Health-related Quality of Life and Productivity Among a Real-world Cohort of Severe Asthma Patients in the United States

Weily Soong[1,*], Bradley E. Chipps[2], Jennifer Trevor[3], Warner Carr[4], Sean O'Quinn[5], Laura Belton[6], Frank Trudo[7], Christopher S. Ambrose[5]

[1]Alabama Allergy & Asthma Center, Birmingham, AL, United States; [2]Capital Allergy & Respiratory Disease Center, Sacramento, CA, United States; [3]University of Alabama at Birmingham, Birmingham, AL, United States; [4]Allergy & Asthma Associates of Southern California, Mission Viejo, CA, United States; [5]AstraZeneca, Gaithersburg, MD, United States; [6]AstraZeneca, Cambridge, United Kingdom; [7]AstraZeneca, Wilmington, DE, United States.

*Presenting author.

Background

- Subspecialist care and intense therapy are frequently necessary to treat severe asthma, which affects approximately 5–10% of patients with asthma[1,2]
- Severe asthma significantly reduces patients' health-related quality of life (HRQoL) as well as their overall activity and work productivity
- There are no contemporary estimates of HRQoL and activity/productivity from a national, real-world sample of U.S. adults with severe asthma

Methods

- CHRONICLE (ClinicalTrials.gov Identifier: NCT03373045) is an ongoing, noninterventional, observational study of U.S. adults with severe asthma treated by allergists/immunologists or pulmonologists
- Protocol-eligible patients are adults with asthma receiving biologic therapy and/or maintenance systemic corticosteroids (mSCS) and/or those uncontrolled (according to European Respiratory Society/American Thoracic Society criteria) on high-dosage inhaled corticosteroids and additional controllers (HD ICS+)
- At enrollment, patients were asked to complete the St. George's Respiratory Questionnaire (SGRQ),[3] including its question on overall health assessment, and the asthma-specific Work Productivity and Activity Impairment (WPAI)[4] questionnaire online
  - The 50-question SGRQ references the prior 3 months and assesses respiratory symptoms, activity limitations, and psycho-social impacts; scores range from 0 to 100, with 0 representing perfect health and 100 representing maximum impairment
    - Patient-reported overall health is captured via a single, separately scored, item in the SGRQ using a 5-point verbal rating scale: Very Good, Good, Fair, Poor, Very Poor
  - The WPAI references the prior 7 days and captures work absenteeism, work presenteeism, total work productivity loss (absenteeism plus presenteeism), and patient-reported work activity impairment; WPAI scores represent the percentage of work impairment (0–100%)
- SGRQ and WPAI responses were summarized overall by treatment category for patients enrolled from February 2018 to February 2019. SGRQ scores were also summarized by patient-reported health
- Further analyses of the SGRQ responses were conducted to describe the following:
  - The correlation between scores and patients' overall self-assessment of their health
  - The frequency of specific disease effects captured by true/false and free response questions
  - Patient clusters based on concordance/discordance of SGRQ domain scores

Results

- At the time of this analysis, a total of 796 patients were enrolled across 89 sites
- Overall, 482 (61%) patients completed ≥1 questionnaire at enrollment
- Patient demographics and other characteristics were generally similar for those completing questionnaires and all patients enrolled (Table 1)

Table 1. Patient Demographics and Clinical Characteristics at Enrollment[a]

