Mount Sinai Health Partners

Mount Sinai Ambulatory Care Pathway

Type II Diabetes Mellitus

Background

- This document is primarily intended to provide **guidance to support primary care providers and the collaborative team on diabetes management in adults, with an emphasis on Type 2 diabetes.**
- The optimal care of patients with diabetes mellitus involves **glycemic control, prevention of complications,** and screening and management of all related co-morbidities.
- **Optimal Diabetes care team is multidisciplinary** and may include physicians, certified diabetic educators, nutritionists, pharmacists, care managers, behavioral health providers and home health care professionals.
- **Reducing cardiovascular events and chronic kidney disease may be accomplished** through proper diet, exercise and the use of more established and newer medication options.
- **New medications, while efficacious, are substantially more expensive.**

Table of Contents

This 2020 MSHS Type II Diabetes Mellitus Ambulatory Pathway is organized into the following sections:

Introduction

According to American Diabetes Association, in 2018, 34.2 million of people within the United States, or 10.5% of the population, had diabetes. 26.8 million were diagnosed, and 7.3 million or 20% were undiagnosed[1].

Key steps in the management of diabetes include the following:

- Confirm the diagnosis
- Evaluate for complications of diabetes and potential comorbid conditions
- Review previous treatment and risk factor control in patients with established diabetes
- Begin patient engagement in the formulation of management plan
- A follow-up visit should include most components of the initial comprehensive medical evaluation, including interval medical history, assessment of medication taking behavior and intolerance/side effects, physical examination, laboratory evaluation as appropriate to assess attainment of A1C and metabolic targets, and assessment of risk for complications, diabetes self-management behaviors, nutrition, psychosocial health, and the need for referrals, immunizations, or other routine health maintenance screening
- Ongoing management should be guided by the assessment of diabetes complications and shared decision-making to set therapeutic goals
- The 10-year risk of a first atherosclerotic cardiovascular disease event should be assessed using the race and sex-specific pooled cohort equations to better stratify atherosclerotic cardiovascular disease risk (e.g. http://tools.acc.org/ASCVD-Risk-Estimator-Plus/#!/calculate/estimate/)

[1] American Diabetes Association, “Statistics About Diabetes”. American Diabetes Association website, Available at https://www.diabetes.org/resources/statistics/statistics-about-diabetes. Accessed October 28, 2020.

Diagnosis[2]

Prediabetes	Type 2 DM
Hba1c between 5.7% – 6.4%, or	A hemoglobin A1c (HbA1c) level of 6.5% or higher, or
Fasting blood glucose between 100 – 125 mg/dl, or	A fasting plasma glucose (FPG) level of 126 mg/dL or higher, *or*
An Oral Glucose Tolerance Test 2 hour blood glucose between 140 mg/dl – 199 mg/dl	A 2-hour plasma glucose level of 200 mg/dL or higher during a 75-g oral glucose tolerance test (OGTT), *or*
	A random plasma glucose of 200 mg/dL or higher in a patient with classic symptoms of hyperglycemia or hyperglycemic crisis

Prediabetes[3]

- Consistently under addressed opportunity for health promotion/disease prevention.
- Chronic hyperglycemia in prediabetes range associated with modestly increased risk of mortality, CAD, and stroke, though not as potent as other cardiovascular risk factors.
- Interventions to strongly consider:
    - Intensive lifestyle modification is recommended to **reduce body weight by 7%** and achieve moderate levels of **exercise** (such as a brisk walk) for **150 minutes per week**
    - 500-1000 calorie per day reduction to achieve 1-2 lb./week weight loss, preferably within 6 months
    - Exercise goal of 750 calorie/week expenditure achieved through ≥3 sessions/wk., 10 min per session, and a maximum of 75 min/wk. of weight training.
    - Metformin can be used to treat prediabetes, particularly for patients <60 yrs. old, a prior history of gestational diabetes, and/or a BMI > 35
    - Annual follow-up testing to detect progression to diabetes is warranted.

[2] Classification and Diagnosis of Diabetes: Standards of Medical Care in Diabetes-2020, Diabetes Care 2020;43(Suppl. 1):S14–S31 | https://doi.org/10.2337/dc20-S002.
[3] Prevention or Delay of Type 2 Diabetes: Standards of Medical Care in Diabetes-2020, Diabetes Care 2020;43(Suppl. 1):S32–S36 | https://doi.org/10.2337/dc20-S003.

Management: Monitoring and Goals[4]

- HgbA1c is the mainstay to be measured at least every 6 months.
  - Measures average blood sugar over the prior 3 months (see Table 1 below)

Table 1: Estimated Average Glucose (eAG)

A1C (%)	mg/dL*	mmol/L
5	97 (76 – 120)	5.4 (4.2 – 6.7)
6	126 (100 –152)	7.0 (5.5 – 8.5)
7	154 (123 – 185)	8.6 (6.8 – 10.3)
8	183 (147 – 217)	10.2 (8.1 – 12.1)
9	212 (170 – 249)	11.8 (9.4 – 13.9)
10	240 (193 – 282)	13.4 (10.7 – 15.7)
11	269 (217 – 314)	14.9 (12.0 – 17.5)
12	298 (240 – 347)	16.5 (13.3 – 19.3)

Data in parentheses are 95% CI. A calculator for converting A1C results into eAG, in either mg/dL or mmol/L, is available at professional.diabetes.org/eAG.

*These estimates are based on ADAG data of 2,700 glucose measurements over 3 months per A1C measurement in 507 adults with type 1, type 2, or no diabetes. The correlation between A1C and average glucose was 0.92 (6,7). Adapted from Nathan et al. (6).

- Blood Glucose Monitoring
  - Self-Monitoring of Blood Glucose (SMBG)
    - Focus should be on pre-prandial blood glucose measurement. Post-prandial glucose measurements (1-2 hrs. after meals) most helpful when HgbA1c remains above goal, despite pre-prandial results within target range.

- HgbA1c Goals
  - **HgbA1c <7% is general target for adults**
    - This threshold has been proven to **reduce development of microvascular complications** (retinopathy, neuropathy and CKD) and, though to a lesser extent, macrovascular complication (non-fatal MI, stroke, CV death) in Type 1 and Type 2 DM.
    - Corresponds to **pre-prandial plasma glucoses between 80-130** mg/dl and **postprandial** (1-2 hrs.) plasma glucose **<180 mg/dl.**
  - **HgbA1c <8% is a reasonable goal for select patients** at increased risk of severe hypoglycemia, limited life expectancy, well established complications, or other compelling reasons for less stringent control.
  - HgbA1c <6.5% may be used selectively for patients at lower risk of hypoglycemia or other adverse effects of more intensive treatment.

- Continuous Glucose Monitoring (CGM)
  - Measures interstitial glucose levels

[4] Glycemic Targets: Standards of Medical Care in Diabetes-2020 Diabetes Care 2020;43(Suppl. 1):S66–S76 | https://doi.org/10.2337/dc20-S006.

- Glucose levels that are in-range 70% time correlate with HgbA1c <7%
- Two types:
  - Personal - Provide un-blinded data to patients than can be used to adjust treatment (e.g. Dexcom G6)
  - Professional - Provide blinded data that can be retrospectively reviewed by provider and patient (e.g. Freestyle Libre Pro)

- Treating Hypoglycemia
  - Glucose (15-30 g) or other carbohydrate should be given for conscious patients with glucose <70 mg/dl, and repeated in 15 minutes if persistent hypoglycemia, followed by a snack once level returns to desired range.
  - Glucagon should be prescribed for all patients at risk of more pronounced hypoglycemia (glucose <54 mg/dl), a level when neuroglycopenic symptoms occur. Caretakers should be educated on how to administer the glucagon.

