



Pharmacological management of Type 2 Diabetes Mellitus Guideline

Approved Hywel Dda University Health Board policies can be found on the [Policies and Procedures Approved section of the intranet](#)

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Brief Summary of Document:	This guideline provides evidence-based information and resources for the pharmacological management of Type 2 Diabetes Mellitus.
Scope	All HDUHB Medical and Independent Non-Medical Prescribers, Pharmacy and Nursing staff. This guideline applies to all patients treated for Type 2 Diabetes Mellitus (T2DM) in HDUHB. This Policy is provided as a resource to aid clinicians when prescribing for Type 2 Diabetes Mellitus. This guideline does not cover gestational diabetes or guidelines for Peri-delivery or ante-natal care.
To be read in conjunction with:	<ul style="list-style-type: none"> • HDUHB Formulary • Summaries of Product Characteristics (SPC) of the individual medicines • British National Formulary (BNF)
Patient Information:	Include links to Patient Information Library
Owning committee/group	Diabetes Mellitus consultants / Diabetic Network Dr Sam Rice/ Dr M Barnard

Executive lead	Dr Sam Rice/ Dr M Barnard
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Reviews and updates		
Version no:	Summary of Amendments:	Date Approved:
1	New guideline	15/09/2020
2	Drug costs updated	

Glossary of terms

Term	Definition
T2DM	Type 2 Diabetes Mellitus

Keywords	Type 2 Diabetes Mellitus (T2DM), Guideline
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1. Scope

This guideline applies to-

SITE: Primary and Secondary care settings within Hywel Dda University Health Board (H DUHB).

STAFF: clinicians, pharmacists, nursing and non-medical prescribing staff.

PATIENTS: All adult patients with Type 2 diabetes Mellitus.

2. Aim of Guideline

This guideline for Type 2 diabetes mellitus has been developed to ensure that evidence-based medicines are used to optimise the treatment of adult patients with Type 2 Diabetes Mellitus (T2DM) throughout Hywel Dda University Health Board.

3. Objectives

The key objectives are:

- To provide guidance for the pharmacological management of Type 2 Diabetes Mellitus.
- To assist evidence-based prescribing and the appropriate use of medicines in Type 2 Diabetes Mellitus.
- To provide a repository of currently recommended patient information resources to be used by diabetes practitioners in H DUHB.

4. Pharmacological management of Type 2 Diabetes Mellitus Guideline

Refer to Appendices 1 to 9:

1. Type 2 diabetes Mellitus guideline
2. Lifestyle Measures
3. Patient resources
4. Management of T2DM in frail/ elderly patients.
5. Insulin use ready-reckoner
6. List of available insulins
7. GLP-1 Agonists
8. Self-monitoring of blood glucose
9. Hypertension guidelines for patients with diabetes (NICE)

5. Guideline Implementation

- The guideline available on Hywel Dda University Health Board intranet
- The Diabetes/ Endocrine teams and Medicines Optimisation team will make Clinicians, Pharmacists, Nursing and Non-Medical Prescribing staff aware of guidance.

6. Monitoring of Guideline

Adherence to this guideline will be monitored through regular review of hospital discharge information, referrals from primary care and analysis of prescribing information.

7. References

- 1) SIGN - Pharmacological management of glycaemic control in people with type 2 diabetes
<https://www.sign.ac.uk/assets/sign154.pdf> accessed 03 August 2020
- 2) NICE, 2016, Type 2 diabetes in adults: management (Updated Aug 2019)
<https://www.nice.org.uk/guidance/ng28> accessed 03 August 2020
- 3) H DUHB, 2016, Guidelines for Home Blood Glucose Monitoring (Primary, Community, Acute and Mental Health Care)

<http://howis.wales.nhs.uk/sitesplus/documents/862/Guidelines%20for%20Home%20Blood%20Glucose%20Monitoring%20HDUHB%20v2%200%20Final%20February%202016.pdf>

- 4) Specialist Pharmacy Service, 2016, London Medicines Evaluation Network Overview: Glucagon-Like Peptide-1 receptor analogues <https://www.sps.nhs.uk/wp-content/uploads/2017/01/GLP-1-analogues.pdf>
- 5) Guideline for the managed introduction of biosimilar basal insulin. <https://www.guidelines.co.uk/diabetes/guideline-for-the-managed-introduction-of-biosimilar-basal-insulin/454932.article>
- 6) Diabetes and Driving <https://www.gov.uk/diabetes-driving>
- 7) Injection Technique matters <https://trend-uk.org/injection-technique-matters/>
- 8) Specialist Pharmacy Services -Answers to commonly asked questions about biosimilar versions of insulin glargine. <https://www.sps.nhs.uk/articles/answers-to-commonly-asked-questions-about-biosimilar-versions-of-insulin-glargine/>
- 9) Sheahan KH, Wahlberg EA, Gilbert MP. An overview of GLP-1 agonists and recent cardiovascular outcomes trials. *Postgraduate Medical Journal* 2020;96:156-161.
- 10) Arnott, C. et al. 2020. Sodium-Glucose Cotransporter 2 Inhibition for the Prevention of Cardiovascular Events in Patients With Type 2 Diabetes Mellitus: A Systematic Review and Meta-Analysis. *Journal of the American Heart Association* 9(3). Available at: <https://www.ahajournals.org/doi/10.1161/JAHA.119.014908>
- 11) Zhang, K. et al. 2020. Cardiovascular risk following metformin treatment in patients with type 2 diabetes mellitus: Results from meta-analysis. *Diabetes Research and Clinical Practice* 160. Available at: [https://www.diabetesresearchclinicalpractice.com/article/S0168-8227\(19\)31471-8/abstract](https://www.diabetesresearchclinicalpractice.com/article/S0168-8227(19)31471-8/abstract) [Accessed: 26 May 2020].
- 12) Strain W, Hope S, Green A, Kar P, Valabhji J, Sinclair A. Type 2 diabetes mellitus in older people: a brief statement of key principles of modern day management including the assessment of frailty. A national collaborative stakeholder initiative. *Diabet Med* 2018; 35 (7): 838-845.
- 13) National Institute of Health and Care Excellence (NICE) (2019) Hypertension in adults: diagnosis and management. NG136. Available at: <https://www.nice.org.uk/guidance/NG136> accessed 03 August 2020.
- 14) MIMS, MIMS diabetes clinic. Available at <https://www.mims.co.uk/clinics/diabetes> Accessed 03 August 2020.
- 15) Lifestyle changes for Type 2 diabetes. Diabetes.co.uk. Available at <https://www.diabetes.co.uk/lifestyle-changes-for-type2-diabetes.html> Accessed 03/08/2020
- 16) Trend Diabetes website <https://trend-uk.org/> (registration required)

