In-patient Care for People with COVID-19 and Diabetes in Myanmar

Aye Aye Aung,1 Ko Ko,2 Khin Saw Than,3 Aung Ko Ko,1 Myo Thet Naing1

1Department of Medicine, University of Medicine, Mandalay, Myanmar
2Department of Endocrinology, University of Medicine 2, Yangon, Myanmar
3Department of Endocrinology, University of Medicine 1, Yangon, Myanmar

Key words: recommendations, in-patient, Myanmar

INTRODUCTION

These recommendations are synthesized from international references coupled with expert advice from endocrinologists and doctors caring for patients with COVID-19, to help guide physicians in Myanmar in managing persons with diabetes who are admitted.

UPON ADMISSION

Blood glucose should be checked in all patients admitted to the hospital. Additionally, blood ketone testing should be done in all patients with diabetes especially those with an initial blood glucose greater than 12 mmol/L (Table 1). COVID-19 disease precipitates atypical presentations of diabetic emergencies such as mixed diabetic ketoacidosis (DKA) and hyperglycemic hyperosmolar state (HHS), and thus, we need to be alert for these conditions. Laboratory criteria for hyperglycemic emergencies are presented in Table 2. Hyperglycemia may also be caused by new onset diabetes, sepsis, missed treatments for diabetes and systemic steroids.1

Table 1. Ketone levels and appropriate steps

<table>
<thead>
<tr>
<th>Blood ketones</th>
<th>Interpretation/recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;0.6 mmol/L</td>
<td>Safe</td>
</tr>
<tr>
<td>1.5 to 2.9 mmol/L</td>
<td>Increased risk for DKAa</td>
</tr>
<tr>
<td>≥3 mmol/L</td>
<td>Check venous blood gas pH and bicarbonate</td>
</tr>
</tbody>
</table>

aDKA, diabetic ketoacidosis
Adapted1

Table 2. Criteria for diagnosis of hyperglycemic emergencies

<table>
<thead>
<tr>
<th>Parameter</th>
<th>DKAa</th>
<th>HHSb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood glucose</td>
<td>≥11 mmol/L</td>
<td>≥30 mmol/L</td>
</tr>
<tr>
<td>Ketones</td>
<td>Blood ≥3 mmol/L</td>
<td>Urine ≥2</td>
</tr>
<tr>
<td>pH</td>
<td>&lt;7.3</td>
<td>&gt;7.3</td>
</tr>
<tr>
<td>Serum bicarbonate</td>
<td>&lt;15 mEq/L</td>
<td></td>
</tr>
<tr>
<td>Serum osmolality</td>
<td></td>
<td>&gt;320 mOsm/kg</td>
</tr>
</tbody>
</table>

aDKA, diabetic ketoacidosis
bHHS, hyperglycemic hyperosmolar state
1can be <11 mmol/L if on sodium glucose cotransporter 2 (SGLT2) inhibitor treatment, pregnant and/or has severe COVID-19 infection
2calculated as (2 x Na) + glucose + urea
3Adapted4

BLOOD GLUCOSE TARGETS

The target glucose range for majority patients with diabetes whether critically ill or not, is 7.8 to 10.0 mmol/L (140 to 180 mg/dL),2,3 keeping in mind that individualization of goals should still be done in consideration of the severity of the infection and the age of patients (Table 3).

Table 3. Individualized glycemic recommendations

<table>
<thead>
<tr>
<th>Patient Profile</th>
<th>Fasting blood glucose</th>
<th>2-hour postprandial or random blood glucose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild presentation of COVID-19</td>
<td>4.4 - 6.1 mmol/L</td>
<td>6.1 - 7.8 mmol/L</td>
</tr>
<tr>
<td>Severe or critically ill COVID-19</td>
<td>7.8 - 10.0 mmol/L</td>
<td>7.8 - 13.0 mmol/L</td>
</tr>
<tr>
<td>Older with mild COVID-19 or use of glucocorticoids</td>
<td>6.1 - 7.8 mmol/L</td>
<td>7.8 - 10.0 mmol/L</td>
</tr>
</tbody>
</table>

Adapted4

FREQUENCY OF GLUCOSE MONITORING

Among patients who are able to eat regularly, glucose monitoring should be performed before each meal, and more frequently e.g., every 4-6 hours among those who are not eating. In resource limited settings, blood glucose (BG) monitoring two times a day is satisfactory.

