

Diabetes Medications

Presented by
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B. Pharm, CDE.

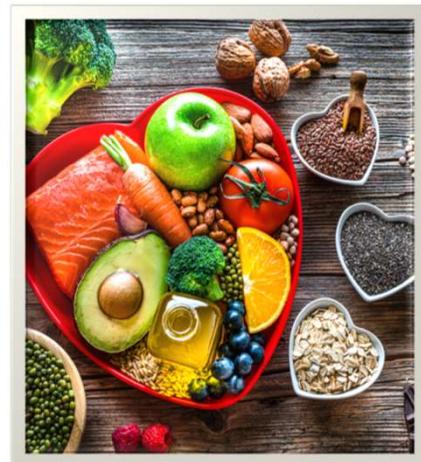
Updated March 2025



1

Housekeeping

- Diabetes Pathophysiology
- Medical Management - Medicines
- Medical Management - Insulin
- Q&A evaluation



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Acknowledgement of Country

Diabetes WA acknowledge and recognise Aboriginal and Torres Strait Islander peoples as the Traditional Owners and Custodians of the lands where we live, learn and work.

We pay respects and acknowledge the important role of Elders past and present, for they hold the memories of the traditions, cultures, and aspirations of Australia's First Nations peoples, and have taken on the responsibility to protect and promote our culture and leave a legacy for future Elders and leaders.

We acknowledge any Sorry Business that may be affecting individuals, families, and communities at this time.

As an organisation, we understand the impact that diabetes has on Aboriginal and Torres Strait Islander peoples across Australia and as such we promise to be respectful, take lead from the community and walk together with Aboriginal and Torres Strait Islander peoples, communities, and organisations in our journey to reducing the impact of diabetes for the First Peoples of Australia.



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Introduction to Diabetes



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NDSS Snapshots

As at 30 June 2024

There were 1,485,889 people with diabetes registered with the NDSS

Diabetes Type	Number	%	Registered in Past Year
Type 1 diabetes	139,257	9.4%	3,847
Type 2 diabetes	1,288,817	86.7%	65,654
Gestational diabetes	45,347	3.1%	45,290
Other diabetes	12,468	0.8%	1,266
Total	1,485,889	100.0%	116,057

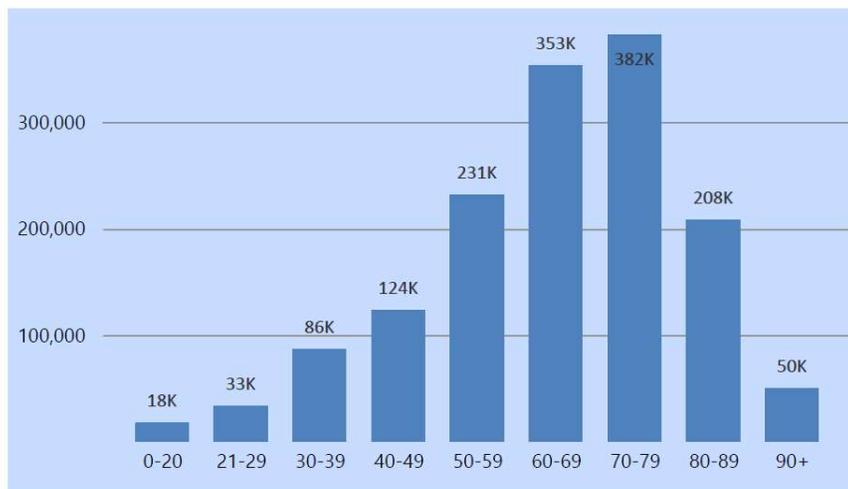
* An additional 189,336 women who previously had gestational diabetes are registered with the NDSS. These women are at high risk of developing type 2 diabetes and receive regular reminder letters to have a diabetes check.



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NDSS Snapshots

All people with diabetes by age group



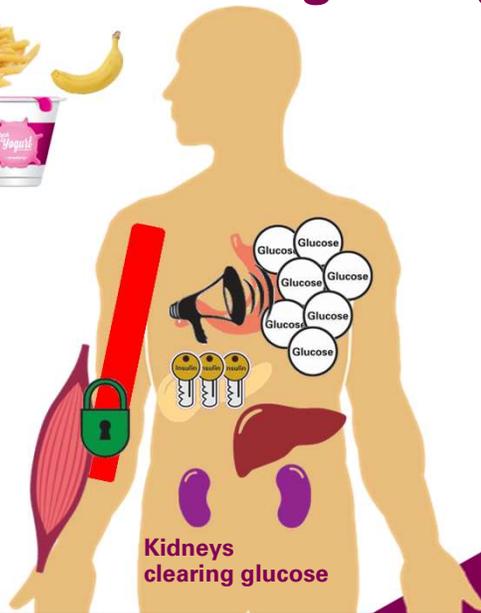
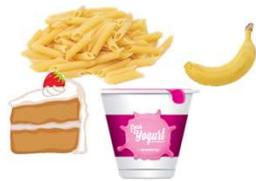
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Let's start at the beginning...



