Improving Diabetes Outcomes

This toolbox provides practical tips and resources to help improve outcomes in patients with diabetes, with a focus on nonpregnant **adults**. A second chart below suggests approaches for management of diabetes medications around religious fasts, dietary fasts, or short medical procedures.

Guidelines from the ADA and Diabetes Canada are available at:

- ADA: https://diabetesjournals.org/care.
- Diabetes Canada: https://guidelines.diabetes.ca/cpg.

Goal	Suggested Strategies or Resources
Set an appropriate **A1c target**.	• Recommend an A1c <7% (ADA) or ≤7% (DC) in many patients with diabetes to reduce complications.[1,2] • Select less stringent targets, such as <8% (ADA) or ≤8.5% (DC), in certain diabetes patients such as those at risk for severe hypoglycemia, with limited life expectancy, or with advanced vascular complications.[1,2] • Consider a more stringent target, such as ≤6.5% (DC), if it can be attained safely and benefits are likely to be realized (e.g., long life expectancy, short diabetes duration, few vascular complications).[1,2] • DC has an online tool providers can use to individualize your patient's A1c target at http://guidelines.diabetes.ca/reduce-complications/a1ctarget.

Choose the **most appropriate agent(s)** to achieve the A1c target.
 	
Continued…
	• Individualize treatment choice based on weight, A1c target, comorbidities, safety, tolerability, and cost.[1,2]
	• Start with **metformin** in most patients with type 2 diabetes without severe renal impairment (eGFR <30 mL/min/1.73 m^2, due to rare risk of lactic acidosis).[1,2] Metformin has negligible risk of hypoglycemia, does not cause weight gain, has a long history of use, and might have CV benefit.[1,2] Most patients in the CV outcomes studies with other agents (e.g., SGLT2 inhibitors) were taking metformin.[1,2]
	  ○ Metformin is associated with **B12 deficiency**. Consider checking levels periodically (every two to three years), especially in patients with anemia or neuropathy (Canada: check every one to two years).[1,2,3]
	• If the A1c is ≥1.5% above target, combination oral therapy (e.g., metformin plus another agent), an injectable, or injectable combination will be needed.[1,2]
	• In patients with **CV disease**, **high CV risk** (DC: age ≥60 years with ≥2 CV risk factors), **heart failure**, or **kidney disease**, irrespective of metformin use or A1c goal, use an agent with proven cardiorenal benefit in these patients.[1,2,28] Evidence-based examples include:
	  ○ **CV disease**: canagliflozin, empagliflozin, dulaglutide, liraglutide, semaglutide injection (MACE).[1,2]
	  ○ **high CV risk** (primary prevention): dapagliflozin (CV death or HF hospitalization), dulaglutide (MACE).[2]

<table>
<tr><th>Goal</th><th>Suggested Strategies or Resources</th></tr>
<tr><td>Most appropriate agent(s), continued</td><td>

kidney disease: SGLT2 inhibitors (canagliflozin, dapagliflozin, empagliflozin) preferred to reduce nephropathy progression, MACE (canagliflozin), and HF hospitalization; GLP-1 agonists reduce MACE (liraglutide, semaglutide injection) and perhaps nephropathy progression.[1,2,29]
heart failure (HF hospitalization or CV death): dapagliflozin, empagliflozin.[1,2]
See our chart, Diabetes Medications: Cardiovascular and Kidney Impact, for details on study outcomes for each agent.

