Clinical characteristics of Korean Severe Asthma : Findings from ISAR

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DEFINITIONS: UNCONTROLLED, DIFFICULT-TO-TREAT, AND SEVERE ASTHMA

Understanding the definitions of difficult-to-treat and severe asthma starts with the concept of uncontrolled asthma.

Uncontrolled asthma includes one or both of the following:

- Poor symptom control (frequent symptoms or reliever use, activity limited by asthma, night waking due to asthma)
- Frequent exacerbations (≥2/year) requiring OCS, or serious exacerbations (≥1/year) requiring hospitalization.

Difficult-to-treat asthma is asthma that is uncontrolled despite prescribing of medium- or high-dose ICS with a second controller (usually a LABA) or with maintenance OCS, or that requires high-dose treatment to maintain good symptom control and reduce the risk of exacerbations.[175] It does not mean a 'difficult patient'. In many cases, asthma may appear to be difficult to treat because of modifiable factors such as incorrect inhaler technique, poor adherence, smoking or comorbidities, or because the diagnosis is incorrect.

Severe asthma is a subset of difficult-to-treat asthma (Box 8-1). It means asthma that is uncontrolled despite adherence with maximal optimized high-dose ICS-LABA treatment and management of contributory factors, or that worsens when high-dose treatment is decreased.[175] At present, therefore, 'severe asthma' is a retrospective label. It is sometimes called 'severe refractory asthma',[175] because it is defined by being relatively refractory to high-dose inhaled therapy. However, with the advent of biologic therapies, the word 'refractory' is no longer appropriate.

Asthma is not classified as severe if it markedly improves when contributory factors such as inhaler technique and adherence are addressed.[175]

중증 천식의 정의 (GINA)

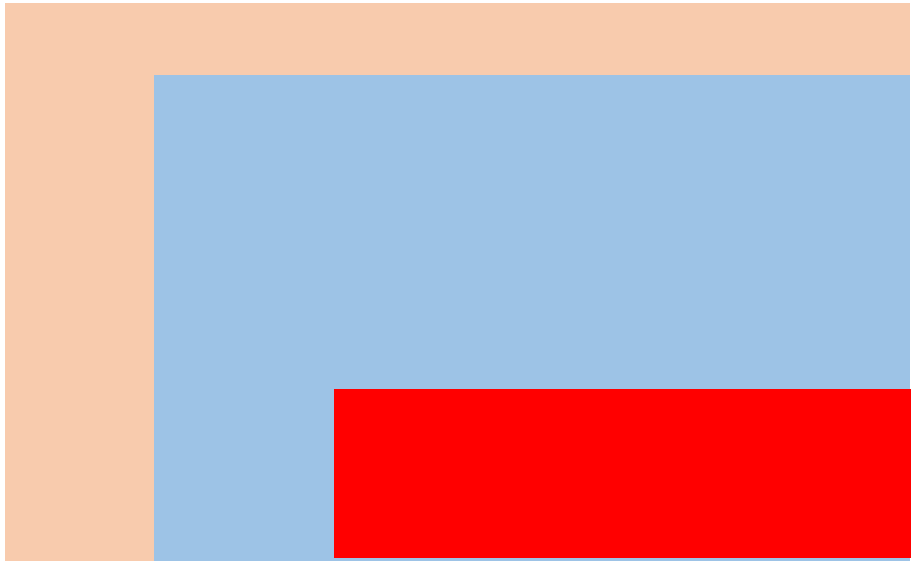
- 조절되지 않는 천식(uncontrolled asthma): 아래의 두가지 항목 중 하나
  - 조절되지 않는 천식 증상 (빈번한 천식 증상 또는 증상 완화제의 사용, 천식으로 인한 활동 제한 또는 야간수면 방해)
  - 년 2회 이상의 경구용 스테로이드가 필요한 천식 악화 또는 년 1회 이상의 입원이 필요한 중증 천식 악화