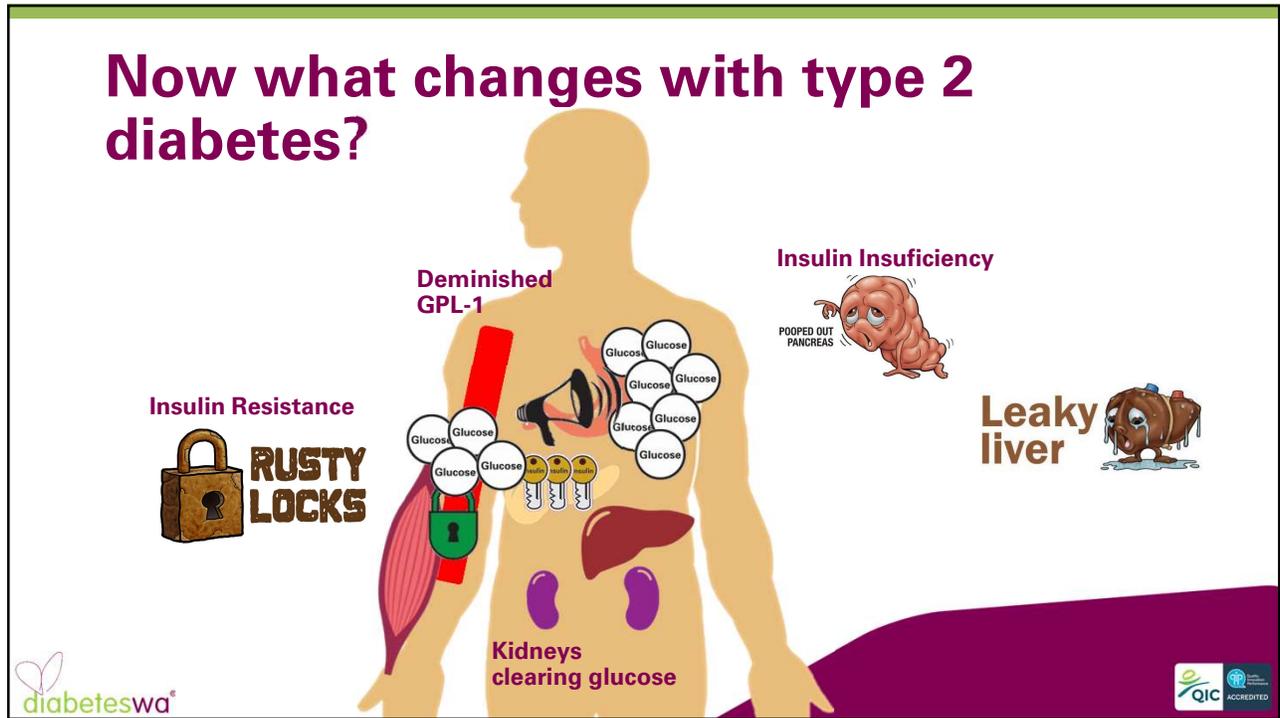
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Let's start at the beginning...



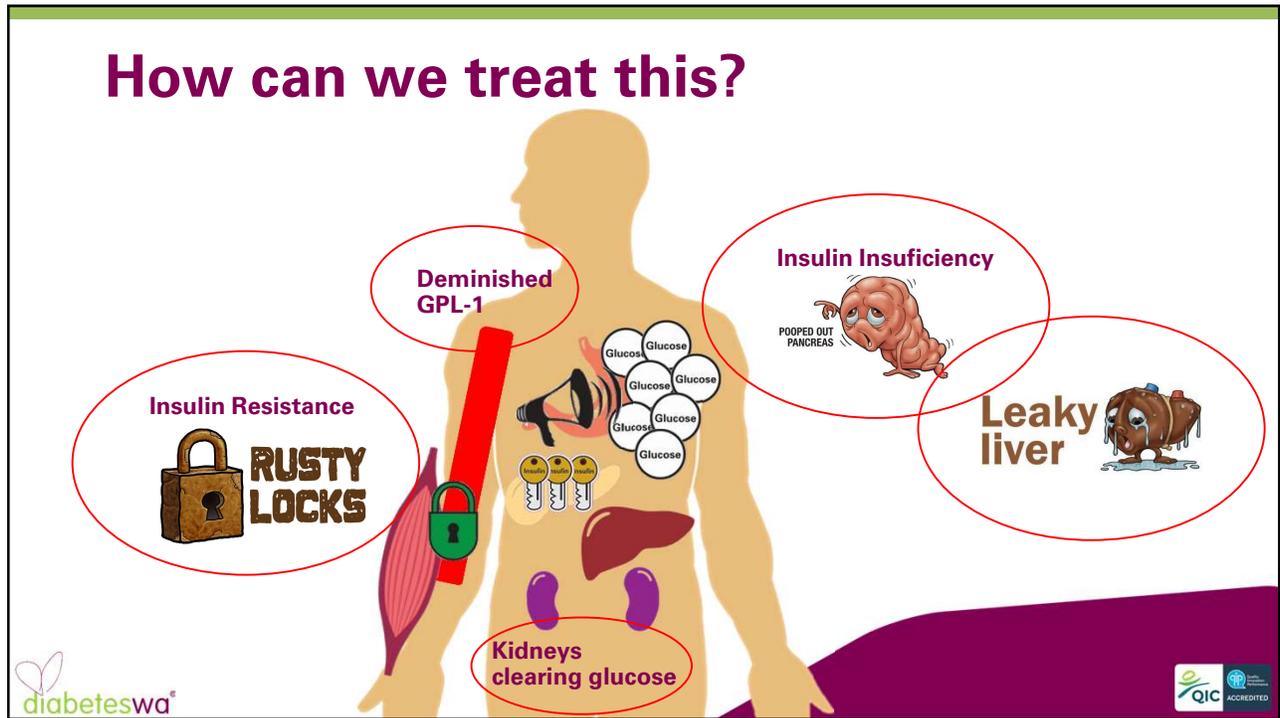
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Now what changes with type 2 diabetes?



