Using the Medication Adherence Reasons Scale (MAR-Scale) in Asthma and Chronic Obstructive Pulmonary Disease to Identify and Describe Reasons for Non-Adherence in 5 European Countries

Cerner Enviza
an Oracle company

Elizabeth J. Unni,[1] Nikoletta Sternbach,[2] Amanda R. Mercadante,[2] Kathryn L. Krupsky,[2] Halley Costantino[2]

[1]Touro College of Pharmacy, New York, NY, USA; [2]Cerner Enviza, Malvern, PA, USA

PCR108

Introduction

- Asthma and Chronic Obstructive Pulmonary Disease (COPD) are inflammatory diseases that affect airflow in the lungs.[1]
- The global prevalence of asthma is 6.2% and that of COPD is 4.9%.[2]
- In the European Union (EU), respiratory diseases is the third leading cause of death, causing 8% of all deaths.[3]
- The non-adherence rate to asthma medication(s) is >50% and that with COPD medication(s) is between 22% and 93%.[4,5]
- The First European Congress on Adherence to Therapy urged Europe to place non-adherence to inhaled respiratory medication higher on the policy agenda.[6]
- Understanding the reasons for non-adherence with asthma and/or COPD can result in developing targeted interventions to improve the adherence with these medications.
- The Medication Adherence Reasons Scale (MAR-Scale) is a patient-reported outcomes measure that assesses the different aspects of non-adherence, such as reasons and frequency.
- The scale has demonstrated acceptable reliability and validity in 17 disease areas.[7]

Objective

- The objective of this study was to determine the frequency of and reasons for non-adherence to asthma and COPD medications from 5 European countries (5EU; France, Germany, Italy, Spain, and the United Kingdom [UK]).

Methods

Data Source / Sample

- Data from the National Health and Wellness Study (NHWS), a self-administered, internet-based cross-sectional survey of adults in 2021 in 5EU countries.
- NHWS uses a quota sampling framework (age and sex) to ensure that it is representative of the demographic composition of the 5EU adult population, based on data from International Bureau of the Census.
- The NHWS has been approved by Pearl IRB (Indianapolis, IN, USA).
- NHWS respondents who self-reported taking daily prescription medication(s) to treat asthma and/or COPD responded to the 19 reasons for non-adherence and one global item of the MAR-Scale. The MAR-Scale measures non-adherence "in the past 7 days," on an 8-point scale ranging from 0 days to 7 days. Frequencies were used to identify the reasons for non-adherence.
- Patient Activation Measure (PAM-13) was used to determine the knowledge, skills, and confidence of respondents in managing their health.[8]
- A single-item was used to assess severity for each condition: "*What is the level of severity of your [condition] when using your medication?*"
  - Response options for COPD: mild, moderate, severe
  - Response options for asthma: mild intermittent, mild persistent, moderate persistent, severe persistent

Medication Adherence Reasons Scale (MAR-Scale)

- The scale contains 19 items that capture the specific reasons for non-adherence and one global item to measure the extent of self-reported adherence.
  - Respondents were shown the 19 items from the MAR-Scale and were asked to select all of the items that were reasons for their non-adherence in the past week. For the items chosen by the respondent, they then selected the number of days, using a 7-point scale (1 day to 7 days) in which that reason was a cause of their non-adherence.
  - The global item provided an overall estimate of the frequency of medication adherence. Respondents used an 8-point scale (0 days to 7 days) to report the number of days they took the medication as prescribed in the past week.

Statistical Analysis

- Descriptive statistics included counts and percentages for categorical variables and means and standard deviations (SD) for continuous variables.
- Chi-square tests and ANOVA were used to test differences between groups for categorical variables and continuous variables, respectively.

Results

Patient Characteristics

- Within the NHWS data, 2,136 respondents with asthma and 1,202 respondents with COPD reported taking daily medication(s) (**Table 1**).
- Patients with asthma were, on average, 51.29 years old, 40.96% were male, and 37.55% had a college degree or more (**Table 1**).
- Patients with COPD were, on average, 62.50 years old, 58.90% were male, and roughly one-quarter had at least a college degree (**Table 1**).
- Most patients with asthma and COPD were overweight or obese (>60%), drank alcohol (>70%), and received their COVID-19 vaccine (>75%) (**Table 2**).
- Roughly one-quarter of patients with asthma and over one-third of patients with COPD smoked, and the average number of exercise days for both cohorts ranged from 5.17 to 6.87 days (**Table 2**).