The mini-table below contains additional considerations for choice of agent.
<table>
<tr><th>Drug Class</th><th>Consider for…[1,2,4]</th><th>Avoid or Use Caution in…[1-6,13]</th></tr>
<tr><td>SGLT2 inhibitors</td><td>CV disease risk, heart failure, CKD, overweight</td><td>Renal impairment, diuretic use, risk factors for amputation, history of genital fungal infections, fracture risk</td></tr>
<tr><td>GLP-1 agonists</td><td>CV disease risk, overweight, high A1c</td><td>Personal or family history of medullary thyroid cancer or multiple endocrine neoplasia type 2, pancreatitis risk factors, gallbladder disease</td></tr>
<tr><td>Sulfonylureas</td><td>Cost concerns</td><td>Hypoglycemia risk, overweight</td></tr>
<tr><td>Insulin</td><td>High A1c</td><td>Hypoglycemia risk, overweight</td></tr>
<tr><td>Pioglitazone</td><td>High triglycerides, NASH, CV risk</td><td>Heart failure, risk of bladder cancer, patients on insulin, fracture risk</td></tr>
<tr><td>DDP-4 inhibitors</td><td>Post-prandial effect desired, overweight</td><td>Heart failure (saxagliptin, alogliptin)</td></tr>
<tr><td>Alpha-glucosidase inhibitors</td><td>Post-prandial effect desired, overweight</td><td>A1c ≥8.5%</td></tr>
</table>

When goals aren't met, scrutinize the patient's med list for drugs that significantly increase glucose.
For more detailed information, including expected A1c reduction, weight loss, and more, see our charts:

Drugs for Type 2 Diabetes (US subscribers).
Stepwise Treatment of Type 2 Diabetes (Canadian subscribers).

For information on insulin for type 2 diabetes, see our resources:

How to Switch Insulin Products (US subscribers, Canadian subscribers).
Comparison of Insulins (US subscribers, Canadian subscribers).

</td></tr>
<tr><td>Ensure safe use of diabetes meds.</td><td>

New insulin concentrations and products can create confusion. For strategies and resources to help prevent errors with insulin, see our chart, Tips to Improve Insulin Safety.
For notable adverse effects of SGLT2, pioglitazone, and more, see our charts, Drugs for Type 2 Diabetes (US subscribers) and Stepwise Treatment of Type 2 Diabetes (Canadian subscribers).

</td></tr>
</table>

Goal	Suggested Strategies or Resources

Start a **statin** when appropriate.	• **Primary Prevention**
	  ○ **ADA**:[1]
	  ▪ Start a moderate-intensity statin for adults 40 to 75 years of age with diabetes.[1]
	  ▪ Start a high-intensity statin in patients 40 to 75 years of age with diabetes and additional CV risk factors to reduce LDL by ≥50% with an LDL target of <70 mg/dL.[1]
	  ▪ In patients >75 years of age with diabetes, starting a statin (moderate-intensity) can be reasonable after a risk/benefit discussion.[1]
	  ▪ In adults 20 to 39 years of age with additional CV risk factors, a statin may be reasonable.[1]
	  ○ **AHA/ACC**[7]
	  ▪ Start a moderate-intensity statin for adults 40 to 75 years of age with diabetes and an LDL ≥70 mg/dL. Consider a high-intensity statin based on CV risk.
	  ▪ In patients >75 years of age with diabetes, starting a statin moderate-intensity statin can be reasonable after a risk/benefit discussion.
	  ▪ In adults 20 to 39 years of age with diabetes that is longstanding (≥10 years for type 2 or ≥20 years for type 1), albuminuria (≥30 mcg/mg creatinine), eGFR <60 mL/min/1.73 m^2, ABI <0.9, retinopathy, or neuropathy, starting a statin may be reasonable.
	  ○ **CCS**[8]
	  ▪ Statins are indicated for diabetes and age ≥40 years, or diabetes ≥15 years' duration and age ≥30 years, or diabetes with microvascular disease.
	• **Secondary Prevention**
	  ○ A high-intensity statin is indicated for secondary prevention in patients with diabetes and ASCVD.[1,7,8]
	  ▪ ADA guidelines recommend an LDL reduction of ≥50% with an LDL target of <55 mg/dL (based on IMPROVE-IT and FOURIER), with the addition of an ezetimibe or PCSK9 inhibitor if needed to reach goal.[1,26,27]
	• For more information on individualized statin dosing (e.g., based on CV risk, kidney/liver function, age, ancestry), statin dose comparisons, monitoring, side effects, LDL goals, and the role of non-statins, see our FAQs, *Cholesterol Guidelines (United States)* or *Canadian Dyslipidemia Recommendations*.