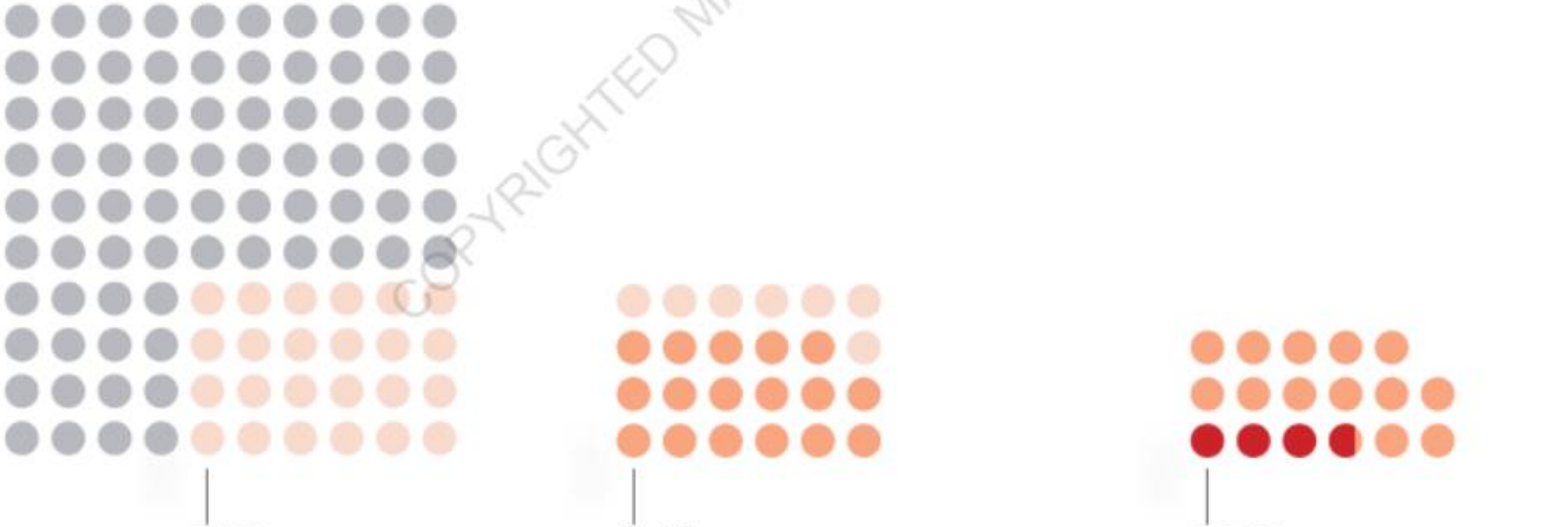
표 3-8. 천식조절평가(GINA 2021)

천식증상조절			천식 증상 조절 정도		
지난 4주 간의 증상			조절 천식	일부 조절 천식	조절되지 않는 천식
- 일주일간 3회 이상의 주간천식 증상	있음 □	없음 □			
- 천식으로 인한 야간수면방해	있음 □	없음 □	4항목 모두 없음	1-2 항목 있음	3-4 항목 있음
- 일주일에 3회 이상 SABA 증상완화제 사용	있음 □	없음 □			
- 천식으로 인한 활동 제한	있음 □	없음 □			
천식 악화 위험 인자					

- 조절되지 않는 천식(uncontrolled asthma): 아래의 두가지 항목 중 하나
- 난치성 천식(difficult-to-treat asthma): 아래 중 하나의 경우
  - 중간 또는 고용량의 흡입스테로이드와 다른 조절제 또는 유지 용량의 경구용 스테로이드를 사용하는데도 불구하고 여전히 조절되지 않는 경우
  - 증상 조절 및 악화 위험 감소를 위하여 고용량 흡입스테로이드 이상의 치료가 필요한 경우

- 조절되지 않는 천식(uncontrolled asthma): 아래의 두가지 항목 중 하나
- 난치성 천식(difficult-to-treat asthma): 아래 중 하나의 경우
- 중증 천식(severe asthma): 난치성 천식 중 아래의 경우에 모두 해당하는 경우
  - 치료에 대한 순응도가 좋으며 천식증상의 악화에 기여하는 요인을 모두 치료하고 있음.
  - 고용량 흡입스테로이드-지속형 베타작용제 복합제를 최적화하여 사용하고 있음에도 천식 증상이 조절되지 않거나 치료 용량을 줄이면 악화되는 경우.





GINA 2024
J Allergy Clin Immunol 2015;135:896-902

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Primary Objectives

- Describe and characterise the severe asthma patient population natural history overall, where appropriate, and by different subgroups
- Facilitate phenotyping and endotyping of patients with severe asthma and describe these groups by burden of illness, disease management patterns and clinical evolution in an international setting

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- Evaluate real-life effectiveness and safety of treatments for severe asthma overall and in specific patient groups/phenotypes
- Support development of effective and efficient diagnostic routines and therapeutic principles
- Improve patient outcomes through structured asthma reviews (short-term) and increased understanding of severe asthma (long-term)
- Minimise side effects of steroid exposure through use of appropriate treatments
- Assess differences in levels of classification as defined by comparing physician-diagnosed severe asthma at baseline against diagnostic criteria of established guidelines
- Describe disease management patterns such as treatment changes over time (e.g. step up, step down and switches), as well as reasons for changes, and the effect of these changes on clinical progression
- Describe factors associated with treatment choice at baseline
- Describe risk factors associated with poor asthma outcomes including exacerbations, disease burden, health care resource use, medication side effects and disease progression
- Assess the occurrence of exacerbations and other conditions, such as upper respiratory tract infections, including seasonal variations
- Assess biomarker data and estimate their predictive value for disease diagnosis, phenotype/endotype characterisation, response to treatment and progression
- Identify patients who may be eligible for participation in future research studies

