

Epidemiology of lung function in a global severe asthma population

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Introduction

- To date, clinical characteristics of the international severe asthma population are not fully known.
- The International Severe Asthma Registry (ISAR; <http://isaregistry.org/>) is the first global adult severe asthma registry; a multi-country, multi-center, observational real-life initiative.
 - ISAR captures 95 core variables, from existing and newly formed national severe asthma registries, as well as additional safety and effectiveness variables including information on asthma severity, co-morbidities, biomarkers, lung function, diagnostics, medications, control and adherence.¹

Aims

To describe post-bronchodilator (post-BD) lung function of adult severe asthma patients for an initial set of 5 countries (Ireland (IE), Italy (IT), South Korea (SK), the UK and the USA) using a standardised severe asthma definition.

Methods

- ISAR incorporates retrospectively and prospectively collected baseline lung function data from severe asthma patients (≥ 18 years old), receiving GINA Step 5 treatment or remaining uncontrolled on GINA Step 4 treatment (GINA 2018)² from secondary and tertiary care between December 2014 to December 2018.
- Lung function variables assessed included: pre and post-BD % predicted forced expiratory volume in one second (FEV₁), % predicted forced vital capacity (FVC) and FEV₁/FVC.
- Both patient- and aggregate-level data from were used for the analyses.

Results

- The mean post-BD FEV₁/FVC was 0.69 (SD: 0.13) for GINA step 5 patients, and 0.71 (SD: 0.13) for those with uncontrolled asthma on GINA Step 4 (Tables 1A & 1B).
- Both pre- and post-BD % predicted FEV₁ and FVC values at baseline appeared to:
 - Not differ by asthma severity (Figure 1A & 1B) and
 - Showed little improvement post-bronchodilator (Figure 1A & 1B).
- Both of these features were observed at the country level, with some variability noted (Tables 1A & 1B).
- 43% of Step 4 patients and 47% of Step 5 patients had post-BD FEV₁/FVC <0.7.
- Mean bronchodilator responsiveness was < 9% for those in both severity groups and was irrespective of smoking history (Figure 2).³
 - Some inter-country variability was noted (Table 1C).

Table 1A: Lung function for patients uncontrolled on GINA Step 4 included in ISAR and according to country/registry

	Uncontrolled on GINA Step 4					
	Pre-bronchodilator			Post-bronchodilator		
	FEV ₁ (%)	FVC (%)	FEV ₁ /FVC	FEV ₁ (%)	FVC (%)	FEV ₁ /FVC
All	71.8 (15.3) n=2830	78.7 (15.0) n=2965	0.69 (0.12) n=2662	75.7 (16.1) n=2104	82.1(14.7) n=2080	0.71 (0.13) n=1784
USA	72.3 (13.7) n=2244	78.2 (14.1) n=2382	0.70 (0.11) n=2512	75.8 (14.1) n=1591	81.4 (13.6) n=1639	0.71 (0.13) n=1732
UK	72.5 (22.3) n=117	85.2 (17.8) n=114	-	77.5 (22.5) n=73	91.5 (18.1) n=71	-
SK	68.1 (20.1) n=341	76.7 (18.0) n=341	0.6 (0.16) n=12	73.8 (21.1) n=341	81.9 (18.2) n=341	0.62 (0.17) n=12
IT	74.2 (20.5) n=99	91.5 (18.8) n=99	0.65 (0.11) n=109	77.1 (19.1) n=99	-	0.59 (0.14) n=11
IE	65.2 (14.5) n=29	76.2 (19.6) n=29	0.65 (0.15) n=29	83.0 (18.2) n=29	103.2 (17.3) n=29	0.68(0.14) n=29

Results

Table 1B: Lung function for patients on GINA Step 5 included in ISAR and according to country/registry

	GINA Step 5					
	Pre-bronchodilator			Post-bronchodilator		
	FEV ₁ (%)	FVC (%)	FEV ₁ /FVC	FEV ₁ (%)	FVC (%)	FEV ₁ /FVC
All	70.4 (19.0) (n=1437)	82.5 (17.3) (n=1484)	0.68 (0.12) (n=1045)	76.2 (19.2) (n=975)	84.5 (17.3) (n=775)	0.69 (0.13) (n=530)
USA	74.9 (15.8) (n=625)	80.1 (15.3) (n=688)	0.69 (0.11) (n=740)	75.5 (15.6) (n=390)	82.1 (14.2) (n=413)	0.69 (0.13) (n=445)
UK	65.2 (22.0) (n=503)	84.5 (20.4) (n=487)	-	71.1 (21.9) (n=276)	89.9 (20.5) (n=264)	-
SK	68.0 (20.7) (n=98)	77.5 (19.0) (n=98)	0.60 (0.13) (n=8)	72.1 (21.4) (n=98)	80.4 (19.8) (n=98)	0.63 (0.15) (n=8)
IT	70.7 (18.8) (n=211)	88.3 (18.4) (n=211)	0.66 (0.13) (n=297)	86.0 (20.5) (n=211)	-	0.68 (0.14) (n=77)

