

**CHRONIC DISEASE
MANAGEMENT
TOOLKIT:
DIABETES &
HYPERTENSION**

NDSU

CENTER FOR
COLLABORATION AND
ADVANCEMENT IN PHARMACY

DIABETES DIAGNOSTIC CRITERIA

Fasting plasma glucose

- Prediabetes: 100-125 mg/dL
- Diabetes: ≥ 126 mg/dL

A1C

- Prediabetes: 5.7-6.4%
- Diabetes: $\geq 6.5\%$

2-hour plasma glucose test (OGTT)

- Prediabetes: 140-199 mg/dL
- Diabetes: ≥ 200 mg/dL

Random plasma glucose

- Prediabetes: Not recommended
- Diabetes: ≥ 200 mg/dL

GOALS FOR DIABETES

A1C goal: A1C goals must be patient-centered and may be increased or decreased based on patients frequency of hyper-hypoglycemia

- ADA: <7%
- AACE: 6.5%

Pre-prandial capillary plasma glucose

- ADA: 80-130 mg/dL
- AACE: <110 mg/dL

Post-prandial capillary plasma glucose

- ADA: <180 mg/dL
- AACE: <140 mg/dL

TREATMENT

CLASS	MEDICATION EXAMPLES	ROUTE	EFFICACY	RISK OF HYPOGLYCEMIA	WEIGHT CHANGE
Biguanides	Metformin	Oral	High	None	Neutral
SGLT-2 inhibitors*	Canagliflozin, dapagliflozin, empagliflozin	Oral	Intermediate to high	None	Loss
GLP-1 receptor agonist	Liraglutide and semaglutide	Oral and subcutaneous	High to very high	None	Loss
DPP-4 inhibitor	Sitagliptin and alogliptin	Oral	Intermediate	None	Neutral
Thiazolidinediones (TZD)	Pioglitazone	Oral	High	None	Gain
Sulfonylureas (SU0)	Glipizide, glyburide, & glimepiride	Oral	High	Yes	Gain
Insulin	See table on next page	Subcutaneous	High to very high	Yes	Gain

*Recommended for established or high risk ASCVD, heart failure, and chronic kidney disease.

TREATMENT

CLASS	MEDICATION EXAMPLES	ROUTE	EFFICACY	HYPOGLYCEMIC RISK	WEIGHT CHANGE
Biguanides	Metformin	Oral	High	None	Neutral
SGLT-2 inhibitors*	Canagliflozin, dapagliflozin, empagliflozin	Oral	Intermediate to high	None	Loss
GLP-1 receptor agonist	Liraglutide and semaglutide	Oral and subcutaneous	High to very high	None	Loss
DPP-4 inhibitor	Sitagliptin and alogliptin	Oral	Intermediate	None	Neutral
Thiazolidinediones (TZD)	Pioglitazone	Oral	High	None	Gain
Sulfonylureas (SUO)	Glipizide, glyburide, & glimepiride	Oral	High	Yes	Gain
Insulin	See table on next page	Subcutaneous	High to very high	Yes	Gain

*Recommended for established or high risk ASCVD, heart failure, and chronic kidney disease.

Insulin Medication Examples

TYPE	MEDICATION EXAMPLES	ONSET (HOURS)	DURATION (HOURS)
Ultra rapid action	Aspart (fiasp)	0.25 to 4	5 to 7
Rapid acting	Aspart (Novolog)	0.25 to 0.4	3 to 7
Rapid acting	Lispro (humalog)	0.5 to 0.75	5.7 to 6.6
Short acting	Regular (Humulin R, Novolin)	0.5	8
Intermediate acting	NPH (Humulin-N, Novolin-N)	1 to 2	14 to 24
Long acting	Degludec (Tresiba)	1	N/A
Long acting	Detemir (Levemir)	3 to 4	6 to 23

Insulin Medication Examples Cont.

