reduce the risk of heart disease.

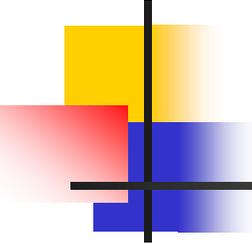
Metformin does not cause hypoglycaemia when used as monotherapy. It can lead to weight loss (3–5% of body weight), and it has been shown to decrease plasma triglycerides concentration (10–20%).

Normally given twice daily; however, it can be given three times daily (with meals) or once daily (extended release). Starting dose is 500 mg daily. Gradual titration of metformin, starting at 500 mg with breakfast and increasing by 500 mg in weekly intervals until a dose of 1000 mg with breakfast and dinner is reached helps to prevent GI side effects. The maximum dose is 2550 mg per day but most practitioners use up to 2000 mg per day.



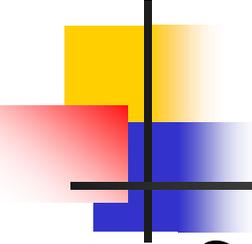
Biguanides, side effects and cautions

- The most common side-effects of metformin are gastrointestinal complaints: diarrhoea, nausea, abdominal discomfort, and a metallic taste. These side effects often resolve with continued use.
- Metformin can cause very rare, but life-threatening lactic acidosis (<1 in 100,000). It should be used with caution in people with renal failure. The dose should be reviewed when Estimated Glomerular Filtration Rate (eGFR) falls below 45ml/min and should not be used when eGFR is 30ml/min or below (NICE, 2022).



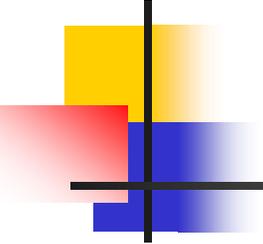
Sodium glucose cotransporter 2 (SGLT2) inhibitors

- There are four SGLT2) inhibitors available, Dapagliflozin, Canagliflozin, Empagliflozin, Ertugliflozin.
- SGLT2 enables the proximal renal tubules in the kidneys to reabsorb around 90% of glucose from tubular fluid. SGLT2 inhibitors block the reabsorption of glucose by the kidney, and increase the amount of urine excreted by the kidney. This reduces blood glucose levels in people with diabetes who have elevated blood glucose levels. SGLT2 inhibitors work independently of insulin and can be used in combination with insulin. They are thought to protect renal function and the cardiovascular system



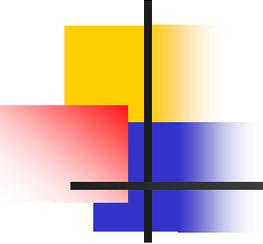
SGLT2: Side effects and cautions

- Common side effects include candida infection, back pain, increased amount of urine passed, dizziness and a mild skin rash.
- Serious, life-threatening, and fatal cases of diabetic ketoacidosis (DKA) are rare in people with type two diabetes.
- Gangrene (necrotising fasciitis of the genitalia or perineum) is a rare but serious and potentially life-threatening infection, has been associated with the use of sodium-glucose co-transporter 2 (SGLT2) inhibitors.
- **They should not be prescribed if eGFR is less than 60 mL/minute as they are dependent on good renal function to act**



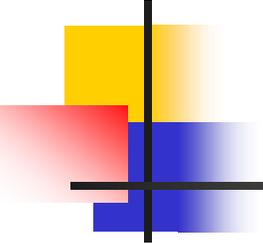
Benefits SGLT2 drugs

- Protect renal function and the cardiovascular system.
- Improve HbA1c and body weight when combined with insulin and decrease the required dose of insulin without increasing the risk of hypoglycaemia.
- Reduce major adverse cardiovascular events, such as stroke, myocardial infarction and cardiovascular death, as well as the number of hospital admissions for heart failure



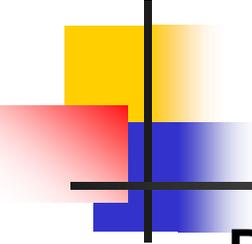
DPP-4 inhibitors, gliptins

- The DPP-4 inhibitors are alogliptin, linagliptin, saxagliptin, sitagliptin and vildagliptin.
- They work by blocking the action of DPP-4, an enzyme which destroys the hormone incretin. Incretins help the body produce more insulin only when it is needed and reduce the amount of glucose being produced by the liver.