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How can we treat this?



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Type 1 or Type 2....?



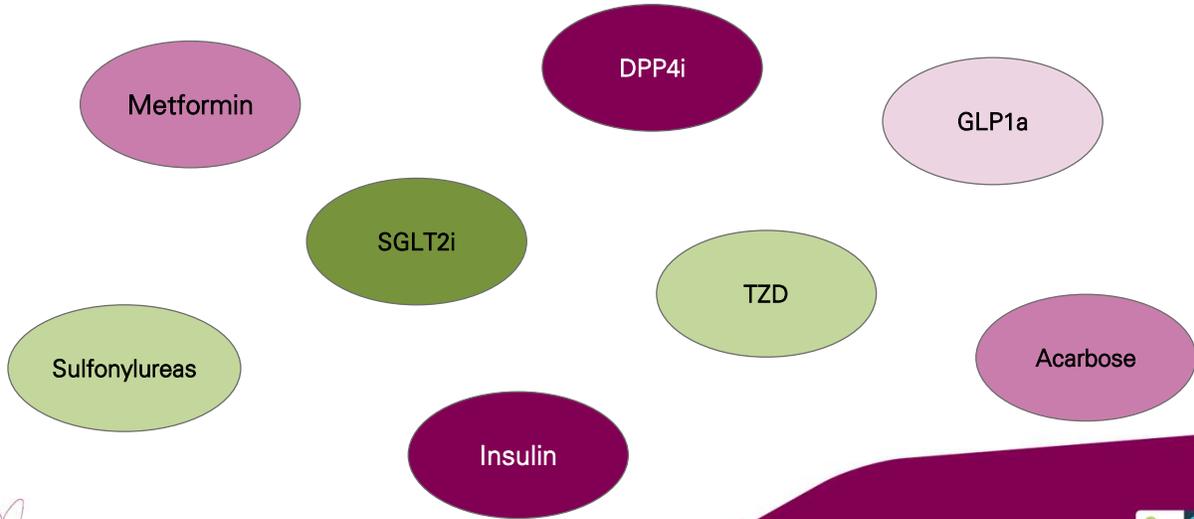
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Medical Management – Medications



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Classes of Medications



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NDSS AUSTRALIAN TYPE 2 DIABETES GLYCAEMIC MANAGEMENT ALGORITHM

This Type 2 Diabetes Glycaemic Management algorithm should be read in conjunction with the Living Evidence Guidelines in Diabetes (please click here).

All patients should receive education regarding lifestyle measures: healthy diet, physical activity and weight management. Determine the individual's HbA1c target – commonly 5.3 mmol/mol (7.0%) but should be appropriately individualised (refer to ADO position statement).

MONOTHERAPY: Metformin is the usual monotherapy unless contraindicated or not tolerated.

DUAL THERAPY: Choice of treatment – add on an oral agent or injectable therapy. Choice of dual therapy should be guided by clinical considerations: presence of or high risk of cardiovascular disease, heart failure, chronic kidney disease, hypoglycaemia risk, obesity, side effect profile, contraindications and cost.

MULTIPLE THERAPIES: Choice of treatment – include additional oral agent or GLP-1 RA or insulin. Choice of agents should be guided by clinical considerations as above. Note: combinations not approved by PBS include GLP-1 RA with SGLT2i. Consider reviewing any previous medication that has not reduced HbA1c by ≥0.5% after 3 months and take into consideration glycaemic control, side effects, tolerability, and cost.

Review treatment in 3 months. If HbA1c is not at target, treatment, lifestyle measures and review weight management strategies.

To intensify treatment to meet glycaemic targets:

- If on metformin+DPP4i, consider adding SGLT2i or switching DPP4i to a GLP-1 RA, or an SGLT2i.
- If on metformin+GLP-1 RA, consider adding SGLT2i or switching to insulin.
- If on metformin+SGLT2i, consider adding SU or insulin.
- If on basal insulin, consider adding SGLT2i or GLP-1 RA or basal insulin with rapid-acting insulin.
- If on metformin+DPP4i+SGLT2i, consider adding SU or insulin.

With increasing clinical complexity consider specialist endocrinology consultation.

