



Patient Care During Ramadan: A Narrative Review

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Abstract

Ramadan is the Islamic holy month when Muslims around the world fast from dawn to sunset. This 30-day pattern of intermittent diurnal fasting can have a significant physiologic impact on the body. Importantly, oral intake is forbidden during this time, and many patients do not wish to take medications. From a clinical perspective, this potentially impacts healthcare delivery and chronic disease states. Despite these important changes, awareness of individual patient practices remains limited among healthcare providers in North America, which may worsen health disparities in Muslim patients. A fundamental understanding of the cultural and physiological implications of fasting during Ramadan can improve cultural competence and patient outcomes. In this paper, we review the physiologic changes during fasting, medical exemptions to fasting, and special considerations for the care of Muslim patients with chronic conditions who may fast during Ramadan.

Keywords

Ramadan, fasting, primary care, Physiology, Muslim

Introduction

Approximately 1.5 billion Muslims worldwide fast during the month of Ramadan every year because it is considered one of the 5 pillars of the Islamic faith. From a spiritual and cultural perspective, many Muslim patients have a fundamental need to engage in this religious practice.¹ The month of Ramadan occurs in the ninth month of the Islamic calendar. Since this is a lunar calendar, the timing of the holiday varies according to the seasons and geographical locations. The duration is 29 to 30 days, followed by a celebratory holiday called *Eid Al Fitr*. This intermittent diurnal fasting pattern occurs with a ceremonial meal before sunrise (*Suhur*) and a formal fast-breaking (*Iftar*) at sunset. Nothing by mouth is allowed in this interval period, including food, fluids, water, smoking, engaging in intercourse, and potentially medications. It is important to note that there will be variances in practice based on country of origin, ethnicity, subset of faith, and between individuals.

Cross-cultural competence and communication between physicians, healthcare providers, and patients become crucial to promote the safe observance of Ramadan. This is particularly true in countries where Muslims represent a minority of the population, and where there is a strong likelihood that many Muslim patients will encounter physicians of a different cultural

background. Survey data of North American primary care physicians demonstrate a lack of comfort and knowledge when medically counseling Muslim patients about Ramadan fasting. Despite the fact that there are data that demonstrate increases in adverse events during the month of Ramadan, many patients are not asked about their fasting habits at their primary care visits, which may limit cross-cultural competence and create disparities in care.² Additionally, many Muslim patients belong to subpopulations predisposed to healthcare disparities, which may further worsen healthcare outcomes.³

Increasing a fundamental comprehension of the spiritual and medical implications of fasting during Ramadan will improve physicians' and other healthcare providers' ability to provide safe, effective care to patients during this month. Partnering with these patients by demonstrating openness to learn about their religious practices and allowable acceptances will

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Submitted May 13, 2024. Revised June 5, 2024. Accepted June 15, 2024.

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facilitate shared decision-making. For example, there are many situations where fasting is excused within religious practice. Pregnant and breastfeeding adults, as well as small children, are excused. If fasting in any way can cause harm to the patient, they are exempt according to religious scripture.⁴ Yet, many patients opt to observe Ramadan fasting regardless of this fact.^{2,4} Communicating an understanding of the aspect of religious practice that allows for exceptions can help build partnerships toward safe patient care. In addition, patients will often not take oral medications during fasting; this can also extend to injections and topical medications.⁵ This presents an opportunity to discuss changes in medication doses or administration schedules to reduce the likelihood of adverse events.⁴ This narrative review aims to create a more comprehensive framework for primary care physicians to facilitate patient care during Ramadan than exists in previous literature. The target group is physicians who practice in Western countries, where there is a demonstrated knowledge gap in caring for Muslim patients during Ramadan.^{3,6}

Physiologic Changes During Fasting

The physiologic implications of diurnal, intermittent fasting are varied.⁷ Animal models have shown trends toward a reduction in inflammation as well as cancer prevention, and small human studies have shown lower levels of pro-inflammatory cytokines and circulating leukocytes during Ramadan than at baseline.^{7,8} At the cellular level, trends suggest a modulation of innate immunity but were not statistically significant.⁸ Taken together, these changes may suggest that fasting patterns in Ramadan may affect disease activity in patients with autoinflammatory conditions.