Checklist for Diabetes Mellitus Disease Management for Front Line Providers[4,5,6]

Screening/ Management Target	Benchmark	Frequency	Next Step if uncontrolled/ positive finding	Comments
HgbA1c Test	<7.0%	Every 6 months if controlled Every 3 months if poorly controlled	• Lifestyle modification • Escalate dosing of diabetes medications • Referral to endocrinologist or pharmacist if HgbA1c >9% • CM/BH referral as indicated	
Blood Pressure Control	BP <140/90 or <130/80 in select pts with CVD, CAD, or ASCVD risk ≥ 15%*	Annually if normal	• Lifestyle modification • Home BP monitoring • If no CKD, use ACE/ARB, diuretic, or CCB • If CKD present: ACE/ARB	

[4] Glycemic Targets: Standards of Medical Care in Diabetes-2020 Diabetes Care 2020;43(Suppl. 1):S66–S76 | https://doi.org/10.2337/dc20-S006.
[5] Cardiovascular Disease and Risk Management: Standards of Medical Care in Diabetes-2020 Diabetes Care 2020;43(Suppl. 1):S111–S134 | https://doi.org/10.2337/dc20-s010
[6] Microvascular Complications and Foot Care: Standards of Medical Care in Diabetes-2020 Diabetes Care 2020;43(Suppl. 1):S135–S151 | https://doi.org/10.2337/dc20-s011

			• If resistant hypertension or progressive kidney disease, consider refer to Nephrology or clinical pharmacy program	
Lipid Management	LDL is <100 mg/dL. With CV disease, target is <70 mg/dL.	Annually	• Lifestyle modification • Statin therapy	
Cardiovascular Disease	Assess ASCVD Risk (using ASCVD Risk Calculator) and HF Risk (patient 40-79)[7] Antiplatelet Therapy for Primary/Secondary Prevention	Annually	• ASA 75-162 mg daily for primary prevention if 50-75 yrs old and ≥1 additional risk factor • ASA 75-162 mg daily for established ASCVD • SGLT-2i or GLP-1 RA if multiple risk factors or known ASCVD and/or CKD • SGLT-2i if heart failure present	
Monitoring for Diabetic Kidney Disease (eGFR and UACR)	eGFI >100 UACR <30 mg/g C	Annually (Consider semiannually if EGFR <60 or UACR >30 mg/g of C)	• ACE/ARB if eGFI <60 or UACR >30 • Consider use of SGLT-2i or GLP-1 RA • Intensify diabetic medications to optimize glycemic control • Dietary intake of ~0.8 g protein/kg weight per day	

[7] American College of Cardiology, "ASCVD Risk Calculator." American College of Cardiology Webpage. Available at http://tools.acc.org/ASCVD-Risk-Estimator-Plus/#!/calculate/estimate/. Accessed on October 29, 2020

			• Consider Nephrology referral	
Retinopathy Screening	Absence of retinopathy or macular edema	If retinopathy or macular edema present, annual dilated eye exam or retinal photography	• Annual evaluation by ophthalmologist if retinopathy or macular edema present	Screening can be performed in PCP office with a retinal camera; optometry clinic or ophthalmology clinic.
Foot Exam	No ulcerations or fungal infections, 2+ Pedal pulses, Normal sensory response with monofilament	Annually	• Referral to podiatrist for management of any abnormalities • Refer for Ankle Branchial Index (ABI) if Peripheral Arterial Disease (PAD) suspected	

Diabetes Checklist Considerations

Blood Pressure Control[5]

Hypertension

- Blood Pressure Targets:
  - <140/90 for patients with diabetes, hypertension, and ASCVD risk <15%.
  - <130/80 ideal for patients with established cardiovascular disease (particularly stroke) or ASCVD Risk ≥15%
- Home blood pressure monitoring is recommended for patients with diabetes and hypertension.
- Treatment
  - **Lifestyle modification** including Dietary Approaches to Stop Hypertension (DASH) diet, low salt (<2,300 mg/d), increased fruits and vegetables, low fat, and limited alcohol intake. Also essential is increased physical activity, ideally achieving moderate levels of **exercise** (such as a brisk walk) for **150 minutes per week[8].**
  - Treatment with antihypertensive medications w proven efficacy in diabetes (ACE/ARB, thiazide diuretics, and calcium channel blockers).
  - ACE/ARB at maximal tolerated dose are preferred treatment if urine albumen ≥30 mg/g creatinine

[5] Cardiovascular Disease and Risk Management: Standards of Medical Care in Diabetes-2020 Diabetes Care 2020;43(Suppl. 1):S111–S134 | https://doi.org/10.2337/dc20-s010.

[8] Facilitating Behavior Change and Well-being to Improve Health Outcomes: Standards of Medical Care in Diabetes-2020 Diabetes Care 2020;43(Suppl. 1):S48–S65 | https://doi.org/10.2337/dc20-S005

Chronic Kidney Disease[6]

- 20%-40% prevalence in diabetes, as defined by presence of increased urinary albumin excretion, reduced glomerular filtration rate, or other evidence of kidney damage.
- May be present at time of diagnosis of Type 2 DM (typically occurs 10 years after onset of Type 1 DM).
- Annual Screening:
    - eGFI
        - Derived from serum creatinine using approved methodology, such as CKD-Epi. https://www.kidney.org/professionals/kdoqi/gfr_calculator) The National Kidney Foundation currently recommends using the CKD-EPI Creatinine Equation (2009) to estimate GFR.
    - Urinary albumin to creatinine ratio (UACR):
        - ≥30 mg per gram creatinine is abnormal.
        - False positive results can occur with exercise within 24 hours of testing, fever, hyperglycemia, heart failure, severe hypertension, and menstruation
        - **At any GFR, risk of CVD, CKD progression, and mortality increase with rising albuminuria.**
- Surveillance:
    - **Serum Creatinine, eGFR, potassium, and urinary albumin secretion should be monitored at least annually, with semiannual testing in those w UACR >30 mg/g creatinine and/or eGFR <60.**
    - If eGFR <60, medication doses should be adjusted accordingly and nephrotoxins avoided.
    - ACE/ARB's can cause modest increases (<30%) in serum creatinine in absence of volume depletion or AKI.
    - **KidneyIntelX™ is an option for risk assessment of kidney disease progression[9] (Disclosure):**
        - **A quantitative electrochemiluminescence immunoassay combined with clinical data that uses an advanced machine learning algorithm to generate a patient-specific score for assessing the five-year risk of progressive decline in kidney function in patients with existing DKD (diabetic kidney disease).**
        - Categorizes patients as low, intermediate or high risk of progressive DKD.
        - For patients with T2DM and DKD stages 1-3b.
        - Has been granted Breakthrough Device designation by the US Food and Drug Administration (FDA).

- Interventions:
    - Nutrition
        - Protein intake: 0.8 g per kg body weight per day to delay progression for patients w non-dialysis dependent CKD. Intake higher in patients w ESRD

[6] Microvascular Complications and Foot Care: Standards of Medical Care in Diabetes-2020 Diabetes Care 2020;43(Suppl. 1):S135–S151 | https://doi.org/10.2337/dc20-s011.

[9] Disclosure: KidneyIntelX is based on technology developed by Mount Sinai faculty and licensed to Renalytix AI, Inc. Mount Sinai faculty members are co-founders and equity owners in the company. In addition, the Icahn School of Medicine at Mount Sinai has equity ownership in Renalytix AI plc.

        - Sodium restriction <2,300 mg/d.
        - Potassium restriction if hyperkalemic
    - Glycemic Targets:
        - **Intensive treatment to achieve near normal glycemic control slows the development and progression of CKD in both Type 1 and 2 DM.**
    - Medication Considerations in Diabetes and Chronic Kidney Disease:
        - Metformin
            - Should not be started if GFR <45.
            - Should be discontinued if GFR <30 or prior to/at time of administration of iodinated contrast for GFR 30-60.
        - **SGLT-2i or GLP-1 RA should be considered as 2nd agents added to metformin or as first line in metformin intolerant patients.**
            - **SGLT-2i particularly beneficial in patients with Chronic Kidney Disease (with eGFR >30 and UACR >30 mg/g Cr), patients with heart failure with or without diabetes mellitus.**
            - **GLP-1 RA useful for patients with Chronic Kidney Disease & risk factors for Coronary Artery Disease**
        - Antihypertensive treatment
            - ACE/ARB's decrease rate of progression to ESRD in hypertensive patients with decreased eGFR (<60) and/or elevated UACR (>300 mg/g C)
            - ACE/ARBs also decrease rate of progression of albuminuria (UACR from 30- 299 to over 300 mg/g C) and prevent cardiovascular events
            - ACE/ARB treatment has not been proven to be effective treatment for albuminuria in absence of hypertension.

Lipid Disorders[5]

- For patients with diabetes, target LDL is <100 mg/dL. Statin therapy may be initiated to achieve this goal. In patients with diabetes and cardiovascular disease, the target is <70 mg/dL.
- Indicated lifestyle modifications include increased physical activity, Mediterranean style or DASH intake, reduced saturated and trans fat consumption, increased n-3 fatty acids, viscous fiber, and plant stanols/sterols, and weight loss if overweight.
- **Statins have been proven to reduce ASCVD events when used for both primary and secondary prevention in patients with diabetes and is now quality measurement metric.**

Diabetic Neuropathy[6]

- Background
    - Small fiber damage occurs earlier, leads to pain and dysesthesias
    - Injury to large fibers leads to numbness and loss of protective sensation (LOPS)
    - Most cases can be diagnosed in office, referral usually not necessary

- Screening: Annually with Monofilament (see table below)

[5] Cardiovascular Disease and Risk Management: Standards of Medical Care in Diabetes-2020 Diabetes Care 2020;43(Suppl. 1):S111–S134 | https://doi.org/10.2337/dc20-s010.
[6] Microvascular Complications and Foot Care: Standards of Medical Care in Diabetes-2020 Diabetes Care 2020;43(Suppl. 1):S135–S151 | https://doi.org/10.2337/dc20-s011.