Note: combinations not approved by PBS include GLP-1 RA with SGLT2i. Consider reviewing any previous medication that has not reduced HbA1c by ≥0.5% after 3 months, and take into consideration glycaemic control, side effects, tolerability, and cost.

Recommendation for addition of an SGLT2i or GLP-1 RA where SGLT2i is not:

- Consider combination for metformin as first-line monotherapy in adults with type 2 diabetes.
- Consider combination for DPP-4i in addition to other glucose lowering medications in adults with type 2 diabetes and/or chronic kidney disease, and are unable to be prescribed an SGLT2i or a GLP-1 RA due to either intolerance or contraindications.
- Consider combination against authorities being the first choice medication to add to current therapy in adults with type 2 diabetes at 1% risk of severe hypoglycaemia.

Denote that doses include usual therapeutic strength, unless otherwise specified.

Light to dark boxes denote alternative approaches (order does not matter to denote any specific preference).

White boxes indicate not commonly used approaches.

Red = pharmacovigilance concerns only – heart failure, CKD = chronic kidney disease, SU = sulphonylurea, TZD = thiazolidinedione, DPP-4i = dipeptidyl peptidase-4 inhibitor, GLP-1 RA = glucagon-like peptide-1 receptor agonist, SGLT2i = sodium glucose cotransporter inhibitor.

For more details visit here to access the Living Evidence Guidelines in Diabetes.

TREATMENT MANAGEMENT PLANS: TYPE 2 DIABETES & OBESITY

TOOLS TO GUIDE THE MANAGEMENT OF TYPE 2 DIABETES AND OBESITY

T2D TREATMENT PLAN OBESITY TREATMENT PLAN

LIFESTYLE MEASURES

DIET, EXERCISE AND WEIGHT CONTROL SHOULD BE THE INITIAL APPROACH AND REINFORCED AT EACH STAGE.

ALL PATIENTS SHOULD RECEIVE EDUCATION REGARDING LIFESTYLE MEASURES: HEALTHY DIET, PHYSICAL ACTIVITY AND WEIGHT CONTROL.

IF NOT AT TARGET, OR IF A HbA1c REDUCTION OF ≥ 0.5% IS NOT ACHIEVED AFTER 3 MONTHS

MOVE DOWN THE ALGORITHM

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Further Guidance from the RACGP

Table 1. Clinical considerations when choosing diabetes medications

Clinical outcome	Medication effects on clinical outcomes			
	Metformin	Sulfonylurea (SU)	Dipeptidyl peptidase-4 inhibitor (DPP-4)	Acarbose
Patients with established or at high risk of CVD (refer to the section Type 2 diabetes and cardiovascular risk)	Neutral effect ¹	Increased risk when compared with metformin monotherapy (excluding glitazone), but neutral when used in combination with metformin ²	Neutral effect ^{1,3-13} Refer to Note A	Neutral effect ¹⁴
Patients at risk of hypoglycaemia	Lower rates compared to SU ¹	Higher clinical risks, both as monotherapy and in combination with other agents ² Glitazone – fewer hypoglycaemia episodes versus other SUs ¹⁵ Glitazone – higher rates of hypoglycaemia, especially in older people ¹⁶	Lower rates compared to SU ¹	Neutral effect
Patients at risk of gastrointestinal conditions (eg IBS, IBD and gastroesophagitis)	Known intolerance as monotherapy or combination therapy – diarrhoea ¹⁷	Neutral effect	Neutral effect	Known intolerance – bloating and flatulence ¹⁸
Patients in whom stabilisation of BMI or weight loss is desired	Neutral effect	Neutral effect (glitazone) ¹⁵ Modest weight gain (other SUs) compared with metformin monotherapy ²	Neutral effect	Neutral effect
Patients with renal impairment (eg lowered CrC)	Reduce dose by 50% with eGFR 30-50 Contraindication with CrC <30 mL/min ¹⁹	Contraindication if CrC <15 mL/min Hypoglycaemia risk increases	Safe with dose reduction but insulin can be used in all stages (no dose reduction) Refer to Note B	Contraindication in severe renal impairment ¹
Other class-specific information	Monotherapy or combination with other agents (DPP-4 or SGLT2) is available to reduce 'pill burden'	The Australian algorithm (Figure 1) suggests SU may be used as monotherapy or combined with other agents	Contraindication – do not use with a GLP-1 RA Increased hospitalisation for heart failure with saxagliptin	