TYPE	MEDICATION EXAMPLES	ONSET (HOURS)	DURATION (HOURS)
Long acting	Glargine (Lantus)	3 to 4	10.8 to >24
Long acting	Glargine (Basaglar)	3 to 4	>24
Long acting	Glargine (Toujeo)	6	>24
Combination	NPH+Regular (Humulin 70/30, Novolin 70/30)	0.5	18 to 24
Combination	Lispro protamine+Lispro (Humalog Mix 50/50, Humalog Mix 75/25)	0.25 to 0.5	14 to 24
Combination	Aspart protamine + Aspart (Novolog Mix 70/30)	0.17 to 0.33	18 to 24

APPROACHES TO TREATMENT

Initial A1C <7.5%:
Monotherapy with
metformin

Initial A1C ≥7.5-9%*:

Dual therapy

- Metformin + SU/TZD/DPP-4/SGLT-2i/GLP-1/insulin
- Triple therapy
 - Metformin + SU+ DPP-4/SGLT-2i/GLP-1/insulin

Comorbid conditions

- Established or high risk ASCVD
 - GLP-1 or SGLT-2i
- Preserved or reduced EF
 - SGLT-2i
 - Avoid TZDs and sitagliptin
- Chronic kidney disease
 - SGLT-2i

*=Reserve insulin treatment for patients with high A1C (>10%) or A1C>9% with symptoms

FOLLOW-UP

Patient at goal

Assess glycemic status at least two times per year

Patient not at goal/recently changed therapy

Assess glycemic status at least four times per year

PRE-DIABETES INTERVENTIONS

Counsel on lifestyle modifications for weight management

Refer to the National Diabetes Prevention Program at www.ndc3.org

Counsel on smoking cessation if appropriate

NOTES

Any questions, contact the CAP Center at NDSU.CAPCenter@ndsu.edu



CHRONIC DISEASE MANAGEMENT TOOLKIT: HYPERTENSION

NDSU

CENTER FOR
COLLABORATION AND
ADVANCEMENT IN PHARMACY

HYPERTENSION DIAGNOSTIC CRITERIA

Blood Pressures

1. Normal: <120 AND <80 mmHg
2. Elevated: 120-129 AND <80 mmHg
3. Hypertension Stage 1: 130-139 OR 80-89 mmHg
4. Hypertension Stage 2: ≥ 140 OR ≥ 90 mmHg
5. Hypertensive crisis: >180 AND/OR >120 mmHg

Cuff Size

Confirm you are using the correct sized cuff (using the wrong cuff can lead to discrepancies as great as 10 mmHg SBP or 8 mmHg DBP).

Readings

Take an average of 2 readings on two different occasions to estimate the patients blood pressure

GOALS FOR THERAPY

Patients <65 years

Goal for patients <65 years with hypertension, regardless of chronic comorbidities, is **<130/80 mmHg** (if tolerated by patient)

Patients ≥65 years

Goal for patients ≥65 years with hypertension is **<130 mmHg** (SBP)

1. Adjust goal based on patient factors including comorbidity burden, life expectancy, clinical judgment and patient preference

Patients with comorbidities

Goal for patients with comorbidities (listed below) is **<130/80 mmHg**

1. Diabetes mellitus
2. Chronic kidney disease
3. After renal transplant
4. Heart failure
5. Stable ischemic heart disease
6. Peripheral artery disease

TREATMENT ALGORITHM

Treat hypertension if blood pressure is:

1. $\geq 130/80$ mmHg AND patient has ASCVD of $>10\%$ OR has clinical ASCVD
2. $\geq 140/90$ mmHg AND patient has ASCVD of $<10\%$

TREATMENT OPTIONS - FIRST LINE

Thiazide/thiazide-type diuretic	<ul style="list-style-type: none">• Monitor sodium, potassium, calcium, and uric acid• Ex: Chlorthalidone and hydrochlorothiazide
Angiotensin converting enzyme (ACE) inhibitor	<ul style="list-style-type: none">• Monitor potassium• Do not use in junction with ARBs• Ex: Benazepril, enalapril, and lisinopril
Angiotensin receptor blocker (ARB)	<ul style="list-style-type: none">• Monitor potassium• Do not use in junction with ACE inhibitors• Ex: Candesartan, losartan, and valsartan
Calcium-channel blocker (CCB)	<ul style="list-style-type: none">• Dihydropyridines ex: Amlodipine and nifedipine• Avoid use with HFrEF, if required use amlodipine or felodipine• Non-dihydropyridines ex: Diltiazem and verapamil• Do not use in HFrEF