Table 1. Demographic Characteristics

Demographic Characteristics	Asthma			*p-Value*	COPD			*p-Value*
	Total (n=2,136)	Adherent (n=1,180)	Non-Adherent (n=956)		Total (n=1,202)	Adherent (n=835)	Non-Adherent (n=367)	
Male	40.96	38.90	43.51	<0.05	58.90	59.76	56.95	0.362
18-34	18.96	11.53	28.14	<0.001	5.57	1.44	14.99	<0.001
35-44	14.56	11.69	18.10	<0.001	5.49	2.51	12.26	<0.001
45-54	18.68	18.81	18.51	0.86	8.99	7.19	13.08	<0.005
55-64	22.38	25.25	18.83	<0.001	23.63	24.91	20.71	0.115
65+	25.42	32.71	16.42	<0.001	56.32	63.95	38.96	<0.001
Age (mean / SD)	51.29 / 15.99	55.32 / 14.77	46.30 / 16.03	<0.001	62.50 / 13.02	65.65 / 9.77	55.34 / 16.27	<0.001
Married (%)	46.54	46.86	46.13	0.735	50.17	51.50	47.14	0.164
Single, never married (%)	23.08	21.10	25.52	<0.05	12.40	10.18	17.44	<0.001
Retired (%)	26.73	33.64	18.20	<0.001	56.74	63.95	40.33	<0.001
College graduate (four-year) or more (%)	37.55	36.19	39.23	0.149	27.70	25.39	32.97	<0.01

Table 2. Lifestyle Characteristics

Lifestyle Characteristics	Asthma			*p-Value*	COPD			*p-Value*
	Total (n=2,136)	Adherent (n=1,180)	Non-Adherent (n=956)		Total (n=1,202)	Adherent (n=835)	Non-Adherent (n=367)	
Overweight / obese^ (%)	61.32	64.23	57.66	<0.005	66.98	68.25	63.86	0.151
Currently smoke cigarettes (%)	23.60	18.98	29.29	<0.001	36.44	33.53	43.05	<0.005
Drink alcohol (%)	76.40	75.59	77.41	0.327	73.54	71.62	77.93	<0.05
Mean days exercising in the past month	6.87	6.89	6.84	0.885	5.17	4.66	6.33	<0.005
Currently taking steps to lose weight (%)	42.84	38.31	48.43	<0.001	35.94	31.74	45.50	<0.001
Seasonal Influenza (flu) vaccine (%)	48.17	54.32	40.59	<0.001	63.31	67.66	53.41	<0.001
Coronavirus (COVID-19) vaccine (%)	77.20	80.76	72.80	<0.001	83.61	87.54	74.66	<0.001

Note: ^Differing base size – respondents didn't provide weight.

Adherence

- 45% of the respondents with asthma were non-adherent for at least one reason on the MAR-Scale, and 30% of COPD patients were non-adherent (**Table 3**).
- The mean number of days missing medication(s) due to non-adherence in a week is 3.28 days (**Table 3**).
- The older respondents and retired patients were more likely to be adherent (**Table 1**).
- In asthma, respondents who were non-adherent were more overweight and were more likely to report smoking, though they were also taking more steps to lose weight (**Table 2**).

References

1. COPD Overview: https://www.mayoclinic.org/diseases-conditions/copd/symptoms-causes/syc-20353679.
2. Hosseini M, Almasi-Hashiani A, Sepidarkish M, et al. Global prevalence of asthma-COPD overlap (ACO) in the general population: a systematic review and meta-analysis. *Respir Res*. 2019;20:229. doi:10.1186/s12931-019-1198-4.
3. Eurostat (2020). Causes of death statistics, Statistics Explained, September 2020.
4. Bhattarai B, Walpola R, Mey A, Anoopkumar-Dukie S, Khan S. Barriers and Strategies for Improving Medication Adherence Among People Living With COPD: A Systematic Review. *Respir Care*. 2020;Nov;65(11):1738-1750. doi: 10.4187/respcare.07355. Epub 2020 Jun 23. PMID: 32576706.
5. Engelkes M, Janssens HM, de Jongste JC, Sturkenboom MC, Verhamme KM. Medication adherence and the risk of severe asthma exacerbations: a systematic review. *Eur Respir J*. 2015 Feb;45(2):396-407. doi: 10.1183/09031936.00075614. Epub 2014 Oct 16. PMID: 25323234.
6. van Boven JFM, Lavorini F, Dekhuijzen PNR, Blasi F, Price DB, Viegi G. Urging Europe to put non-adherence to inhaled respiratory medication higher on the policy agenda: a report from the First European Congress on Adherence to Therapy. *Eur Respir J*. 2017 May 19;49(5):1700076. doi: 10.1183/13993003.00076-2017. PMID: 28526801.
7. Unni EJ, Sternbach N, Goren A. Using the Medication Adherence Reasons Scale (MAR-Scale) to identify the reasons for non-adherence across multiple disease conditions. *Patient Prefer Adherence*. 2019 Jun 28;13:993-1004. doi: 10.2147/PPA.S205359. PMID: 31308635. PMCID: PMC6612984.
8. Hibbard JH, Mahoney ER, Stockard J, and Tusler M. Development and Testing of a Short Form of the Patient Activation Measure. Health Services Research. 2005;40:1918-1930. https://doi.org/10.1111/j.1475-6773.2005.00438.