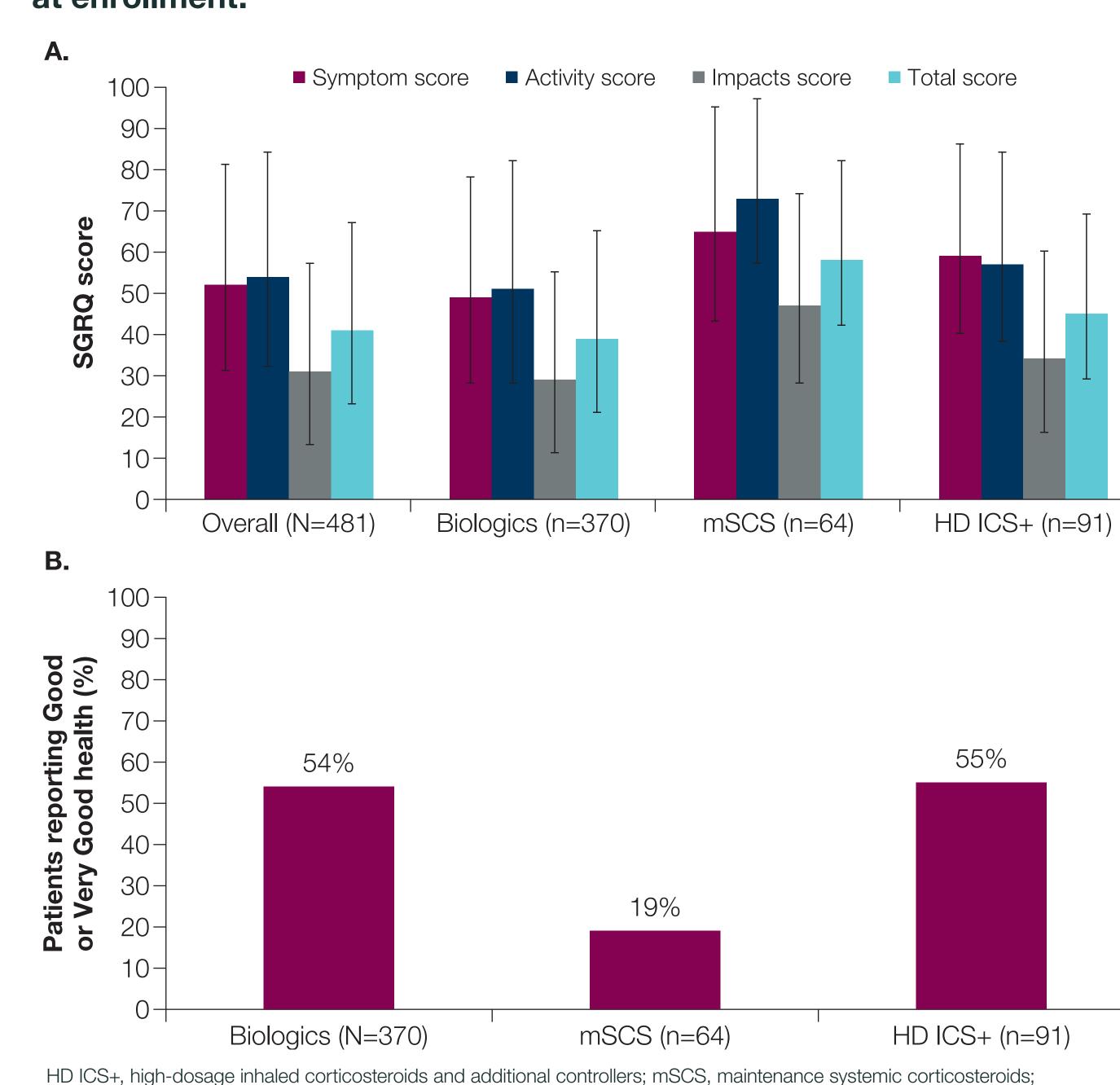|	All enrolled (N=796)	Completed enrollment questionnaires (N=481)
Age at enrollment, y		
Mean (SD)	54 (14)	53 (16)
Median (range)	55 (18–89)	55 (18–83)
Female sex, %	67%	68%
Race, %		
White	77%	82%
Black	16%	12%
Other	7%	6%
Hispanic or Latino ethnicity, %	8%	7%
BMI, kg/m²		
Mean (SD)	33 (8)	33 (8)
Median (range)	31 (16–70)	31 (27–38)
Care by subspecialist at site, %		
Allergist/immunologist	45%	49%
Pulmonologist	43%	38%
Allergist/immunologist and pulmonologist	11%	13%
Insurance, %		
Commercial	63%	66%
Medicare	22%	22%
Medicaid	9%	5%
Uninsured	1%	1%
Other[b]	5%	5%
Residential area, %		
Urban	26%	24%
Suburban	50%	52%
Rural	22%	22%
Missing	2%	2%
Smoking status, %		
Never	68%	67%
Former	29%	28%
Current	3%	4%
Employment status, %		
Employed full-time	43%	43%
Employed part-time	6%	6%
Self-employed	3%	3%
Homemaker	4%	5%
Full-time student	1%	2%
Retired	22%	22%