Footnote to both Table 1A and Table 1B
Data are presented as mean (standard deviation)
FEV₁: forced expiratory volume in one second; FVC: forced vital capacity; GINA: Global Initiative for Asthma; IE: Ireland; IT: Italy; SK: south Korea
% predicted data are based on aggregate level data from UK, SK and IT, and patient level data from the USA and IE
FEV₁/FVC is derived from patient level lung function data from USA, SK, IT and IE. It is not reported for the UK due to aggregate level data.
There were no patients on GINA Step 5 treatment from Ireland

Table 1C: Bronchodilator reversibility (%) as a function of asthma severity and smoking status for all patients included in ISAR and according to country/registry

Country	Uncontrolled on GINA Step 4		GINA Step 5	
	Smokers	Non-smokers	Smokers	Non-smokers
	ERS definition (change from % predicted FEV ₁ ; threshold >9%) ³			
All (n=2149)	6.9% (6.9)	6.7% (7.8)	7.6% (8.1)	7.0% (8.6)
USA (n=1849)	7.0%(6.9)	6.6%(6.9)	7.0% (7.9)	6.5% (7.8)
SK (n=20)	6.2% (6.9)	5.0% (4.9)	4.1% (3.1)	9.0% (5.1)
IT (n=251)	7.5% (7.0)	9.0% (17.5)	9.9% (9.0)	7.6% (9.8)
IE (n=29)	6.8% (4.7)	6.2% (5.9)	-	-

Bronchodilator Reversibility (% change in lung function) are presented as mean (standard deviation) bronchodilator reversibility according to ERS/ATS definition.
FEV₁: forced expiratory volume in one second; ERS: European Respiratory Society; GINA: Global Initiative for Asthma; IE: Ireland; IT: Italy; SK: South Korea
Bronchodilator reversibility is not reported for UK due to aggregate level data
There were no patients on GINA Step 5 treatment from Ireland

Conclusions

- Results from the initial ISAR countries indicate that fixed airflow obstruction is common in severe asthma patients seen by specialists or at tertiary care centres, and is associated with poor bronchodilator responsiveness regardless of smoking history or treatment on GINA Steps 4 or 5.

References

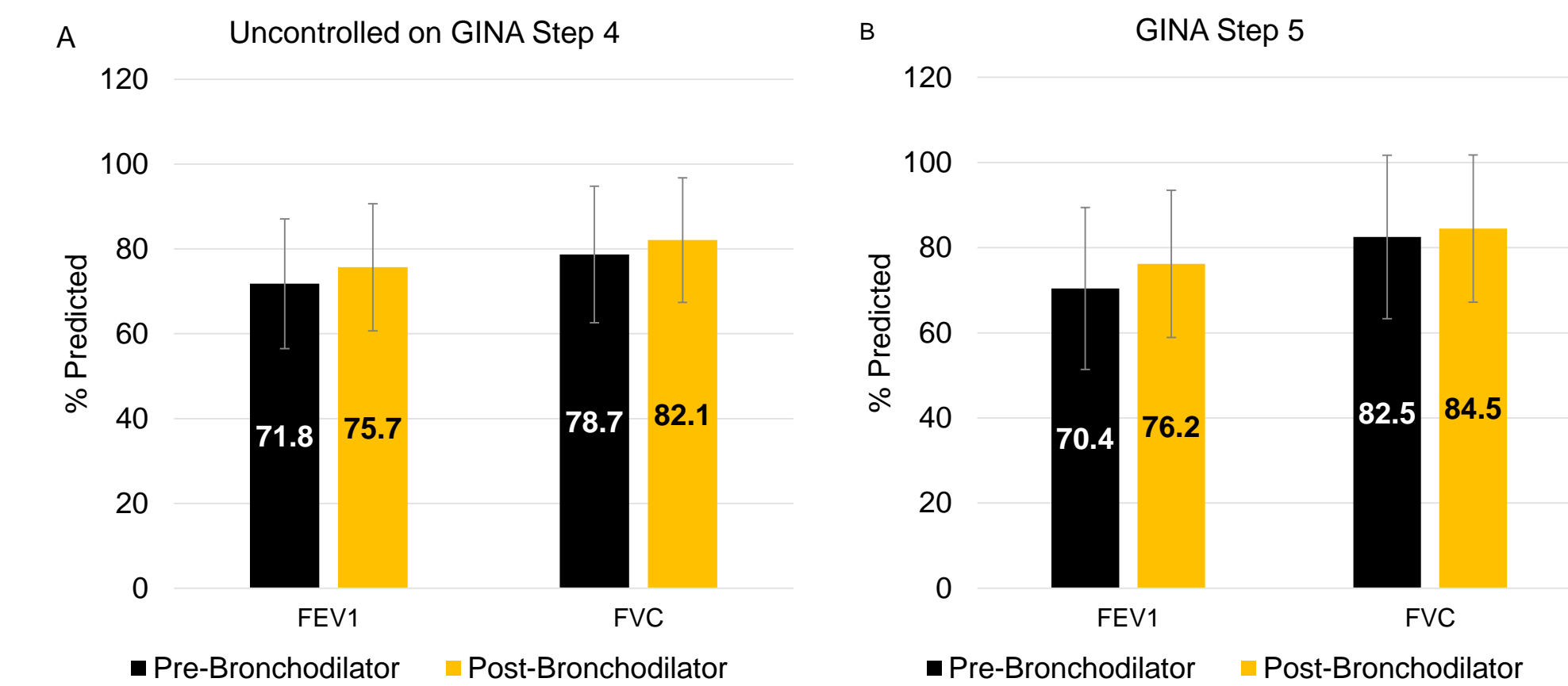
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Acknowledgments & Conflict of interest