Meet an appropriate **blood pressure goal**.	• Initiate meds at ≥130/80 mm Hg (ACC/AHA, Hypertension Canada), or ≥140/90 mm Hg (JNC8, Int Soc HTN).[9-12] • Goal BP: <130/80 mm Hg (ADA: if it can be achieved safely).[1,2,9,11,12] JNC8 goal is <140/90 mm Hg, but these are older guidelines based on older studies.[10] • Pharmacotherapy should generally include an antihypertensive shown to reduce CV events in patients with diabetes: ACEI or ARB (especially with kidney disease or high CV risk), thiazide diuretic (preferably chlorthalidone or indapamide), or dihydropyridine calcium channel blocker.[2,10-12] ○ For details from each guideline, see our FAQ, *Treatment of Hypertension*.

Goal	Suggested Strategies or Resources

Choose safe and effective treatment for patients with concomitant **heart failure.**	• **Recommended (beneficial effect in HF)**
	  ○ SGLT2 inhibitors: dapagliflozin and empagliflozin have been shown to reduce HF hospitalization and CV death in patients with HF*r*EF or HF*p*EF.[1]
	  ▪ Do not start an SGLT2 inhibitor in severe kidney insufficiency. See our chart, *Target Doses of Medications for Heart Failure* for details.
	  ○ For information on other recommended heart failure meds (e.g., ARB, beta-blocker, aldosterone antagonist), see our chart, *Target Doses of Medications for Heart Failure*.
	• **May use (neutral effect in HF)**: metformin, sulfonylurea, insulin, GLP-1 agonists, DPP-4 inhibitors (also see AVOID, below).[1]
	• **AVOID**:
	  ○ saxagliptin, alogliptin (associated with HF hospitalization).[1,13]
	  ○ pioglitazone.[13]

Start **low-dose aspirin** if appropriate.	• **Secondary prevention**: use low-dose aspirin (e.g., 81 mg/day) in diabetes patients for **secondary prevention** in patients with a history of ASCVD.[1,2] • **Primary prevention**: routine use is not recommended.[2] Low dose aspirin (e.g., 81 mg/day) can be considered in patients with increased CV risk, after a thorough discussion with the patient on risks and benefits.[1] ○ Get more information on the evidence regarding low-dose aspirin benefits and risks from our chart, *Aspirin for CV Primary Prevention and More*.

Make sure patients are up to date on **vaccines**.	• People with diabetes should receive routine age-appropriate immunizations per the latest immunization schedules (e.g., CDC, National Advisory Committee on Immunization).[1,2]
	• Especially encourage immunization of adults for influenza, pneumonia, zoster, hepatitis B, human papilloma virus (ADA), tetanus/diphtheria/pertussis (ADA).[1,2]
	• For more information, see our resources on vaccinations:
	  ○ *COVID-19 Vaccines*.
	  ○ *Communicating About COVID-19 Vaccination.*
	  ○ *Flu Vaccines*.
	  ○ *Pneumococcal Vaccination in Adults.*
	  ○ *Shingles Vaccine.*
	  ○ *Hepatitis B Vaccination in Adults.*
	  ○ *HPV Vaccination*.

