BRIEF REPORT

Clinician Barriers to Ordering Pulmonary Function Tests for Adults with Suspected Asthma

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Background: **Primary care clinicians do not adhere to national and international guidelines recommending pulmonary function testing (PFTs) in patients with suspected asthma. Little is known about why that occurs. Our objective was to assess clinician focused barriers to ordering PFTs.**

Methods: **An internet-based 11-item survey of primary care clinicians at a large safety-net institution was conducted between August 2021 and November 2021. This survey assessed barriers and possible electronic health record (EHR) solutions to ordering PFTs. One of the survey questions contained an open-ended question about barriers which was analyzed qualitatively.**

Results: **The survey response rate was 59% (117/200). The top 3 reported barriers included beliefs that testing will not change management, distance to testing site, and the physical effort it takes to complete testing. Clinicians were in favor of an EHR intervention to prompt them to order PFTs. Responses to the open-ended question also conveyed that objective testing does not change management.**

Discussion: **PFTs improve diagnostic accuracy and reduce inappropriate therapies. Of the barriers we identified, the most modifiable is to educate clinicians about how PFTs can change management. That in conjunction with an EHR prompt, which clinicians approved of, may lead to guideline congruent and improved quality in asthma care. (J Am Board Fam Med 2024;37:321–323.)**

Keywords: **Asthma, Electronic Health Records, Family Medicine, Internal Medicine, Nurse Practitioners, Physician Assistants, Physicians, Primary Health Care, Pulmonary Function Tests, Quality of Care, Safety-Net Providers, Surveys and Questionnaires**

Introduction

Guidelines for adults with suspected asthma recommend objective lung function testing with spirometry or pulmonary function tests (PFTs) to initiate therapy and assess responsiveness.[1] PFTs demonstrating an increase in forced expiratory volume in 1 second (FEV1) by at least 12% and increase in 200 mL after bronchodilator use are diagnostic of asthma.[2] One Choosing Wisely initiative recommends that objective testing is necessary to confirm the diagnosis of asthma.[3] This helps avoid misdiagnoses, for example assuming the clinical presentation is asthma when it is actually cardiovascular disease. Objective testing leads to greater medication adherence with asthma controller therapy.[4] There are known health and economic risks of using inappropriate inhaler therapies in patients without asthma. Tachycardia, tremor, and nervousness are known side effects of β-2 agonists, and oral candidiasis can be associated with use of inhaled corticosteroids. Inhaled corticosteroids with formoterol are recommended as first-line therapy for asthma based on the Global Initiative for Asthma (GINA) guidelines, and a single inhaler retails for $250–$400 with variable insurance coverage.[5] However, many patients are diagnosed with asthma and treated without testing. Testing utilization rates in asthma are the lowest among primary care physicians (PCPs).[6–7] Little is known about why this discrepancy between guideline recommendations and actual practice exists.

Denver Health (DH) is an integrated academic health care system of eleven ambulatory federally

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Table 1. Percentage of Patients on Denver Health Asthma Registry with Spirometry or Pulmonary Function Tests (PFTs) from April 2016 to November 2020

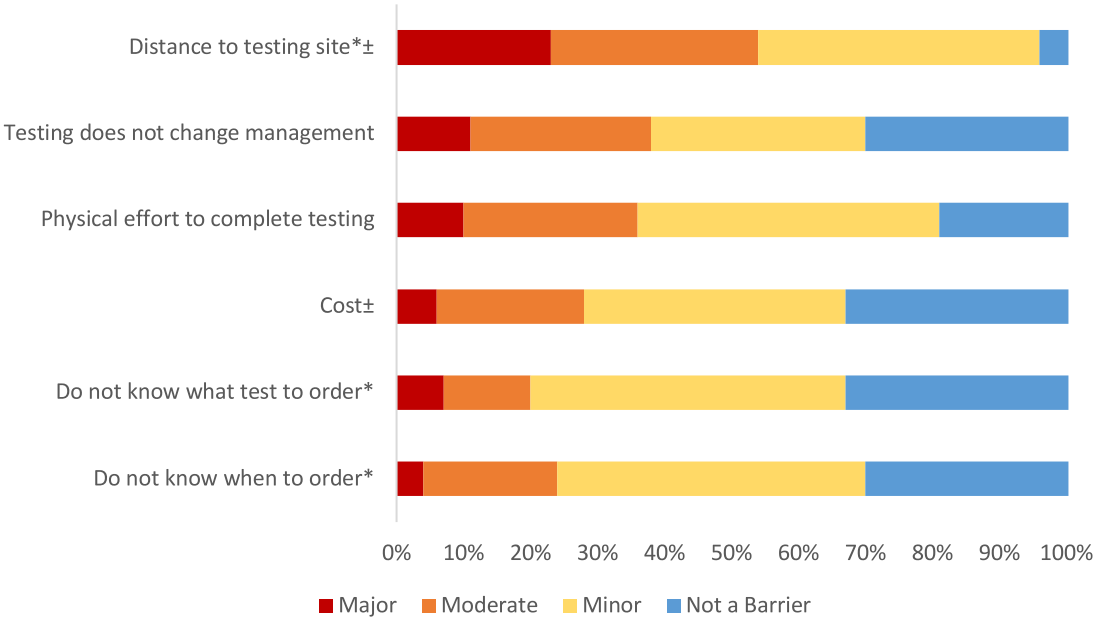
	Persistent Asthma	Intermittent Asthma
Spirometry	14% (391/ 2791)	8% (622/7408)
PFTs	11% (318/ 2791)	8% (563/7408)