ISAR is conducted by Optimum Patient Care Global Limited, and co-funded by OPC Global and AstraZeneca.

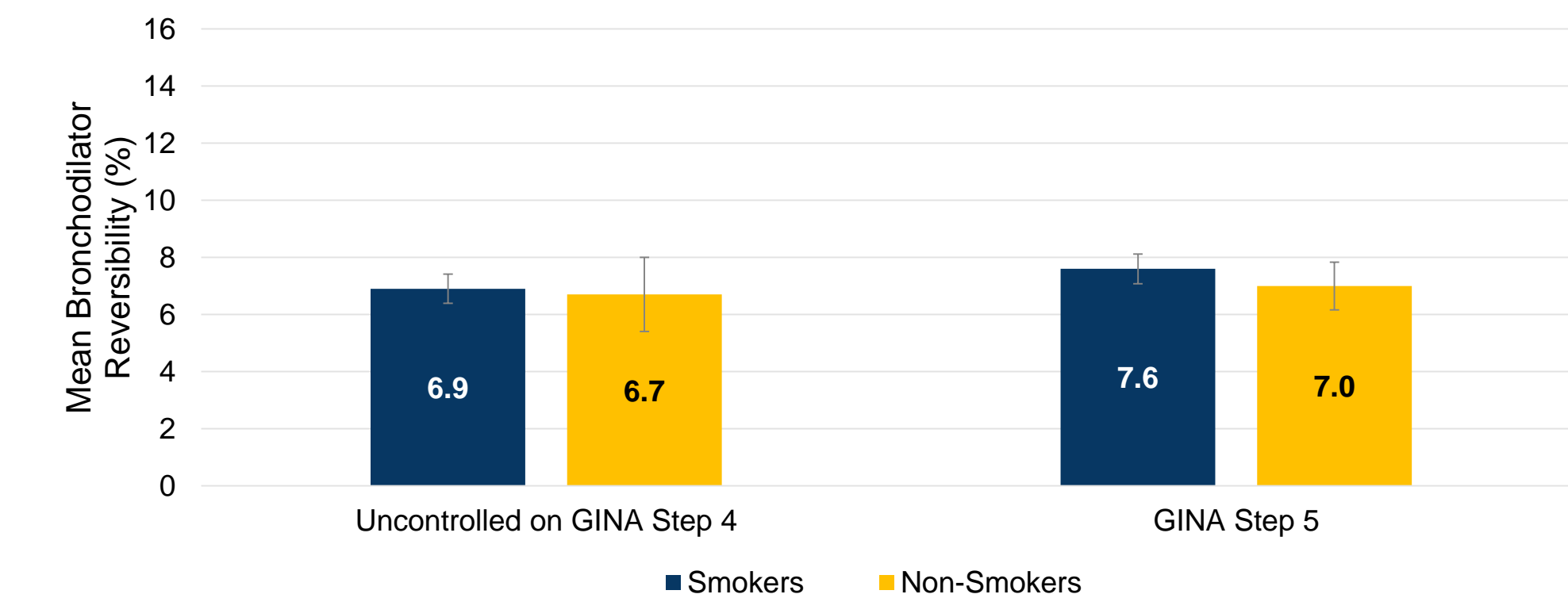
Andrew Menzies-Gow declares grants from AstraZeneca, Boehringer Ingelheim, GlaxoSmithKline, and Hoffmann La Roche; consultancy agreements with AstraZeneca, Sanofi, and Vectura; attendance at advisory boards for AstraZeneca, Boehringer Ingelheim, GlaxoSmithKline, Novartis, Sanofi, and Teva; received speaker fees from AstraZeneca, Boehringer Ingelheim, Novartis, Teva, and Vectura; and attended international conferences for Boehringer Ingelheim and Teva.

Figure 1 Pre- and post-bronchodilator lung function in ISAR patients (A) uncontrolled on GINA Step 4 and (B) on GINA Step 5 (all patients)



FEV₁: forced expiratory volume in one second; FVC: forced vital capacity; GINA: Global Initiative for Asthma; ISAR: International Severe Asthma Registry

Figure 2 Mean bronchodilator reversibility in smokers and non-smokers in ISAR patients according to asthma severity (all patients)



GINA: Global Initiative for Asthma; ISAR: International Severe Asthma Registry