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To: All Members from HFD Medical Direction,

As the COVID-19 pandemic continues to evolve, more information is being gathered on the clinical course of the disease. This includes both the presentation of the disease, as well as what risk factors are associated with increased morbidity and mortality. As this information develops, certain trends are being discovered about this still novel and largely unknown disease.

Evidence is emerging that patients with COVID-19 may present with what is known as silent hypoxia, also described as a "Happy Hypoxic". This refers to patients who may have decreased oxygen levels in their bloodstream, but little to no subjective dyspnea or respiratory distress. Many of these patients will have a normal respiratory pattern, while others may not realize they have increased their respiratory efforts. Some patients present with SpO_2 readings as low as 50%[1,2]. In recently published data, 30-40% of patients admitted for COVID-19 infections show signs of silent hypoxia[3,4].

Silent hypoxia is thought to occur due to how COVID-19 effects the lungs. Unlike typical pneumonia, COVID-19 does not cause the lungs to fill with fluid. Instead, COVID-19 appears to cause collapse of the small air sacs, limiting oxygenation but not causing a build-up of CO_2[2,5]. Elevated CO_2 levels trigger the need to increase respiratory efforts and cause the sensation of shortness of breath. Without increased CO_2 levels, many patients do not feel dyspneic in the early stages of a COVID-19 infection[5]. If a COVID-19 patient displays subjective shortness of breath, that has been shown to be a significant predictor of mortality in patients these patients.

In patients with comorbidities such as diabetes or chronic lung disease, silent hypoxia may be a risk factor for requiring mechanical ventilation and increased mortality[6]. In some early studies, a persistent SpO_2 less than 90% and dyspnea were both independently associated with increased mortality[7]. In several hospital systems, patients presenting with a new oxygen requirement but otherwise well can be discharged with home oxygen and pulse oximetry monitoring[8], and these patients are able to recover at home without further advanced care.

Additionally, other vital sign abnormalities and risk factors have been shown to increase mortality and other risk. A systolic blood pressure less than 90 mmHg has been shown to be associated with increased mortality, as has a respiratory rate greater than 24 breaths/min[9]. Additionally, patients greater than 79 years of age have a significantly higher risk of requiring mechanical ventilation[6], which itself has shown to be a predictor of increased mortality.

While many of these risk factors may be present in many patients that HFD encounters, as the prevalence of COVID-19 continues to climb in Houston, there will be a large number of patients who do not have any of these risk factors. It is still true that asymptomatic and minimally symptomatic patients can be COVID-19 positive and can spread the disease to others. Therefore, it is imperative that HFD personnel protect themselves, their families, and their crews by wearing proper PPE on all scenes, regardless of whether the patient is a "classic COVID" patient or not. Additionally, members should watch for the risk factors listed above and be more cautious in dispositioning patients who have any of them. Patients with significant risk factors likely require a higher level of care, while those with none of the above risk factors may be able to be cared for at the BLS level, or potentially may be ETHAN candidates, as designated in the new guidance coming out in conjunction with this Medical Notes.

Thank you for all the hard work that you are doing in this difficult time. HFD is doing a great job under the most difficult of circumstances in this pandemic, and it is greatly appreciated. Keep up the good work and stay safe out there!

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