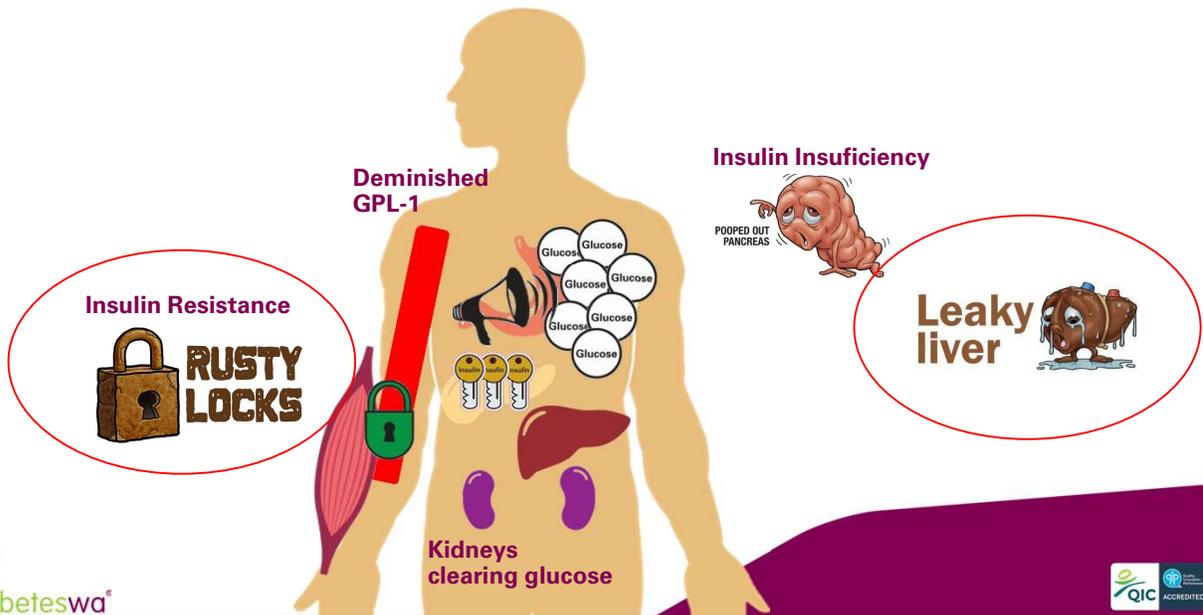
Table 1. Clinical considerations when choosing diabetes medications

Clinical outcome	Medication effects on clinical outcomes			
	Thiazolidinedione (TZD)	Sodium glucose co-transporter 2 inhibitors (SGLT2)	Glucagon-like peptide-1 receptor agonists (GLP-1 RA)	Insulin
Patients with established or at high risk of CVD (refer to the section Type 2 diabetes and cardiovascular risk)	Contraindication if symptomatic heart disease, including heart failure ²⁰ Pioglitazone is the preferred TZD	Selective benefit, depending on individual drug choice ²¹	Selective benefit, depending on individual drug choice ²²	Neutral effect ^{1,23}
Patients with risk from hypoglycaemia	Lower rates compared to SU ¹	Lower rates compared to SU ¹	Lower rates compared to SU ¹	Higher clinical risks as monotherapy and in combination with other agents ²³
Patients at risk of gastrointestinal conditions (eg IBS, IBD and gastroesophagitis)	Neutral effect	Neutral effect	Known intolerance – nausea and vomiting, diarrhoea ²⁴	Neutral effect
Patients in whom stabilisation of BMI or weight loss is desired	Modest gain compared with other dual combination therapies ²	Modest weight loss (in monotherapy, plus in combination with metformin versus metformin with alternate dual oral drug combinations) ^{25,26}	Weight loss (in monotherapy, plus in combination with metformin versus metformin with alternate dual oral drug combinations) ^{27,28}	Modest gain ^{29,30}
Patients with renal impairment (eg lowered eGFR)	Neutral effect	Glycaemic-lowering efficacy decreases, thus contraindicated with renal impairment (eGFR <45 mL/min) ³¹	Contraindication eGFR <30 mL/min (dulaglutide <15)	No contraindication, but hypoglycaemia risk increases
Other class-specific information	Increased atypical fractures (relative risk 1.57) ³² with women more at risk than men ³³ Pioglitazone is contraindicated in individuals with bladder cancer or un-investigated haematuria ³⁴	Modest lowering of BP Increased genitourinary infections (especially females) Refer to Note C Less common – euglycaemic diabetic ketacidosis ³⁵ (refer also to discussion of surgery in the section 'Managing' risk and other impacts of type 2 diabetes)	Once-weekly formulations are available ³⁶ Contraindication – combination with a DPP-4	Dose required to be titrated to glycaemic goals while mitigating glycaemic variability and hypoglycaemia



<https://www.racgp.org.au/clinical-resources/clinical-guidelines/key-racgp-guidelines/view-all-guidelines/diabetes/medical-management-of-glycaemia>

Metformin



NL1

Class	Active Medication Name	Brand
Biguanides	Metformin	Diabex, Diaformin, Metex

Action



↓ hepatic glucose production



↑ insulin sensitivity



Delays glucose absorption

Adverse effects – gastrointestinal: nausea, bloating, diarrhoea

When to administer – with a meal, XR formulation can be given once daily, usually with the evening meal

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CL0

Class	Active Medication Name	Brands
Sulfonylureas	Glipizide Gliclazide Glimeperide Glibenclamide	Minidiab Diamicron, Glyade, Nidem Amaryl, Aylide Daonil

