analysis of the randomized evidence. *Oncotarget* 2017;8:41670–41678.
12 Kuijvenhoven JC, Korevaar DA, Tournoy KG, Malfait TLA, Dooms C, Rintoul RC, *et al*. Five-year survival after endosonography vs mediastinoscopy for mediastinal nodal staging of lung cancer. *JAMA* 2016;316:1110–1112.
13 Kotoulas CS, Foroulis CN, Kostikas K, Konstantinou M, Kalkandi P, Dimadi M, *et al*. Involvement of lymphatic metastatic spread in non-small cell lung cancer accordingly to the primary cancer location. *Lung Cancer* 2004;44:183–191.
14 Keller SM, Vangel MG, Wagner H, Schiller JH, Herskovic A, Komaki R, *et al*.; Eastern Cooperative Oncology Group. Prolonged survival in patients with resected non-small cell lung cancer and single-level N2 disease. *J Thorac Cardiovasc Surg* 2004;128:130–137.
15 Korevaar DA, Crombag LM, Cohen JF, Spijker R, Bossuyt PM, Annema JT. Added value of combined endobronchial and oesophageal endosonography for mediastinal nodal staging in lung cancer: a systematic review and meta-analysis. *Lancet Respir Med* 2016;4:960–968.

More on Pulse Oximetry for Monitoring Patients with COVID-19 at Home

To the Editor:

We read with great interest the outstanding review by Luks and Swenson entitled "Pulse Oximetry for Monitoring Patients with COVID-19 at Home: Potential Pitfalls and Practical Guidance" (1). We congratulate the authors on their very comprehensive review. Fingertip pulse oximeters are one of the most widely and successfully used medical standard monitoring tools to assess the oxygenation state in patients. In fact, a pulse oximeter noninvasively measures arterial blood oxygen saturation (percentage), and it represents an accessible tool that can be easily used by patients, physicians, and prehospital healthcare providers.

Although the authors have extensively covered all the important issues about the utility and the correct use of a pulse oximeter at home, we would like to add a few relevant points about its potential. Two recently Food and Drug Administration–approved fingertip spot-check pulse oximeters can also provide patients with the respiration rate parameter. The latter is derived from the pulsatile plethysmograph waveform (2, 3). Even though it is well known that a noticeable increase in respiratory rate is a precursor of coronavirus disease (COVID-19) symptoms, this measure may not be feasible in all patients, as the movement-induced signal must be detectable in the pulsatile waveform and irregular breathing can cause irregularities in measurements.

Furthermore, a very recent document of the UK National Health Service has set out principles to support the remote monitoring, by using pulse oximetry, of patients with confirmed or possible COVID-19 that should be read alongside the general practice and community health services standard operating procedures (4). Some other health services have plans to loan spot-check pulse oximeters to patients in self-isolation with mild symptoms of COVID-19 for regular monitoring of arterial blood oxygen saturation. Then, the Bluetooth links the oximeter to the cell phone, and some recent applications collect the data so that it can be relayed back to the healthcare facility prescribing the solution.

Thanks to the introduction of an ultra-low-power wireless system on a chip, another very recent technology enables tetherless pulse oximetry for continuous monitoring on the move up to 4 days before battery replacement. This device can also be used as part of a secure cloud platform capable to remotely manage patients with COVID-19 at home.

In conclusion, there should not be more doubt about the importance of including pulse oximetry self-monitoring data in the COVID-19 remote monitoring programs to preserve capacity in hospitals for those patients with more severe symptoms or underlying conditions (5, 6).

Author disclosures are available with the text of this letter at www.atsjournals.org.

Valentina Quaresima, Ph.D.
Marco Ferrari, M.D.*
University of L'Aquila
L'Aquila, Italy

ORCID IDs: 0000-0001-9884-0304 (V.Q.); 0000-0002-3041-2917 (M.F.).

*Corresponding author (e-mail: marco.ferrari@univaq.it).

References

1 Luks AM, Swenson ER. Pulse oximetry for monitoring patients with COVID-19 at home: potential pitfalls and practical guidance. *Ann Am Thorac Soc* 2020;17:1040–1046.
2 Alwadhi V, Sarin E, Kumar P, Saboth P, Khera A, Gupta S, *et al*. Measuring accuracy of plethysmography based respiratory rate measurement using pulse oximeter at a tertiary hospital in India. *Pneumonia (Nathan)* 2020;12:4.
3 Bergese SD, Mestek ML, Kelley SD, McIntyre R Jr, Uribe AA, Sethi R, *et al*. Multicenter study validating accuracy of a continuous respiratory rate measurement derived from pulse oximetry: a comparison with capnography. *Anesth Analg* 2017;124:1153–1159.
4 UK National Health Service. NHS guidance for pulse oximetry to detect early deterioration of patients with COVID-19 in primary and community care settings. 2020 [updated 2020 Aug 12; accessed 2020 Jun 21]. Available from: https://www.england.nhs.uk/coronavirus/publication/pulse-oximetry-to-detect-early-deterioration-of-patients-with-covid-19-in-primary-and-community-care-settings/.
5 Jouffroy R, Jost D, Prunet B. Prehospital pulse oximetry: a red flag for early detection of silent hypoxemia in COVID-19 patients. *Crit Care* 2020;24:313.
6 Annis T, Pleasants S, Hultman G, Lindemann E, Thompson JA, Billecke S, *et al*. Rapid implementation of a COVID-19 remote patient monitoring program. *J Am Med Inform Assoc* 2020;27:1326–1330.