Goal	Suggested Strategies or Resources
Ensure patients stay on appropriate medications through **transitions of care**.	• Use our *Transitions of Care Checklist* at admission, at transfer between units at the same facility, and at the patient's first post-admission outpatient visit to keep patients on track with their medications in and out of the hospital. • Tools to improve medication reconciliation are available from: o Society for Hospital Medicine: https://www.hospitalmedicine.org/clinical-topics/medication-reconciliation/. o Agency for Healthcare Research and Quality: https://www.ahrq.gov/patient-safety/settings/hospital/match/index.html. • Pharmacy technicians can learn to assist patients with med lists using our technician tutorial, *Mastering Medication Lists and Histories*.
Help improve **medication adherence**.	• Individualize medication regimens and educate patients with diabetes to help them adhere. • See our resources on improving adherence: o *Medication Adherence Strategies*. o *Guide for Helping Patients Afford Their Medications*. • When patients are part of the decision-making process, they are more likely to be adherent. Most conditions have several reasonable treatment options, each carrying a different balance of risks and benefits. In these situations, "shared decision making," which involves providing balanced information on the benefits and risk of each option, can be used.[14] o An online diabetes decision aid to use with your patients is available from the Mayo Clinic at https://diabetesdecisionaid.mayoclinic.org. • Educate patients about managing their diabetes meds on sick days. o A patient handout on Managing Sick Days is available from the CDC at: https://www.cdc.gov/diabetes/managing/flu-sick-days.html.
Prevent and manage **diabetes complications**.	• See our resources: o *Pharmacotherapy of Neuropathic Pain*. o *Foot Infections in Patients with Diabetes*. o *Diabetes Medications: Cardiovascular and Kidney Impact*. It includes kidney outcomes data for medications used to treat type 2 diabetes, and reviews other strategies to reduce kidney risk (e.g., ACEI or ARB, finerenone).
Use **self-monitoring of blood glucose** appropriately. *Continued…*	• Self-glucose monitoring is probably of limited use for most patients not using insulin.[1] o Self-glucose monitoring can be useful for patients with problems with hypoglycemia; during illness; if weight fluctuates; when control is poor; if there are questions about the reliability of A1c values; or if the results can be used to adjust therapy, to see the impact of new medications, or to understand how diet and exercise affect glucose levels.[1,2,15] • Self-glucose monitoring is generally indicated for patients using insulin.[1,2] o Individualize timing and frequency.[2] o ADA: timing and frequency should be individualized based on needs and goals.[1]

Goal	Suggested Strategies or Resources
Self-monitoring of blood glucose, continued	○ DC: for once-daily insulin, check at least once daily (at variable times); if insulin is used more than once daily, check at least three times daily (pre- and postprandial).[2] • Individualize choice of glucose self-monitoring device based on patient preferences, patient/caregiver abilities, and therapeutic needs.[1] • Ensure that the patient/caregiver knows how to use the device.[1] • For patients using insulin, consider a CGM device.[1,2] ○ Patients using a CGM device should also have a device for measuring fingersticks.[1] ○ For more information on CGM devices, see our FAQ, *Continuous Glucose Monitoring*.
Address **diet, exercise, and other lifestyle changes**.	• Consider weight loss of at least 5% to 15% (ADA) depending on weight, safety, and feasibility, to reduce A1c and CV risk, using:.[1] ○ healthy eating with caloric deficit. ○ physical activity. ○ medications (e.g., GLP-1 agonists, SGLT2 inhibitors). ○ bariatric surgery. • Physical activity: ○ Recommend at least 150 minutes of moderate to vigorous aerobic activity per week, with no more than two rest days.[1,2] For more fit adults, 75 minutes/week of vigorous activity or interval training may be enough.[1] ○ Two to three sessions of resistance training per week on nonconsecutive days is recommended.[1,2] • Nutrition ○ Recommend healthy fats such as nuts, seeds, olive oil, and fatty fish.[1,2] ○ Carbohydrate sources should be high in fiber, minimally processed, with minimal added sugar (e.g., fruits, whole grains).[1] ○ Limit sodium to <2,300 mg/day (ADA).[1] ○ A Mediterranean eating pattern (i.e., fruits, nonstarchy vegetables, whole grains, legumes, nuts, seeds, olive oil, fish, poultry) is an example of a healthy eating pattern.[1,2] • Advise smoking cessation.[1,2] • Screen for sleep disorders, and refer if appropriate (ADA).[1] • Diabetes is best managed with diabetes self-management education and support services.[1,2] To find an accredited diabetes education program, go to https://www.diabeteseducator.org/living-with-diabetes/find-an-education-program (US). • Referral to a registered dietitian, if possible.[1,2] To find a registered dietitian, go to https://www.eatright.org/find-a-nutrition-expert. • For more information on beneficial lifestyle changes for patients with diabetes, see our resources: ○ *Weight Loss Products*. ○ *E-Cigarettes and Vaping*.

