Asthma control among the treated U.S. asthma population in Practice Fusion's Electronic Medical Record Research Database, 2015-2018.

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Aims

- The Global Initiative for Asthma (GINA) recommends that asthma symptom control should be assessed at every opportunity, including during routine prescribing or dispensing.[1]
- While current real-world data sources enable researchers to understand asthma treatment, the majority of these sources do not capture data on asthma symptom control.
- In 2015, the Practice Fusion (PF) Electronic Medical Record (EMR) integrated the Asthma Control Test[2] (ACT), a patient-reported measure assessing symptom control, into their platform.
- This study investigated the burden of *not well-controlled* asthma, both overall, and by GINA treatment step, among the treated asthma patient population in PF's research database.

Methods

- We established a retrospective cohort of asthma patients with a valid ACT measurement between 01-January-2015 and 31-December-2018.
  - Full inclusion / exclusion criteria provided below.

Key inclusion criteria	Key exclusion criteria
• ≥1 asthma diagnosis code(s) reported at any encounter between 01-Jan-2015 and 31-Dec-2018 • ≥1 valid ACT measurement between 01-Jan-2015 and 31-Dec-2018 • Prescribed ≥1 asthma treatment in the 6 months prior to the 4-week recall period of their first, valid ACT measurement (*index date*)	• Age <12 years • No encounters in the database at least 6 months prior to index date • COPD diagnosis on index date or at any time in the database prior to index date

- We assessed GINA treatment step for each patient based on the medication prescribed during the 6-month period prior to the 4-week recall period of the patient's index date ACT record.
- ACT scores ≤19 reflect *not well-controlled* asthma and >19 reflect *controlled* asthma.[3]
- We used a Poisson regression model with robust variance to directly estimate the prevalence ratio (PR) of *not well-controlled* asthma by GINA step, adjusting for age, race, Hispanic ethnicity, smoking status, BMI, and visit type.

References
1. Global Initiative for Asthma, Global Strategy for Asthma Management and Prevention, 2019. 2019.
2. Nathan RA, Sorkness CA, Kosinski M, et al. Development of the asthma control test: A survey for assessing asthma control. Journal of Allergy and Clinical Immunology. 2004;113(1):59-65.
3. Jia, C. E., et al. (2013). "The Asthma Control Test and Asthma Control Questionnaire for assessing asthma control: Systematic review and meta-analysis." J Allergy Clin Immunol 131(3): 695-703.

Results

Table 1. Asthma control status and patient characteristics by GINA Step among the treated asthma population, Practice Fusion EMR, 2015-2018 (n=15,579)

Characteristic	Step 1 (N=5,374)	Step 2 (N=3,751)	Step 3 (N=2,187)	Step 4 (N=3,909)	Step 5 (N=165)	Undefined (N=193)	Overall (N=15,579)
Asthma Control[2]							
Not well-controlled	1,572 (29.3%)	940 (25.1%)	617 (28.2%)	1,331 (34.0%)	74 (44.8%)	63 (32.6%)	4,597 (29.5%)
Controlled	3,802 (70.7%)	2,811 (74.9%)	1,570 (71.8%)	2,578 (66.0%)	91 (55.2%)	130 (67.4%)	10,982 (70.5%)
Age in years							
Mean (SD)	39.4 (21.8)	44.1 (22.7)	43.9 (22.7)	49.3 (20.6)	55.9 (16.6)	54.9 (19.5)	44.0 (22.2)
Range	12.0 - 88.0	12.0 - 88.0	12.0 - 88.0	12.0 - 88.0	12.0 - 87.0	12.0 - 88.0	12.0 - 88.0
Sex, Male, n (%)	1,996 (37.1%)	1,310 (34.9%)	787 (36.0%)	1,359 (34.8%)	59 (35.8%)	73 (37.8%)	5,584 (35.8%)
Hispanic ethnicity, Yes, n (%)	1,150 (21.4%)	680 (18.1%)	426 (19.5%)	786 (20.1%)	15 (9.1%)	33 (17.1%)	3,090 (19.8%)
Race[3], n (%)							
White	2,362 (44.0%)	1,864 (49.7%)	946 (43.3%)	1,826 (46.7%)	64 (38.8%)	91 (47.2%)	7,153 (45.9%)
African American	946 (17.6%)	557 (14.8%)	402 (18.4%)	647 (16.6%)	30 (18.2%)	29 (15.0%)	2,611 (16.8%)
Other	424 (7.9%)	280 (7.5%)	201 (9.2%)	321 (8.2%)	6 (3.6%)	19 (9.8%)	1,253 (8.0%)
Unknown	1,642 (30.6%)	1,050 (28.0%)	638 (29.2%)	1,115 (28.5%)	65 (39.4%)	52 (26.9%)	4,562 (29.3%)
Smoking status[4], n (%)							
Non-smoker	3,467 (64.5%)	2,677 (71.4%)	1,482 (67.8%)	2,589 (66.2%)	90 (54.5%)	114 (59.1%)	10,419 (66.9%)
Former smoker	628 (11.7%)	452 (12.1%)	307 (14.0%)	602 (15.4%)	34 (20.6%)	39 (20.2%)	2,062 (13.2%)
Current smoker	660 (12.3%)	244 (6.5%)	172 (7.9%)	373 (9.5%)	19 (11.5%)	26 (13.5%)	1,494 (9.6%)
Body mass index[5], kg/m²							
Mean (SD)	31.1 (8.4)	31.1 (8.1)	31.1 (8.3)	31.9 (8.3)	33.2 (9.0)	31.0 (8.8)	31.3 (8.3)
Range	13.7 - 68.3	15.3 - 66.4	14.3 - 64.5	14.6 - 70.4	16.5 - 60.5	15.7 - 60.5	13.7 - 70.4
Visit Type, n (%)							
Primary Care	3,061 (57.0%)	2,064 (55.0%)	1,058 (48.4%)	2,158 (55.2%)	65 (39.4%)	121 (62.7%)	8,527 (54.7%)
Specialist	570 (10.6%)	820 (21.9%)	585 (26.7%)	1,234 (31.6%)	92 (55.8%)	51 (26.4%)	3,352 (21.5%)
Other	1,664 (31.0%)	819 (21.8%)	514 (23.5%)	466 (11.9%)	6 (3.6%)	16 (8.3%)	3,485 (22.4%)
Unknown/Missing	79 (1.5%)	48 (1.3%)	30 (1.4%)	51 (1.3%)	2 (1.2%)	5 (2.6%)	215 (1.4%)