During Ramadan, there is a shift toward gluconeogenesis and glycogenolysis.⁹ After Ramadan, favorable decreases in leptin, glucagon-like peptide-1 (GLP-1), and ghrelin are seen. Increased leptin in nonfasting individuals promotes satiety, but lower levels in fasting subjects facilitate gluconeogenesis, which could mitigate hypoglycemia. The leptin and adiponectin ratio may represent a risk for metabolic syndrome. Decreases in GLP-1 and the improved leptin/adiponectin ratio in time-restricted fasting favor decreased insulin resistance.^{9,10} These markers are also affected by circadian rhythm, which changes during Ramadan fasting.⁹ Low-density lipoprotein, triglycerides, insulin, CRP levels, and endothelial function demonstrate improvement in studies comparing periods before and during Ramadan.^{11,12} Overall, there does not appear to be any evidence supporting negative metabolic consequences in healthy patients, but trends toward favorable changes.⁹ Analysis of the gut microbiome shows an increase in favorable organisms in pre- and post-Ramadan fecal analysis. These findings may positively affect the risk of obesity and gastrointestinal symptoms if sustained.¹⁰

Statistically significant increases in blood pressure in the periods soon after fast-breaking is documented.¹³ Generally, individuals have heavier meals than usual during this time, which could contribute to temporal rises in blood pressure.

Other studies have shown favorable reductions in blood pressure for the month.^{13,14} During the month, there are changes in circadian rhythm, fluid intake, and diurnal variations of blood glucose. Those engaged in regular physical activity may notice decreased exercise tolerance due to daytime sleepiness, blood glucose fluctuations, and volume depletion.¹⁵ Weight loss does occur in Ramadan; however, the changes are typically temporary and often related to loss of water associated with glycogen rather than significant body fat or protein loss.^{15,16}

Emergent Care and Medical Exemptions

One of the core tenets of fasting during Ramadan is to prevent self-harm. As such, there are several situations in which individuals are exempt from fasting. Any illness or medical emergency is an allowable excuse to omit fasting. Other allowable acceptances include children, pregnancy, breastfeeding, and traveling.^{2,3} Bleeding is considered an event that invalidates a fast; as such, menstruating patients abstain from fasting. For this reason, many patients will avoid phlebotomy for lab draws during fasting hours. However, blood drawn for medical and research purposes is exempted. Notably, there are religious means to make amends for missed days of fasting. These include days after Ramadan, where fasting can occur, and alms can be donated to charity through a local mosque. Studies from Muslim predominant countries demonstrate decreased or neutral emergency room utilization during Ramadan.¹⁷ What is unclear is the impact of people avoiding health care to maintain fasting on emergency room visit numbers. This trend holds for diabetic and cardiac emergencies across different countries.¹⁸

Pre-Ramadan Assessment

Hassanenein et al indicate the need for pre-Ramadan education and assessment for patient's planning to fast with diabetes.¹⁹ We recommend extrapolating those recommendations to all patients. A visit should be scheduled with the patient before the onset of Ramadan. Some studies suggested an appointment 6 to 8 weeks prior but the individual practitioner would best determine this based on their patients.¹⁹⁻²¹ The framework of this visit will start with assessing whether the patient plans to fast and their beliefs around what would constitute the breaking of a fast. Discussing religious exemption for fasting and medical emergencies is integral. General recommendations while fasting include decreasing physical activity, 1 to 2 L of fluid intake in nonfasting hours, using daily, combined, or sustained release medications when possible, and adjust inhaled medications to nonfasting hour dosing. Ultimately, a discussion on risk stratification based on comorbidities should conclude the visit. The text below will review this in the context of specific disease states. If the patient chooses to fast despite physician reservations, consider 1 to 2 week trial or interval visits during the month for monitoring (Table 1).^{19,22}

Table 1. Summary of General Recommendations for Ramadan Fasting.