Disabled due to asthma	8%	8%
Disabled due to nonasthma condition	5%	4%
Unemployed[c]	5%	4%
Missing	3%	2%
Education level, %		
Some high school or less	5%	4%
Graduated high school	21%	21%
College	48%	47%
Graduate school	22%	22%
Missing	5%	5%
Enrollment treatment class, %		
Uncontrolled on high-dosage ICS/LABA only	19%	19%
Any monoclonal antibody	77%	77%
Omalizumab	41%	44%
Non-omalizumab	36%	34%
Systemic corticosteroids or immunosuppressant	13%	13%
Exacerbations 12 months prior to enrollment		
Mean number of confirmed exacerbations per patient, n	1.1	1.1
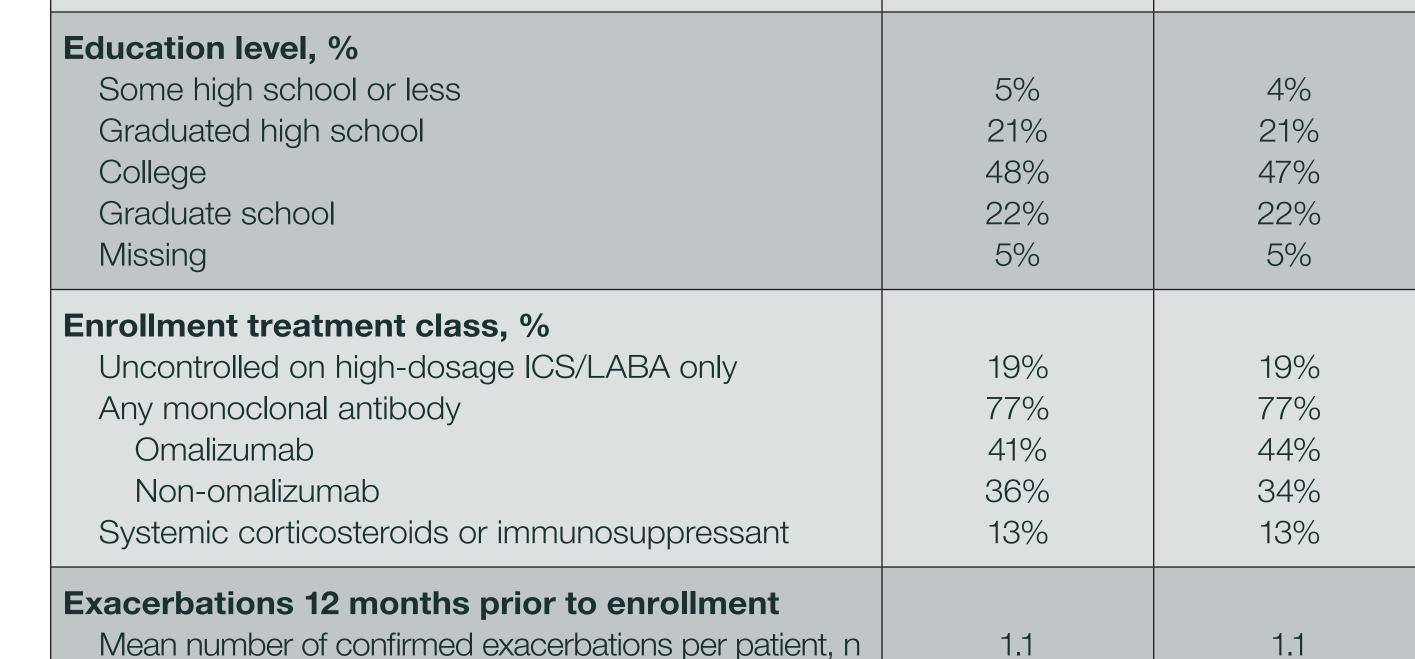
BMI, body mass index; ICS, inhaled corticosteroid; LABA, long-acting β₂-agonist; SD, standard deviation.
[a]Percentages may not sum to 100% as a result of rounding.
[b]"Other" includes "other government, insurance" and "other."
[c]"Unemployed" does not include retired, disabled, or homemaker.