Type of Nerve Injured	Potential Test	Recommended Screening
Small Fiber	Pinprick, temperature	Pinprick
Large Fiber	Vibration, 10 g monofilament	10 g monofilament

- Treatment
  - **Glycemic control may prevent peripheral and autonomic neuropathy and progression in Type 2.**
  - Effective symptomatic treatments: Gabapentin, pregabalin, and duloxetine; may also consider tricyclic antidepressants, carbamazepine, venlafaxine and capsaicin

Diabetic Foot Care[6]

- Risk factors for diabetes-related foot ulcers and amputations include poor glycemic control, neuropathy with loss of protective sensation, cigarette smoking, foot deformities, pre-ulcerative corns and callouses, peripheral arterial disease, prior foot ulcer or amputation, visual impairment, and Chronic Kidney Disease (especially dialysis dependence).
- **Annual Physical Examination**
  - Includes inspection to assess for skin integrity, deformities, vascular perfusion including pedal pulses, and neuropathy/loss of protective reflexes
- Ankle-brachial index (ABI) should be ordered in patients with signs or symptoms of PAD.
- All patients, particularly those at increased risk, should be educated regarding general foot care and proper footwear
- Treatment
  - Patient with neuropathy, increased plantar pressure, or deformities may be treated with well fitted walking and athletic shoes, including extra wide/deep or custom molded footwear.
  - If ulcer or PAD present,
    - At least one of the following should also be performed, as available: skin perfusion pressure (>/=40 mmHg), toe pressure (>/=30 mmHg), transcutaneous oxygen pressure (TcP02 >/-25 mmHg)
    - Urgent vascular referral indicated for diabetic foot ulcer with ABI <50 mm Hg, toe pressure <30 mm Hg, or TcP02 <25 mmHg.
  - Patients with neuropathy and acute onset of a red, warm, and/or swollen foot or ankle should be rapidly assessed for Charcot joint and, if present, promptly treated.
  - **Infected wounds are typically polymicrobial, with staphylococci and streptococci being the most common pathogens. Most infections respond to antibiotics directed against these pathogens, though more chronic, severe, and/or previously treated infections may require broader spectrum antibiotics. Referral to a podiatrist, orthopedist, or vascular surgeon may be warranted.**
  - Hyperbaric oxygen therapy (HBOT) has not been proven effective in treating diabetic foot infections.

[6] Microvascular Complications and Foot Care: Standards of Medical Care in Diabetes-2020 Diabetes Care 2020;43(Suppl. 1):S135–S151 | https://doi.org/10.2337/dc20-s011.

Diabetic Retinopathy[6]

- General
  - **Diabetic retinopathy and macular edema may be asymptomatic, thus screening required**
  - **Intensive treatment to achieve near normalization of glucose can prevent or delay progression of retinopathy**
  - Aspirin is not contraindicated in diabetic retinopathy, as the risk of bleeding is not increased.
- Screening
  - Dilated retinal exam by an ophthalmologist, optometrist, or retinal photography (reviewed by an ophthalmologist) in PCP office every two years
  - If retinopathy present, annual exam required
    - Women with type 2 DM should be screening prior to a planned pregnancy or in the 1st trimester.
- Treatment of Diabetic Retinopathy
  - **Pan-retinal laser photocoagulation therapy** indicated for high risk proliferative retinopathy and some case of severe non-proliferative retinopathy
  - **Intravitreous injections of anti-vascular endothelial growth factor (ranizibumab, bevacizumad, aflibercept)** are indicated for diabetic macular edema and/or moderate to proliferative retinopathy, which is not inferior to laser photocoagulation. It is associated with less peripheral visual loss, fewer vitrectomies, and additional surgeries for complications. These injections are also indicated for central macular edema accruing beneath the fovea, in order to preserve reading.

DM Contribution to Other Chronic Diseases

Type 2 Diabetes and Heart Disease (Atherosclerotic Vascular Disease (ASVD) and Heart Failure (HF)[5]

- **Ideally, risk factors for ASVD and Heart Failure should be assessed annually, using prognostic tools such as the ASCVD Risk Calculator (available online at tools.acc.org/ASCVD-Risk-Estimator-Plus[7]). The 10 year risk of a first ASCVD event used to guide interventions.**
- Screening
  - Testing is indicated for typical/atypical chest pain, signs/symptoms of other vascular disease, or an abnormal ECG.
  - Exercise testing with/without echocardiography is the recommended initial test. Pharmacologic stress echo or nuclear imaging is indicated for those who are unable to exercise or have significant resting ECG abnormalities.
  - **Routine screening for ASCVD with CT calcium scores/CT angiography in asymptomatic high risk patients is not recommended.**
- Antiplatelet Therapy

[6] Microvascular Complications and Foot Care: Standards of Medical Care in Diabetes-2020 Diabetes Care 2020;43(Suppl. 1):S135–S151 | https://doi.org/10.2337/dc20-s011.

[5] Cardiovascular Disease and Risk Management: Standards of Medical Care in Diabetes-2020 Diabetes Care 2020;43(Suppl. 1):S111–S134 | https://doi.org/10.2337/dc20-s010.

[7] American College of Cardiology, "ASCVD Risk Calculator." American College of Cardiology Webpage. Available at http://tools.acc.org/ASCVD-Risk-Estimator-Plus/#!/calculate/estimate/. Accessed on October 29, 2020

    - **ASA (75-162 mg daily) may be used for primary prevention in patients with diabetes aged 50-75 years with at least one additional ASCVD risk factors (family hx, dyslipidemia, hypertension, tobacco use, CKD/albuminuria) and not at increased risk of bleeding.**
    - ASA (75-162 mg/d) maybe used for secondary prevention, in patients with diabetes with known ASCVD (prior MI/stroke).
    - Clopidogrel may be used in patients with known ASA allergy.
- **In patients with known or multiple risk factors for ASCVD and/or CKD, a SGLT-2i or a GLP-1 RA should be part of the medication regimen.**
- Heart Failure
    - In patients with HF (with or without diabetes), a SGLT-2i may be used to reduce HF hospitalizations[10]
    - Contraindicated:
        - DPP-4 Saxagliptin is associated with an increased risk hospitalization for HF and is contraindicated in HF patients.
        - Thiazolidinediones are also contraindicated in patients with heart failure

Considerations for Older Adults[11]

- Other common comorbidities may impact outcomes more than optimizing glycemic control in older patients
- Optimize nutrition (including protein intake) and regular exercise (aerobic and resistance)
- The complexity and costs of monitoring and treatment regimens should be tailored to individual patients
- Screen for and take into account common geriatric syndromes, like polypharmacy, cognitive impairment and depression which may impair treatment adherence
- Dementia
    - **Patients with DM are at increased risk of dementia**
    - Recurrent severe hypoglycemia is associated with cognitive impairment.
    - Annual screening after age 65 using a validated tool (Minicog, MOCa, MMSE) is recommended with appropriate work up and treatment if abnormal results obtained
- Hypoglycemia
    - Older adults, particularly those with cognitive impairment and/or receiving insulin therapy are at increased risk.
    - The intensity of monitoring, glycemic targets and medications should be adjusted accordingly
    - **An HgbA1c < 7.5% is a reasonable goal for older highly functional patients with limited comorbidities. A HgbA1c <8.5% is acceptable for those with more extensive comorbidities and/or functional/cognitive impairment**
- Treatment considerations
    - Insulin secreatogogues, such as sulfonylureas should be avoided due to potential for hypoglycemia. Shorter acting agents like glimepiride and glipizide are preferred to longer acting agents like glyburide.

---

[10] McMurray JV, Solomon SD, Inzucchi SE, et al. Dapagliflozin in Patients with Heart Failure and Reduced Ejection Fraction. N Engl J Med. 2019;381(21):1995-2008.

[11] Older Adults: Standards of Medical Care in Diabetes-2020 Diabetes Care 2020;43(Suppl. 1):S152–S162 | https://doi.org/10.2337/dc20-S012

- GLP-1 RA are administered by injection (except for semiglutide) which may be difficult for impaired seniors to use
- SGLT-2i may be more likely to cause volume depletion in the elderly
- The use of basal insulin once daily is easier to manage than multiple dose regimens

Immunizations[12]

- Influenza
  - Annual vaccination recommended for all patients with diabetes ≥6 months old
- Pneumococcal Pneumonia
  - Patients 2-64 years old should receive 23-valent pneumococcal polysaccharide vaccine (PPSV23).
  - Patients ≥65 years old, regardless of vaccination history, receive additional PPSV23.
- Hepatitis B
  - Administer a 2- or 3-dose series of hepatitis B vaccine, depending on the vaccine, to unvaccinated adults with diabetes ages 18 through 59 years.
  - Consider administering a 3-dose series of hepatitis B vaccine to unvaccinated adults with diabetes ≥60 years of age.