Goal	Suggested Strategies or Resources
Help schedule **screenings** as appropriate.	• Encourage adults with type 2 diabetes to schedule eye exams at least every two years (or at least every year if there is evidence of retinopathy), get screened for nephropathy annually, get screened for neuropathy annually, and get comprehensive foot exams at least annually.[1,2]

Managing Diabetes Drugs When Fasting

The chart below suggests approaches for management of diabetes medications around religious fasts, dietary fasts, or short medical procedures. **Individualize** decisions.[19] Most recommendations are based on expert opinion; medication mechanism of action and duration of effect; and purpose and duration of fast. For surgical fasts, see our chart, *Perioperative Management of Diabetes.* For colonoscopy, see our chart, *Managing Chronic Meds in Patients Undergoing Colonoscopy*. See **footnote e** for patients who should consider opting out of nonessential fasting.

Drug	Short Procedures/Lab Tests[a]	Intermittent Fast (~16 to 24 hours)[b]	Ramadan Fast[c,d]
Alpha-glucosidase inhibitors (e.g., acarbose, miglitol)	• Skip unless eating a carbohydrate-containing meal.[16,20,21]		
DPP-4 inhibitor (e.g., sitagliptin)	• Take as usual day/evening before if eating. Do not take day of procedure.[20] • Some experts suggest a 24-hour washout between last dose and start of fast.[21]	• Continue or skip on fasting day.[16]	• Take as usual.[17]
GLP-1 agonist	• Take as usual day/evening before if eating. Do not take day of procedure.[20] • Some experts suggest a 24-hour washout between last dose of liraglutide and start of fast.[21]	• Once weekly product: continue (not practical to hold).[16] • Exenatide (*Byetta*), lixisenatide, semaglutide (oral): skip unless eating (likely no benefit of taking).[3,16] • Liraglutide: continue.[16]	• Take as usual.[17]

Drug	Short Procedures/Lab Tests[a]	Intermittent Fast (~16 to 24 hours)[b]	Ramadan Fast[c,d]
Insulin, basal (see **footnote f**)	**Procedures** • **Type 2**: on the day before the procedure, take one-half to two-thirds of the usual dose.[20,23] On the morning of the procedure, hold, or take one-half to two-thirds of the usual dose.[20,23] • **Type 1**: on the day before the procedure, take 50% to 80% of the usual dose.[20] On the morning of the procedure, take 50% to 80% of the usual dose.[20] **Lab test**: reduce evening dose and hold until after fast.[22]	• Experts suggest, on the day of the fast, take one-half to two-thirds of the usual dose. • Daytime only fast (16-hour): consider reducing the usual dose by ~20% (starting the night before, if applicable).[19]	• Once daily basal: take with Iftar (evening meal). Consider 15% to 30% dose reduction.[17,18] • Twice-daily basal: take usual morning dose at Iftar (evening meal), and take 50% of usual evening dose at Suhoor (predawn meal).[17] • Consider stopping or reducing dose if used with a sulfonylurea, pioglitazone, or DPP-4 inhibitor.[17]
Insulin, mealtime	• Skip unless eating solid food.[20,22,23] • For high blood sugars, can take half of usual "correction dose."[23]	• Skip unless eating a carbohydrate-containing meal.[16] Adjust dose based on carbohydrate content of meal.[16]	• Take usual morning dose with Iftar (evening meal), and 50% to 75% of the usual evening dose with Suhoor (predawn meal).[17,18] Skip lunchtime dose.[17]
Insulin, premix	• As for basal insulin.[20]	• See mealtime insulin.[16]	• Consider switching to a basal insulin to reduce hypoglycemia risk.[17] • Otherwise, take usual morning dose with Iftar (evening meal), and 50% of the usual evening dose with Suhoor (predawn meal). Skip lunchtime dose.[17]
Insulin pump	• Insulin pump: when fast begins, **reduce** basal rate **by** 20% to 50%.[20,21] Others suggest using 65% of usual dose.[23]	• Insulin pump: reduce basal rate by 10%, with further adjustments based on glucose monitoring every two hours until stable.[16]	• Insulin pump: reduce basal dose by 20% to 40% in the last three to four hours of fasting, then increase after Iftar (evening meal).[18] • Insulin pump: bolus dosing as per usual.[18]