- Conduct a pre-Ramadan visit to assess beliefs and plans
- Decrease strenuous physical activity
- A minimum of 1-2 L of fluid intake in nonfasting hours
- Change medications to daily, combined, or sustained-release formulae is where possible
- Caution with SGLT-2 inhibitors and diuretics as new therapies prior to Ramadan
- Evaluate for vitamin and micronutrient deficiencies in the appropriate patients
- Encourage smoking cessation
- Adjust timing of maintenance inhalers to nonfasting hours
- For high-risk patients who choose to fast, consider scheduling interval visits for check-ins

Abbreviations: CGM, continuous glucose monitor; SGLT-2, sodium-glucose cotransporter-2.

Thyroid Disease

Most patients with thyroid disease are able to fast without any difficulty. For hypothyroidism, levothyroxine should be dosed on an empty stomach 30 min before any other medications or food ingestion. The timing of this dose can be adjusted before mealtime consumption based on the patient's preference, such as in the evening 30 min before Iftar (breaking the fast). A study on post-thyroidectomy patients indicated that dosing after sunset (pre-Iftar) demonstrated the most stable thyroid function tests.²³ There may be variances in TSH levels, but often, T4 levels are within normal limits.²⁴ This is thought to be due to dietary changes and inconsistent adherence to levothyroxine during Ramadan. Some small studies have suggested increasing levothyroxine by 25 to 50 µg per day at the beginning of Ramadan and continuing for 2 to 3 weeks after to prevent fluctuations.²⁴

Thyrotoxicosis is considered an emergency and would meet exemption criteria. Otherwise, mild hyperthyroidism is safe to treat during Ramadan. If possible, methimazole is more easily dosed, while propylthiouracil is not recommended, given required dosing every 4 to 6 h.²⁵

Pulmonary Disease

Many patients believe Ramadan is about building healthy spiritual and lifestyle habits. Continuing those habits after the month has concluded is a common goal. Consequently, Ramadan is a prime opportunity to discuss long-term smoking cessation with patients. Tobacco use, in all forms, including cigarette smoking, is prohibited during fasting for Muslim patients. Consequently, patients decrease their number of cigarettes during this month. The introduction of daily doses of bupropion or varenicline is an effective strategy to use in this population that is already reducing tobacco consumption.²⁶

Religious practices around inhaled medications during Ramadan are varied. Since the medication is not ingested in

the gastrointestinal tract, some consider these medications not prohibitive. Others argue that anything passing the oropharynx would constitute breaking fast. Nonetheless, adjusting the timing of maintenance inhalers is typically not cumbersome. Fasting patients do not find asthma or chronic obstructive pulmonary disease (COPD) burdensome. Religious fasting does not affect disease severity in patients with COPD or asthma outside of medication nonadherence.²⁷ Pilot studies demonstrate stable inflammatory markers and spirometry while fasting in patients with asthma and COPD.²⁸⁻³⁰

Cardiac Disease

In patients with stable cardiac disease, which includes heart failure, coronary artery disease, atrial fibrillation, and valvular disease, adverse outcomes of fasting are uncommon. There are no contraindications to participating in Ramadan for patients with controlled hypertension, and fasting does not lead to increased emergency room visits or hospitalizations for patients with coronary artery disease or congestive heart failure. Fasting is contraindicated in patients with poorly controlled hypertension or frequent hypertensive emergencies.³¹ Ideally, titration of medication therapies for hypertension should be avoided during Ramadan in fasting patients. However, if new therapies must be started, we would recommend avoiding diuretics prior to religious fasting. Combined therapy and sustained-release medications are preferred, and patients should be counseled on the possibility of increased orthostatic episodes.³¹

Patients who have had acute coronary syndromes, an acute heart failure exacerbation, or cardiac surgery should not fast until they have stable disease for a minimum of 3 months. Percutaneous coronary intervention within 3 months demonstrated a higher incidence of adverse events during Ramadan, as volume depletion can contribute to in-stent thrombosis.³² Administer antiplatelet and lipid-modifying therapy when food is allowed, and antiplatelet agents with longer half-lives, such as clopidogrel are favored over ticagrelor during Ramadan.

