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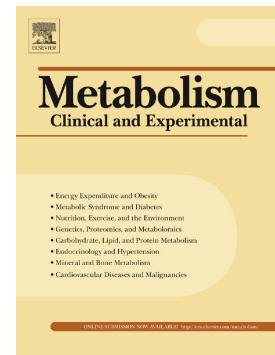
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## **COVID-19 in Patients with Diabetes: Risk Factors That Increase Morbidity**

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We agree with the conclusion by Dr. Hill and colleagues in their commentary “COVID-19 in Patients with Diabetes”, that for patients with COVID-19 infections, the presence of diabetes increases the risk for medical complications including death.<sup>(1)</sup> They appropriately stressed the importance of glycemic control during COVID-19 infections because hyperglycemia may adversely affect pulmonary function and immune response. There are many reasons why COVID-19 patients might have worse glycemic control or be at higher risk than they were in their pre-Covid-19 state.

We propose four risk factors - along with potential remedies - for diabetes patients with COVID-19, compared to COVID patients without diabetes, which can increase the risk of poor outcomes.

- 1) Susceptibility to hyperglycemia from corticosteroid therapy. This therapy raises glucose levels in 80% of patients with diabetes and in many patients without diabetes, which could increase mortality risk in coronavirus infections.<sup>(2)</sup> Corticosteroids are not indicated in all severely ill patients with COVID-19. The Surviving Sepsis Campaign recommendations recommends using corticosteroids for mechanically ventilated patients in specific situations rather than routinely. (See Table 1) If corticosteroids are necessary, then glucose levels should be treated vigorously to maintain near euglycemia aimed at maintaining optimal pulmonary and immunologic function.<sup>(3)</sup>
  
- 2) Inadequate glucose monitoring. Optimal hospital glycemic control requires frequent blood glucose (BG) tests.<sup>(4)</sup> For COVID-19 patients a nurse must wear personal protective gear for fingersticking. In some cases, a nurse will not have time or adequate protective equipment resulting in suboptimal testing. Some physicians will order infrequent testing to minimize direct contact between the nurse and patient. In some hospitals, trials are underway to use continuous glucose monitoring (CGM) systems<sup>(5)</sup> to minimize contact. Currently, no CGM is cleared for use in the hospital so this method cannot be recommended outside of a clinical trial.
  
- 3) Lack of contact with healthcare professionals. COVID-19 patients with diabetes will be quarantined and unable to visit their physicians.<sup>(6)</sup> Over 50 U.S. health systems now have telemedicine programs. that allow clinicians to see patients who are at home.<sup>(7)</sup> More contact with physicians will help quarantined COVID-19 patients improve their glucose control.

4) Inappropriate discontinuation of an angiotensin receptor blocker or an angiotensin converting enzyme inhibitor. A recent article in Lancet stated that diabetes and hypertension treatment with these classes of drugs “increases the risk of developing severe and fatal COVID-19.”<sup>(8)</sup> This statement generated much press coverage including a discussion in the American Diabetes Association Clinical Programs & Centers Interest Group.<sup>(9)</sup> Many physicians have likely discontinued such medications in spite of recommendations not to do so from the American College of Cardiology<sup>(10)</sup> and The European Society of Cardiology.<sup>(11)</sup> A recent review of Renin–Angiotensin–Aldosterone System Inhibitors in patients with Covid-19 recommended that to avoid excess cardiovascular risk, these drugs should be continued in patients at risk for or are being evaluated for COVID-19.<sup>(12)</sup>

Thus, the current trend of diabetes patients with COVID-19 receiving inpatient corticosteroid therapy, inpatient missed BG monitoring, isolation from physicians, and inappropriate discontinuation of ARBS and ACEIs can all increase morbidity from this infection.

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Table 1. Recommendations for the use of corticosteroids from the Surviving Sepsis Campaign: guidelines on the management of critically ill adults with Coronavirus Disease 2019 (COVID-19).<sup>(3)</sup>

In mechanically ventilated adults with COVID-19 and respiratory failure (**without ARDS**), we suggest against the routine use of systemic corticosteroids.

*Weak recommendation, low-quality evidence.*

In mechanically ventilated adults **with** COVID-19 and **ARDS**, we suggest using systemic corticosteroids, over not using corticosteroids.

*Weak recommendation, low-quality evidence.* Remark: The majority of our panel support a weak recommendation (i.e. suggestion) to use steroids in the sickest patients with COVID-19 and ARDS. However, because of the very low-quality evidence, some experts on the panel preferred not to issue a recommendation until higher quality direct evidence is available.