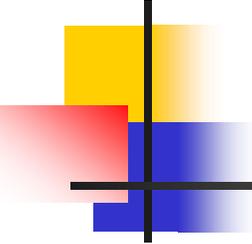
DPP4: Side effects and cautions

- Prescribers should check hepatic, renal and cardiac function prior to prescribing. Linagliptin can be used safely in renal failure at a normal dose but dose should be reduced in the other gliptins.
- Avoid in people with a history of pancreatitis as they are associated with acute pancreatitis. Patients should be advised to report severe upper abdominal pain and medication should be stopped if this occurs
- There is an increased risk of heart failure with saxagliptin, there was a lesser risk with alogliptin and no indication of increased risk with sitagliptin NICE, guidance recommends that vildagliptin is not prescribed in severe heart failure and alogliptin is avoided in moderate to severe heart failure. Saxagliptin should be used with caution in older people and those with moderate to severe heart failure.



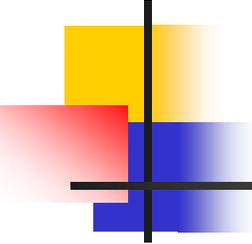
Glitazones

- Pioglitazone is the only glitazone licensed for use in the UK. It works by treating insulin resistance. It is contraindicated in heart failure, can cause fluid retention, increase fracture risk in post-menopausal women and increases the risk of bladder cancer NICE (2022) recommend Pioglitazone as a second line medication. **A careful assessment of the risks and benefits of this medication should be undertaken before use.**



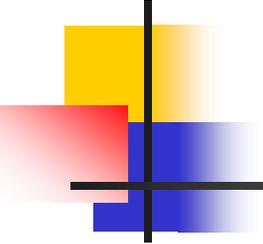
Sulphonylureas

- There are five Sulphonylureas, Glibenclamide, Gliclazide, Glimepiride, Glipizide and Tolbutamide
- Sulphonylureas stimulate the beta cells in the pancreas to produce more insulin and decrease clearance of insulin by the liver. They are only effective if there are functioning pancreatic β -cells
- They can be effective in lowering blood glucose quickly.



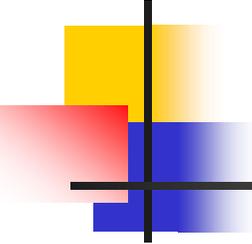
Sulphonylureas: Side effects and cautions

- Sulphonylureas can cause hypoglycaemia and should be used with caution in older people as hypoglycaemia is damaging to the ageing brain and can contribute to ill health and cognitive decline
- Sulphonylureas lead to weight gain so are best avoided in people who are obese.



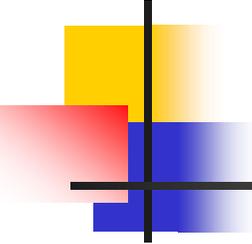
Glucagon-like Peptide 1 Receptor Agonists (GLP-1)

- There are five GLP-1 agonists, Exenatide, (being discontinued) Liraglutide, Lixisenatide, Dulaglutide, Semaglutide
- GLP-1 agonists work by activating GLP-1 receptors in the pancreas, which leads to an increase in insulin release, reduce glucagon release and slow gastric emptying aiding a reduction in blood glucose and body weight



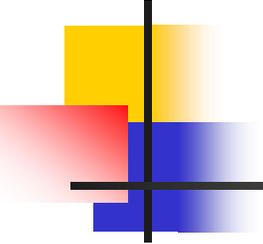
GLP-1: Side effects and cautions

- GLP-1 do not cause hypoglycaemia alone, however they may contribute if using alongside sulphonylureas and insulin.
- GLP-1 agonists have historically only been licenced for use in people living with type 2 DM however, Semaglutide can now be prescribed in people living with obesity alone however advised to be prescribed under a specialist weight management service with multi-disciplinary input (NICE, 2022e).