8. Appendix 1 - Type 2 diabetes Mellitus guideline

INITIAL THERAPY In ADDITION to comprehensive lifestyle measures (weight management and physical activity)	SET GLYCAEMIC TARGET: HbA1c <7% (53 mmol/mol) OR INDIVIDUALISED AS AGREED		CVD, HF and CKD risk factors need to be considered independently of HbA1c. If BMI>40kgm ⁻² consider referral to level 3 obesity service. <u>HDUHB preferred options:</u> <ul style="list-style-type: none">• Sulfonylurea - Gliclazide• SGLT2 inhibitor –Canagliflozin, Dapagliflozin, Empagliflozin• DPP4 inhibitor - Alogliptin, Linagliptin, Saxagliptin, Sitagliptin.• GLP-1 RA – Dulaglutide, Liraglutide, Semaglutide (oral+inj),• Biosimilar insulin glargine: Abasaglar or Semglee.
	USUAL APPROACH	ALTERNATIVE APPROACH: if GI symptoms with or intolerant to metformin	
	METFORMIN*	<ul style="list-style-type: none">• SGLT2-inhibitor (CVD, HF,CKD benefit (Cana, Dapa- and Empagliflozin are licensed for monotherapy)• DPP4 inhibitor (Lina-, Saxa-, Sita- and Vildagliptin are licensed for monotherapy)• Sulfonylureas (SU)• Pioglitazone	
Useful where risk of	CVD		
CV BENEFIT	Yes		
HYPOGLYCAEMIA RISK	Low		
WEIGHT	Reduction		
MAIN ADVERSE EVENTS	Gastrointestinal		
IN CKD STAGE 3A (eGFR 45-59ml/min)	Maximum 2g daily		

FIRST INTENSIFICATION In ADDITION to lifestyle measures	If not reaching target HbA1c (58mmol/mol) after 3-6 months ² , review adherence, then, dependent on patient risk factors (e.g. CV risk, weight, renal),			
	Add one of:			
	SGLT2 Inhibitor* OR	DPP-4 Inhibitor* OR	Pioglitazone* OR	Sulfonylurea*
Useful where risk of	CVD, HF or CKD.	-----	-----	-----
CV BENEFIT	Yes (Cana, Dapa-, Empagliflozin)	No	Probable (but fluid retention)	No
HYPOGLYCAEMIA RISK	Low	Low	Low	High
WEIGHT	Loss	Neutral	Gain	Gain
MAIN ADVERSE EVENTS	Genital fungal infections & UTIs	Few	Oedema / fractures ⁵	Hypoglycaemia
IN CKD STAGE 3A (eGFR 45-59ml/min)	Do not initiate (except Canagliflozin) ³	Reduce Dose ⁴ (except Linagliptin)	Dose unchanged	Careful monitoring ¹

SECOND INTENSIFICATION In ADDITION to lifestyle measures	If not reaching target Hb1Ac (58mmol/mol) after 3-6 months, review adherence: then ⁶			
	Add <i>EITHER</i> an additional Oral Agent from a different class <i>OR</i> an Injectable Agent (GLP-1 or Insulin)			
ORAL AGENTS →	SGLT2 Inhibitor* OR	DPP4-Inhibitor* OR	Pioglitazone* OR	Sulfonylurea*
INJECTABLE AGENTS → (Semaglutide available as oral + inj)	If BMI > 30kg/m ² GLP1- Agonist*		If BMI < 30kg/m ² Basal Insulin*	
Useful where risk of	CVD	Notes: <ul style="list-style-type: none"> • Stop DPP4 inhibitor • Consider reducing sulfonylurea • Continue metformin • Can continue pioglitazone • Can continue SGLT2 inhibitor 	-----	Notes: Inject before bed <ul style="list-style-type: none"> • Use isophane (NPH) insulin or longer acting analogues according to risk of hypoglycaemia⁹ • Can continue metformin, pioglitazone, DPP4 Inhibitor or SGLT2 inhibitor • Can reduce or stop sulfonylurea
CV BENEFIT	Yes (Sema ¹⁰ -, Lira ¹¹ - and Dulaglutide ¹²)		No	
HYPOGLYCAEMIA RISK	Low		Highest	
WEIGHT	Loss		Gain	
MAIN ADVERSE EVENTS	Gastrointestinal		Hypoglycaemia	
IN CKD STAGE 3A (eGFR 45-59ml/min)	Dose Unchanged ⁷		Dose Unchanged ⁸	

THIRD INTENSIFICATION	If not reaching target HbA1c after 3-6 months, review adherence: then
In ADDITION to lifestyle measures	Add additional agents from Second Intensification options (consider specialist input if needed).

