



Guidance for the Distribution of Pulse Oximeters to Patients at Increased Risk for Severe COVID-19

The New York City Department of Health and Mental Hygiene (NYC Health Department) will facilitate the distribution of pulse oximeters to hospitals and outpatient providers that predominantly serve populations disproportionately impacted by COVID-19, including those with medical comorbidities and sociodemographic factors that put them at increased risk for poor outcomes. This document provides guidance for the use of home pulse oximetry to facilitate enhanced home monitoring of patients who are at higher risk for moderate to severe COVID-19 illness.

Background

Although most cases of COVID-19 are mild, the clinical status of some patients can deteriorate rapidly, particularly in the second week of illness. There are also reports of COVID-19 patients who develop silent hypoxemia, when blood oxygen saturation levels are exceedingly low despite patients not exhibiting shortness of breath or other symptoms of respiratory distress, leading to dangerous delays in care. Risk factors for this specific clinical course have not yet been identified, but providers can take steps to identify a clinical decline promptly so care can be escalated early.

Home self-monitoring of peripheral pulse oxygen saturation (SpO₂) can be a useful tool to support the ongoing evaluation and care of individuals exhibiting COVID-19 symptoms that are at [increased risk for severe illness](#). In a NorthShore University Health System study,¹ 50% of patients discharged with pulse oximeters returned to the emergency department when SpO₂ was found to be below 92% (per clinical instructions). These patients were admitted even though they did not perceive their symptoms to be worse. With appropriate patient instruction and follow-up plans, home SpO₂ monitoring can be used in a variety of settings including emergency departments and ambulatory clinics, or as part of a telemedicine program.

The [American College of Emergency Physicians](#) and [UK National Health Service](#) have included pulse oximetry self-monitoring as part of community care plans. Additional background on silent hypoxemia can be found in the NYC Health Department's [May 17, 2020 Dear Colleague Letter](#). For additional information on identifying and triaging adult patients at increased risk for severe COVID-19 in outpatient settings, see the [NYC Health Department guidance](#).

Pulse Oximetry Distribution to Patients With COVID-19 Through NYC Test & Trace Corps

Patients that are NYC residents with laboratory-confirmed COVID-19 are automatically referred to the NYC Health + Hospitals' [NYC Test & Trace Corps](#) program, which generally attempts a phone intake interview with patients within one day of test result notification. All patients who complete

¹ Shah S, Majmudar K, Stein A, et al. Novel use of home pulse oximetry monitoring in COVID-19 patients discharged from the emergency department identifies need for hospitalization. *Academic Emerg Med*. 2020;27(8):681-692. doi:[10.1111/acem.14053](https://doi.org/10.1111/acem.14053)

an NYC Test & Trace Corps intake interview will be sent a home care package that includes a pulse oximeter along with language appropriate guidance on how to use pulse oximeters and instructions on how to enroll in NYC's free text message COVID-19 oxygen monitoring program. Care packages are generally delivered to patients within one to two business days of completing an intake interview.

Considerations for the Use of Pulse Oximetry in Outpatient Settings

When patients develop signs or symptoms of COVID-19, providers should recommend testing as soon as possible at one of NYC's many outpatient testing sites, provided there is no other reason for the patient to be evaluated in an emergency setting (visit [here](#) to search outpatient testing sites by ZIP code). Testing of symptomatic patients is critical to the City's control of COVID-19 and depends heavily on the advocacy of providers and hospitals across the city.

Since older patients and those with comorbidities are at heightened risk of developing severe illness due to COVID-19, providers may be interested in providing a pulse oximeter for remote monitoring to high-risk patients as soon as they present with symptoms suggestive of COVID-19, which may be prior to receiving test results. NYC is distributing pulse oximeters to provider groups and hospitals should they wish to distribute them in this targeted way to high-risk groups with symptoms.