SGRQ Results

- 481 patients completed the SGRQ questionnaire at enrollment
- Patients receiving biologic therapy (n=370), mSCS (n=64), and HD ICS+ only (n=91) had mean total SGRQ scores of 39, 58, and 45, respectively (Figure 1A)
  - Among those treatment categories, 54%, 19%, and 55% of patients, respectively, reported Good or Very Good health (Figure 1B)
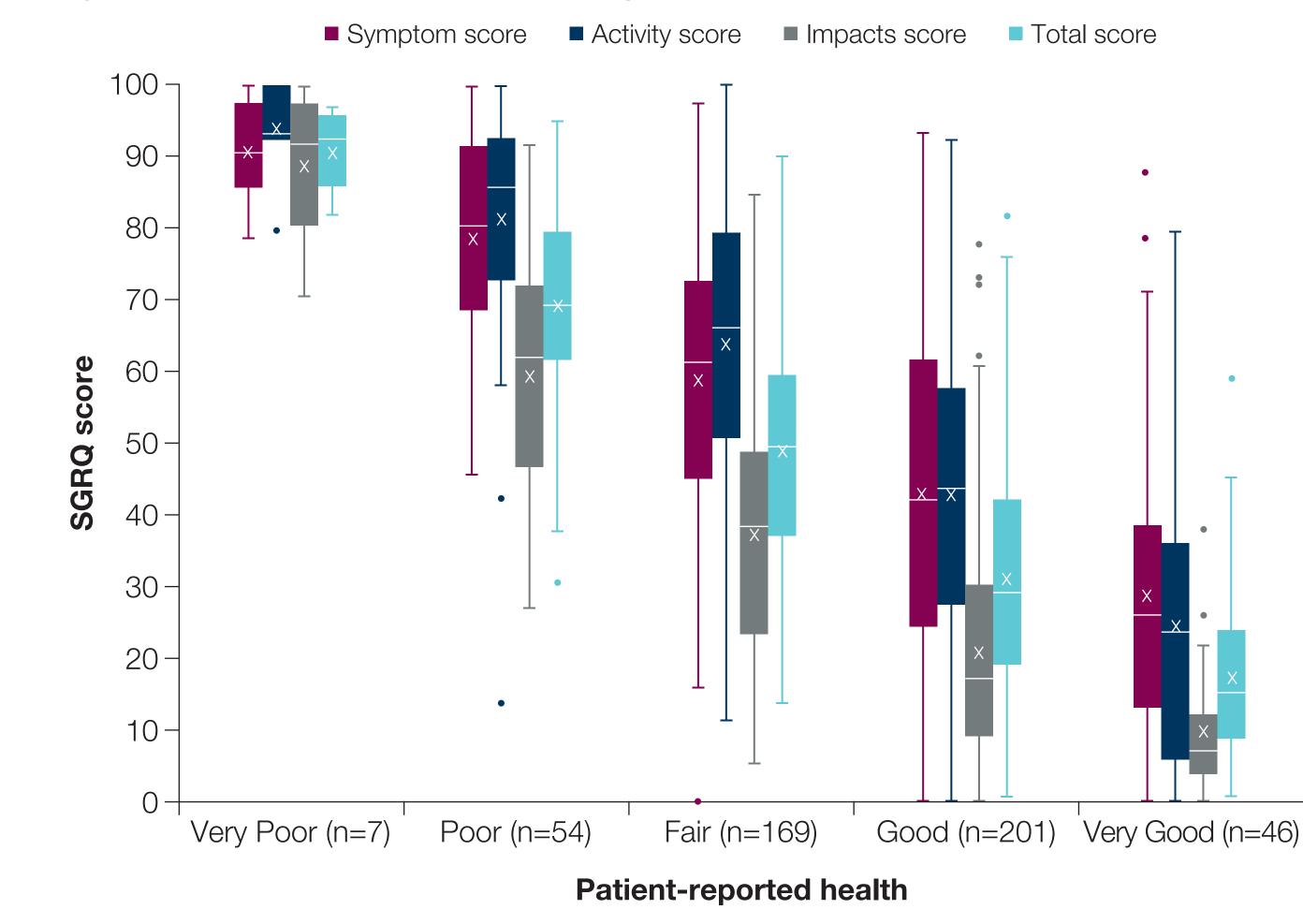
Figure 1. A) Mean (±SD) SGRQ scores, and B) percentage of patients reporting Good or Very Good health, according to treatment category at enrollment.

HD ICS+, high-dosage inhaled corticosteroids and additional controllers; mSCS, maintenance systemic corticosteroids; SD, standard deviation; SGRQ, St. George's Respiratory Questionnaire.

- At the subgroup level, SGRQ scores were consistent with patient-reported health; however, at the patient level, there was significant variability