***Continue medication at each stage if either individualised target achieved or HbA1c falls more than 5.5mmol/mol in 3-6 months. Discontinue if target not reached.**

1. Consider dose reduction. 2. Do not delay if first-line options/ inappropriate 3. See BNF: 100mg canagliflozin can be started (from 45ml/min) or (from 30ml/min if ACR>300mg/g), other specific agents can be continued at reduced dose 4. See BNF: no dose reduction required for linagliptin 5. Pioglitazone is contra-indicated in people with (or history of) heart failure or bladder control 6. Do not combine dapagliflozin with pioglitazone 7. Caution with exenatide when eGFR<50ml/min/. 8. Adjust according to response. 9. Driving, occupational hazards, risk of falls, previous history. ABBREVIATIONS: CKD 3A = chronic kidney disease stage 3A (estimated glomerular filtration rate 45–59 ml/min/1.73 m2) CVD = Cardiovascular Disease. 10. CVD benefit proven for injection only. 11. Only proven for 1.8mg 12. Evidence for primary and secondary CVD prevention

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Key considerations to support drug selection (check BNF/ SPC for more in-depth prescribing info.)

DRUG		Hypo risk	Effect on weight	eGFR & dose reduction	Safety Considerations	Cost per 28 days (Prices May 2020 Drug Tariff)
Biguanides	Metformin (CVD benefits)	---	---	Caution ^c	Renal impairment	500mg - £1.36, 850mg-£1.34 500mg MR - £4.00, 750mg MR + 1000mg MR - £6.40, 500mg/5ml- £6.75 150ml 1000mg/5ml - £24.00 150ml
Sulfonylureas	Gliclazide	↑	↑	Caution ^b	Porphyria, DKA, Driving ^e	40mg - £1.51, 80mg – £1.07 30mg MR - £2.81 60mg MR - £4.77
TZDs	Pioglitazone	---	↑	No caution	CCF (NYHA stages I to IV), fluid retention Bladder cancer, hepatic impairment, DKA	15mg - £1.41 30mg - £1.55 45mg - £1.82
DPP4 Inhibitors	Alogliptin	---	---	6.25mg (<30ml/min) 12.5mg (30-50ml/min) 25mg (>50ml/min) Caution	CCF (caution NYHA class III-IV) Pancreatitis	6.25mg, 12.5mg, 25mg - £26.60
	Linagliptin	---	---	No caution	Pancreatitis	5mg - £33.26
	Saxagliptin	---	---	2.5 mg (<45ml/min) 5mg (≥45ml/min) Caution	CCF (caution NYHA class III-IV) Pancreatitis	£31.60 – all strengths
	Sitagliptin	---	---	25mg (<30ml/min) 50mg (≥30- 44ml/min) 100mg (≥45ml/min) Caution	Pancreatitis	25mg, 50mg, 100mg - £33.26
	Vildagliptin	---	---	50mg (<50ml/min) 100mg (≥50ml/min) Caution	Pancreatitis	50mg - £33.35
SGLT2 inhibitors	Canagliflozin (CVD benefits)	---	↓	Caution (100mg can be initiated from 45ml/min) or (from 30ml/min with urinary ACR > 300 mg/g)	Genital fungal infections + UTI, DKA, Fournier's gangrene ^g Lower limb amputations ^f	100mg, 300mg - £36.59
	Dapagliflozin (CVD benefits)	---	↓	Caution ^d (do not initiate if <60ml/min) Stop if <45ml/min	Genital fungal infections + UTI, DKA, Fournier's gangrene ^g	5mg, 10mg - £36.59
	Empagliflozin (CVD benefits)	---	↓	Caution ^d (do not initiate if <60ml/min) Stop if <45ml/min		10mg, 25mg - £36.59
	Ertugliflozin	---	↓	Caution ^d (do not initiate if <60ml/min) Stop if <45ml/min	Genital fungal infections + UTI, DKA, Fournier's gangrene ^g Lower limb amputations ^f	5mg, 25mg - £29.40

GLP 1 Receptor (d=daily, w=weekly)	Dulaglutide (w) (CVD benefits) (evidence for primary + secondary CVD prevention)	---	↓↓	Caution ^a (do not use if <15ml/min)	Pancreatitis, severe GI disease	£73.25 / 4 pens (28d) 0.75mg/0.5ml + 1.5mg/0.5ml
	Exenatide (bd or w)	---	↓↓	Caution ^b do not use if <30ml/min)	Pancreatitis, severe GI disease	10micrograms £81.89, 2mg MR £73.36
	Liraglutide (d) (Secondary CVD prevention with 1.8mg)	---	↓↓	No caution (except end stage)	Pancreatitis, severe GI disease, thyroid disease CI NYHA class IV	1.2mg OD dose - £78.48 1.8mg OD dose £117.72 (1.8mg not cost effective)
	Semaglutide inject(w)+oral(d) (Secondary CVD prevention proven with injectable only)	---	↓↓	No caution (except end stage)	Pancreatitis, severe GI disease. CI NYHA class IV	£73.25 – inj., all strengths £73.25 – oral, all strengths
Insulin	Insulin	↑↑	↓↓↓	Caution (↓insulin metabolism)	Driving ^e	Costs vary depending on insulin and dose—check BNF.

Key

^aCaution – stop if eGFR<15ml/min

^bCaution – contra-indicated/ stop if eGFR<30ml/min

^cDose reduction required in eGFR <45ml/min, stop if eGFR < 30ml/min – see BNF or SPC

^dEfficacy depends on good renal function. Reduce dose if eGFR<60ml/min, stop if eGFR < 45 ml/min.

