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Smartphones, Apps, Smart Inhalers: Using Tech to Personalize COPD Care

Mary Caffrey

From smartphones to smart rescue inhalers, researchers offered ideas to make chronic obstructive pulmonary disease care more data-driven and personalized.

A randomized clinical trial in telehealth was a disappointment. But a host of small studies using smartphone apps, pulse oximeters, and a digital rescue inhaler showed promise during Tuesday's technology-focused poster session at the American Thoracic Society 2018 International Conference in San Diego, California.

As one researcher put it, right now it's hard to predict which patients with chronic obstructive pulmonary disease (COPD) will end up in the emergency department (ED), or which ones will have a second exacerbation within days of the first. So, studies presented at the session put forth a host of ideas for tracking patient data with the goal of tackling this problem. There were also ideas for using technology for better remote management without adding significant staff time or costs.

"Smartphone ownership has grown over the last several years in the target demographic," said Jennifer T. Krall, MD, the lead author on one of the abstracts. Thus, asking patients with COPD to use personal digital tools to collect data or manage their disease is rarely the challenge it might have been just a few years ago.

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Personalization is a priority, said Andrew Miller, MD, another study author, due to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2017 mandates, which call for greater emphasis on individualized care and were cited frequently throughout ATS 2018.

Smartphone management. Krall, Cone Health in Greensboro, North Carolina, presented results of a feasibility study using a smartphone application to promote patient engagement. Of

77% to 97%. It took staff less than 1 person/hour a day to manage the patient portal.[1]

Pulse oximeters. Home- or smartphone-based tools offer a noninvasive way to measure oxygen saturation, but commercial apps can have varying levels of accuracy. A team from the University of Illinois tested 3 "wellness" pulse oximeter apps—from Walgreens C20, iCare, and SHealth—against a reference app that received FDA clearance, the Nonin Onyx II. The 19 patients had a mean peripheral capillary oxygen saturation (SpO_2) of 92.7 (7.2)% as measured by the reference standard. The mean percent error for the other pulse oximeters ranged from -1.8% to +5.7%; the Walgreens C20 was the most accurate; but none of these apps could identify severe hypoxemia, which is $SpO_2 \leq 88\%$. Authors found a substantial price difference; the most expensive of the 3 non-FDA cleared apps was $39.99, compared with $350 for the reference app.[2]

A "smart" rescue inhaler. Miller, of the University of Colorado, captured the audience's attention with his zeal for his pilot study, which involves equipping rescue inhalers with passive sensors to capture the exact time and date when patients are using them. Not only does this eliminate recall bias, but as Miller explained, it also opens up a host of possibilities for "machine learning." There's a difference between "frequent use," and "patterned use," he said; in his home state of Colorado, for example, running patient use data against known weather patterns would likely show how rescue inhaler use increase when there is a forest fire. In time, the data would give clinicians the ability to meet the GOLD 2017 mandate for more personalized approaches to COPD management.[3] While the pilot is small, so far, the patients who have infrequent rescue inhaler use without a pattern have a body mass index (BMI) of less than 28 kg/m^2.

Negative results, but patients liked telehealth. PROMETE II was a multicenter, randomized clinical trial that randomized 229 patients to either telehealth or routine clinical practice, with the primary endpoint of reducing exacerbations that led to a visit to the emergency department (ED) and hospital admission. Participants had an average age of 71 years and 80% were men. After 12 months, there were the number of COPD-related ED visits and all-cause deaths was comparable between the 2 groups. The number of mean exacerbations was 1.0 in the

average). On the plus side, doctors and patients both liked telehealth, despite the results.[4]

Reference

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3. Miller AL, Bowler RP, Allinder M, et al. Real-time data collection of rescue inhaler use in COPD patients: an important step to achieving the new GOLD standard. Presented at the American Thoracic Society 2018 International Conference; San Diego, California; May 18-23, 2018; Abstract A4559.
4. Soriano JB, Garcia-Rio F, Vazquez-Espinosa E, et al. Efficacy and costs of telehealth for the management of COPD: a multicenter, randomized controlled trial. Presented at the American Thoracic Society 2018 International Conference; San Diego, California; May 18-23, 2018; Abstract A4546.

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