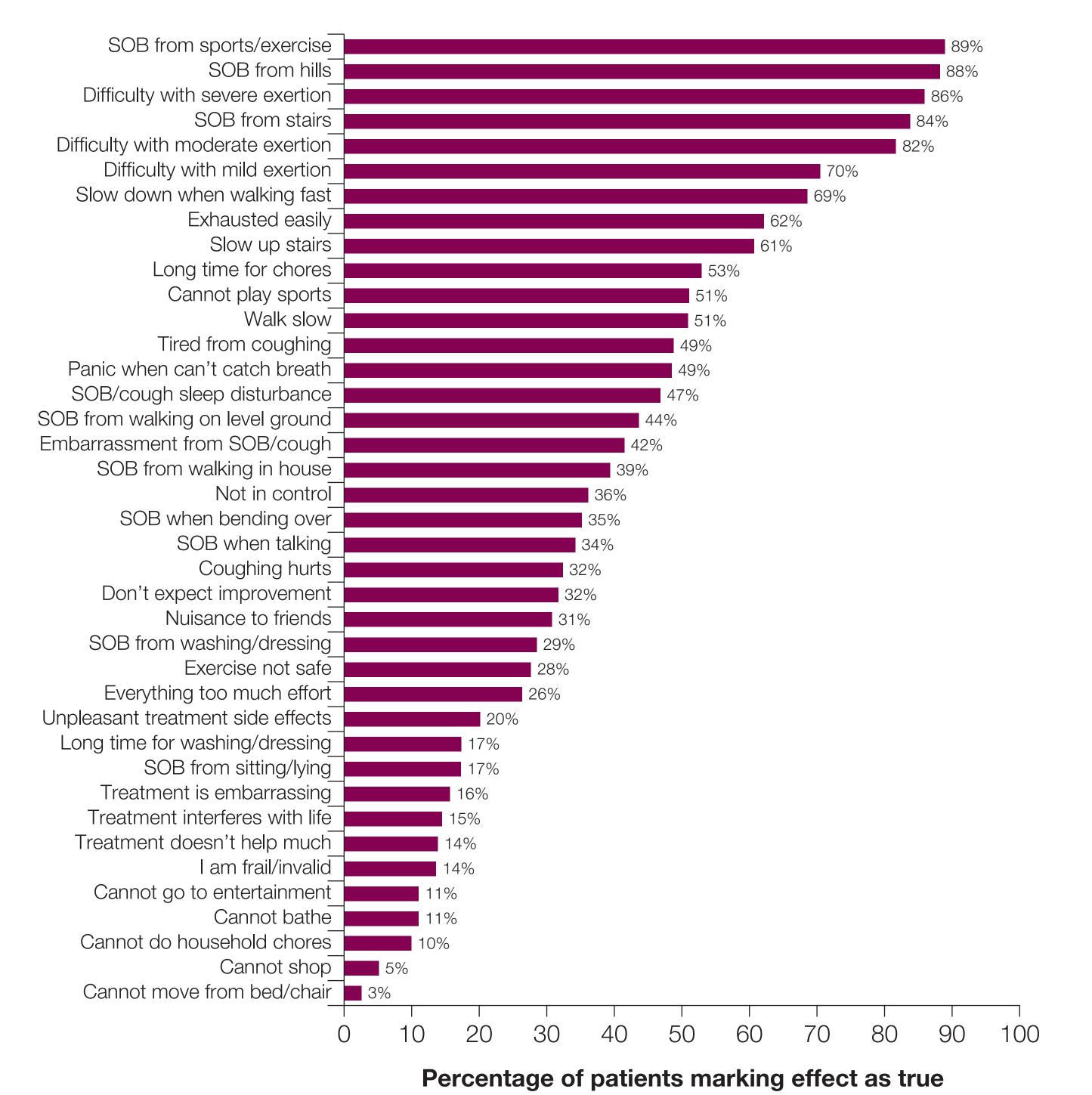**Figure 2. SGRQ scores according to patient-reported health.[a,b]**

SGRQ, St. George's Respiratory Questionnaire.
[a]4 respondents with incomplete or missing data were excluded.
[b]The interquartile range is represented by a filled box. The bar represents the median value and the X represents the mean. Whiskers represent the minimum and maximum observation, accounting for any outliers. Outliers are represented by a filled circle.
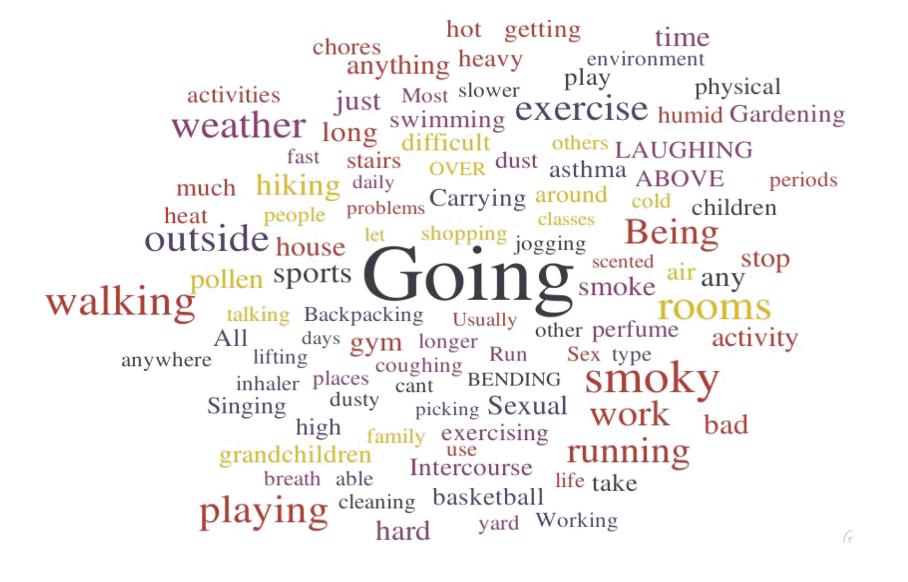
- Among the 39 true/false questions about specific disease effects in the SGRQ, the most commonly reported effects were shortness of breath from sports/exercise, hills, severe exertion, and stairs (Figure 3)
  - Using free text responses, patients reported other important activities for which severe asthma might limit their participation; these free text responses are summarized by a word cloud (Figure 4)

Figure 3. Percentage of patients responding true to specific disease effects collected by the SGRQ.[a]

SGRQ, St. George's Respiratory Questionnaire; SOB, shortness of breath.
[a]Questions listed in this figure are paraphrased from the SGRQ.