Although disruptions in the sleep cycle can lead to increased rates of atrial fibrillation, fasting does not usually increase the risk of atrial fibrillation or other supraventricular tachyarrhythmias. This includes patients with implantable cardiac devices. As a result, patients with stable atrial fibrillation should be able to fast during Ramadan even with anticoagulation.^{31,32}

Fasting is likely low risk for stable heart failure patients with an ejection fraction greater than or equal to 35% with New York Heart Association (NYHA) class I and II. Patients with NYHA functional class III to IV and a 6-min walk test of fewer than 300 m are not candidates for fasting.³² A Pakistani observational study of patients with heart failure with preserved ejection fraction demonstrated improved serological cardiovascular risk profiles, volume status, and decreased rates of atrial fibrillation.³³ In patients with heart failure with reduced ejection fraction, over 90% had improved or neutral NYHA functional classification. Medication nonadherence

was the causative factor in those who experienced exacerbations during Ramadan.³⁴

Religious fasting appears safe for patients with mechanical valves on oral anticoagulation with warfarin.³⁵ There is limited to no data on patients with aortic stenosis, hypertrophic obstructive cardiomyopathy, or severe pulmonary hypertension. We recommend advising against fasting in patients with concomitant systolic blood pressure less than 90 mm Hg. Patients with heart failure transplants should only be permitted to fast if they are compliant with immunosuppressants, have documented therapeutic drug levels, and have preserved renal function. Those with left ventricular assist devices, cyanotic heart disease, and severe valvular disease must not fast.^{32,36}

Gastrointestinal Disease

Patients suffering from gastroesophageal reflux disease may benefit from fasting as studies have indicated reductions in symptoms, even when accounting for change in meal size and tobacco use.^{10,37,38} Studies using upper endoscopy surveillance during Ramadan did not detect any worsening occurrences of gastritis, gastric ulcers, or gastric bleeding though there were increases in rates of duodenal ulcers and duodenitis. Patients with known duodenal disease should take caution with fasting. The rates of acute upper gastrointestinal bleeding increase during Ramadan secondary to peptic ulcer disease, most commonly duodenal ulcers. The use of acid suppression prophylaxis is indicated in inpatients or high risk for peptic ulcer disease. Patients with stable Crohn's disease and ulcerative colitis appear to have no significant flares as a result of fasting during Ramadan. Though some data suggested an increase flares in elderly patients with ulcerative colitis.¹⁰

For patients with metabolic dysfunction-associated steatotic liver disease (MASLD), previously nonalcoholic fatty liver disease, Ramadan fasting can prove helpful. Improvements in blood pressure, lipids, and blood glucose levels are part of the aforementioned physiological effects, which are treatment recommendations for MASLD.³⁹ Unfortunately, some of these effects are mitigated due to the nature of most food consumed after sunset. Well-balanced diets, rich in fruits and vegetables, sustain the positive effects of fasting.⁴⁰

Animal models demonstrated that hepatitis B antigen levels increase with fasting, secondary to increased viral transcription. Transcription enzymes are activated during gluconeogenesis. There are no obvious clinical correlates. Evaluation and monitoring of liver function tests should be instituted for a patient prepared to fast.³⁹

Cirrhosis is a contraindication to fasting. There is evidence of an increased rate of liver decompensation, variceal bleeding, and peptic ulcers during Ramadan. The highest-risk patients were Child-Pugh Class C.^{39,41} When patients with cirrhosis fast, there are statistically significant increases in serum bilirubin, and there may be decreases in ALT, AST, GGT, and ALP. Portal blood flow was increased, likely due to large meals grouped close together during Ramadan. This may be a pathophysiologic mechanism for increased bleeding and worsening

volume status. As fasting is a central spiritual need, shared decision-making can play a role in a subgroup of these patients. Child-Pugh Class A patients without recent complications or other comorbidities can fast with physician clearance and interval monitoring. As stated earlier, diuretic use raises concerns about volume depletion, dehydration, and prerenal injury. Diabetic patients with concomitant cirrhosis should not fast because they have decreased hepatic glycogen stores and thus impaired gluconeogenesis, increasing the risk of hypoglycemia.^{39,41,42} For patients who have undergone liver transplantation, fasting may be safe if they meet the following criteria: 1 year after liver transplantation, normal renal function, and adherence with an immunosuppressive regimen supported by documented stable drug levels.⁴³