Action



Stimulates release of insulin from beta cells

Adverse effects – hypoglycaemia, rash

When to administer – with a meal, XR can be given once per day

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Slide 17

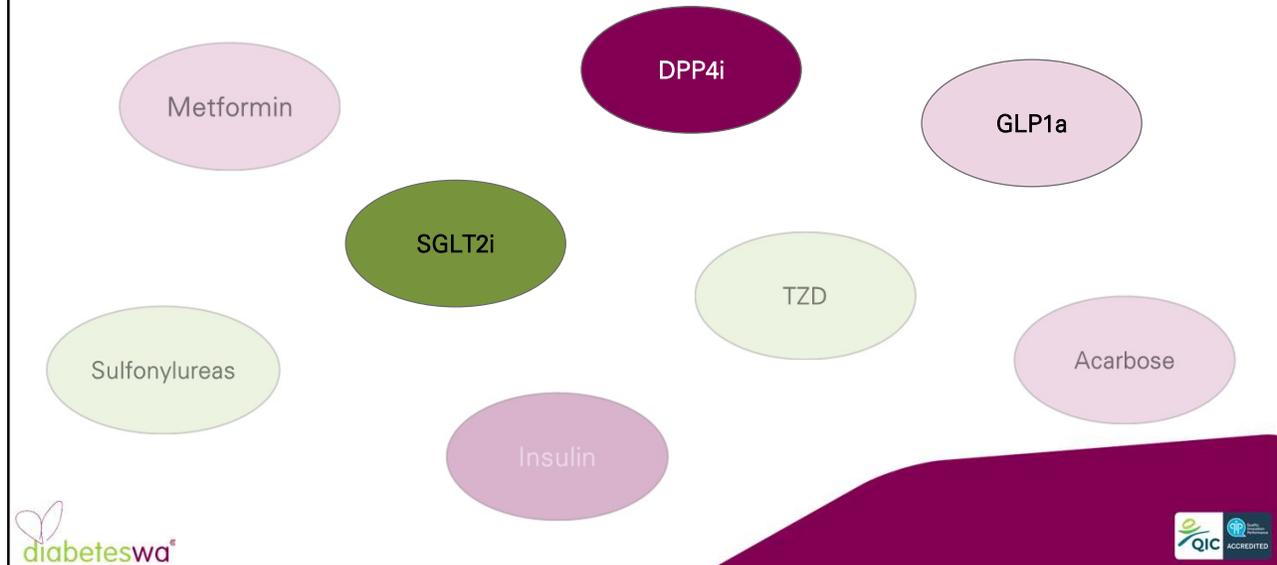
CLO Please make notes clearer
Carly Luff, 2023-10-02T06:06:14.006

NL1 I think the activity where we ask each table to work out where on the feltman to put their drug name (before we talk about the specific drug class) is a very effective learning tool and I would like to keep it in the training.
Nyaree Lawler, 2023-10-19T04:18:33.830

Slide 18

CLO Please make notes clearer
Carly Luff, 2023-10-02T06:06:33.584

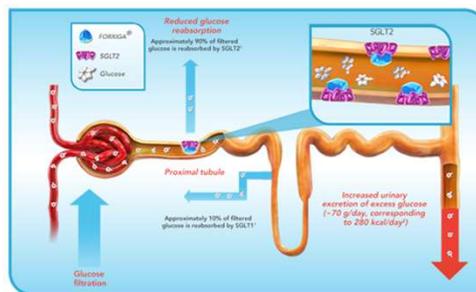
Modern Diabetes Medication Options



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Class	Active Medication Name	Brand
Sodium Glucose Co-transporter 2 inhibitor	Dapagliflozin Empagliflozin	Forxiga Jardiance