INSULIN ADVICE

In all diabetes patients, previous insulin use should always be inquired. Among persons with known type 1 diabetes, basal insulin should always be continued, as DKA may result with insulin discontinuation.

Subcutaneous or intravenous insulin should be initiated for those with persistent blood sugar elevation at levels ≥10.0 mmol/L (≥180 mg/dL). Those who are very ill or unable to eat may benefit from intravenous insulin infusion. An alternative subcutaneous (SC) insulin regimen may be used in mild to moderate DKA, or in the absence of an infusion pump for intravenous insulin.1
In the intensive care unit (ICU), continuous intravenous insulin infusion is the best method of delivery, with blood glucose monitoring every 2 hours. A basal + correction regime is an alternative. Significant insulin resistance has been seen in people with type 2 diabetes in ICU settings, and intravenous insulin protocols may need amending, as there have been reports of patients requiring up to 20 units/hour.

Outside of the ICU, SC short or rapid-acting insulin may be given before meals if the patient is able to eat, or every 6 h if no meals are given or if the patient is receiving continuous enteral/parenteral nutrition. Basal insulin or a basal plus correction regimen is preferred. If the patient is eating, insulin injections are scheduled before meals. For those who have poor oral intake, a safer procedure might be to administer the rapid-acting insulin immediately after eating. A recommended strategy for insulin initiation is given in Table 4.

FLUID MANAGEMENT

The recommended fluid replacement for hyperglycemic emergencies may be individualized in patients with evidence of pulmonary edema or myocarditis. The recommended amount of required intravenous fluids may be reduced to half to avoid exacerbating adult respiratory distress syndrome. Involvement of the critical care team is also recommended. In situations where ketosis is observed to persist despite appropriate treatment, the use of 10 to 20% glucose may be considered.1

OTHER ANTI-DIABETIC AGENTS

Sulphonylureas are known as a drug class to increase the risk of hypoglycemia and are thus, generally avoided in hospitalized patients with severe medical illness.3

The use of dipeptidyl peptidase-4 (DPP-4) inhibitors in individuals with COVID-19 and concomitant clinically significant volume depletion or sepsis may necessitate dosage adjustment due to a reduction in renal function.5

SGLT2 inhibitors and metformin should be discontinued in all admitted patients.3

Although glucagon-like peptide-1 receptor agonists (GLP-1RA) safely lower blood glucose in short term studies of ventilated patients with critical illness, there is insufficient experience in critically ill subjects to make therapeutic recommendations for use of these agents in the context of coronavirus infection.7

Statement of Authorship

The authors certified fulfillment of ICMJE authorship criteria.

Author Disclosure

The authors declared no conflicts of interest.

Funding Source

None.

References

Authors are required to accomplish, sign and submit scanned copies of the JAFES Author Form consisting of: (1) Authorship Certification, that authors contributed substantially to the work, that the manuscript has been read and approved by all authors, and that the requirements for authorship have been met by each author; (2) the Author Declaration, that the article represents original material that is not being considered for publication or has not been published or accepted for publication elsewhere, that the article does not infringe or violate any copyrights or intellectual property rights, and that no references have been made to predatory/suspected predatory journals; (3) the Author Contribution Disclosure, which lists the specific contributions of authors; and (4) the Author Publishing Agreement which retains author copyright, grants publishing and distribution rights to JAFES, and allows JAFES to apply and enforce an Attribution-Non-Commercial Creative Commons user license. Authors are also required to accomplish, sign, and submit the signed ICMJE form for Disclosure of Potential Conflicts of Interest.

For original articles, authors are required to submit a scanned copy of the Ethics Review Approval of their research as well as registration in trial registries as appropriate. For manuscripts reporting data from studies involving animals, authors are required to submit a scanned copy of the Institutional Animal Care and Use Committee approval. For Case Reports or Series, and Images in Endocrinology, consent forms, are required for the publication of information about patients; otherwise, appropriate ethical clearance has been obtained from the institutional review board. Articles and any other material published in the JAFES represent the work of the author(s) and should not be construed to reflect the opinions of the Editors or the Publisher.