^eSee DVLA requirements for appropriate advice, occupational hazard may also be an issue

^fToe and Midfoot amputation. Advise patients on routine preventative footcare

^gFournier's gangrene (necrotising fasciitis of the genitalia/perineum) is a rare side-effect of all SGLT2 inhibitors that may be preceded by urogenital infection or perineal abscess. Advise patients to seek urgent medical attention if they experience severe pain, tenderness, erythema, or swelling in the genital or perineal area, accompanied by fever or malaise. See [MHRA](#) Alert Feb 2019.

Cardiovascular disease (CVD)—defined as acute coronary syndromes (ACS), a history of myocardial infarction (MI), stable or unstable angina, coronary or other arterial revascularization, stroke, transient ischemic attack, or peripheral arterial disease presumed to be of atherosclerotic origin

Established CVD disease (indicators of high CVD disease risk: age ≥55 years + LVH or coronary, carotid, lower extremity artery stenosis >50%)

Heart Failure (HF) particularly Heart Failure with reduced Ejection Fraction (HFrEF (LVEF <45%)

Chronic Kidney Disease (CKD) Specifically CKD with eGFR 30–60 ml/min/1.73 m² or UACR >30 mg/g, particularly UACR >300 mg/g

HbA1c	mmol/mol	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
	%	4.0	4.4	4.9	5.4	5.8	6.3	6.7	7.2	7.6	8.1	8.6	9.0	9.5	9.9	10.4	10.8

9. Appendix 2 - Lifestyle Measures

Lifestyle measures (from diabetes.co.uk)

The recommended lifestyle interventions include:

- Taking 2.5 hours each week of moderate intensity physical activity or one hour and 15 minutes of high intensity exercise.
- Losing weight gradually to achieve a healthy BMI
- Replacing refined carbohydrates with wholegrain foods and increase intake of vegetables and other foods high in dietary fibre.
- Reducing the amount of saturated fat in the diet.
- Employing stress management techniques, such as mindfulness, to reduce stress levels.

10. Appendix 3 – Patient resources

- Pocket Medic <http://www.diabeteswales.org.uk/en/pocket-medic.htm>
- Trend Diabetes website – resources <https://trend-uk.org/resources/>
 - [65+ years old: keeping well with your type 2 diabetes](#)
 - [Diabetes and Emotional Well-being](#)
 - [Diabetes and enteral feeding](#)
 - [Diabetes and pancreatic exocrine insufficiency](#)
 - [Diabetes and the menopause](#)
 - [Diabetes and travel](#)
 - [Diabetes and your kidneys](#)
 - [Diabetes safe driving and the DVLA](#)
 - [Diabetes – Hypoglycaemia explained](#)
 - [Keeping safe with insulin therapy](#)
 - [Looking after your feet when you have diabetes](#)
 - [Managing mealtime insulin](#)
 - [How to reduce the risk of genital fungal infection](#)
 - [Type 2 Diabetes and steroid tablets](#)

11. Appendix 4 - Management of T2DM in frail/ elderly patients.

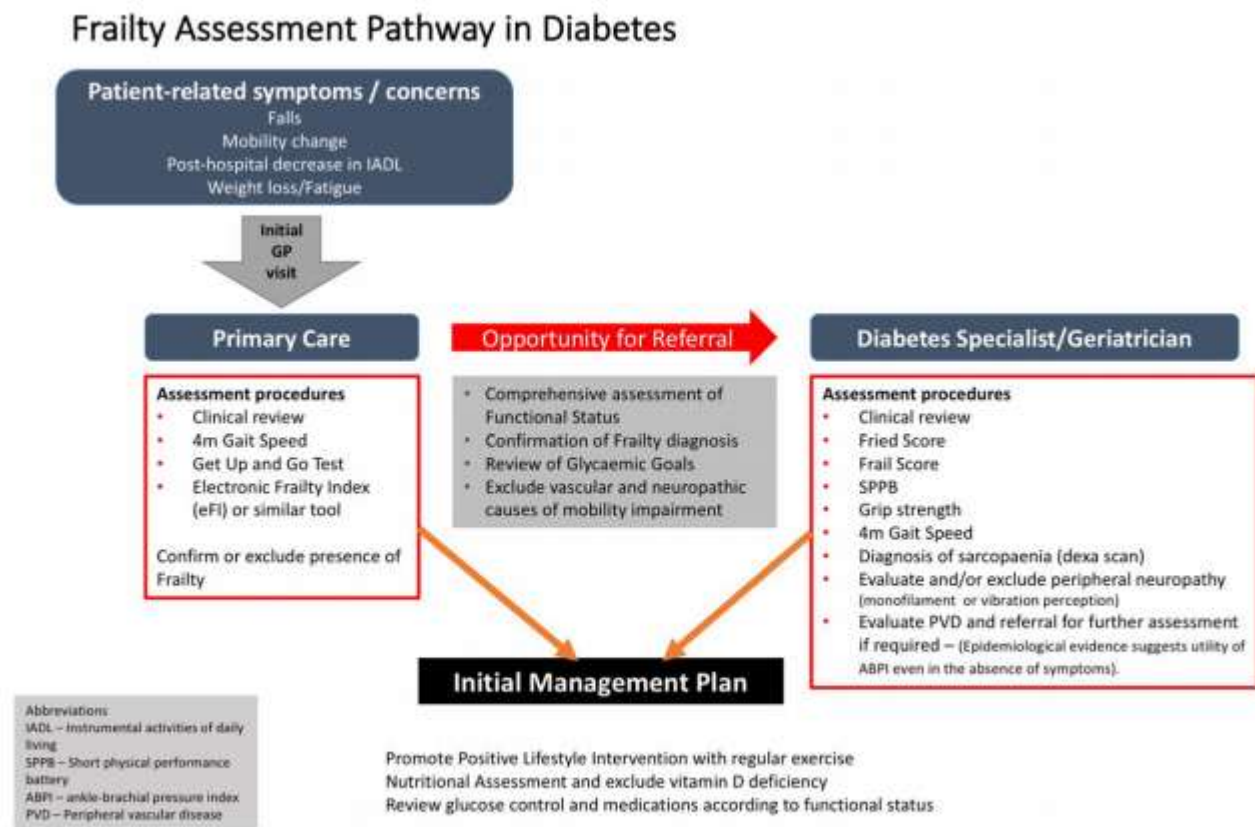
Management of T2DM in frail/ elderly patients.Frailty assessment pathway in diabetes¹².