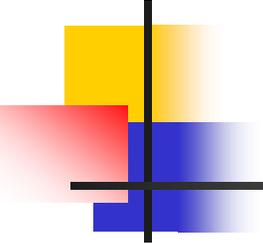
GLP-1 contraindications

- **Do not prescribe a GLP-1 receptor agonist to people with:**
- Ketoacidosis, pancreatitis or renal impairment.
- Severe hepatic impairment — avoid liraglutide.
- Severe gastrointestinal disease — avoid exenatide, liraglutide (for example if diabetic gastroparesis or inflammatory bowel disease), lixisenatide, and dulaglutide



GLP-1 adverse effects

- Acute pancreatitis (rare) — advise the person to seek urgent medical advice if symptoms such as severe upper abdominal pain, nausea, and/or vomiting develop. Advise to discontinue treatment if pancreatitis is suspected.
- Gastrointestinal — decreased appetite, altered taste, nausea, vomiting, dyspepsia, burping, gastro-oesophageal reflux, constipation, diarrhoea, gallbladder disorders (liraglutide).
- Headache, dizziness, drowsiness, alopecia, hyperhidrosis.
- Renal impairment (exenatide, liraglutide).
- Atrioventricular block, sinus tachycardia, delayed gastric emptying (dulaglutide).
- Skin reactions including rash, angioedema, urticaria, and pruritus



Medications to titrate blood glucose

Metformin
1g BD

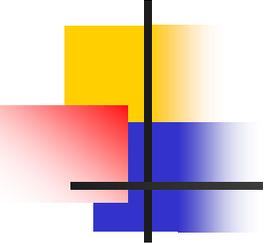
- Blood glucose levels remain elevated and optimization required.

SGLT-2/
GLP-1

- Consider adding SGLT-2 or GLP-1 next. Consider if the patient will be able to administer GLP-1. What is their BMI? What is the renal function? Is weight loss or cardiovascular protection preferable?

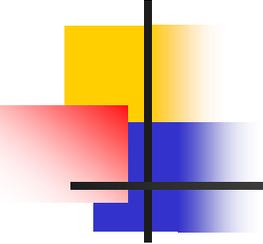
DPP4
inhibitors

- If SGLT-2/GLP1 are not a option consider DPP4 inhibitors. They can be useful in older people as they can be used in poor renal function



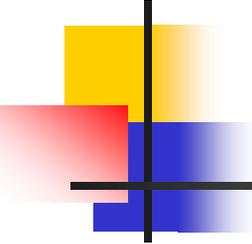
Rescue therapy

- Two choices if symptomatic and poor control:
- 1. A sulphonylurea e.g. gliclazide 40–80 mg daily initially only works if there are functional beta cells. Causes hypoglycaemia and weight gain
- 2. Insulin, e.g. glargine.



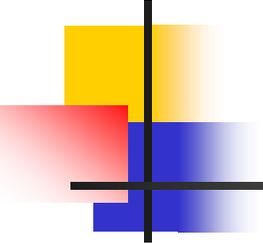
The impact of Covid

- Reduction in diabetes services
- Reduction in monitoring
- Changes to regimes e.g. once daily rather than BD insulin
- Increase new diagnosis of type 2 diabetes post Covid
- Reduced access to primary care



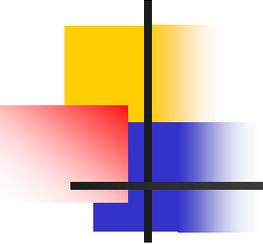
Setting HbA1c targets

- NICE recommends an HbA1c of 48mmol/mol in adults managing type 2 DM with diet and lifestyle modifications or single drug therapy
- Those who are using drug therapy associated with hypoglycaemia aim for a HbA1c of 53mmol/L.
- HbA1c targets should be assessed on an individual basis especially for people who are vulnerable for example, older people, learning disabilities, severe mental health, or end of life. We need to balance risks of hypoglycaemia



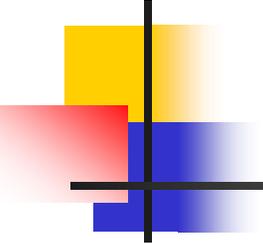
Setting blood glucose targets

- Normal target range 5-8mmol/L
- For the vulnerable 6-12mmol/L
- Blood glucose monitoring should be offered if a person is taking medications that can cause hypoglycaemia, has an increased risk of hypoglycaemia, drives, operates machinery, is planning pregnancy or pregnant.
- Blood glucose monitoring can be useful in the short-term following initiation of a new medication or monitoring hyperglycaemia.



