Transforming Clinical Data for Asthma Surveillance: A Use Case of the Multi-State EHR-Based Network for Disease Surveillance

Rationale The Centers for Disease Control and Prevention (CDC) estimates that nearly 25 million adults and children in the United States have asthma.[1] Asthma presents significant health-related morbidity, especially if it is not well-controlled, and is associated with a high number of emergency department visits, missed school and work days, and other challenges.[2,3,4] Asthma disproportionately affects certain population groups (e.g., higher prevalence and/or adverse outcomes among Black Americans, people with lower household incomes, and adult women[1,2,5]).

National- and state-level surveys with asthma data are well-established and methodologically rigorous. Asthma prevalence data have largely relied on surveys using self-reported data of healthcare provider-diagnosed asthma. These survey data might be published one or more years after data collection and the completion of key methodologic steps, including data cleaning and developing sampling weights to generate national- and state-level estimates. More timely data sources could complement these existing surveys addressing asthma, as well as inform responsive intervention and policy action. Data with more geographic granularity (e.g., census tract level or residential geography available at the 5-digit ZIP code level) could help focus limited public health resources in neighborhoods most disproportionately affected by asthma. As public health departments and their partners work to improve asthma outcomes among children and adults (e.g., as part of CDC's National Asthma Control Program [NACP]), use of electronic health record (EHR) data could inform public health actions for asthma by providing more timely and geographically granular estimates from a care-seeking population.

This document broadly describes how clinical EHR data could inform asthma burden, asthma control, and/or asthma-related healthcare use and, more specifically, how data from the Multi-State EHR-based Network for Disease Surveillance (MENDS) pilot project serves as an example. Primary audiences include MENDS partners and other public health and healthcare professionals interested in using EHR data sources, in addition to clinical, community, and school leadership and staff who could play a key role in using clinical data to address asthma burden and disparities.

How can EHR-based asthma estimates from a care-seeking population be used? Several possible uses for EHR-based estimates of asthma burden, asthma control, and/or asthma-related healthcare use can

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[1] Centers for Disease Control and Prevention (CDC). Most Recent National Asthma Data. https://www.cdc.gov/asthma/most_recent_national_asthma_data.htm#print

[2] Pate, et al. 2021. Asthma Surveillance—United States, 2006–2018. Morbidity and Mortality Weekly Report—Surveillance Summaries. https://doi.org/10.15585/mmwr.ss7005a1.

[3] Trivedi and Denton. 2019. Asthma in children and adults—what are the differences and what can they tell us about asthma? *Front Pediatr*.7:256. https://doi.org/10.3389/fped.2019.00256.

[4] American Lung Association. Asthma Trends and Burden. https://www.lung.org/research/trends-in-lung-disease/asthma-trends-brief/trends-and-burden

[5] Keet, et al. 2015. Neighborhood poverty, urban residence, race/ethnicity, and asthma: rethinking the inner-city asthma epidemic*. Journal of Allergy and Clinical Immunology 135*:3. https://doi.org/10.1016/j.jaci.2014.11.022.

complement traditional data sources for asthma surveillance. Along with clinical data, insurer (payer) administrative claims are becoming available. Administrative claims provide critical insight into medication dispensing pattern, acute care encounters, procedures, and diagnoses assignment across all sites and providers. Use of clinical data that describe the intended treatment plan together with claims data could inform public health activities, outcomes, and performance measures aligned to implementation of CDC's evidence-based EXHALE strategies. For example, these data can help identify communities disproportionately affected by asthma that could benefit from expansion of tailored asthma self-management education, home visits, and other services to comprehensively reduce asthma triggers. Depending on the availability, completeness, and specificity of EHR data, users may also be able to analyze data for insights into gaps in clinical management of asthma and opportunities for improvement across healthcare settings.

Public health departments can use EHR-based asthma estimates from a care-seeking population to: (1) enumerate community members diagnosed with asthma; (2) identify and characterize trends in asthma burden by patient characteristic (e.g., age); (3) discover or confirm inequities in asthma morbidity; (4) identify potential local geographies to prioritize for collaborative strategies and interventions; (5) assess the effectiveness of implemented interventions; (6) evaluate asthma morbidity that may be triggered by local environmental exposures; and (7) make data-driven changes to policy, practice, and other strategic actions.

What is MENDS? MENDS is a distributed data network that leverages EHR data from multiple data contributors across the United States to generate timely chronic disease surveillance data (e.g., hypertension surveillance data) at national, state, and local levels. As of today, approximately 15 states have sufficient data (>5,000 patients) for state level estimates (see map). Data contributors provide refreshes on a monthly or quarterly cycle, resulting in a 6-month data availability delay. MENDS data can be accessed by participating health departments and other authorized users for monitoring trends, informing policies, planning programs, and evaluating outcomes to improve the health of the population. More information about MENDS.

What type of asthma data does MENDS use? MENDS extracts diagnosis codes and prescription orders from EHR data to identify asthma cases ("asthma status"). A goal is to use these data to assess asthma burden by geographic area (i.e., state and sub-state levels) and demographic characteristics (e.g., age, race, primary payer, etc.). More information about how the MENDS case definition for asthma is applied can be found in the asthma algorithm documentation.