FIGURE 1 An implementable frailty assessment scheme. IADL, instrumental activities of daily living; SPPB, short physical performance battery; ABPI, ankle brachial pressure index; PVD peripheral vascular disease.

Key features of a modern-day diabetes service for older people.

- Inter-professional activity leading to an agreed diabetes and frailty care plan
- A medication risk minimisation strategy to decrease unwanted adverse drug events, hospitalisation and hypoglycaemia
- An active deprescribing policy that avoids over-prescribing of glucose-lowering and other medications without compromising patient safety
- A review of diabetes and frailty status at the time of care home residency
- Use of additional outcomes of clinical care that can form the basis of multi-professional audit (and national audits of care) and be more aligned with the needs of the older adult with diabetes, e.g. quality of life, change in functional status, falls rate, admissions to hospital for hypoglycaemia.

	De-escalation threshold		Treatment Target	
	Threshold	Suggested interventions	Targets	Interventions
The fit older adult with diabetes	53mmol/mol (7.0%)	Evaluate long-acting sulfonylurea and insulin therapy that may cause hypoglycaemia. Consider appropriate dosage in setting of renal function.	58mmol/mol (7.5%)	Avoid initiating new agents that may cause hypoglycaemia or exaggerate weight loss.
Moderate severe frailty	58mmol/mol (7.5%)	Discontinue any sulfonylurea if HbA1c below threshold. Avoid TZD's because of risk of heart failure. Cautious use of insulin and metformin mindful of renal function.	64mmol/mol (8.0%)	DPP-4 inhibitors and longer acting insulins have demonstrated safety. TZD's may increase risk of heart failure. SGLT-2 inhibitors may provide additional benefit in people with heart failure but also exacerbate symptoms of diabetes.
Very Severe frailty	64mmol/mol (8.0%)	Withdraw sulfonylureas and short-acting insulins because of risk of hypoglycaemia. Review timings and suitability of NPH insulin with regard to risk of hypoglycaemia. Therapies that promote weight loss may exacerbate sarcopenia.	70mmol/mol (8.5%)	DPP-4 inhibitors at renally appropriate dose for those close to target. Consider once-daily morning NPH insulin or analogue alternatives if symptomatic nocturnal hyperglycaemia. Educate carers and relatives regarding risk of hypoglycaemia.
HbA1C= glycated haemoglobin. TZD=Thiazolidinediones (pioglitazone). DPP-4= dipeptidyl-4. SGLT-2=sodium glucose co-transporter-2. NPH=Neutral protamine Hagedorn.				
Strain W, Hope S, Green A, Kar P, Valabhji J, Sinclair A. Type 2 diabetes mellitus in older people: a brief statement of key principles of modern day management including the assessment of frailty. A national collaborative stakeholder initiative. Diabet Med 2018; 35 (7): 838-845.				

12. Appendix 5 - Insulin use ready-reckoner**Insulin use ready-reckoner - Calculation Chart for the Monthly amount of insulin to be prescribed in relation to daily dose taken (for 100units/ml insulin only).**

Daily dose	With air shots used when changing pen needles. Daily units.	No. of units used per month with air shots (pens and cartridges)	No. of 3ml cartridges or pens needed per monthly prescription (contain 300 units)	No. of units required per month with no air shot (syringes)	No. of 10ml vials needed per monthly prescription (1000 units) No air shot required.
10 units	22	616	2	280	1 will last 3 months
20 units	32	896	3	560	1
30 units	42	1176	4	840	1
40 units	52	1456	5	1120	2
50 units	62	1736	6	1400	2
60 units	72	2016	7	1680	2
70 units	82	2296	8	1960	2
80 units	92	2576	9	2240	3
90 units	102	2856	10	2520	3
100 units	112	3136	11	2800	3
110 units	122	3416	12	3080	4
120 units	132	3696	13	3360	4
130 units	142	3976	14	3640	4
140 units	152	4256	15	3920	4
150 units	162	4536	16	4200	5

Insulin calculation will be needed for each type of insulin used. At times of sickness, infection, pregnancy, steroid treatment, more insulin will be required for that period. People with type 1 and type 2 diabetes who vary insulin dose with meals will need enough to cover the average amount taken each month.