Type 2 DM Medications[13]

- General Principles
  - Initial combination therapy should be considered for newly diagnosed patients with an HgbA1c 1.5-2% above target
  - Increasing costs and variable insurance coverage, particularly related to new medications and cost shifting by payers creating financial burden on patients and impacting compliance.
  - **It is imperative that tight glycemic control not be achieved at the cost of severe or recurrent hypoglycemia**
  - Metformin, SGLT-2s, GLP-1s, DPP-4s and TZDs have limited risk of hypoglycemia
  - Metformin is considered initial treatment of choice. Selection of other agents should take into account cardiovascular and renal comorbidities, risk of hypoglycemia, other side effects, cost, body weight, and patient preference
  - In the absence of a known indication for a SGLT-2i or GPL-1RA, there is little evidence that any particular other medication class has greater efficacy, when considered as a 2nd or 3rd agent to add to metformin
  - GLP-1s < SGLT-2s > Metformin are beneficial in terms of promoting weight loss
  - Early initiation of insulin should be considered when evidence of catabolism (weight loss, hypertriglyceridemia, ketosis), dehydration, or marked hyperglycemia (HgbA1c >10%, serum glucose ≥300 mg). A GLP-1 RA is an alternative if HgbA1c is between 9-10.

[12] Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Medical Care in Diabetes-2020 Diabetes Care 2020;43(Suppl. 1):S37–S47| https://doi.org/10.2337/dc20-S004
[13] Pharmacologic Approaches to Glycemic Treatment: Standards of Medical Care in Diabetes-2020 Diabetes Care 2020;43(Suppl. 1):S98–S110 | https://doi.org/10.2337/dc20-S009

Table 2 - Diabetes Medication List, Dosing & Cost

Anti-diabetic medication list median monthly (30-day) cost of maximum approved daily dose						
Medication Class	**Compound(s)**	**Common Trade Names**	**Dosage strength/product (if applicable)**	**Starting Dose (no renal/ hepatic dysfunction)**	**Maximum approved daily dose***	**Median AWP (min, max) †**
Biguanides	**Metformin**	**Glucophage Riomet**	**500 mg (IR)**	500 mg qd	**2,000 mg**	**$84 ($4, $85)**
			850 mg (IR)		**2,550 mg**	**$108 ($6, $109)**
			1,000 mg (IR)		**2,000 mg**	**$87 ($4, $88)**
		Fortamet, Glucophage XR, Glumetza, Riomet ER	**500 mg (ER)**	500 mg qd	**2,000 mg**	**$89 ($87, $7,412)**
			750 mg (ER)		**1,500 mg**	**$74 ($65, $74)**
			1,000 mg (ER)		**2,000mg**	**$242 ($242, $7,214)**
Sulfonylureas (2nd generation)	**Glimepiride**	**Amaryl**	1 mg, 2 mg, **4 mg**	1 mg qd	**8 mg**	**$74 ($71, $198)**
	Glipizide	**Glucotrol**	5 mg, **10 mg (IR)**	5 mg qd	**40 mg (IR)**	**$75 ($67, $97)**
		Glucotrol XL	2.5 mg, 5 mg, **10 mg (XL)**	2.5 mg qd	**20 mg (XL)**	**$48**
	Glyburide	**Glynase PresTabs**	1.5 mg, 3 mg, **6 mg (micronized)**	1.5 mg qd	**12 mg (micronized)**	**$50 ($48, $71)**
		None in USA	1.25 mg, 2.5 mg, **5 mg**	2 mg qd	**20 mg**	**$93 ($63, $103)**
Thiazolidinediones	**Pioglitazone**	**Actos**	15 mg, 30 mg, **45 mg**	15 mg qd	**45 mg**	**$348 ($283, $349)**
	Rosiglitazone	**Avandia**	2 mg, **4 mg**	2 mg qd	**8 mg**	**$407**
Meglitinides (glinides)	**Nateglinide**	**Starlix**	60 mg, **120 mg**	60 mg tid ac	**360 mg**	**$155**
	Repaglinide	**Prandin**	0.5 mg, 1.0 mg, **2 mg**	0.5 mg tid ac	**16mg**	**$878 ($162, $897)**

DPP-4 inhibitors	**Alogliptin**	**Nesina**	6.25 mg, 12.5 mg, **25 mg**	25 mg qd	**25 mg**	**$234**
	Saxagliptin	**Onglyza**	2.5 mg, **5 mg**	5 mg qd	**5 mg**	**$505**
	Linagliptin	**Trajenta**	**5 mg**	5 mg qd	**5 mg**	**$523**
	Sitagliptin	**Januvia**	25 mg, 50 mg, **100 mg**	100 mg qd	**100 mg**	**$541**
SGLT2 inhibitors	**Ertugliflozin**	**Steglatro**	5 mg, **15 mg**	5 mg qd	**15 mg**	**$338**
	Dapagliflozin	**Farxiga**	5 mg, **10 mg**	5 mg qd	**10 mg**	**$591**
	Empagliflozin	**Jardiance**	10 mg, **25 mg**	10 mg qd	**25 mg**	**$591**
	Canagliflozin	**Invokana**	100 mg, **300 mg**	100 mg qd	**300 mg**	**$593**
GLP-1 RAs	**Exenatide (extended release)**	**Bydureon, Bydureon Bcise**	**2 mg powder for suspension or pen**	2 mg qweek	**2 mg****	**$840**
	Exenatide	**Byetta**	5 mcg, **10 mcg pen**	5 mcg bid	**20 mcg**	**$876**
	Dulaglutide	**Trulicity**	0.75mg**, 1.5 mg,** 3.0 mg, 4.5 mg,	0.75 mg qweek	**1.5 mg****	**$911**
	Semaglutide	**Ozempic**	0.5 mg, **1 mg pens**	0.25 mg qweek	**1 mg****	**$927**
		Rybelsus	3 mg, 7 mg, 14 mg **(tablet)**	3 mg qday	**14 mg**	**$927**
	Liraglutide	**Victoza, Saxenda**	6 mg/ml, **18 mg/3 mL pen**	0.6 mg qweek	**1.8 mg**	**$1,106**
	Lixisenatide	**Adlyxin**	**300 mcg/3 mL pen**	10 mcg qday	**20 mcg**	**$744**

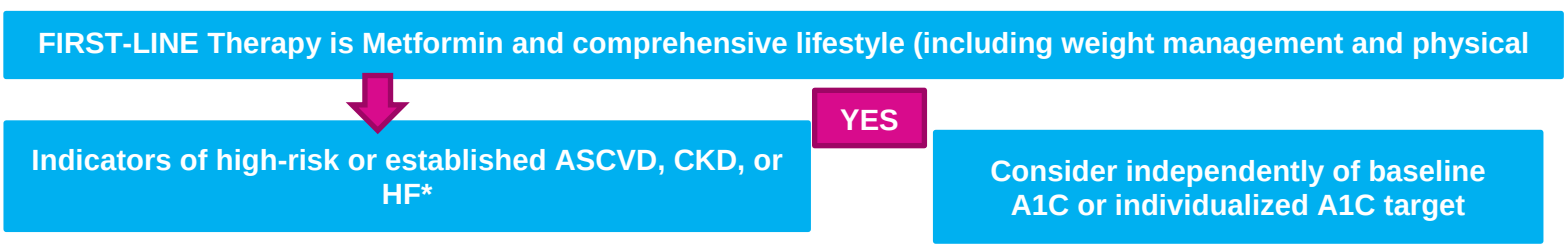
AWP, average wholesale price; DPP-4, dipeptidyl peptidase 4; ER and XL, extended release; GLP-1 RA, glucagon-like peptide 1 receptor agonist; IR, immediate release; N/A, data not available; SGLT2, sodium–glucose cotransporter 2.