Patient centered care

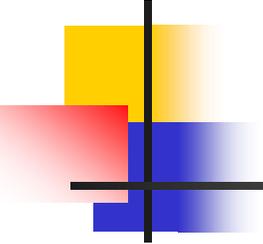
- If person doesn't like taking medication consider MR and combined medications
- Check the person can swallow medication some can be big and hard to swallow
- Check patient is taking and if not why not
- Work with the person to improve quality of life



Patient centred care (2)

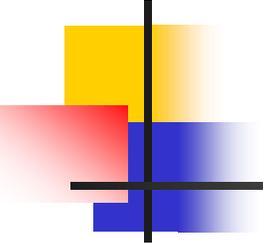
What does your patient do?

- A bus or Heavy Goods Driver would be required to undertake 2 hourly blood glucose monitoring whilst behind the wheel if on a sulphonylurea. So prescribe an SGLT2 or a GLP1 instead as these do not cause hypoglycaemia.



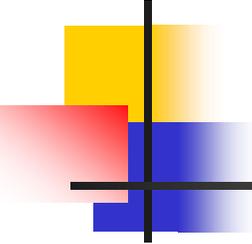
Charles: Case history I

- Charles is a 46 year old gentleman, BMI 22 admitted with Schizophrenia, past medical history of polysubstance misuse including heroin, known type two diabetes, normal renal function, HbA1c 113 mmol/mol. Blood glucose range 15-28mmol/mol.



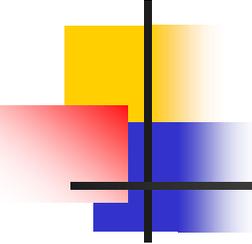
Charles treatment

- Metformin 500mg BD, increased after a week to 1g BD. Blood glucose range remained 15-25mmol/L.
- PRN Novorapid was prescribed 6 units four hourly if the blood glucose levels were greater than 25mmol/L.
- Gliclazide was initiated 40mg BD, and further increased over a week gradually to 160mg BD. Blood glucose levels 12-24mmol/mol.
- Dapagliflozin 10mg once daily was initiated achieving blood glucose range of 8-14mmol.



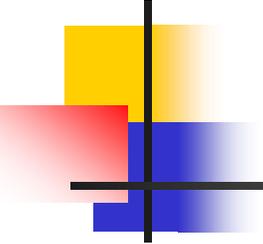
So why didn't we give Charles insulin?