Drug	Short Procedures/Lab Tests[a]	Intermittent Fast (~16 to 24 hours)[b]	Ramadan Fast[c,d]
Meglitinide (e.g., repaglinide, nateglinide)	• Skip unless eating a carbohydrate-containing meal.[16,21]		
Metformin	• Skip unless eating a meal (i.e., take with food).[20,21] Note: consult institutional guidelines regarding procedures that use dye.	• Skip unless eating a meal (i.e., take with food).[21]	• Once daily dosing: take usual dose at Iftar (evening meal).[17] • BID dosing: take usual dose at Iftar (evening meal) and Suhoor (predawn meal).[17] • TID dosing: Take usual morning dose at Suhoor (predawn meal).[17] Combine usual lunch and dinner dose and take at Iftar (evening meal).[17]
Pioglitazone	• Skip unless eating a meal.[20,21,23]	• Take as usual.[16,19]	• Take as usual.[17]
SGLT2 inhibitor (e.g., dapagliflozin)	• Skip starting the morning prior to the fast day.[21] • Some experts hold for two days prior, especially if dehydration could occur. • Note that US labeling says hold at least three days before **surgery** (ertugliflozin four days) but does not address shorter procedures.[24]	• Skip starting the morning prior to the fast day.[21] • Some experts hold for two days prior, depending on the duration of the fast, and if dehydration could occur.	• If continued, advise fluid intake, and take with Iftar (evening meal).[17]
Sulfonylurea[g]	• **Procedure**: last dose 24 to 36 hours prior to onset of fasting.[21] • **Lab test**: reduce or omit evening dose. Hold until after fast.[22]	• Last dose 24 to 36 hours prior to onset of fasting.[21] • For a partial-day fast (e.g., one meal consumed part-way through fasting day), the safest option is to skip that day's dose. Half the usual dose could be given if the patient is educated on hypoglycemia.[16]	• Once daily dosing: take usual dose at Iftar (evening meal).[17] • BID dosing: take usual dose at Iftar (evening meal) and 50% of usual dose at Suhoor (predawn meal).[17]

a. Most blood tests do not require fasting, but uninformed patients might fast unnecessarily unless instructed otherwise.[25] Except for insulin, sulfonylureas, and meglitinides, the risk of hypoglycemia when fasting is low.[16] **If fasting is necessary**, advise more frequent glucose checks until eating, and suggest that they get a ride to get their labs drawn.[22,25]
b. **Intermittent fasting** includes fasting as part of a diet plan, or daytime or sundown to sundown religious fasts, such as for certain Jewish holidays.[19] Ramadan fasting is a type of intermittent fast,[17] but Ramadan information is presented here separately.
c. Try to obtain stable doses before Ramadan.[17] Consider loosening glycemic target to reduce hypoglycemic risk.[17]
d. Iftar is the meal after sunset (usually the larger meal). Suhoor is the meal before sunrise.[17,18]
e. People with diabetes who should typically **not** participate in religious fasts or fasting diets include: pregnant and lactating patients; young children; elderly with frailty, advanced age, or dementia; immunosuppressed patients; patients with a history of head trauma or cognitive defects; severe hypoglycemia, ketoacidosis, or hyperosmolar hyperglycemic state within the previous three months; recurrent hypoglycemia or hypoglycemic unawareness; severe hyperglycemia (e.g., A1c >10% or premeal glucose >300 mg/dL [>16.7 mmol/L]); dialysis patients; patients who are acutely ill; and patients who engage in hard manual labor.[16,17]
f. **Basal insulin**: Individualize based on patient's fasting glucose, hypoglycemia risk, and insulin duration of action.[16] (For example, some experts suggest stopping *Tresiba* [insulin degludec] a day before the fast because it can last almost two days.) During the fast, recommend patients on insulin check their blood sugar in the morning, then at least every four to six hours,[19] up to every two hours depending on hypoglycemia risk. Consider CGM for patients who do intermittent fasting on a regular basis (e.g., to lose weight).[16] Ensure patient knows what to do in the event of hyper- or hypoglycemia.[16] Advise breaking a nonessential fast for glucose <70 mg/dL (<3.9 mmol/L), hypoglycemia symptoms, glucose >300 mg/dL (>16.7 mmol/L), dehydration, or acute illness.[17]
g. For patients on a sulfonylurea, consider checking glucose every four to six hours.