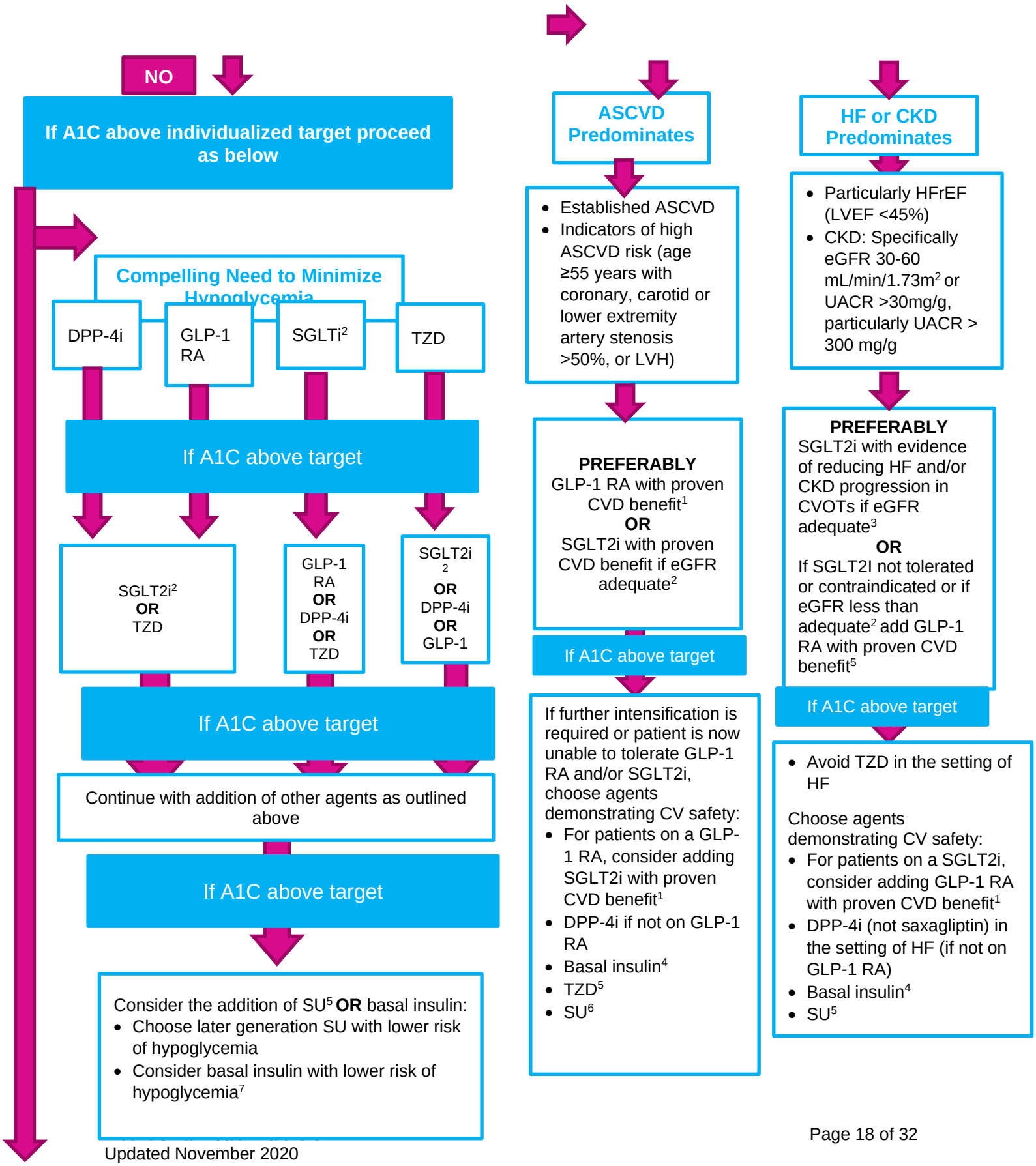
†Calculated for 30-day supply (AWP) for dose highlighted and underlined in bold; median AWP listed alone when only one product and/or price.

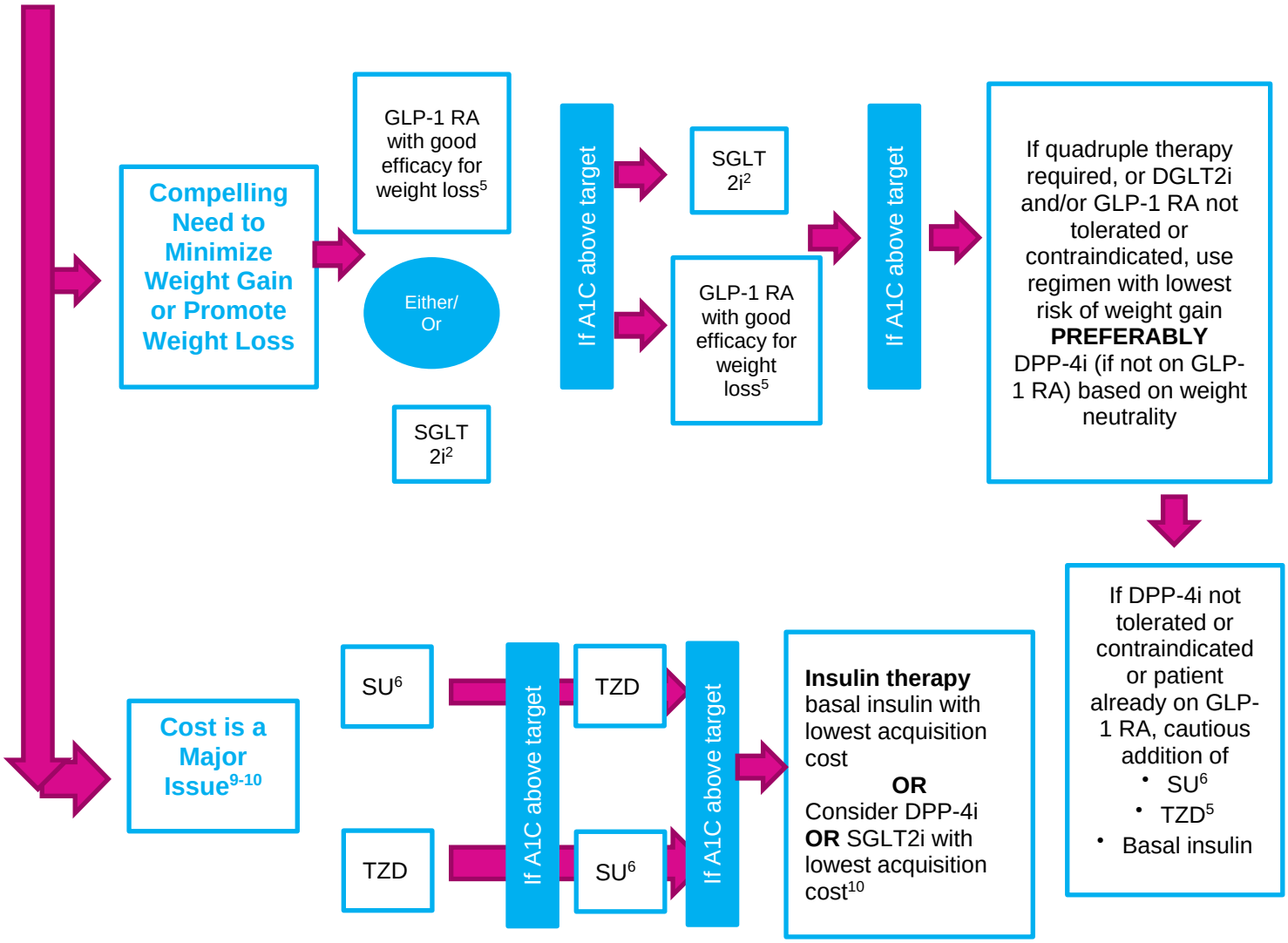
***Utilized to calculate median AWP (min, max); generic prices used, if available commercially.**

****Administered once weekly.**

Figure 1: Oral Diabetes Medication Treatment[13]




NO
If A1C above individualized target proceed as below
Compelling Need to Minimize Hypoglycemia
DPP-4i
GLP-1 RA
SGLTi2
TZD
If A1C above target
SGLT2i2 OR TZD
GLP-1 RA OR DPP-4i OR TZD
SGLT2i 2 OR DPP-4i OR GLP-1
If A1C above target
Continue with addition of other agents as outlined above
If A1C above target
Consider the addition of SU5 OR basal insulin:
• Choose later generation SU with lower risk of hypoglycemia
• Consider basal insulin with lower risk of hypoglycemia7
ASCVD Predominates
• Established ASCVD
• Indicators of high ASCVD risk (age ≥55 years with coronary, carotid or lower extremity artery stenosis >50%, or LVH)
PREFERABLY
GLP-1 RA with proven CVD benefit1
OR
SGLT2i with proven CVD benefit if eGFR adequate2
If A1C above target
If further intensification is required or patient is now unable to tolerate GLP-1 RA and/or SGLT2i, choose agents demonstrating CV safety:
• For patients on a GLP-1 RA, consider adding SGLT2i with proven CVD benefit1
• DPP-4i if not on GLP-1 RA
• Basal insulin4
• TZD5
• SU6
HF or CKD Predominates
• Particularly HFrEF (LVEF <45%)
• CKD: Specifically eGFR 30-60 mL/min/1.73m2 or UACR >30mg/g, particularly UACR > 300 mg/g
PREFERABLY
SGLT2i with evidence of reducing HF and/or CKD progression in CVOTs if eGFR adequate3
OR
If SGLT2I not tolerated or contraindicated or if eGFR less than adequate2 add GLP-1 RA with proven CVD benefit5
If A1C above target
• Avoid TZD in the setting of HF
Choose agents demonstrating CV safety:
• For patients on a SGLT2i, consider adding GLP-1 RA with proven CVD benefit1
• DPP-4i (not saxagliptin) in the setting of HF (if not on GLP-1 RA)
• Basal insulin4
• SU5