13. Appendix 6 - List of available insulins

List of commercially available insulin (correct as of August 2020 ¹⁴)							
	Preparation	Manufacturer	Species	Form	Onset (approx.)	Peak activity (approx.)	Duration of action (approx.)
Neutral Insulin Injection	Hypurin Porcine Neutral	Wockhardt	Porcine	Vial, C2	30min-1hr	1.5-4.5hr	6-8hr
	Actrapid	Novo Nordisk	Human	Vial	<30min	1.5-3.5hr	7-8hr
	Humulin S	Lilly	Human	Vial, C3	30min-1hr	1-6hr	6-12hr
	Insuman Rapid	Sanofi	Human	Pen, C4, C5	<30min	1-4hr	7-9h
	Apidra (insulin glulisine)	Sanofi	Human analogue	Vial, Pen, C4, C5.	10-20 min	55min	1.5-4hr
	Fiasp (insulin aspart)	Novo Nordisk	Human analogue	Vial, Pen, C1	4min	1-3hr	3-5hr
	Humalog (insulin lispro)	Lilly	Human analogue	Vial, Pen C3	15min	1.5hr	2-5hr
	Insulin Lispro Sanofi	Sanofi	Human analogue	Vial, Pen, C5	15min	1.5hr	2-5hr
	Lyumjev (insulin lispro)	Lilly	Human analogue	Vial, Pen, C3	20min	1-3hr	5hr
	NovoRapid (insulin aspart)	Novo Nordisk	Human analogue	Vial, Pen, C1	10-20min	1-3hr	3-5hr
Biphasic insulin injection	Hypurin Porcine 30/70	Wockhardt	Porcine	Vial, C2	<2hr	4-12hr	24hr
	Humulin M3	Lilly	Human	Vial, Pen, C3	30min-1hr	1-12hr	22hr
	Insuman Comb 15	Sanofi	Human	C4,C5	30min-1hr	2-4hr	11-20hr
	Insuman Comb 25	Sanofi	Human	Vial, Pen, C4, C5.	30min-1hr	2-4hr	12-19hr
	Insuman Comb 50	Sanofi	Human	C4, C5	<30min	1.5hr-4hr	12-16hr
	Humalog Mix25	Lilly	Human analogue	Vial, Pen, C3	15min	2hr	22hr
	Humalog Mix50	Lilly	Human analogue	Pen, C3	15min	2hr	22hr

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	Novomix 30	Novo Nordisk	Human analogue	Pen, C1	10-20min	1-4hr	24hr
Isophane (NPH) Insulin injection	Hypurin Porcine Isophane	Wockhardt	Porcine	Vial, C2	<2hr	6-12hr	18-24hr
	Humulin I	Lilly	Human	Vial, Pen, C3	30min-1hr	1-8hr	22hr
	Insulatard	Novo Nordisk	Human	Vial, C1, D	<1.5hr	4-12hr	24hr
	Insuman Basal	Sanofi	Human	Vial, Pen, C4, C5.	<1hr	3-4hr	11-20hr
Long-acting insulin injection	Abasaglar (insulin glargine)	Lilly	Human analogue	Pen, C3	30min-1hr	-	24hr
	Lantus (insulin glargine)	Sanofi	Human analogue	Vial, Pen, C4, C5	30min-1hr	-	24hr
	Levemir (insulin detemir)	Novo Nordisk	Human analogue	Pen, C1, D	30min-1hr	-	24hr
	Semglee (insulin glargine)	Mylan	Human analogue	Pen	30min-1hr	-	24hr
	Toujeo (insulin glargine 300 units/ml)	Sanofi	Human analogue	Pen	30min-1hr	-	24-36hr
	Tresiba (insulin degludec 100 and 200 units/ml)	Novo Nordisk	Human analogue	Pen, C1, L	30min-1.5hr	-	>42hr
C=cartridge , C1=compatible with Novopen range, C2=compatible with Autopen Classic, C3=Compatible with Humapen Luxura HD +Humapen Savvio, C4=compatible with Autopen 24, C5=compatible with Allstar Pro + JuniorSTAR, D=Innolet device, L=prefilled combination pen with Liraglutide.							

14. Appendix 7 - GLP-1 Agonists (from MIMS June 2020)

Generic (brand)	Dosing frequency	Indicated for mono therapy	Studied as combination therapy					Cardiovascular benefits	Cost (£) per 28 days
			With metformin	With pioglitazone (+/- metformin)	With Sulfonylurea* (+/- metformin)	With SGLT2i (+/- metformin)	With insulin (+/- metformin)		
Dulaglutide (Trulicity)	Weekly	•	•	•	•	•	• (basal, prandial)	Prevention of MACE** Evidence for primary and secondary CVD prevention Reduction in systolic BP	73.25
Exenatide (Bydureon)	Weekly		•	•	•	•	• (basal)	Reduction in systolic BP	73.36
Exenatide (Byetta)	Twice daily		•	•	•		• (basal)	–	76.43
Liraglutide (Victoza)	Daily	•	•	(studied with rosiglitazone + met)	•	•	• (basal, biphasic)	Prevention of MACE and expanded MACE** Reduction in systolic BP	Maintenance treatment: 73.25–109.87
Lixisenatide (Lyxumia)	Daily		•	•	•		• (basal)	Reduction in systolic and diastolic BP	Maintenance treatment: 57.93
Semaglutide (Ozempic)	Weekly	•	•	•	•		• (basal)	Prevention of MACE Reduction in systolic BP	73.25
Semaglutide (Rybelsus)	Oral (daily)	•	•	•	•	•	•	Reduction in systolic BP	73.25 all strengths

*Consider reducing the dose of sulfonylurea or insulin.

**MACE (major adverse cardiovascular events) are: cardiovascular-related death, non-fatal myocardial infarction and non-fatal stroke. Expanded MACE are: MACE plus unstable angina leading to hospitalisation, coronary revascularisation, and hospitalisation due to heart failure.

- All GLP-1 agonists promote weight loss and reduce HbA_{1c}. NICE recommends that treatment with a GLP-1 agonist is continued only if HbA_{1c} has reduced by 1% and weight by 3% within 6 months.