Action

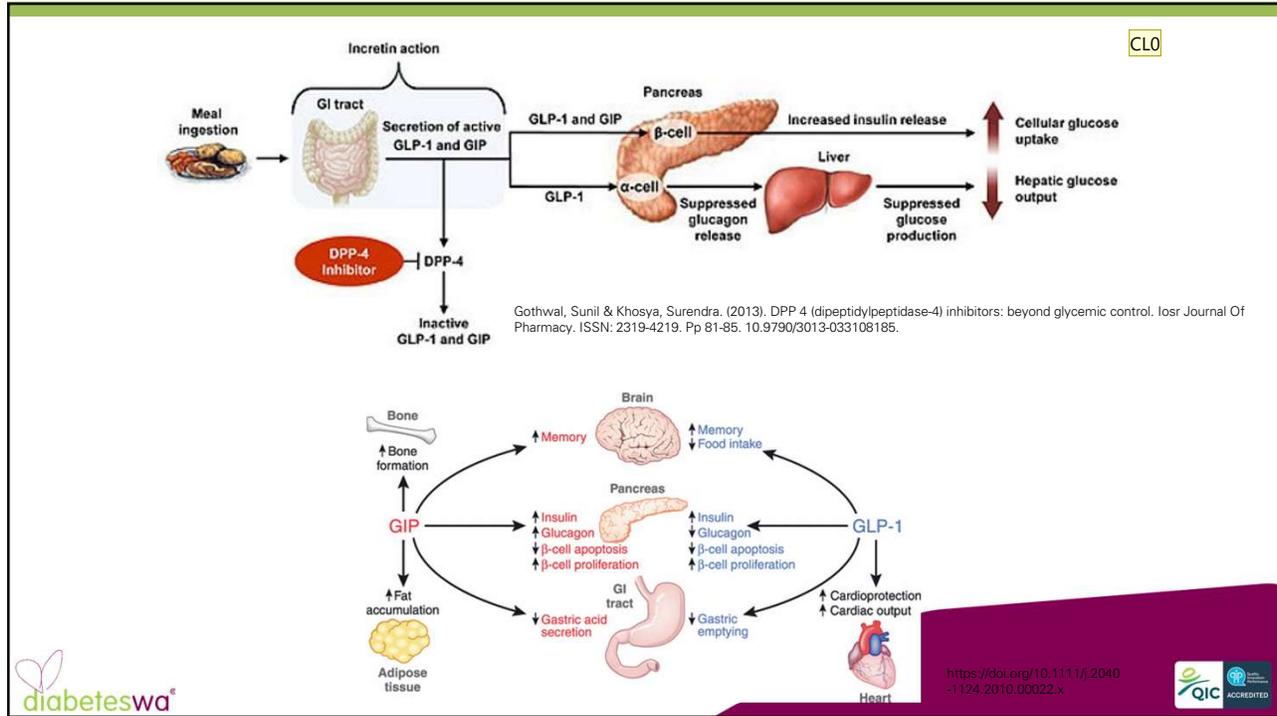


Adverse Effects – UTI, thrush, polyuria, dehydration, euglycaemic DKA

When to administer – with or without food



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CLO

Class	Active Medication Name	Brand
Dipeptidyl Peptidase-4 Inhibitors (Gliptins)	Alogliptin Linagliptin Saxagliptin Sitagliptin Vildagliptin	Nesina Trajenta Onglyza Januvia, Sitaglo, Xelevia Galvus

Action

Allows incretin driven insulin release

↓ glucagon release

Adverse effects – headache, musculoskeletal pain, nasopharyngitis

When to administer – with or without food

diabeteswa[®] QIC ACCREDITED

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Slide 21

CLO Please add some notes to this slide and reference where the image came from

Carly Luff, 2023-10-02T06:10:35.458

Slide 22

CLO Please make notes clearer

Carly Luff, 2023-10-02T06:11:10.116

CLO

Class	Active Medication Name	Brand
Glucagon-like Peptide-1 Analogues	Dulaglutide Semaglutide Liraglutide (not PBS listed)	Trulicity Ozempic Victoza, <i>Saxenda (wt loss)</i>
GLP-1/GIP	Tirzepatide (not PBS listed)	Mounjaro

Action



Incretin driven insulin release



↓ glucagon release



Delays gastric emptying

Adverse Effects - nausea, vomiting, pancreatitis

When to administer – once a week, by injection



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DO NOT CHEW OR CRUSH. SWALLOW WHOLE.



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Slide 23

CLO Please make notes clearer

Carly Luff, 2023-10-02T06:11:48.022

CLO

Treatment Decision Infographic

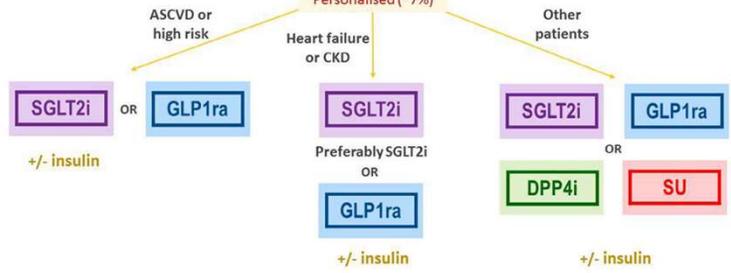
New approach for glycaemic therapy in patients with type 2 diabetes

- Cardiovascular risk reduction:
- Blood pressure (ACEI/ARB)
 - Statin
 - Smoking cessation

Weight Loss, Healthy Eating, Exercise

Metformin

HbA1c above target Personalised (~7%)



Reference: Priorities and practicalities of prescribing diabetes medicines with cardiovascular and renal protective effects: an Australian perspective Sarah A. Hitchen, Nick S. R. Lan, P. Gerry Fegan and Bu B. Yeap. 20 November 2020 <https://doi.org/10.1111/mj.15055>



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Medical Management – Insulin



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Slide 25

CLO It may be worth adding notes to where this one came from and some further explanation

Carly Luff, 2023-10-02T06:13:11.551

Insulin

- 32% of all people diagnosed with diabetes use insulin
- Type 1 diabetes – no pancreatic insulin production, therefore insulin injections are required
- Type 2 diabetes – when other medications are unable to keep the BGL's in target or patients have contraindications or side effects to other medications
- Gestational diabetes – insulins used to manage GDM are considered safe to use during pregnancy

• NDSS Statistics as at 31/06/2024 [Insulin-Therapy.pdf \(ndss.com.au\)](https://www.ndss.com.au/Insulin-Therapy.pdf)