Bariatric Surgery

Participating in Ramadan may lead to improved body composition, healthy weight loss, decreased body fat, and remission of hypertension and type 2 diabetes mellitus in bariatric patients, and the majority of patients who have undergone bariatric surgery may fast during Ramadan with some caveats.⁴⁴ A minimum of 6 months' restriction on fasting is recommended after new bariatric procedures, including resolution of any post-operative complications. Ideally, patients who have undergone recent bariatric surgery should have clearance from their surgeon and a nutritionist prior to Ramadan, and evaluations for vitamin and micronutrient deficiencies should be completed before fasting. Consideration should be given to increasing multivitamin supplements during the month, and a minimum of 1 to 2 L fluid intake before sunrise and after sunset is advised to avoid hypovolemia. When breaking fast, limiting high-fat, heavily spiced, and high-carbohydrate foods is paramount to avoid complications such as dumping syndrome and postprandial hypoglycemia. There is no significant evidence that fasting increases the incidence of marginal ulceration, GERD, or gastritis.

Diabetes Mellitus

Diabetes would fall in the category of allowable acceptances to excuse the patient from fasting. Despite this, the many Muslim patients with diabetes will fast.^{21,45} As such, the physician's goal should not be to prohibit fasting for these patients but to guide them on how to do it safely. Risk stratification using national or international diabetic guidelines is a reasonable step to decide which patients should be advised against fasting. Complications such as hyperglycemia, hypoglycemia, diabetic ketoacidosis, and severe volume depletion can be life-threatening. Type 1 diabetic patients have a higher risk of these complications. Patients should be instructed to break their fasting and seek urgent care if such complications develop as is allowable under Islamic scripture. Excessive physical activity during fasting should be counseled against to avoid hypoglycemia.²¹ Studies are mixed on the effect of Ramadan on fasting blood glucose and hemoglobin A1c, although the majority

favor decreased values.¹³ The 2021 International Diabetes Federation and Diabetes and Ramadan Practical Guidelines classify patients with type 1 diabetes as high risk. They note fasting can be safely performed with close blood glucose monitoring.^{19,46} In addition to type 1 diabetes status, patients at increased risk include a *c* greater than 7.5, recurrent hypoglycemia, insulin use (particularly multiple injections), diabetic ketoacidosis or hyperglycemic hyperosmolar state in the past 3 to 6 months, concomitant renal disease with GFR less than 60, impaired cognition, and pregnancy.¹⁹ Those with multiple risk factors or advanced comorbid states should consider fasting avoidance.

The most severe risk of hypoglycemia during Ramadan is associated with insulin.¹ However, this does not necessitate insulin avoidance or discontinuation when clinically indicated. Switching from a premixed insulin strategy to a basal and short-acting premeal insulin strategy is favored to ameliorate the risk of hypoglycemia.^{20,21} A 15% to 30% dose reduction is best practice when using daily dosed basal insulin administered during Iftar. Regarding twice daily dosing, the evening dose is administered during Suhur and reduced by 50%. The morning dose (at Iftar) is unchanged. These recommendations hold true for a basal and short-acting premeal strategy with the addition of abstaining from lunchtime doses.²⁰ Alternatively, a 50/50 insulin premix is favored over a 70/30 approach to account for the prolonged absence of caloric intake. Insulin pumps can be used safely during Ramadan and have a reduced risk of hypoglycemia. More frequent monitoring is recommended during fasting. Finger pricks for blood glucose monitoring are not considered a violation of the fast.^{19,21} The use of continuous glucose monitors should be considered during this month if it is not cost-prohibitive for the patient.