TREATMENT OPTIONS - SECOND LINE

<p>Other diuretics</p>	<ul style="list-style-type: none"> • Loop ex: Bumetanide and furosemide <ul style="list-style-type: none"> ◦ Preferred if symptomatic heart failure and preferred over thiazide if GFR<30mL/min • Potassium-sparing ex: Amiloride and triamterene <ul style="list-style-type: none"> ◦ Monitor potassium and renal function ◦ Minimally effective and avoid if GRF<45mL/min • Aldosterone antagonists ex: Eplerenone and spironolactone <ul style="list-style-type: none"> ◦ Monitor potassium and renal function ◦ Avoid use with potassium supplements, potassium-sparing diuretic, or significant renal dysfunction
<p>Beta-blockers</p>	<ul style="list-style-type: none"> • Cardio selective ex: Atenolol, metoprolol, succinate, and metoprolol tartrate • Non-cardio selective ex: Nadolol and propranolol <ul style="list-style-type: none"> ◦ Avoid in reactive airway disease • Intrinsic sympathomimetic ex: Acebutolol and pindolol • Alpha and beta-receptor blocker ex: carvedilol and labetalol
<p>Direct renin inhibitor</p>	<ul style="list-style-type: none"> • Ex: Aliskiren <ul style="list-style-type: none"> ◦ Monitor potassium and renal function ◦ Do not use with ACE inhibitors or ARBs
<p>Alpha-1 blockers</p>	<ul style="list-style-type: none"> • Ex: Doxazosin and Prazosin
<p>Central alpha 2 agonist</p>	<ul style="list-style-type: none"> • Ex: Clonidine, guanfacine, and methyldopa <ul style="list-style-type: none"> ◦ Taper clonidine due to rebound hypertension
<p>Direct vasodilators</p>	<ul style="list-style-type: none"> • Ex: Hydralazine and minoxidil <ul style="list-style-type: none"> ◦ Associated with sodium/water retention and tachycardia: use with diuretic and beta blocker

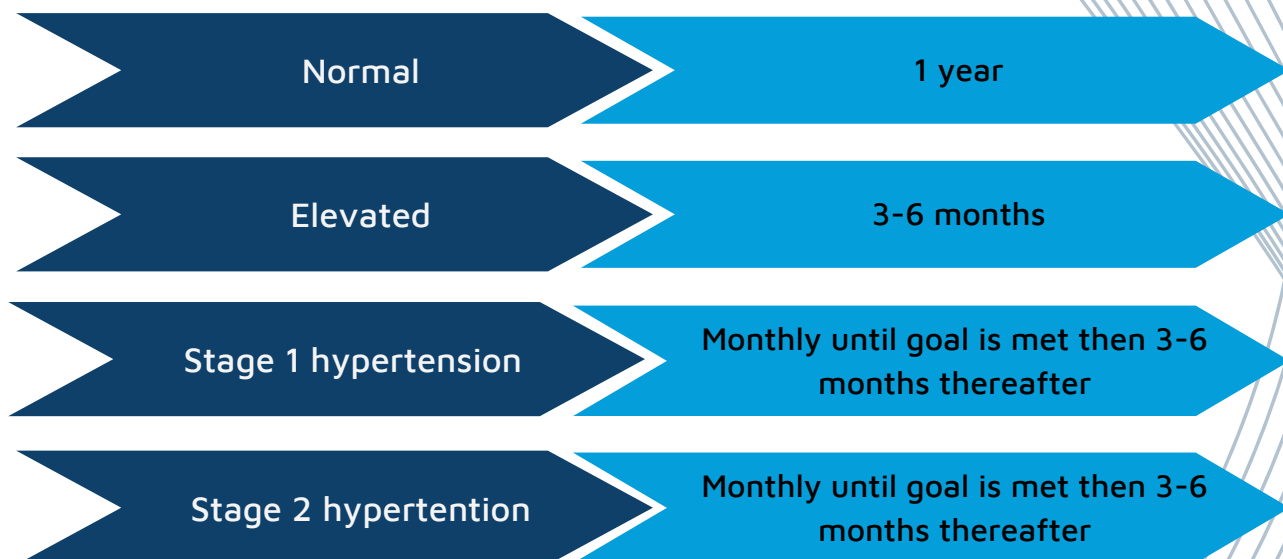
TREATMENT OPTIONS - AFRICAN-AMERICAN ADULTS

- Initial treatment should include thiazide-type diuretic or a calcium channel blocker

TREATMENT OPTIONS - PREGNANCY

- DO NOT USE ACE inhibitors, ARBs or direct renin inhibitors
- Treatment should be transited to methyldopa, nifedipine or labetalol

FOLLOW-UP



NOTES

Any questions, contact the CAP Center at NDSU.CAPCenter@ndsu.edu