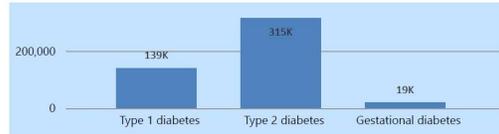


As at 30 June 2024

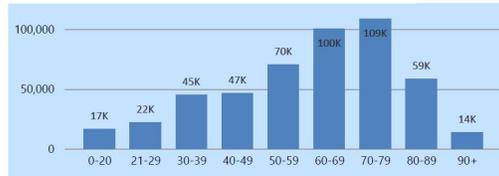
There were 481,336 people with diabetes registered with the NDSS who require insulin therapy. This was 32% of all people with diabetes

Diabetes Type	Requiring Insulin	% of Total	% of Diabetes Type
Type 1 diabetes	139,257	29%	100 %
Type 2 diabetes	315,432	66%	25 %
Gestational diabetes	18,638	4%	41 %
Other diabetes	8,009	2%	64 %
Total	481,336	100%	32 %

People with diabetes requiring insulin by diabetes type

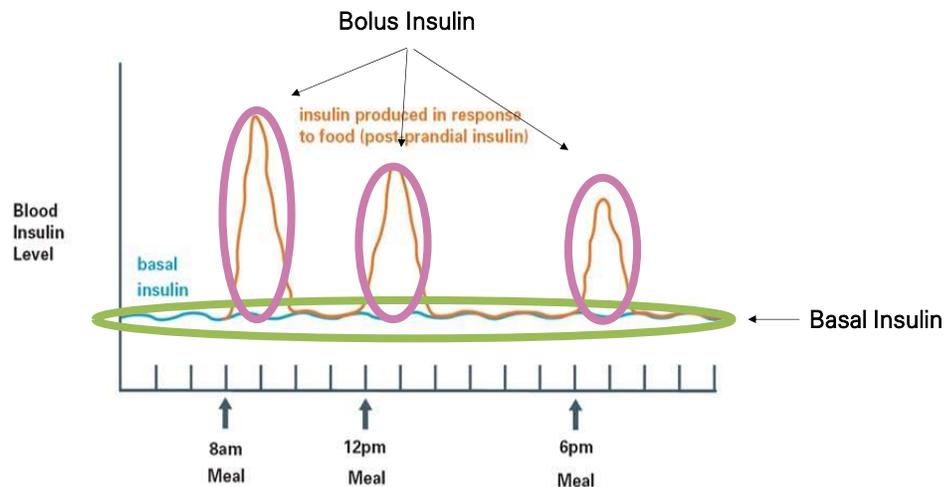


People with diabetes requiring insulin by age group



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CLO



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Slide 27

CLO Are the the latest snapshot images? Please reference date

Carly Luff, 2023-10-02T06:14:51.826

Slide 28

CLO Please add some notes

Carly Luff, 2023-10-02T06:15:04.835

Know Your Insulin

Acting time	100 units/mL unless otherwise stated	When to administer
Ultra short acting		IMMEDIATELY before meals
Short acting		Within 30 minutes before meals
Intermediate acting		ONCE or TWICE daily
Mixed long and short acting	<p>Other less commonly used formulations include Mixard 50/50 (insulin neutral/isophane)</p>	ONCE or TWICE daily Within 30 minutes before meals
Mixed long acting with ultra short acting	<p>Other less commonly used formulations include Humalog Mix 50 (insulin lispro/insulin protamine)</p>	ONCE or TWICE daily IMMEDIATELY before meals
Mixed ultra long acting with ultra short acting		ONCE or TWICE daily IMMEDIATELY before meals
Long acting		ONCE or TWICE daily ONCE daily
Long acting high concentration	<p>Different strengths of insulin glargine are not interchangeable. It is recommended patients continue their same preparation whilst in hospital.</p>	ONCE daily

Take care when prescribing or administering insulin

- Insulin should be ordered as 'units', not 'U'.
- Prescribe insulin by brand names, where possible, to reduce risk of selection error.
- If a patient is fasting, ask the doctor to review the prescription prior to administration of insulin.
- Cartridges or pen injectors are for Single Patient Use Only and labelled with patient details.
- Insulin currently in use for the patient can be kept at room temperature for 28 days or as per the product information.
- Please be aware of new high concentration insulins that are available in the community, these include:
 - Toujeo Solostar (insulin glargine)
 - Humalog U200 KwikPen (insulin lispro)
 - Humulin R 500 KwikPen (insulin neutral)

Contact your clinical pharmacist or diabetes clinical nurse specialist for more information

<https://www.health.wa.gov.au/-/media/Files/Corporate/general-documents/safety/PDF/Medication-safety-resources/Know-your-insulins.pdf>

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Slide 30

NLO I think this slide would go at the end of the whole presentation?

Nyaree Lawler, 2023-10-19T04:23:06.854

TSO 0 [@Nyaree Lawler] - maybe leave it here as this section may be used as a stand alone presentation - feel free to 'hide' it

Tara Savage, 2023-10-23T05:25:47.560

Thank you!
Any questions?

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info@diabeteswa.com.au

To find out more – Contact us today!

- GP Helpline – For Health Professionals
- Diabetes WA Clinic & Telehealth Service - Offering 1 on 1 appointments
- Self-Management Workshops – Funded by the NDSS
- Diabetes WA Training – Suite of Health of Health Professional Presentations