If providers choose to provide pulse oximeters to patients with possible COVID-19 (for example, recent exposure to a confirmed COVID-19 case or displaying symptoms) or confirmed COVID-19, the following items should be considered:

- **Develop a plan for patient education:** Make sure your organization has language-appropriate patient education materials to instruct patients on how to use pulse oximeters and provide clear instructions on when to seek care or contact a provider based on their pulse oximeter readings (see below for available NYC Health Department and NYC Test & Trace resources).
- **Determine how you will perform regular check-ins with patients:** It is important that patients know when to seek care based on their pulse oximeter results. Providers or organizations should interact regularly with their symptomatic high-risk patients while they are using a pulse oximeter. Consider using a patient portal or other secure messaging system, or patients may enroll in NYC's free 14-day text message COVID-19 health monitoring program, which provides daily text reminders for patients to check their oxygen and heart rate as well as customized guidance based on their responses (see below for information on how to enroll).
- **Develop a plan in case patients worsen and need a provider:** Patients may worsen clinically at any hour of the day and may need to talk to a provider to determine whether to seek care in an emergency department or to stay in home isolation. Confirm that your organization has a plan in place for patients to reach a provider if their symptoms worsen or if they develop low oxygen levels, ideally with 24/7 access. Ensure there is a clear back-up plan if patients are unable to reach their primary provider.
- **Plan for how devices and instructions can be distributed:** If patients are not provided pulse oximeters and patient education materials in person, make sure your organization has a way to distribute these materials (such as mail, courier or caregiver pick-up).

Patient Prioritization for Pulse Oximeter Distribution

Pulse oximeters should be distributed in accordance with patient risk level. Priority should be given to high-risk patients presenting with [acute symptoms](#) of COVID-19 (such as fever, cough or shortness of breath) or with a recent [known exposure](#) to someone with COVID-19, while they await their test results. Risk factors for severe illness include:

- Age 65 years or older
- Underlying health conditions that increase the risk of severe illness:
 - Cancer
 - Chronic kidney disease
 - COPD (chronic obstructive pulmonary disease)
 - Immunocompromised state (weakened immune system) from solid organ transplant
 - Heart conditions (such as heart failure, coronary artery disease, or cardiomyopathies)
 - Obesity (body mass index of 30 or higher)
 - Pregnancy
 - Sickle cell disease
 - Smoking
 - Type 2 diabetes mellitus
- Visit the [Centers' for Disease Control and Prevention's website](#) for additional conditions that could lead to an increased risk for severe illness.

In addition, Black and Latino New Yorkers have been disproportionately impacted by COVID-19, including having a higher rate of hospitalization and mortality. These populations, and others known to have less access to health care and poorer health outcomes, such as Indigenous populations, should also be prioritized.

Note: Although pulse oximeters are commonly used in clinical settings to determine when to adjust oxygen therapy, research has shown these devices can produce unreliable results in patients with darker pigmented skin because of how pigment absorbs infrared light. A recent University of Michigan study compared paired oxygen saturation measurements taken with pulse oximetry and arterial blood gas in two large cohorts of patients to determine how often pulse oximeters failed to detect occult hypoxemia (an arterial oxygen saturation level of less than 88% despite showing oxygenation levels between 92% and 96% on pulse oximetry). Black patients had discordant oxygen saturation measurements at a frequency nearly three times higher than White patients. These results suggest that while pulse oximetry may be a convenient tool for monitoring oxygen saturation at home, providers should conduct a full health assessment before sending patients (particularly those with darker skin tones) home with an oximeter. Providers should encourage an in-person visit for closer assessment if a patient demonstrates any concerning signs or symptoms despite seemingly normal home pulse oximetry readings.²

Prior to distribution, ask patients if they have a pulse oximeter at home or received one from the NYC Test & Trace Corps to avoid waste and preserve resources.

² Sjoding MW, Dickson RP, Iwashyna TJ, Gay SE, Valley TS. Racial Bias in Pulse Oximetry Measurement. *The New England Journal of Medicine*. 2020;383(25):2477-2478. doi:[10.1056/NEJMc2029240](https://doi.org/10.1056/NEJMc2029240).