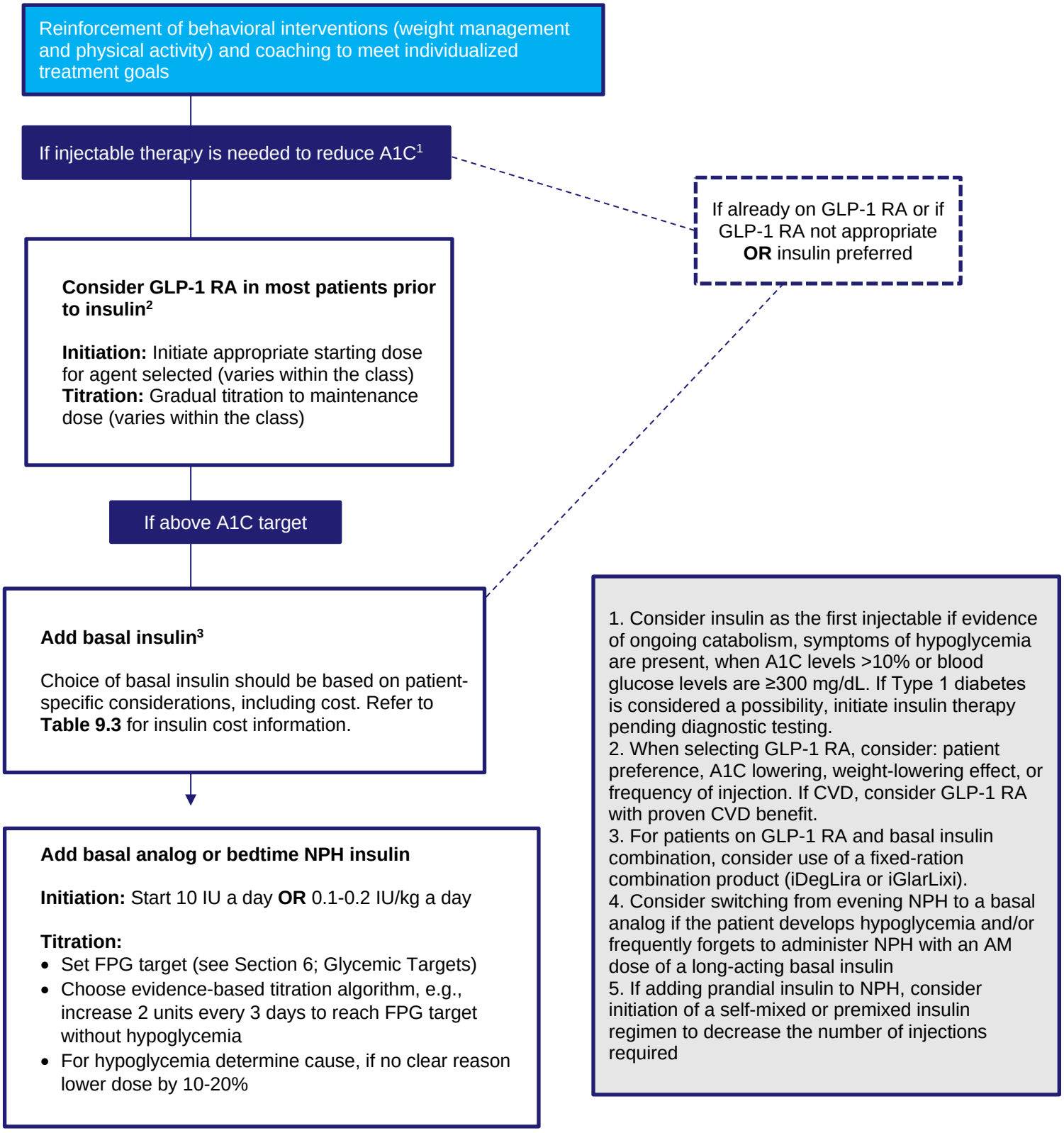
LVH = Left ventricular hypertrophy
HFrEF = Heart failure reduced ejection fraction
UACR = Urine albumin-to-creatinine ratio
LVEF = Left ventricular ejection fraction

1. Proven CVD benefit means it has label indication of reducing CVD events
2. Be aware that SGLT2i labeling varies by region and individual agent with regard to indicated level of eGFR for initiation and continued use
3. Empagliflozin, canagliflozin, dapagliflozin have shown reduction in HF and to reduce CKD progression in VOTs. Canagliflozin has primary renal outcome data from CREDENCE. Dapagliflozin has primary heart failure outcome data from DAPA-HF
4. Degludec or U100 glargine have demonstrated CVD safety
5. Low dose may be better tolerated though less well studied for CVD effects

*Actioned whenever these become new clinical considerations regardless of background glucose-lowering medications

6. Choose later generation SU to lower risk of hypoglycemia, Gilmepiride has shown similar CV safety to DPP-4i
7. Degludec/glargine U300 < glargine U100/detemir < NPH insulin
8. Semaglutide > liraglutide > dulsaglutide > exenatide > lixisenatide
9. If no specific comorbidities (i.e., no established CVD, low risk of hypoglycemia, and lower priority to avoid weight gain or no weight-related comorbidities)
10. Consider country- and region-specific cost of drugs. In some countries TZDs relatively more expensive and DPP-4i relatively cheaper.

Figure 2: Injectable therapy indicated (Unable to achieve A1C goals with orals)[13]



If above A1C target
Despite adequately titrated basal analog or bedtime NPH[4]
OR once basal dose >0.5 IU/kg **OR** FPG at target

Add prandial insulin[5]
Usually one dose with the largest meal or meal with the greatest PPG excursion; prandial insulin can be dosed individually or mixed with NPH as appropriate

Initiation:
- 4 IU a day or 10% of basal insulin dose
- If A1C <8% consider lowering the basal dose by 4 IU a day or 10% of basal dose

Titration:
- Increase dose by 1-2 IU or 10-15% twice weekly
- For hypoglycemia determine cause, if no clear reason lower corresponding dose by 10-20%

If on bedtime NPH, consider converting to twice-daily NPH regimen
Conversion based on individual needs and current glycemic control. The following is one possible approach:
Initiation
- Total dose = 80% of current bedtime NPH dose
- 2/3 given in the morning
- 1/3 given at bedtime

Titration
- Titrate based on individualized needs

If above A1C target

If above A1C target

Stepwise additional injections of prandial insulin (i.e., two, then three additional injections)

Proceed to full basal-bolus regimen (i.e., basal insulin and prandial insulin with each meal)

Consider self-mixed/split insulin regimen
Can adjust NPH and short/rapid-acting insulins separately

Initiation:
- Total NPH dose = 80% of current NPH dose
- 2/3 given before breakfast
- 1/3 given before dinner
- Add 4 IU of short/rapid-acting insulin to each injection or 10% of reduced NPH dose

Titration:
- Titrate each component of the regimen based on individualized needs

Table 3: Summary Table of Diabetes Medications[13]

Drug	Efficacy	Hypo	Weight impact	Cardivascular Effects		Renal effects		Additional considerations
				ASCVD	Heart Failure	Progression of DKD	Dosing considerations	
Metformin	High	No	Neutral (potential for modest loss)	Potential benefit	Neutral	Neutral	Contraindicated with eGFR <30 mL/min/1.73m^2	Gastrointestinal side effects common (diarrhea, nausea) Potential for B12 deficiency Lactic Acidosis
SGLT-2 inhibitors	Intermed	No	Loss	Benefit: empagliflozin†, canagliflozin	Benefit: empagliflozin†, canagliflozin, dapagliflozin‡	Benefit: empagliflozin, canagliflozin, dapagliflozin	Renal dose adjustment required (canagliflozin, dapagliflozin, empagliflozin)	FDA Black Box: Risk of bone fractures (canagliflozin) DKA risk (all agents, rare in T2DM) Genitourinary infections Risk of volume depletion, hypotension Increase LDL cholesterol Risk of Fournier's gangrene
GLP-1 RAs	High	No	Loss	Neutral: lixisenatide Benefit: see label indication of reducing CVD events	Neutral	Benefit: liraglutide	Renal dose adjustment required (exenatide, lixisenatide) Caution when initiating or increasing dose due to potential risk of	FDA Black Box: Risk of thyroid C-cell tumors (liraglutide, albiglutide, dulaglutide, exenatide extended release) and Multiple Endocrine

							acute kidney injury	Neoplasia Syndrome (MEN) Type 2 Gastrointenstinal side effects common (nausea, vomiting, diarrhea) Injection site reactions Acute pacreatitis risk
DPP-4 inhibitors	Inter med.	No	Neutral	Neutral	Potential risk: saxagliptin	Neutral	Renal dose adjustment required (sitagliptin, saxagliptin, alogliptin); can be used in renal impairment No dose adjustment required for linagliptin	Potential risk of acute pancreatitis Joint pain
Thiazolidn ediones	High	No	Gain	Potential benefit: pioglitazo ne	Increased risk	Neutral	No dose adjustment required Generally not recommender in renal impairment due to potential for fluid retention	FDA Black Box: Congestive heart failure (pioglitazone, rosiglitazone) Fluid retention (edema, heart failure) Benefit in NASH Risk of bone fractures Bladder cancer (pioglitazone)

								Increase LDL cholesterol (rosiglitazone)
Sulonylureas (2nd generation)	High	Yes	Gain	Neutral	Neutral	Neutral	Glyburide: not recommender Glipizide and glimepiride: initiate conservatively to avoid hypoglycemia	FDA Special Warning on increased risk of cardiovascular mortality based on studies of an older sulfonylurea (tolbutamide)
Insulin	**Human** **Analogs**	Highest	Yes	Gain	Neutral	Neutral	Neutral Neutral	Lower insulin doses required with a decrease in eGFR; titrate per clinical response	Injection site reactions Higher risk of hypoglycemia with human insulin (NPH or premixed formulations) vs. analogs

Hypo = Hypoglycemia

Medication Class Tables for Additional Detail

- **Sulfonylureas**
- **SGLT2-I**
- **GLP1-RA**
- **DPP-4-I**

Sulfonylureas[13,15,16]

Mechanism of Action: Interact with receptors on pancreatic B-cells to potentiate the release of insulin at all glucose concentrations and modestly increase tissue sensitivity to insulin

Indications for Use

- In patient without heart disease, can be used as first line therapy for patients unable to take metformin
- Can be used as a second line agent or in combination with other medications in patients who are not well controlled on metformin alone
- Higher doses of sulfonylureas (glimepiride 4-8 mg daily, glipizide 10 twice a day) can be helpful in patients with severe hyperglycemia (Hgba1c <10, without ketones or weight loss) who prefer not to use injections

[13] Pharmacologic Approaches to Glycemic Treatment: Standards of Medical Care in Diabetes-2020 Diabetes Care 2020; 43 (Suppl. 1):S98–S110 | https://doi.org/10.2337/dc20-S009.