- Please put your responses in the chat box



Alice case 2

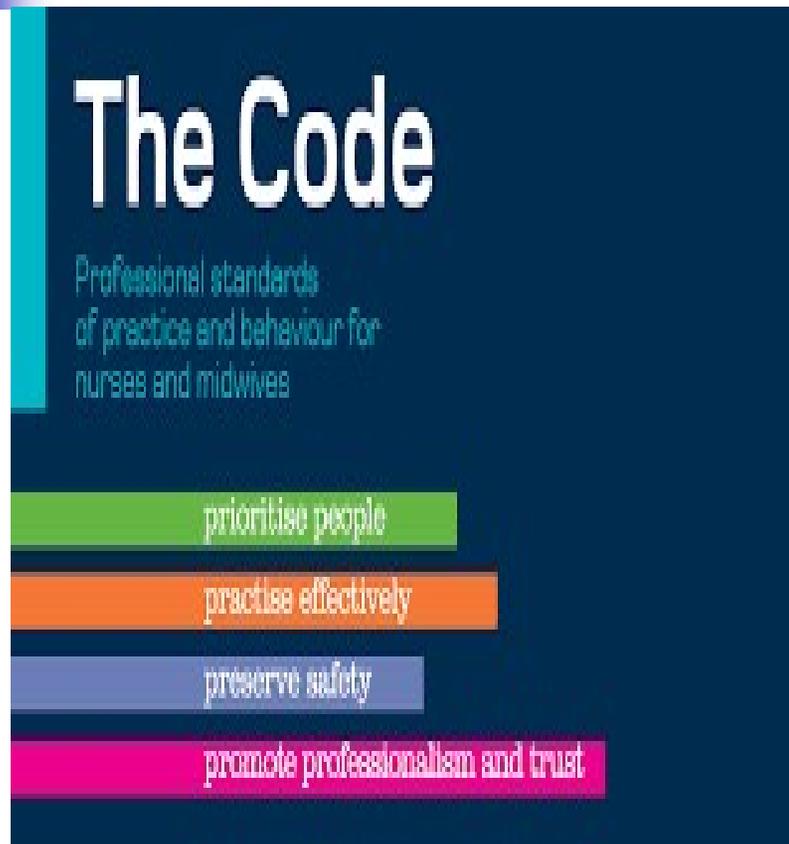
- Alice is a 72 year old lady. BMI 27 admitted with relapse of Bipolar disorder known type two DM, past medical history of urosepsis and recurrent urinary tract infections (UTI). HbA1c 58mmol/mol. Previously prescribed Insulin Glargine 6 units, not tolerated and stopped. Prescribed Metformin 1g BD, Dapagliflozin 10mg OD. No blood glucose monitoring.



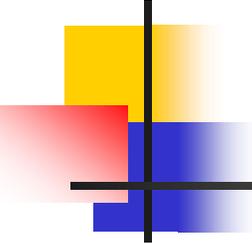
Alice treatment

- Dapagliflozin 10mg OD stopped history of urinary tract infection and urosepsis. Commenced Linagliptin 5mg daily and commenced blood glucose monitoring temporarily twice daily before meals. Blood glucose range 5-10mmol/L.
- Blood glucose monitoring stopped.

Scope of practice

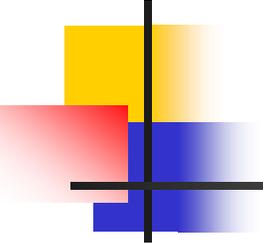


- The nurse is required to work within the limits of competence and make a timely and appropriate referral to another practitioner when it is in the best interests of the individual requiring care and treatment



Don't ever forget the patient

Nursing is rooted from the needs of humanity and is founded on the ideal of service. And that, "the nurse is temporarily the consciousness of the unconscious, the love of life for the suicidal, the leg of the amputee, the eyes of the newly blind, a means of locomotion for the infant, knowledge and confidence for the mother and the mouthpiece for those too weak or withdrawn to speak"

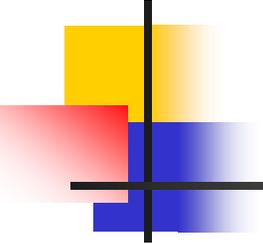


The value of advanced practice

Nurses practicing at advanced level:

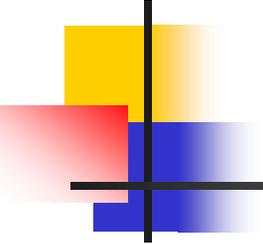
- Raise the bar for all nurses
- Are able to see, diagnose and treat
- Are registered, educated and accountable
- Reduce pressures in acute and primary care
- Improve quality of care

Our challenge is to have our skills recognised and valued at all levels from secretary of state to the patient



Key points

- Type two diabetes is spiralling out of control globally and nationally
- Type two diabetes is driven by an epidemic of obesity
- Diabetes prevention and when ever possible remission are of crucial importance.
- When managing diabetes it is important to develop a partnership with the patient
- Diagnosing and treating adults requires a team approach.



Thank you for listening

Any questions?

If you require a copy of the paper this is based on with references get in touch

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