Figure 4. Word cloud of patient-reported free text responses to the SGRQ prompt for "other activities that your respiratory problems may prevent you from doing".[a]

SGRQ, St. George's Respiratory Questionnaire.
[a]The more frequently a specific word was reported, the bigger and bolder it appears in the word cloud. Generated using WordItOut (http://worditout.com).
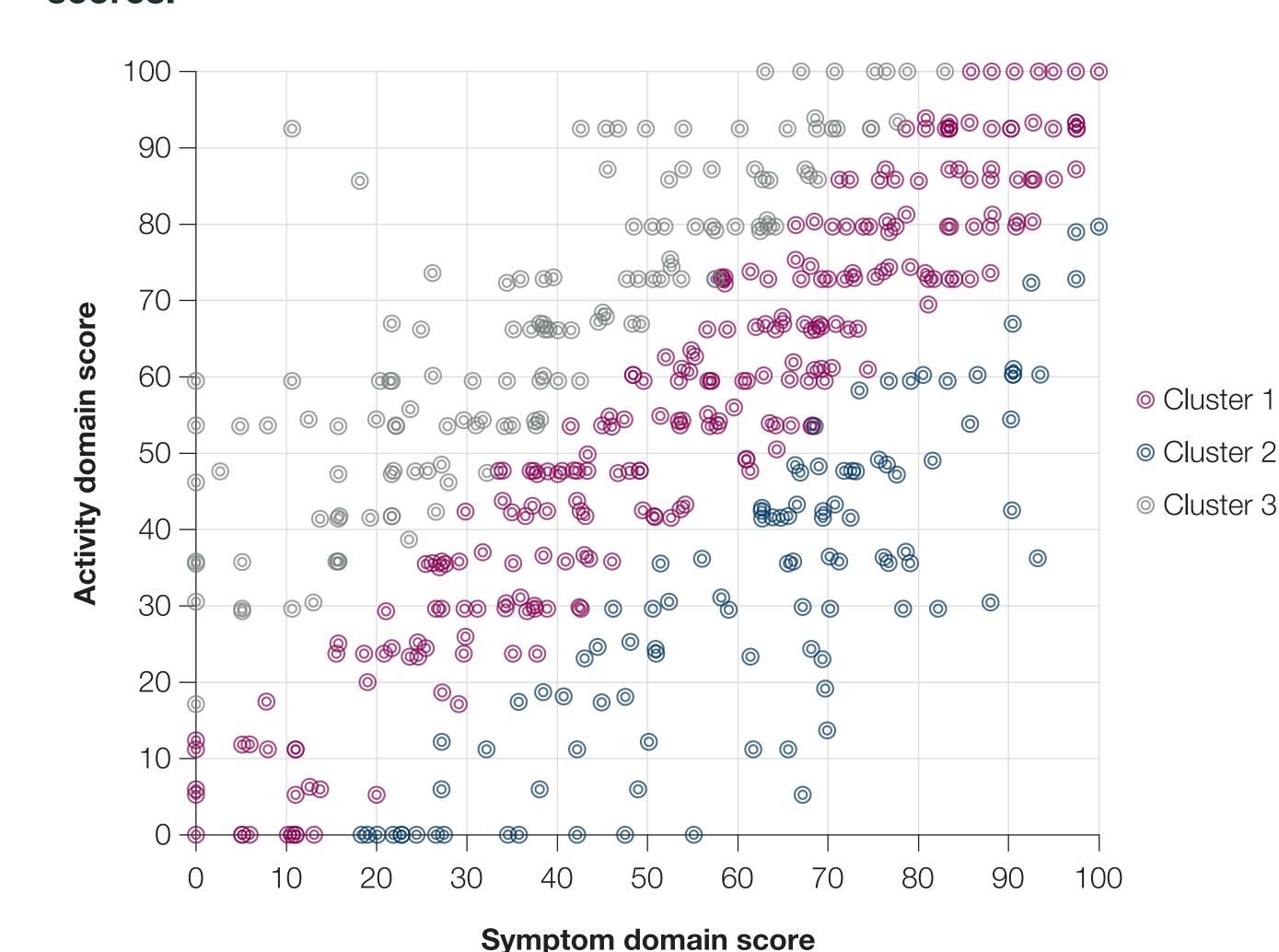
SGRQ Domain Score Correlations

- There were strong correlations between the symptom and impacts domain scores as well as the activity and impacts domain scores; the greatest interpatient variability was found by contrasting symptom and activity domain scores
  - The median difference between symptom and activity domain scores was 14.6

- 3 patient clusters were identified using a symptom vs. activity difference of ≥15 (Figure 5):
  - Cluster 1: similar symptom and activity impairment (difference <15; red)
  - Cluster 2: greater symptom impairment (symptom score ≥15 higher than activity score; blue)
  - Cluster 3: greater activity impairment (activity score ≥15 higher than symptom score; gray)

Figure 5. Comparison of patient SGRQ activity and symptom domain scores.