[15] Bianchi C. et al. Treatment with Oral Drugs. Diabetes Epidemiology, Genetics, Pathogenesis, Diagnosis, Prevention, and Treatment. Edited by Bonoro E, DeFronzo RA, Springer 2018, pages 527-569.

[16] Wexler DJ. Sulfonylureas and meglitinides in the treatment of type 2 diabetes mellitus. UpToDate, Mulder JE (Ed), Watham, MA, (Accessed on October 30, 2020.)

- If sulfonylurea required, glimepiride is preferred in patients with heart disease who cannot tolerate a SGLT-2I or GLP-1 RA
- Reduce HgbA1c by 1-2%

Contraindications:

- Prior diabetic ketoacidosis
- Hypersensitivity to another medication in this class

Adverse Effects:

- Hypoglycemia, particularly with long acting agents with underlying kidney disease
- Weight gain
- Concerns regarding cross reactivity in patients with allergy to sulfonamide antibiotics appears unfounded.
- Second generation sulfonylureas do not appear to increase CV risk

Dosing

- Shorter acting agents (glipizide and glimepiride) are generally preferred .
- Typically not used in combination with insulin

Sodium Glucose Co-transporter 2 Inhibitors (SGLT-2i)[13,15]

Mechanism of Action

Lower blood glucose levels by reducing glucose reabsorption in the proximal tubule, promoting glycosuria and an osmotic diuresis

Indications for Use

- A SGLT-2i with known CV benefit (empagliflozin, dapagliflozin, canagliflozin) should be considered for patients with heart failure, CKD or known or at higher risk for cardiovascular disease, in conjunction with metformin or as first line treatment if metformin intolerant.
- Can be a second or third line agent if adequate glycemic control is not achieved with existing therapies
- Reduce HgbA1c by ~0.6-1.2%

Contraindications

- Type 1 DM
- Prior episodes of/or risk factors for DKA
- CKD with GFR <30
- Relative contraindications include recurrent genitourinary tract infections, low bone density, recurrent falls, foot deformities, and prior amputations

[13] Pharmacologic Approaches to Glycemic Treatment: Standards of Medical Care in Diabetes-2020 Diabetes Care 2020; 43(Suppl. 1):S98–S110 | https://doi.org/10.2337/dc20-S009.

[15] Bianchi C. et al. Treatment with Oral Drugs. Diabetes Epidemiology, Genetics, Pathogenesis, Diagnosis, Prevention, and Treatment. Edited by Bonoro E, DeFronzo RA, Springer 2018, pages 527-569.

Adverse Effects

- Hypovolemia, hypotension and dehydration
- DKA, including euglycemic DKA
- Recurrent bacterial urinary tract infections and fungal vulvovaginitis.
- Possible increased risk of amputations

Dosing

- Close monitoring and dose adjustments may be needed in presence of liver disease

Glucagon-like peptide -1 Receptor Agonists (GLP-1 RA)[13,17,19]

Mechanism of Action

Enhances glucose dependent insulin secretion, slow gastric emptying, reduces post-prandial glucagon secretion, and reduces food intake.

Indications for Use

- A GLP-1 RA with known CV benefit (liraglutide, semaglutide, dulaglutide) should be considered for patients with known or at higher risk for cardiovascular disease who are unable to use metformin or as an additional agent.
- GLP-1 RA are preferred to insulin when adequate control is not achieved with oral therapy.
- Reduces HgbA1c by 0.5% - 1.2%

Contraindications

- Dose adjustment required for Exenitide and lixisenatide in renal disease.
- History of acute pancreatitis (caution suggested, association not well established)
- Personal or family history of medullary thyroid cancer, multiple endocrine neoplasia 2A or 2B
- Should not be used with DPP-4 inhibitors

Adverse Effects

- GI side effects, including nausea, vomiting, and diarrhea
- Injection site reactions
- Semaglutide may be associated with the progression of retinopathy
- Antibodies to the GLP-1 RAs occur infrequently but generally do not impact efficacy

Dosing

- With exception of oral semaglutide, other agents are injected subcutaneously, ranging from twice daily to once a week.
- Long acting agents appear to lower fasting glucose and HgbA1c, while shorter acting agents have greater impact on post-prandial blood glucose
- Can be safely used with insulin

---

[13] Pharmacologic Approaches to Glycemic Treatment: Standards of Medical Care in Diabetes-2020 Diabetes Care 2020;43(Suppl. 1):S98–S110 | https://doi.org/10.2337/dc20-S009

[17] Madsbad S. Holst J. Treatment with GLP-1 Receptor Agonists Diabetes Epidemiology, Genetics, Pathogenesis, Diagnosis, Prevention, and Treatment. Edited by Bonoro E, DeFronzo RA, Springer 2018, pages 570-615

[19] Dungan K, DeSantis A, Glucagon-like peptide 1 receptor agonists for the treatment of type 2 diabetes mellitus. UptoDate, Mulder JE (Ed), Watham, MA, (Accessed on October 30, 2020.)

Dipeptidyl-peptidase- 4 (DPP-4) Inhibitors [13,15,19]

Mechanism of Action

Inhibits Dpp-4 enzyme that inactivates bioactive peptides, including GLP-1 and gastrointestinal peptide (GIP), with modest glucose lowering effect

Indications for Use

- May be first line therapy in patients intolerant to metformin or as an additional agent when adequate glycemic control not attained with metformin and/or other agents.
- Reduces HgbA1c by ~0.7-1%

Contraindications

- Should not be used in conjunction with a GLP-1 RA

Adverse Effects

- Headache, nasopharyngitis, URI, are commonly reported effects. Increased risk of heart failure with saxagliptin, with a neutral effect on HF and ASVD with other agents in class
- Potential risk of acute pancreatitis

Dosing

- With exception of linagliptin, the doses of other agents should be adjusted in presence of CKD

Insulin (Injections) [13,15]

Indications for Use

- Severe hyperglycemia, particularly with evidence of catabolism
- Persistent hyperglycemia despite oral therapy
- Latent autoimmune diabetes in adults (LADA)
- Pancreatic insufficiency

Contraindications

- Recurrent severe hypoglycemia

Adverse Effects

- Hypogylcemia
- Weight gain
- Lipohypertrophy

---

[13] Pharmacologic Approaches to Glycemic Treatment: Standards of Medical Care in Diabetes-2020 Diabetes Care 2020; 43 (Suppl. 1):S98–S110 | https://doi.org/10.2337/dc20-S009.

[15]Bianchi C. et al. Treatment with Oral Drugs. Diabetes Epidemiology, Genetics, Pathogenesis, Diagnosis, Prevention, and Treatment. Edited by Bonoro E, DeFronzo RA, Springer 2018, pages 527-569.

[19] Dungan K, DeSantis A, Dipeptidyl peptidase 4 (DPP-4) inhibitors for the treatment of type 2 diabetes mellitus. UptoDate, Mulder JE (Ed), Watham, MA, (Accessed on November 1, 2020.)

[13] Pharmacologic Approaches to Glycemic Treatment: Standards of Medical Care in Diabetes-2020 Diabetes Care 2020;43(Suppl. 1):S98–S110 | https://doi.org/10.2337/dc20-S009

[15] Bianchi C. et al. Treatment with Oral Drugs. Diabetes Epidemiology, Genetics, Pathogenesis, Diagnosis, Prevention, and Treatment. Edited by Bonoro E, DeFronzo RA, Springer 2018, pages 527-569.