Results, continued

Adherence

- Adherent respondents with asthma were activated at levels 3 and 4: "Taking action and gaining control" and "maintaining their behaviors and pushing further" as measured by the PAM-13 (**Figure 2**).
- In COPD, there was no significant weight difference between respondents who were adherent and those who were non-adherent. However, non-adherent respondents were more likely to smoke, but also exercising more and taking steps to lose weight (**Table 2**).
- In both asthma and COPD, the adherent respondents also exhibited adherence to other preventative strategies such as accepting flu and COVID-19 vaccines (**Table 2**).

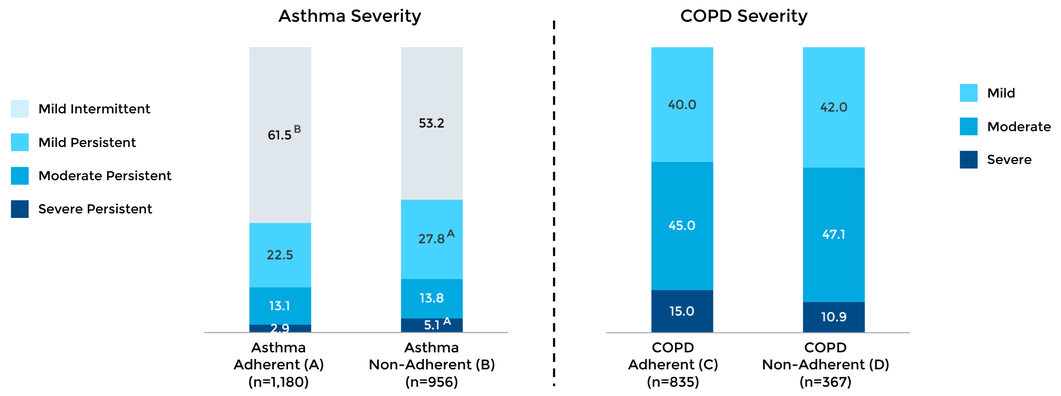
Table 3. Top Reasons for Medication Non-Adherence in Asthma and COPD

Reason for Medication Non-Adherence	EU Asthma (n=2,136)		EU COPD (n=1,202)	
	% of Patients Who Missed	Mean # Days Missed	% of Patients Who Missed	Mean # Days Missed
Non-adherence – aggregated score from 19 reasons	**44.8%**	**3.28**	**30.5%**	**3.28**
Skip the medicine to see if it is still needed	19.8%	2.91	13.4%	3.31
Simply missed the medicine	17.7%	2.38	11.8%	2.91
Concerned about long-term effects from the medicine	16.4%	2.91	13.0%	3.27
Concerned about possible side-effects from the medicine	13.0%	2.83	11.6%	3.25
Don't think that they need the medicine anymore	12.7%	3.82	7.5%	3.56
Side-effects from the medicine	10.5%	2.86	8.3%	2.96
Do not consider taking the medicine as a high priority in my daily routine	10.4%	3.51	10.6%	3.63
Not comfortable taking it for personal reasons	9.3%	3.07	7.5%	3.42
Missed the medicine because of busy schedule / change in routine	9.0%	2.70	8.2%	3.36
Forgetfulness due to cognitive issues	7.5%	3.16	5.2%	3.42
Don't think that the medicine is working for them	7.4%	3.04	8.7%	3.48
Missed the medicine because the pharmacy was out of this medicine / out of refills / mail order did not arrive in time	7.2%	3.06	5.1%	3.48
Trouble managing all the medicines they have to take	7.1%	3.34	6.7%	3.44
Not comfortable taking it for social reasons	7.1%	3.03	5.5%	3.20
Missed the medicine because they didn't have a way to get to the pharmacy / provider	6.6%	3.13	6.2%	3.43
Difficulty opening the container	6.3%	3.29	5.3%	3.63
Difficulty swallowing the medicine or inhaling the medicine	6.2%	3.32	5.5%	3.88
Did not have money to pay for the medicine	6.1%	3.03	5.0%	3.07
Not sure how to take this medicine	5.7%	3.41	4.3%	3.56