Abbreviations: ABI = ankle-brachial index; ACC = American College of Cardiology; ACEI = angiotensin-converting enzyme inhibitor; ADA = American Diabetes Association; AHA = American Heart Association; ARB = angiotensin receptor blocker; ASCVD = atherosclerotic cardiovascular disease; CCS = Canadian Cardiovascular Society; CDC= Centers for Disease Control; CGM = continuous glucose monitoring; CKD = chronic kidney disease; CV = cardiovascular; DC = Diabetes Canada; eGFR = estimated glomerular filtration rate; GLP-1 = glucagon-like peptide 1; Int Soc HTN = International Society of Hypertension; JNC8 = Eighth Joint National Committee; LDL = low-density lipoprotein; MACE = major adverse cardiovascular events; NASH = nonalcoholic steatohepatitis; PCSK9 = proprotein convertase subtilisin/kexin type 9; SGLT2 = sodium-glucose cotransporter 2.

References

1. ElSayed NA, Aleppo G, Aroda VR, et al. Standards of Care in Diabetes-2023. Diabetes Care. 2023 Jan 1;46(Suppl 1):S1-S291.
2. Diabetes Canada. Full guidelines. https://guidelines.diabetes.ca/cpg. (Accessed January 6, 2023).
3. Clinical Pharmacology powered by ClinicalKey. Tampa (FL): Elsevier. 2023. http://www.clinicalkey.com. (Accessed January 4, 2023).
4. Clinical Resource, Drugs for Type 2 Diabetes (United States). Pharmacist's Letter/Pharmacist's Letter. July 2022. [380701].
5. Clinical Resource, Diabetes Medications: Cardiovascular and Kidney Impact. Pharmacist's Letter/Pharmacist's Letter. September 2022. [380920].
6. Canadian Diabetes Association Clinical Practice Guidelines Expert Committee; Harper W, Clement M, et al. Pharmacologic management of type 2 diabetes. Can J Diabetes. 2013 Apr;37 Suppl 1:S61-8.
7. Grundy SM, Stone NJ, Bailey AL, et al. 2018 AHA/ACC/AACVPR/AAPA/ABC/ACPM/ADA/AGS/APhA/ASPC/NLA/PCNA Guideline on the Management of Blood Cholesterol: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. J Am Coll Cardiol. 2019 Jun 25;73(24):e285-e350. Erratum in: J Am Coll Cardiol. 2019 Jun 25;73(24):3237-3241.
8. Pearson GJ, Thanassoulis G, Anderson TJ, et al. 2021 Canadian Cardiovascular Society Guidelines for the Management of Dyslipidemia for the Prevention of Cardiovascular Disease in Adults. Can J Cardiol. 2021 Aug;37(8):1129-1150.
9. Whelton PK, Carey RM, Aronow WS, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Hypertension. 2018 Jun;71(6):e13-e115. Erratum in: Hypertension. 2018 Jun;71(6):e140-e144.
10. James PA, Oparil S, Carter BL, et al. 2014 evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the Eighth Joint National Committee (JNC 8). JAMA. 2014 Feb 5;311(5):507-20. Erratum in: JAMA. 2014 May 7;311(17):1809.
11. Rabi DM, McBrien KA, Sapir-Pichhadze R, et al. Hypertension Canada's 2020 Comprehensive Guidelines for the Prevention, Diagnosis, Risk Assessment, and Treatment of Hypertension in Adults and Children. Can J Cardiol. 2020 May;36(5):596-624.
12. Unger T, Borghi C, Charchar F, et al. 2020 International Society of Hypertension Global Hypertension Practice Guidelines. Hypertension. 2020 Jun;75(6):1334-1357.
13. Heidenreich PA, Bozkurt B, Aguilar D, et al. 2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. J Am Coll Cardiol. 2022 May 3;79(17):e263-e421.
14. Clinical Resource, Medication Adherence Strategies. Pharmacist's Letter/Prescriber's Letter. August 2022. [380822].
15. Choosing Wisely. Endocrine Society. Updated June 3, 2023. http://www.choosingwisely.org/societies/endocrine-society/. (Accessed January 7, 2023).
16. Grajower MM, Horne BD. Clinical Management of Intermittent Fasting in Patients with Diabetes Mellitus. Nutrients. 2019 Apr 18;11(4):873.
17. Ibrahim M, Davies MJ, Ahmad E, et al. Recommendations for management of diabetes during Ramadan: update 2020, applying the principles of the ADA/EASD consensus. BMJ Open Diabetes Res Care. 2020 May;8(1):e001248.
18. Hassanein M, Afandi B, Ahmedani MY et al. Diabetes and Ramadan: Practical guidelines 2021. Diabetes Res Clin Pract. 2022 Mar;185:109185.
19. Grajower MM. Management of diabetes mellitus on Yom Kippur and other Jewish fast days. Endocr Pract. 2008 Apr;14(3):305-11.
20. Hochberg I, Segol O, Shental R, et al. Antihyperglycemic therapy during colonoscopy preparation: A review and suggestions for practical recommendations. United European Gastroenterol J. 2019 Jul;7(6):735-740.
21. Grajower MM. 24-Hour Fasting with Diabetes: guide to physicians advising patients on medication adjustments prior to religious observances (or outpatient surgical procedures). Diabetes Metab Res Rev. 2011 Jul;27(5):413-8. Erratum in: Diabetes Metab Res Rev. 2015 Oct;31(7):771-2.
22. Aldasouqi S, Sheikh A, Klosterman P, et al. Hypoglycemia in patients with diabetes on antidiabetic medications who fast for laboratory tests. Diabetes Care. 2011 May;34(5):e52. Erratum in: Diabetes Care. 2011 Aug;34(8):1887.
23. UMass Memorial Health. Diabetes Center of Excellence. Diabetes medication adjustment guidelines before short procedures. https://www.umassmed.edu/globalassets/diabetes-center-of-excellence-dcoe/images/management-and-care/surgery-proceduce-medication_adjustment-12-21.pdf. (Accessed January 7, 2023).
24. FDA. FDA Drug Safety Communication. FDA revised labels of SGLT2 inhibitors for diabetes to include warnings about too much acid in the blood and serious urinary tract infections. Revised March 15, 2022. https://www.fda.gov/drugs/drug-safety-and-availability/fda-revises-labels-sglt2-inhibitors-diabetes-include-warnings-about-too-much-acid-blood-and-serious. (Accessed January 7, 2023).
25. Aldasouqi S, Mora S, Bhalla G, et al. Fasting-Evoked En Route Hypoglycemia in Diabetes (FEEHD): An