[1] GINA Step defined using prescriptions for asthma treatment in the 6 months prior to the 4-week recall period of patient's index date ACT record
[2] Asthma control defined by ACT scores: 'Not well-controlled' ≤19 and 'Controlled' >19
[3] 'Unknown' race assigned to patients that have 1) conflicting responses for race and/or 2) no entries for race recorded in the system
[4] 'Current' smoking status assigned to patients with a status of 'current smoker' on the date closest to index date. 'Former' assigned to patients with smoking status of 'current smoker' or 'former smoker' at any time before their index date. 'Non-smoker' assigned to patients with only records of 'non-smoker' at any time in the database prior to their index date.
[5] Body mass index measurement recorded on the same date or the date closest to their index date.

Figure 1. Number and percentage of asthma patients by asthma control at index date and by GINA treatment step
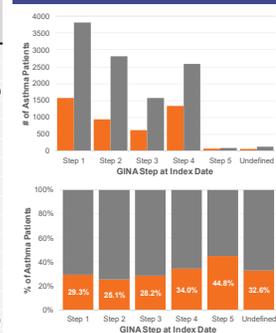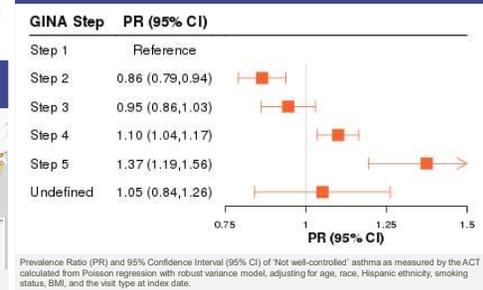

Figure 2. Number of asthma patients and percentage with 'not well-controlled' asthma by 3-digit zip code

* Patients in Puerto Rico are not displayed in this map view.

Conclusions

- Despite a variety of available treatments, patients remain symptomatic across GINA steps in real-world primary care and specialist outpatient practices.
- Our model results indicate that the proportion of 'not well-controlled' asthma patients was higher at higher GINA steps, suggesting an incremental burden and unmet medical need in these populations.

Figure 3. Adjusted prevalence ratio of 'Not well-controlled' asthma symptoms by GINA treatment step among the treated asthma population.

GINA Step	PR (95% CI)
Step 1	Reference
Step 2	0.86 (0.79,0.94)
Step 3	0.95 (0.86,1.03)
Step 4	1.10 (1.04,1.17)
Step 5	1.37 (1.19,1.56)
Undefined	1.05 (0.84,1.26)

Prevalence Ratio (PR) and 95% Confidence Interval (95% CI) of 'Not well-controlled' asthma as measured by the ACT calculated from Poisson regression with robust variance model, adjusting for age, race, Hispanic ethnicity, smoking status, BMI, and the visit type at index date.