Reasons for Non-Adherence

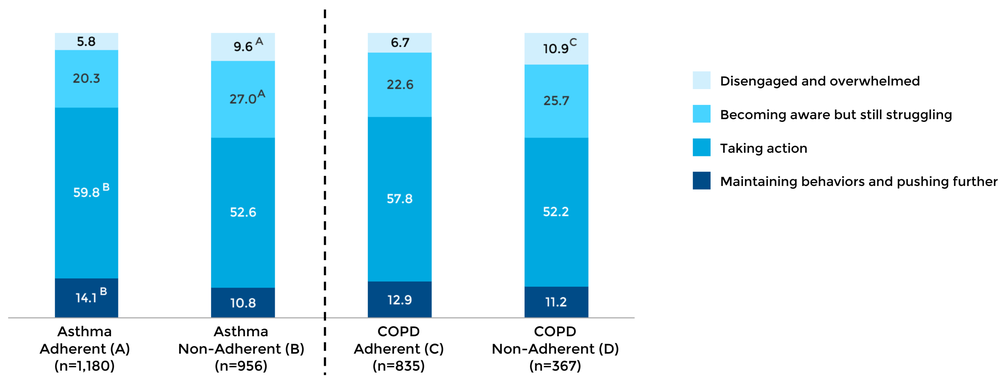
- The major reason for non-adherence in asthma and COPD was "belief" (**Table 3**).
  - The top three reasons for missing medication(s) in both asthma and COPD included: skipping the medicine to see if it is still needed, simply missing the medicine, and concerns about long-term effects from the medicine.
  - Non-adherent respondents with asthma missed taking medicine the most days due to the belief that the medicine is not needed any more (3.82 days). However, for COPD, this was due to difficulty swallowing or inhaling the medicine (3.88 days).
- Non-adherent respondents were more likely to be single and have a college education (**Table 1**).
- Non-adherent respondents were more likely to report severe asthma than adherent patients (**Figure 1**).
- In COPD, there was no relationship between disease severity and adherence (**Figure 1**). However, there was a greater proportion of non-adherent patients in level 1: "disengaged and overwhelmed" (**Figure 2**).

Figure 1. Self-Reported Severity Level When on Medication



Note: Letters indicate statistically significant difference @ 95% confidence level between subgroups.

Figure 2. Patient Activation Measure (PAM-13)



Note: Letters indicate statistically significant difference @ 95% confidence level between subgroups.

Conclusion

Asthma and COPD are symptomatic respiratory diseases that can affect the quality of life of patients. As such, adherence to these medications are essential. Proactive intervention strategies should be developed by clinicians and payers to improve adherence to these medications.

Discussion and Limitations

- The non-adherence rates with asthma and COPD in the 5EU countries, though high, are not as alarming as other disease conditions (e.g., diabetes).[7]
- The major reason for non-adherence, concern beliefs about the medicines, is comparable between asthma and COPD.
- When medicines were missed, they were not taken for an average of 3.28 days.
- Non-adherence was associated with asthma severity.
- Interventions:
  - Younger, single, and college-educated respondents were more likely to be non-adherent. These population can be targeted by healthcare providers.
  - There was a greater proportion of smokers among respondents who reported non-adherence in the asthma/COPD groups. Poor adherence may covary with other negative health behaviors; therefore, these patient groups may benefit most from holistic health and lifestyle interventions.
  - With the low patient activation in respondents who were non-adherent, motivational interviewing can be an intervention strategy that can be used to improve adherence.
  - The proportion of respondents with severe asthma was greater among those who reported non-adherence. Healthcare providers may better meet the needs of patients with severe asthma by initiating earlier discussions around medication adherence.
- Analyses are based on self-reported data of adherence measures. Recall bias may introduce error, in addition to overestimation and/or underestimation of adherence.
- Cross-sectional studies account for only one point in time and do not capture adherence behavior over time. Replicating these results with a longitudinal study would be beneficial.

Presented at ISPOR EUROPE 2022, Vienna, Austria, 6-9 November 2022

Email: elizabeth.unni@touro.edu
https://www.linkedin.com/in/elizabethunni/