Overlooked Form of Hypoglycemia in Clinical Practice. Int J Endocrinol. 2018 Oct 24;2018:1528437.
26. Cannon CP, Blazing MA, Giugliano RP, et al. Ezetimibe Added to Statin Therapy after Acute Coronary Syndromes. N Engl J Med. 2015 Jun 18;372(25):2387-97.
27. Sabatine MS, Giugliano RP, Keech AC, et al. Evolocumab and Clinical Outcomes in Patients with Cardiovascular Disease. N Engl J Med. 2017 May 4;376(18):1713-1722.
28. Das SR, Everett BM, Birtcher KK, et al. Expert Consensus Decision Pathway on Novel Therapies for Cardiovascular Risk Reduction in Patients With Type 2 Diabetes: A Report of the American College of Cardiology Solution Set Oversight Committee. J Am Coll Cardiol. 2020 Sep 1;76(9):1117-1145.
29. EMPA-KIDNEY Collaborative Group; Herrington WG, Staplin N, et al. Empagliflozin in Patients with Chronic Kidney Disease. N Engl J Med. 2023 Jan 12;388(2):117-127.

Cite this document as follows: **Clinical Resource,** ***Improving Diabetes Outcomes. Pharmacist's Letter/Pharmacy Technician's Letter/Prescriber's Letter.*** **February 2023. [390207]**