Examples of public health actions MENDS data can support include:
   a. Accessing data to generate a timely, clinically detailed look at epidemiology of asthma among a care-seeking population, by age, race, ethnicity, and locality

b. Identifying geographic areas where expanded implementation of CDC's evidence-based EXHALE strategies, such as increased access and referrals to coordinated community-based services addressing asthma, could reduce asthma burden and disparities. See an example visualization in the figure below.

c. Reviewing timely, geographically granular asthma data for children and adults, to inform decisions about priority partnerships and interventions for populations/areas at greatest risk

d. Supporting equitable allocation of funding and resources (e.g., community health workers, strengthening of systems, including quality improvement initiatives, etc.) to geographic areas based on current and forecasted asthma burden

e. Developing and delivering tailored training or technical assistance programs for staff serving communities and areas disproportionately affected by asthma morbidity or mortality

f. Informing schools and other partners on seasonal or local increases in asthma-related healthcare use, using trends from repeated cross sections over time.

Please note, these are hypothetical data for illustrative purposes only.
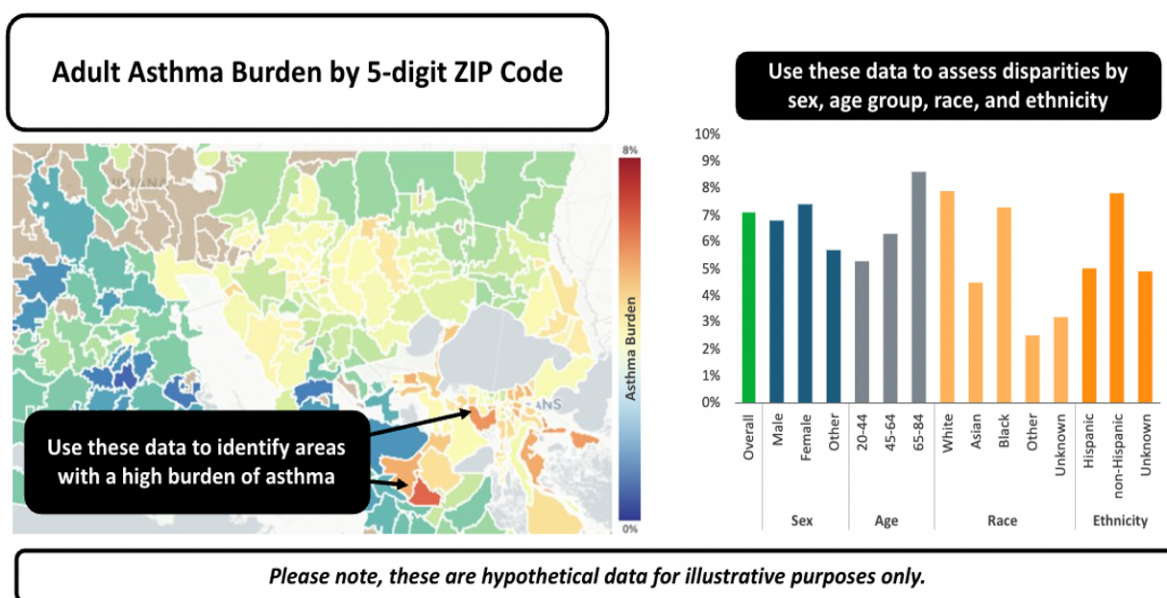
Conclusions EHR-based asthma estimates in areas where data are available can become a valuable tool for new and well-established asthma programs interested in using local data for public health decision-making. CDC's Data Modernization Initiative (DMI) includes prioritizing timely, local data to help jurisdictions focus interventions where they are needed most.[6] DMI efforts can support MENDS partners' chronic disease surveillance activities and NACP partners' work to implement EXHALE strategies to improve asthma control and reduce healthcare costs.

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[6] CDC. Where does our data come from? DMI basics: The why, what, and how of data modernization. https://www.cdc.gov/surveillance/data-modernization/basics/where_does_our_data_come_from.html

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Despite existing asthma prevalence data, clinical guidelines to diagnose and treat asthma, and nationally applied standardized methods that draw from EHR-based data (e.g., methods to define persistent asthma[7] and asthma-related emergency department visits[8,9]), it can be beneficial to take advantage of potential EHR-based opportunities to further advance capabilities to identify people with asthma and facilitate their access to supportive public health programs. As the availability and access to EHR data and administrative claims records continue to expand and evolve, public health and healthcare professionals can leverage the data for more timely, geographically granular estimates to inform efforts to reduce asthma morbidity and mortality. In addition, use of these data by public health departments can better position them to respond to shifting public health and environmental threats and emerging priorities that may increase the burden of asthma.

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[7] Centers for Medicare and Medicaid. Medicaid and Children's Health Insurance Program (CHIP) Scorecard. https://www.medicaid.gov/state-overviews/scorecard/

[8] CDC. National Syndromic Surveillance Program. https://www.cdc.gov/nssp/

[9] Montana Department of Public Health and Human Services. 2022. Asthma Syndromic Surveillance in Montana, 2019-2-21. https://dphhs.mt.gov/assets/publichealth/Asthma/SurveillanceReports/SyndromicReport.pdf

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