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CHEST

Emerging Role of Remote Patient Monitoring in Pulmonary Care

Telemedicine to Smart Phone

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Remote patient monitoring is a rapidly evolving subset of telehealth that presents unique data flow and care coordination challenges and opportunities. There is growing focus on remote patient monitoring for conditions such as COPD and congestive heart failure. The understanding of its potential value in reducing health service utilization and costs (eg, hospitalization and ED visits) continues to expand.[1,2]

The adoption of telehealth and remote patient monitoring has been expedited by the ongoing coronavirus disease 2019 (COVID-19) pandemic. Telemedicine and remote monitoring represent far more than just communication of health data. Along with the maturation of this technology, the device market has experienced significant change. Contemporary telemedicine and telemonitoring offerings support building a system that is ubiquitous, efficient, and sustainable. To support this focus, a new generation of less expensive devices that can be used in different settings with a scalable approach has been conceived.[3]

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FINANCIAL/NONFINANCIAL DISCLOSURES: The authors have reported to *CHEST* the following: N. D. is a consultant for Veran Medical, Level Ex, Boston scientific. None declared (E. D.).

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DOI: https://doi.org/10.1016/j.chest.2020.10.015

Remote patient monitoring including pulse oximetry via smart phone appears to be an attractive option.

Pulse oximetry monitoring plays an increasing role in managing pulmonary diseases, especially during events of pandemics or epidemics of respiratory viral infections, such as COVID-19 and influenza. Oxygen saturation (Spo_2) correlates with lung injury and has become a valuable component of the clinical evaluation used to differentiate those that require close monitoring and hospital admission from those with milder disease.[4] In circumstances of home quarantine, remote clinical pulse oximetry allows patients to objectively report oxygen saturation and heart rate (HR) in addition to their symptoms. Smartphone sensors with Apps could facilitate access to these measurements.[5] Previous studies evaluating the use of smart phones have been limited because the smart phone applications were not compared with saturation measured by arterial blood gas and were found to have lower accuracy even in the presence of mild hypoxemia.[6]

In this issue of *CHEST*, Browne et al,[7] in their article entitled "Smartphone Biosensor With App Meets FDA/ISO Standards for Clinical Pulse Oximetry and Can Be Reliably Used by a Wide Range of Patients," move remote patient monitoring to a next level. The authors evaluated whether the smartphone sensor with App meets Food and Drug Administration (FDA)/International Organization for Standardization (ISO) requirements and how measurements obtained using this system compared with hospital reference devices across a wide range of people. The study compared the smartphone sensor with app vs hospital reference devices-determined Spo_2 and HR and found the accuracy was 0.48% points (CI, 0.38-0.58; $P < .001$) and 0.73 beats/min (CI, 0.33-1.14; $P < .001$), respectively; with Spo_2 and HR precision 1.25 vs reference 0.95 points ($P < .001$) and 5.99 vs reference 3.80 beats/min ($P < .001$), respectively. The authors also point out that these small differences were similar to the variation found between two FDA-approved reference instruments for Spo_2: accuracy, 0.52 points (CI, 0.41-0.64; $P < .001$) and precision (1.01 vs 0.86; $P < .001$). The authors acknowledge the requirement of additional laboratory testing to incorporate at least 200 data points referenced to blood sample analysis.

We agree that technology providing easy access and remote monitoring adds great value and should be integrated into care models. We see great potential to improve management of chronic cardiopulmonary diseases, especially for elderly patients and patients in underserved areas, where access to care is a challenge. Improved communication with health-care providers may lead to earlier outpatient interventions, potentially reducing both morbidity and hospitalization.

Future multicenter trials evaluating the role of remote patient monitoring, especially with smart phone devices measuring parameters such as pulse oximetry and HR, should be welcomed for chronic diseases (such as COPD and congestive heart failure) and infectious diseases such as COVID-19, influenza, and bacterial pneumonia. Other areas of interest might include patient-related outcomes such as safety, health-care utilization such as ED visits, hospitalization, and health-care costs. Best practices and guidelines for obtaining accurate readings and interpretations would be needed as well.

We congratulate Browne et al[7] on this well-conducted trial and are encouraged by the results. This tool could significantly enhance the armamentarium currently available for remote monitoring.

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