SGRQ, St. George's Respiratory Questionnaire.

- Examination of mean SGRQ scores by cluster revealed the following (Figure 6):
  - Clusters 1 (similar) and 3 (greater activity impairment) had similar mean impacts and total scores
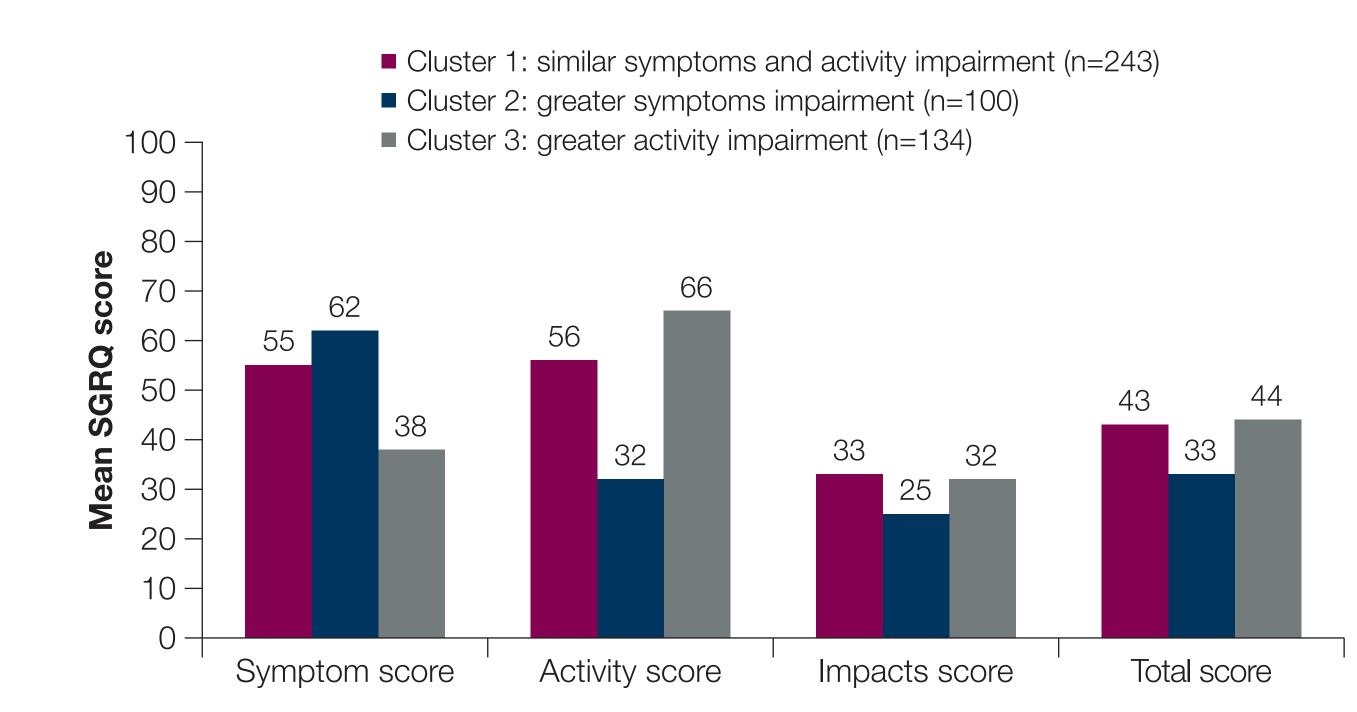 - Cluster 2 (greater symptom impairment) had a lower mean impacts score and lower mean total score
  - Cluster 3 (greater activity impairment) had the highest mean activity score
- Patient-reported health by cluster demonstrated that:
  - Patients in cluster 2 were more likely to report Good or Very Good overall health (67% vs. 47% and 49% in clusters 1 and 3, respectively)
  - Patients in cluster 1 were more likely to report Poor/Very Poor overall health (18% vs. 7% and 7% in clusters 2 and 3, respectively)