Patient Use Cases

In consideration of the risk factors listed above, there are four categories of patient use cases that should be prioritized for distribution of a pulse oximeter (after verifying they do not already have one):

1. A high-risk patient who has tested positive for COVID-19 and is symptomatic
2. A high-risk patient who has symptoms, has had a suspected or known exposure, and has been tested but is awaiting results or is being referred for testing (for instance, a telemedicine encounter)
3. A high-risk patient who has tested positive for COVID-19 but is asymptomatic
4. A high-risk patient who has no symptoms, has had a suspected or known exposure, and has been tested but is awaiting results or is being referred for testing (for instance, a telemedicine encounter)

Settings in which to consider distribution of pulse oximeters include:

- During in-person ambulatory care or COVID-19 testing appointments (for example, at a hospital, outpatient practice or urgent care center)
- Discharge from an emergency department
- Discharge from an inpatient hospital stay (**Note:** These patients may be discharged with home oxygen and may need different instructions)
- Telemedicine patients (consider route of delivery, such as overnight mail, courier or caregiver pick-up)

Patient Education and Support

Make sure patients who are given pulse oximeters are also given appropriate education on proper use, instructions on how to track and record their oxygen saturation levels (normal versus abnormal readings), and what to do in case of abnormal readings. Provide the NYC Health Department's patient handout, [COVID-19: How to Monitor Your Oxygen Levels](#), to your patients. The document is available in several languages under the heading "Pulse Oximeter Program" on the NYC Health Department's [COVID-19: Information for Providers web page](#).

- Instruct patients to call **911** or go to the nearest emergency room immediately if they have an oxygen saturation of **90% or less** or develop symptoms that require urgent evaluation, including new or worsening dyspnea, chest pain, cyanosis or altered mental status.
- Advise patients with oxygen levels of **91% through 94%** to contact you or their regular health care provider immediately. If they do not have or cannot get in contact with a health care provider, they can seek urgent care via [ExpressCare.nyc](#) or call NYC Health + Hospitals at 332-220-1337. A clinician will evaluate the patient over phone or video at no out-of-pocket cost to the patient.
- Patients with oxygen levels of **95% through 100%** should be instructed to walk around for two minutes and then measure their oxygen level again. If their oxygen level falls below **95%**, they should follow the instructions above. Otherwise, they should continue to monitor their oxygen levels twice daily.

Encourage patients to join the NYC Test & Trace Corps' Take Care program's texting service, which provides monitoring support and personalized tips and instructions. To sign up, patients should

text “COVID” to 89888. This service does not collect any patient identifying information (other than the patient’s phone number) and is available in multiple languages.

If a provider or hospital network wishes to direct their patients to their own emergency department, telemedicine service, or to use their texting service or mobile monitoring app, make sure to provide this information to patients as part of the discharge package that contains the pulse oximeter.

Proper Cleaning and Disinfection

All surfaces of pulse oximeters should be wiped off using a cloth, paper towel or cotton ball dampened with minimum 60% isopropyl alcohol (rubbing alcohol) after each use and before being used by others. Show patients how to clean the device and advise them that other members of the household should not use it before disinfection.

Patient Education Materials

- NYC Health Department’s [COVID-19: How to Monitor Your Oxygen Levels](#) patient handout, available in several languages under the heading “Pulse Oximeter Program” on the NYC Health Department’s [COVID-19: Information for Providers web page](#)
- [NYC Test & Trace Corps’ Take Care booklet](#) (multiple languages available)
- [NYC Test & Trace Corps patient resources](#)
- [NYC Health Department’s COVID-19 information page](#)

Additional References

[Luks AM, Swenson ER. Pulse Oximetry for Monitoring Patients with COVID-19 at Home. Potential Pitfalls and Practical Guidance. *Ann Am Thorac Soc.* 2020;17\(9\):1040-1046.](#)

Rabin RC. Pulse Oximeter Devices Have Higher Error Rate in Black Patients. *The New York Times*. 2020. <https://www.nytimes.com/2020/12/22/health/oximeters-covid-black-patients.html>. Accessed January 7, 2021.

[Shenoy N, Luchtel R, Gulani P. Considerations for target oxygen saturation in COVID-19 patients: are we under-shooting? *BMC Med.* 2020 Aug 19;18\(1\):260.](#)

The NYC Health Department may change recommendations as the situation evolves.

1.7.20