Dosing

- Initial treatment is with NPH or long acting analogues, with modest advantage of longer acting agents (U100 glargine or detemir) in reducing symptomatic and nocturnal hypoglycemic episodes, albeit at increased cost.
- Prandial insulin can be added to basal insulin if necessary, initially given w largest meal and then added prior to other meals.
- Human insulin (NPH, Regular, 70/30 NPH/Regular) are appropriate for many patients and can reduce treatment costs.
- Starting basal doses are 0.1-0.2 units/kg/day. Prandial insulin is started at 4 units or 10% of daily basal insulin, given with largest meal.

Other considerations

- Appears to be no clinically significant advantage to rapid-acting analogues compared with regular human insulin
- Basal or multiple daily dose regimens can be combined w GLP-1RA to achieve better control
- **Metformin, thiazolidines and SGLT-2i are generally continued when insulin is started, while sulfonylureas and DPP-4i are typically stopped when starting insulin**
- Both syringes and **insulin pens** are able to effectively administer insulin, with later being **helpful in patients w problems with dexterity and vision.**
- **Patient education regarding correct injection technique, including subcutaneous delivery (not IM) to appropriate sites, periodic site rotation to avoid lipohypertophy, and care to avoid infections at injections sites.**

Clinical Integration Care Delivery Steps

- **Managing and empowering patients with Type II DM is a team sport**[20]
- A **wide-variety of team members** can be involved in the diagnosis, lifestyle changes, medication management and disease management. Please see table A below for care delivery steps.
- Below are **potential team members and options** to integrate specialty care, primary care and advanced practice providers.

Care Delivery Step	Possible Team Member(s)
Diagnosis and Severity Classification	Endocrinologist, PCP, Advanced Practice Provider (APP)
Initial Treatment (Lifestyle, Medications, Nutrition)	Endocrinologist, PCP, APP, Clinical Pharmacist
Maintenance Treatment (Medication Adjust/Adherence, Nutrition)	Endocrinologist, PCP, APP, Clinical Pharmacist
Self-Management (Weight monitoring/ Symptom response, Motivational Interviewing)	Endocrinologist, PCP, Clinical Pharmacist, Care Management (RN), Certified Diabetes Educators, Wellness Coach
Coordinate Specialty Treatment or Testing / Advanced Care	Care Management (SW, RN)
Behavioral Health- Screen and Refer/ Initiate Treatment	PCP, APP, Pharmacy, LCSW
Ambulatory Care Management / Home Care Services	Care Managers (RN, SW), Home Health Aide, Community Paramedicine
Tele-monitoring / Home Care Services	Endocrinologist, Clinical Pharmacist, Care Management (RN), Home Health Aide
Palliative Care- Screening	Endocrine, Geriatrics, or Palliative Care Specialist, PCP, APP, Pharmacist, Care Management (RN)

Referrals

Potential indications for referral for specialty care include

- Endocrinology
  - **For A1c > 9, despite 6 months of adherent therapy**
  - Recurrent hypoglycemia
  - Continuous subcutaneous insulin infusion (insulin pump) therapy
- Cardiology
  - For **treatment of concomitant cardiac disease (CAD, HF),** and orthostatic hypotension.

[20] Improving Care and Promoting Health in Populations: Standards of Medical Care in Diabetes-2020. Diabetes Care 2020;43(Suppl. 1):S7–S13 | https://doi.org/10.2337/dc20-S001

    - Optimize treatment of lipid disorders
- Nephrology
    - To clarify the cause of CKD and assistance managing related complications
    - All Stage 4 CKD (eGFR <30)
    - KidneyIntelX™ medium or high risk score
        - Diagnostic blood test that predicts risk of progressive decline in kidney function in patients with type 2 diabetes and existing Diabetic Kidney Disease at stages 1-3 (eGFR 30-59 or UACR ≥ 30).

MSHS Disease Management Services

Certified Diabetes Education Disease Management Team (Wellness coaches)

Certified Diabetes Educators (CDEs) practice at the top of their license. **They can help manage patients with both a diagnosis of diabetes** and associated comorbidities such as heart failure. CDEs are embedded in primary and specialty care.

Patients receive customized education and strategies to achieve an optimal quality of life. CDE engagement includes[8]:

- Assessing and educating patients and caregivers on their health conditions,
- Cohesive collaboration with the medical team to integrate evidenced- based care into patient's plan of care, ongoing monitoring, real time support and follow up by the medical team,
- Seamless communication amongst the medical team, and Specialty care consultations for high risk patients,
- Oversight and training by a Medical Director, and outcomes evaluation.

Clinical Pharmacy

- Pharmacists are a **key part of the care team for chronic disease management**[21] including diabetes, heart failure, and COPD.
- They are **credentialed providers that can prescribe and adjust medications** through the Collaborative Drug Treatment Model.[22]

Referrals to Pharmacists

- Uncontrolled chronic diseases, such as:
    - Hypertension, diabetes, heart failure, asthma, COPD, depression, behavioral health

[8] Facilitating Behavior Change and Well-being to Improve Health Outcomes: Standards of Medical Care in Diabetes-2020. Diabetes Care 2020;43(Suppl. 1):S48–S65 | https://doi.org/10.2337/dc20-S005
[21] Fazel MT et al Impact of Diabetes Care by Pharmacists as Part of Health Care Team in Ambulatory Settings: A Systematic Review and Meta-analysis. Annals of Pharmacotherapy 2017, Vol. 51(10) 890–907
[22] Practice Advisory on Collaborative Drug Therapy Management, American Academy off Managed care pharmacy, https://www.amcp.org/sites/default/files/2019-03/Practice%20Advisory%20on%20CDTM%202.2012_0.pdf. Accessed November 1, 2020

    - Post Discharge
    - High utilizers
- Polypharmacy, Medication Reconciliation and Medication Adherence

Care Coordination in Diabetes at MSHS[23]

- The medical complexity inherent in many patients with DM requires the involvement of multiple clinicians across many care settings[20].
- Interdisciplinary, team-based care may be the most effective approach to complex diabetes care.
- Mount Sinai Health Partners Care Management social workers and nurses partner with patients, family caregivers, and providers to identify and address known risk factors that can impact patients' health.
- Care Management intervention includes:
    - A comprehensive assessment of the patient's understanding of and ability to manage their illness, including a psychosocial assessment.
    - Development of a comprehensive care plan to set goals to optimize health and quality of life.

Referral Criteria

May include those with:

- Multiple no-shows, Unexplained non-adherence to medications, testing or treatment
- Demonstrated difficulty managing symptoms and/or disease processes (including those newly diagnosed)
- Frequent admissions or ED visits that may be preventable with additional support,
- Complex family dynamics that deplete the provider
- Difficulty accessing needed community-based care and a high "worry score", patients you as the provider are most worried about from visit to visit

How to refer to Care Management and/or Home Health

- **Use the MSHP Care Management Referral in Epic (order #391414).**
- **Email mshpcmreferral@mountsinai.org or call 212-241-7228.**
    - Providers who refer patients can expect:
        - Prompt and efficient processing of your referral
        - Communication about referral processing and assignment through the Epic Inbasket
        - Follow up from clinical staff within one week of assignment.

Home Health Optimization Program

- Referrals for Home Health should be handled through the **designated Home Health nurse coordinator**, a member of the care management team through the Care Management referral information above. The Home Health nurse coordinator will **assess the patient's needs** and determine appropriateness of Home Health.
- **Telephonic education and reinforcement** can be also be delivered by the Nurse Clinical Coordinator. (The home health RN will not provide patient interventions, they will refer to nurse care coordinator if needed.)

---

[23]Information developed and provided by the Mount Sinai Care Management Department

[20] Improving Care and Promoting Health in Populations: Standards of Medical Care in Diabetes-2020. Diabetes Care 2020;43(Suppl. 1):S7–S13 | https://doi.org/10.2337/dc20-S001

- Nursing interventions can include various educational components including recognition of high risk symptoms with an action plan, dietary guidelines, medication management, and **monitoring of blood glucose, weight, and blood pressure.**

Behavioral Health[8,24]

Patients should be screened annually for depression using the PHQ-2/PHQ-9 and referred to psychiatric services through their current care pathway depending on their clinic.

Individuals with chronic conditions are 2-5 times more likely to have anxiety and depressive disorders compared with the general population[25]

- 25% of diabetics have depressive symptoms or depressive disorders.
- Patients with chronic medical illness and a co-morbid psychiatric diagnosis have poorer quality of life, increased functional disability, and increased mortality to name a few.

[8] Facilitating Behavior Change and Well-being to Improve Health Outcomes: Standards of Medical Care in Diabetes-2020. Diabetes Care 2020;43(Suppl. 1):S48–S65 | https://doi.org/10.2337/dc20-S005

[24] Information developed and provided by the Mount Sinai Department of Psychiatry.

[25] Ratcliff, Chelsea & Fletcher, Terri & Petersen, Nancy & Sansgiry, Shubhada & Kauth, Michael & Kunik, Mark & Stanley, Melinda & Cully, Jeffrey. (2017). Recognition of anxiety, depression, and PTSD in patients with COPD and CHF: Who gets missed?. General Hospital Psychiatry. 47. 10.1016/j.genhosppsych.2017.05.004.