qualified health clinics (FQHC) that serve as the primary safety net for residents of Denver, Colorado. We identified many patients within our system that were labeled with a diagnosis of asthma without objective lung function testing to support this diagnosis. Data were obtained via the DH asthma registry using the following criteria: empaneled patients within ambulatory care service (ACS) clinics (≥1 visit in the past eighteen months) and asthma diagnosis on the problem list or as a visit diagnosis since April 2016. Within the DH ACS asthma registry, we found that less than fifteen percent of patients labeled to have persistent asthma had spirometry or PFTs ordered by their clinicians between April 2016 (beginning of the DH electronic health record [EHR] system) and November 2020. The rate of testing was even less in patients classified to have intermittent asthma (Table 1). Consequently, we initiated a project to assess clinician focused barriers to ordering lung function testing and to elicit preferred interventions. Clinicians included physicians (attendings and residents), physician assistants, and nurse practitioners. This study focused specifically on PFTs because no ACS clinics offer adult spirometry, and patients must go to the DH PFT Lab to receive these tests.

Methods

A survey of 11 questions was emailed to all 200 ACS clinicians within the DH system and collected with the DH RedCap system between August 2021 and November 2021. Six questions addressed clinician focused barriers outside of the COVID-19 pandemic using the Likert scale ranging from *major barrier* to *not a barrier* and 1 open-ended question solicited unspecified barriers. Remaining questions assessed clinical site, specialty (family medicine [FM] or internal medicine [GIM]), and preferred EHR clinical decision support tool. The 2 named EHR interventions were Best Practice Advisory (BPA) and Health care Maintenance (HCM) topic. A BPA is defined as an actionable alert prompting to order testing when opening a patient's chart, and

Figure 1. Clinician reported barriers to ordering pulmonary function tests, Denver Health, 2021 (n = 117).
Abbreviations: **GIM, general internal medicine; PFT, pulmonary function tests.**



Note: *A greater proportion of FM clinicians reported these barriers to be major/moderate compared to GIM ($p < 0.05$). ± A greater proportion of clinicians practicing at a clinic distant to the PFT lab reported these barriers to be major/moderate compared to clinicians practicing at a clinic on the same site as the PFT lab ($p < 0.02$).

a HCM topic is an informational alert showing whether testing was completed and if patient is due for repeat testing. Associations between perceived barriers and specialty and clinic location were assessed using Chi-squared analyses. This project was reviewed by the Quality Improvement Committee of Denver Health (QuIRC), which is authorized by the Colorado Multiple Institutional Review Board at the University of Colorado. This was determined not to be human subject research; therefore, this project did not require IRB review.

Results

The overall survey response rate was 59% (117/200). Of responders, 62% (73/117) were from GIM and 38% (44/117) were from FM. The top 3 clinician perceived barriers to ordering PFTs included beliefs that testing will not change management, the distance patients must travel to the testing site, and the physical effort it takes patients to complete testing (Figure 1). FM clinicians were more likely to report barriers than GIM clinicians. Almost all clinicians (91%) were in favor of an EHR intervention to prompt ordering of lung function tests, specifically 39% preferred a HCM topic, 26% preferred a BPA, and 26% preferred both. One theme identified in the open-ended question was that objective testing may not change management. An example quote includes, "I acknowledge the recommendations for asthmatic patients to complete spirometry, but it just does not seem to change management given the patient effort required to schedule and complete the study."

Discussion

PFTs improve diagnostic accuracy and reduce inappropriate therapies, enabling more cost-effective and high-value care. Guidelines for the use of pulmonary testing are incongruent with clinician practice within our health care system due to perceived barriers to complete testing for patients and a sentiment that testing does not change management. This study recognizes a need for primary care clinician education regarding interpretation of PFTs and an explanation of how testing changes management in the diagnosis and treatment of asthma. For example, PFTs can differentiate diseases that present with similar clinical symptoms but require distinct therapies including interstitial lung disease, vocal cord dysfunction, chronic obstructive pulmonary disease, and asthma. Thus far, we have provided educational sessions to GIM and FM clinicians, met with the DH PFT lab to improve streamline of testing, and are implementing an EHR intervention. One limitation of our study is it only included clinicians working in FQHCs that predominately serve uninsured and underinsured patient populations with different barriers to care compared with other populations. In addition, the study was subject to potential response bias. Lastly, we evaluated clinician reported practice instead of actual practice. Looking forward, we plan to finalize implementation of the EHR intervention and assess changes in PFT ordering rates.

There is a discrepancy between clinical guidelines for objective lung testing and actual practice, and there is a paucity of data regarding reasons for this inconsistency. Our study demonstrates clinician focused barriers to ordering lung function tests in diagnosis and management of asthma. This work identifies barriers and can inform ways to increase ordering and thereby access to PFTs in the primary care setting. Future directions could include assessing outcomes of patients with suspected asthma that received PFTs versus those that have not.

Delia Harr, data scientist for Denver Health Ambulatory Care Services, performed data extraction from the electronic health record for this project.

To see this article online, please go to: http://jabfm.org/content/37/2/321.full.

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