15. Appendix 8 - Self-monitoring of blood glucose

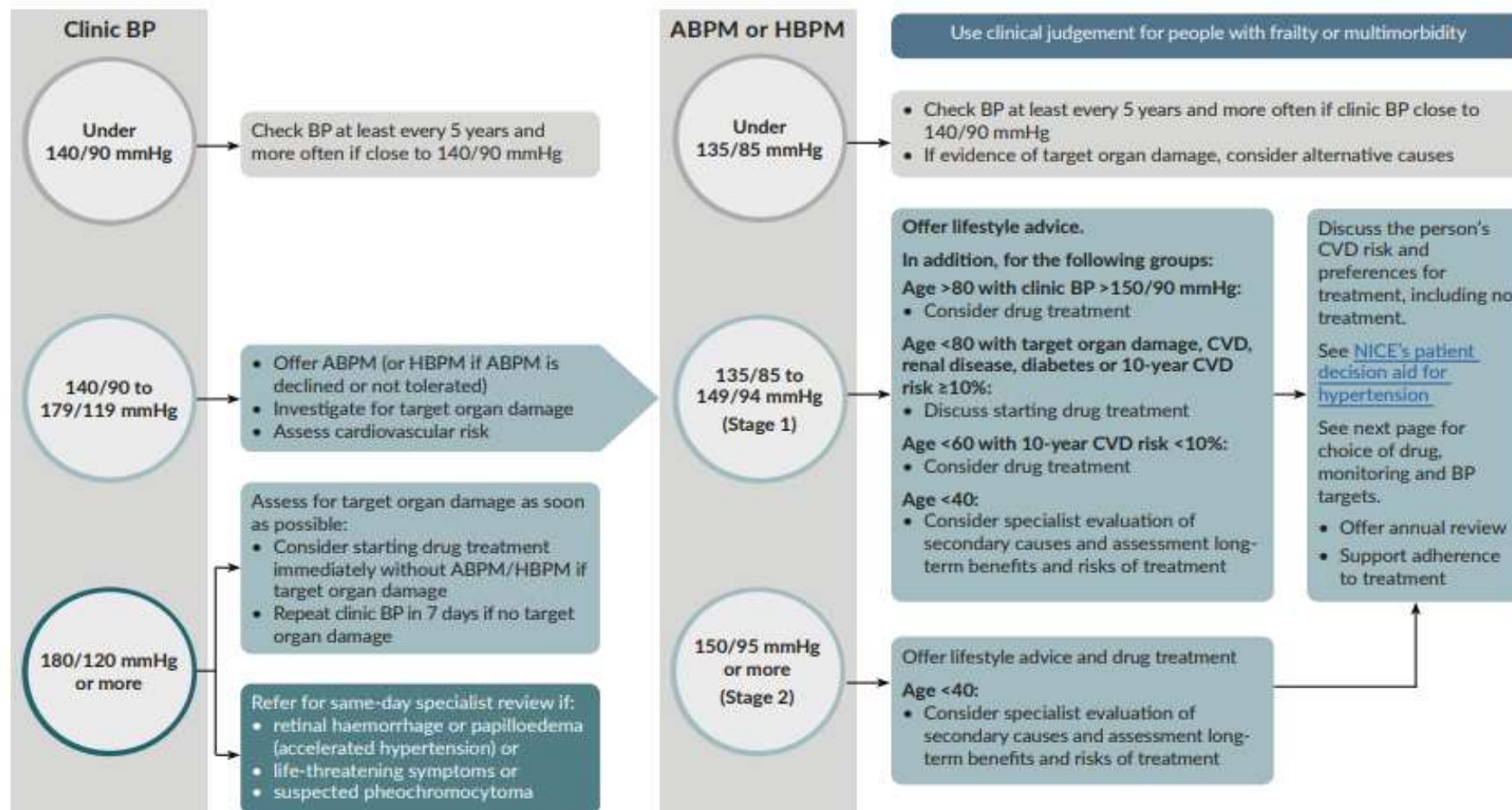
Self-monitoring of blood glucose ([click to access NICE guidance](#))- information from NICE:

- 1) Take the DVLA guidance on "[Assessing fitness to drive: a guide for medical professionals](#)" into account when advising patients with T2DM on self-testing of blood glucose.
- 2) Do not routinely offer self-monitoring of blood glucose levels for adults with type 2 diabetes unless:
 - a. The person is on insulin **or**
 - b. There is evidence of hypoglycaemic episodes **or**
 - c. The person is on oral medication that may increase their risk of hypoglycaemia while driving or operating machinery **or**
 - d. The person is pregnant, or is planning to become pregnant.
- 3) Consider short-term self-monitoring of blood glucose levels in adults with type 2 diabetes (and review treatment as necessary):
 - a. When starting treatment with oral or intravenous corticosteroids **or**
 - b. To confirm suspected hypoglycaemia.