Figure 6. Mean SGRQ scores by cluster according to patient symptoms and activity impairment.
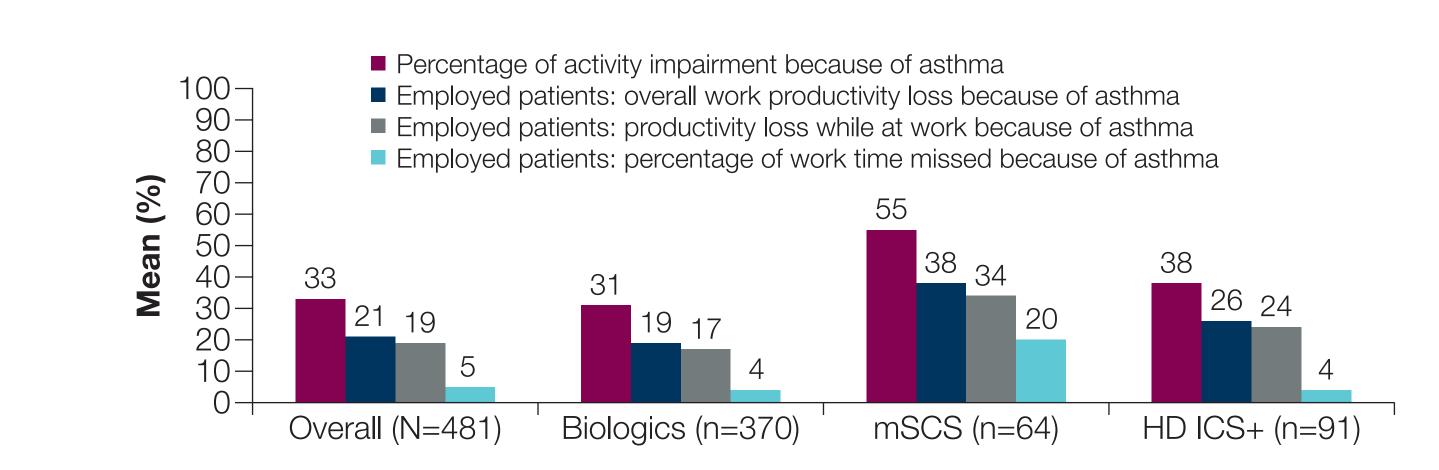

SGRQ, St. George's Respiratory Questionnaire.

WPAI Results

- With the WPAI (N=481), impairment was highest among mSCS patients and lowest among biologic patients
  - Biologic, mSCS, and HD ICS+ only patients had mean percentages of activity impairment due to asthma of 31%, 55%, and 38%, respectively (Figure 7)
  - Among those who were employed (55%, 38%, and 53% of biologic, mSCS, and HD ICS+ only patients, respectively), mean overall work productivity loss was 19%, 38%, and 26%, respectively

Figure 7. WPAI results at enrollment according to treatment categories.[a,b]

HD ICS+, high-dosage inhaled corticosteroids and additional controllers; mSCS, maintenance systemic corticosteroids; WPAI, Work Productivity and Activity Impairment.
[a]Number of employed patients among treatment groups: overall (n=257), biologics (n=204), mSCS (n=24), HD ICS+ only (n=48).
[b]Patients not currently employed reported their ability to complete regular daily activities.

Conclusions

- U.S. patients with severe asthma had reduced HRQoL and work productivity, with less impairment among those receiving biologics and greater impairment among those receiving mSCS or HD ICS+ only
  - Patient-reported health, employment, and work productivity if employed were lower among those receiving mSCS therapy, likely a result of greater disease severity, poorer symptom control, and possible side effects of mSCS therapy
- SGRQ scores correlated with patient-reported health, and free text descriptions of impairments aligned with the concepts captured by the SGRQ. These findings support the SGRQ as an appropriate measure of HRQoL in severe asthma, further validating the performance of the SGRQ among U.S. patients with severe asthma
- Most patients had a difference of <15 points between their symptom and activity impairment scores. Patients in cluster 2 (21% of the total) had greater symptom impairment compared with activity impairment (62 vs. 32, respectively). These patients had better HRQoL as measured by the SGRQ total score
- Rates of patient-reported Good or Very Good health were similar among patients treated with biologic and HD ICS+ only therapies despite HRQoL and productivity differences, suggesting that patient-reported overall health may not reveal meaningful impairment. This finding highlights the challenges of capturing the patient experience via a single item and supports the utility of assessing specific experiences
- These results also suggest that limitation of physical activity, particularly exertional activity, significantly affects quality of life among severe asthma patients

References

1. Chung KF, et al. Eur Respir J. 2014;43:343–73.
2. Global Initiative for Asthma. Global strategy for asthma management and prevention. 2019. Available at www.ginasthma.org/. Accessed August 7, 2019.
3. Jones PW, et al. Am Rev Respir Dis. 1992;145:1321–7.
4. Chen H, et al. Value Health. 2008;11:231–9.