Oral diabetic drugs such as metformin are associated with lower hypoglycemic risk and can be continued without adjustment. However, sulfonylureas may require a reduced dose and a change in timing with meals, for example, PM dosing rather than AM dosing. Sodium-glucose cotransporter-2 inhibitors (SGLT-2) carry a significant risk of volume depletion and urinary tract infection.⁴⁷ A study performed in the United Arab Emirates assessing the safety of SGLT-2 inhibitors in patients during Ramadan found that the risk of hypoglycemia was approximately 18% for those using an SGLT-2 inhibitor with another oral hypoglycemic and approximately 38% for those using an SGLT-2 inhibitor with insulin. Severe adverse effects and hospitalization were rare. Interestingly, few participants had adjustments made to their medication dosing prior to Ramadan despite this study being conducted in a majority Muslim country. In the appropriate patients, SGLT-2 inhibitors should be considered safe during fasting; however, this treatment should not be started prior to Ramadan, and their use should be avoided in elderly patients or those with multiple comorbidities.⁴⁷ Caution is advised in those who are also taking insulin, and adjustments to therapy may be warranted. Glucagon-like peptide 1 agonists used during Ramadan are considered safe. A randomized, non-placebo-controlled trial

comparing liraglutide to sulfonylureas during Ramadan demonstrated fewer hypoglycemic episodes.⁴⁸

Renal Disease

One of the key areas of concern during Ramadan is intravascular volume status. Patients will not consume oral fluids for over 10 h in most instances. Hypovolemia and dehydration are known risk factors for acute kidney injury (AKI), nephrolithiasis, and urolithiasis, so stressing adequate water consumption is vital. A systematic literature review demonstrated trends toward no difference in stone formation between fasting and nonfasting populations.⁴⁹ One study from Israel did detect an increased relative risk of renal colic presenting to the emergency department in Muslim patients during the first 2 weeks of Ramadan when compared to non-Muslim populations; however, no other studies have demonstrated this trend.⁵⁰ In average-risk patients, fasting does not increase the risk of AKI.⁵¹ For stable patients with chronic kidney disease (CKD) stages I through III, there is no available evidence that religious fasting will lead to progression. Renal transplant status is not a contraindication to fasting. Studies have not found increased rates of rejection, worsening renal function, or transplant loss secondary to Ramadan fasting.^{52–54}

Conversely, patients with CKD and cardiovascular disease are at increased risk for adverse events during Ramadan. Rising serum creatinine is a harbinger of a cardiovascular event. Frequent monitoring of creatinine can detect those patients who are not suitable to continue fasting.⁵⁵ Prefasting consultation with a nephrologist is appropriate for all CKD and renal transplant patients. Advanced CKD (stages IV–V) and end-stage renal disease are high-risk patients in which experts recommend avoiding fasting. Data on patients who chose to fast reflect the following: Patients on peritoneal dialysis can adjust their regimens to fit their Ramadan schedule. This is only achievable with interval checkups with Nephrology and a prefasting education session in stable patients.⁵⁶ This is also true for hemodialysis patients but not without increased risk of fluid overload and hyperkalemia. Partial participation is more applicable to these patients by refraining from fasting on dialysis days.⁵⁷ Patients with advanced renal disease should avoid high-potassium and phosphorus foods. Notably, this includes dates, a typical food with spiritual significance for fast breaking. Other renal indications that prohibit fasting include acute tubular necrosis, polyuria defined as urine volume greater than 2.5 L per day, diabetes insipidus, and comorbid chronic liver disease.⁵²

Pregnancy

Limited data exist regarding maternal and perinatal outcomes of fasting during pregnancy. A survey of obstetricians led to expert consensus, which recommends against fasting in the second and third trimesters.^{58,59} There is no consensus regarding the first trimester. Two studies indicate that first-trimester fasting is associated with a lower birth weight.⁶⁰ Larger data

Table 2. Recommendations for High-Risk Patients During Ramadan Fasting.