16. Appendix 9 - Hypertension guidelines for patients with diabetes (NICE)

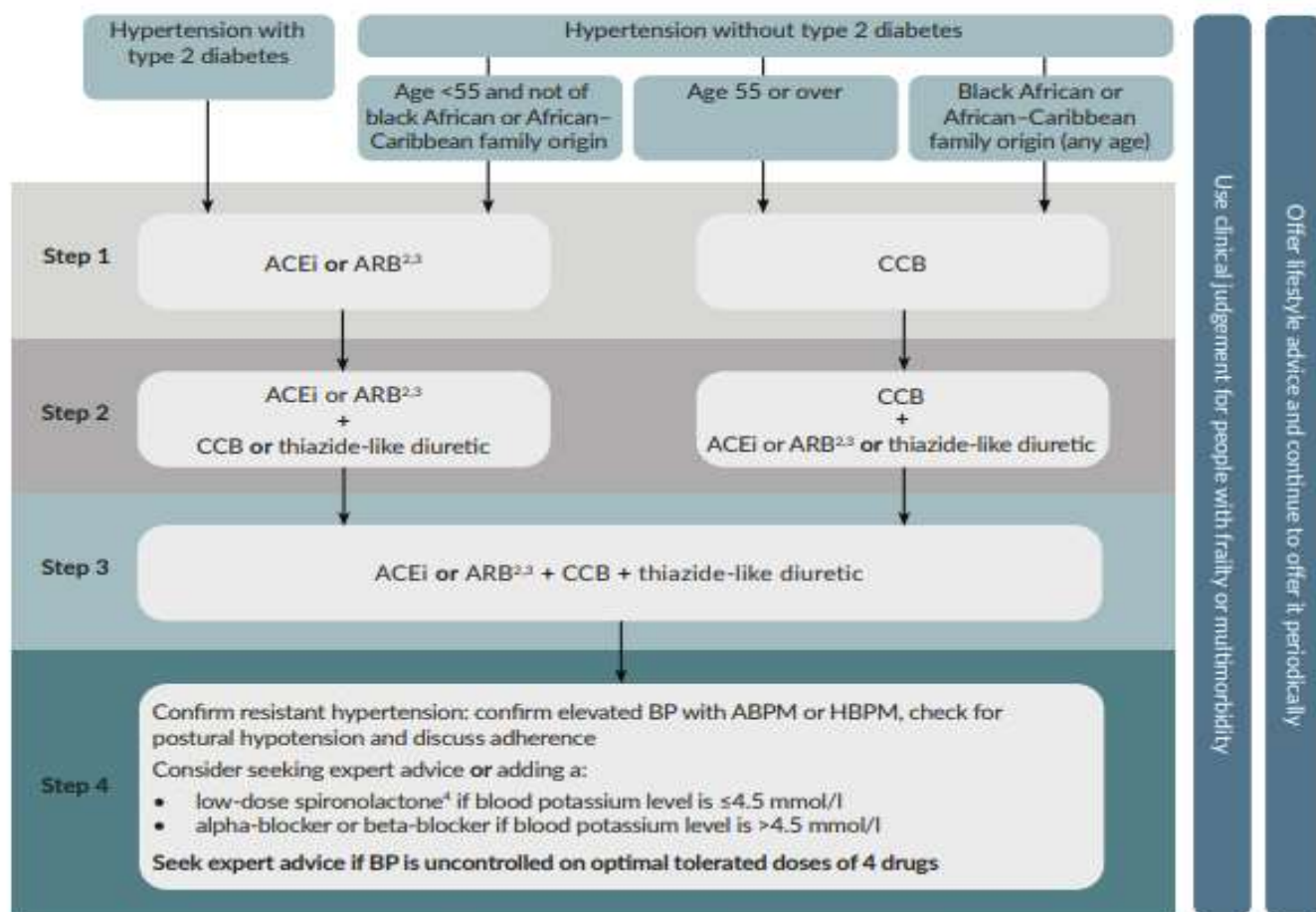
Hypertension in adults: diagnosis and treatment

Offer lifestyle advice and continue to offer it periodically



Abbreviations: ABPM, ambulatory blood pressure monitoring; BP, blood pressure; CVD, cardiovascular disease; HBPM, home blood pressure monitoring.

This is a summary of the recommendations on diagnosis and treatment from NICE's guideline on hypertension in adults. See the original guidance at www.nice.org.uk/guidance/NG136

Choice of antihypertensive drug¹, monitoring treatment and BP targets

Monitoring treatment

Use clinic BP to monitor treatment.

Measure standing and sitting BP in people with:

- type 2 diabetes or
- symptoms of postural hypotension or
- aged 80 and over.

Advise people who want to self-monitor to use HBPM. Provide training and advice.

Consider ABPM or HBPM, in addition to clinic BP, for people with white-coat effect or masked hypertension.

BP targets

Reduce and maintain BP to the following targets:

Age <80 years:

- Clinic BP $< 140/90$ mmHg
- ABPM/HBPM $< 135/85$ mmHg

Age ≥ 80 years:

- Clinic BP $< 150/90$ mmHg
- ABPM/HBPM $< 145/85$ mmHg

Postural hypotension:

- Base target on standing BP

Frailty or multimorbidity:

- Use clinical judgement

¹ For women considering pregnancy or who are pregnant or breastfeeding, see NICE's guideline on [hypertension in pregnancy](#). For people with chronic kidney disease, see NICE's guideline on [chronic kidney disease](#). For people with heart failure, see NICE's guideline on [chronic heart failure](#).

² See MHRA drug safety updates on [ACE inhibitors and angiotensin-II receptor antagonists: not for use in pregnancy](#), which states 'Use in women who are planning pregnancy should be avoided unless absolutely necessary, in which case the potential risks and benefits should be discussed. ACE inhibitors and angiotensin II receptor antagonists: use during breastfeeding and clarification: ACE inhibitors and angiotensin II receptor antagonists'. See also NICE's guideline on [hypertension in pregnancy](#).

³ Consider an ARB, in preference to an ACE inhibitor in adults of African and Caribbean family origin.

⁴ At the time of publication (August 2019), not all preparations of spironolactone have a UK marketing authorisation for this indication.

Abbreviations: ABPM, ambulatory blood pressure monitoring; ACEi, ACE inhibitor; ARB, angiotensin-II receptor blocker; BP, blood pressure; CCB, calcium-channel blocker; HBPM, home blood pressure monitoring.



This visual summary builds on and updates previous work on treatment [published by the BIHS](#) (formerly BHS)

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