Disease state	Considerations
Thyroid disease	<ul style="list-style-type: none"> Methimazole is preferred over propylthiouracil due to dose frequency in patients with hyperthyroidism.
Cardiac disease	<ul style="list-style-type: none"> Confirm 3 months of disease stability for CAD, CHF, and those with recent hospitalizations or interventions. Clopidogrel is favored as antiplatelet therapy due to its half-life.
Gastrointestinal disease	<ul style="list-style-type: none"> Patients with stable MASLD or hepatitis B/C can participate. History of duodenal ulcers is a contraindication. Cirrhosis is a contraindication unless compensated, without complications or comorbidities, and engaged in frequent monitoring.
Bariatric surgery	<ul style="list-style-type: none"> Optimal fasting conditions are at least 6 months after surgery with no complications. Must be cleared by surgical team
Diabetes mellitus	<ul style="list-style-type: none"> High-risk features: HbA1c > 7.5, type I Diabetes, recent DKA/HHS, GFR < 60, impaired cognition. Increased blood glucose monitoring with fingersticks or CGM. Insulin use results in the highest hypoglycemic risk but should not be avoided if clinically indicated
Renal disease	<ul style="list-style-type: none"> Stable CKD is not a contraindication. Dialysis is a contraindication but offer support to those who choose to fast. Avoid fasting on hemodialysis days. Adjust peritoneal dialysis schedule to outside fasting hours
Pregnancy	<ul style="list-style-type: none"> Generally, fasting should be avoided. For those who fast, interval visits during Ramadan should take place
Transplant	<ul style="list-style-type: none"> Transplant patients with normal renal function and no other significant comorbidities can fast with close observation

Abbreviations: CAD, coronary artery disease; CGM, continuous glucose monitor; CHF, congestive heart failure; CKD, chronic kidney disease; DKA, diabetic ketoacidosis; MASLD, metabolic-associated steatotic liver disease; SGLT-2, sodium-glucose cotransporter-2.

reviews do not suggest that any fasting period will affect birth weight or other neonatal complications.^{22,61} A framework for counseling patients in this setting was published by Shahawy et al. Clinicians must demonstrate cultural and religious awareness, shared decision-making, and support pregnant patients who decide to fast. For those patients who should not fast provide a detailed discussion of risk and supporting medical evidence. Alternatively, offer a short trial of fasting with close monitoring.²² These guidelines can be adapted and generalized to all patients who fast.

Discussion

Of all the months in the Muslim lunar calendar, Ramadan holds the highest spiritual significance. Fasting is crucial to these patients' spirituality and being unable to perform these duties can affect their quality of life. In non-Muslim predominant countries, patients and physicians are both apprehensive about discussing this topic. Limited data are available regarding patient care during Ramadan in Western nations. The existing data demonstrate a knowledge gap in patient care and cultural awareness.^{2,3,6} Particularly in these countries, Muslim patients experience discrimination. Islamophobia has increased and can worsen the well-being of this population. We can promote healthcare equity by better equipping ourselves to help these patients in our roles as clinicians.⁶ Many acute and chronic conditions will preclude fasting, according to physicians. Increasing our familiarity with religious practices and awareness of the available evidence in certain disease states will improve communication. Communication will help bridge cultural barriers

and build trust with patients. Only then can shared decision-making effectively occur. Consolidation of our recommendations for high-risk patients is summarized in Table 2.

Regarding limitations, most literature reviewed for this publication discusses studies with small sample sizes, often observational, and were conducted in Muslim countries. Multiple authors note the difficulty in identifying or eliminating confounding variables. In these countries, fasting is integrated into society, and physicians in the healthcare systems are more attuned to counsel patients. The diurnal fasting period can be 2 to 3 h longer and warmer depending on geographic location.⁶² When extrapolating data, it is essential to consider that the study patient populations may not match local demographics, climate, and lifestyle. There is a clear need for more high-quality medical evidence of the effects of fasting with accompanying chronic diseases. We hope this guide can serve as a framework for clinicians based on available evidence and generate interest in conducting future clinical investigations in this population.

Acknowledgments

The study team would like to thank Drs. Ravindra Ganesh, MBBS, MD, and Ivana Croghan, PhD, for spending a significant amount of time mentoring and guiding this project

Authors' Contribution

All the authors participated in at least one of the following: manuscript concept and design, analysis and interpretation of data, and/or drafting and revising the paper. They have all seen and approved the final version of the manuscript.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The time spent in writing was funded in part by the Mayo Clinic Division of General Internal Medicine in Rochester, MN, 5595, USA.

Data Availability Statement

Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

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