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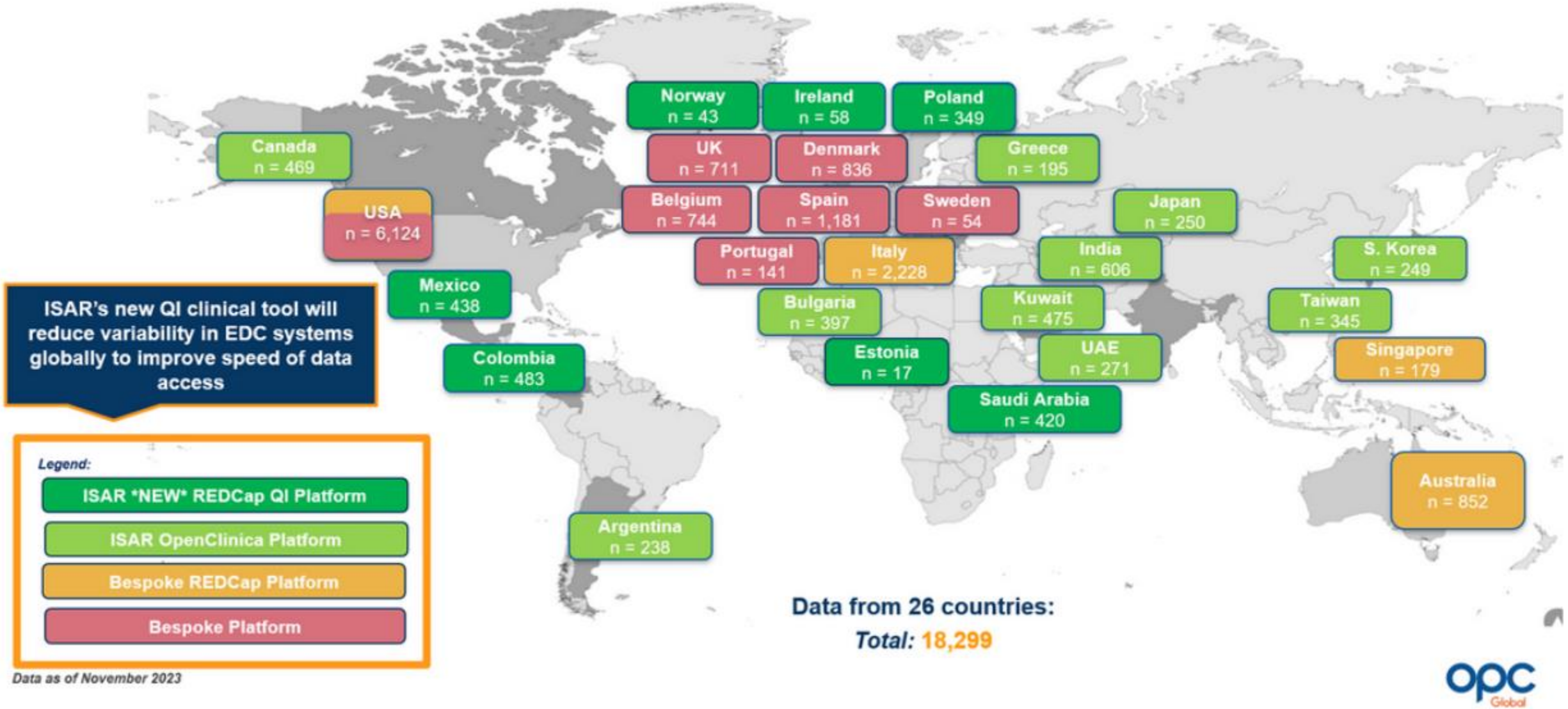

Data as of November 2023

https://www.isar.opcglobal.org/

Table 2 ISAR patient inclusion and exclusion criteria

Inclusion	Exclusion
Adult (≥18 years old) patients with severe asthma	Lack of informed consent for participation
Undergoing GINA Step 5 treatment[a] [19] or Uncontrolled on GINA Step 4 treatment [19] Uncontrolled defined as at least one of the following (per ATS/ERS guidelines [5]): Poor symptom control: ACQ consistently > 1.5, ACT < 20 (or 'not well controlled') [19] Airflow limitation: Pre-bronchodilator FEV_1 < 80% predicted, with reduced FEV_1/FVC (defined as less than the lower limit of normal) Serious exacerbations: ≥1 hospitalisation, ICU stay or mechanical ventilation in the previous year Frequent severe exacerbations: ≥2 bursts of systemic corticosteroids with each course > 3 days in the previous year	

Category	ISAR Variable
Core variables (ISAR-led Delphi study)[a]	
Inclusion criteria	Receiving GINA step 5 therapy Uncontrolled receiving GINA step 4 therapy
Demographics	Date of visit[†] Date of birth Age Gender Body mass index[†] Body surface area[†] Height[†] Weight[†] Ethnicity/Race
Occupation	Current occupation[†]
Medical history	Age of asthma onset Other asthma factors/types/triggers • Exercise, occupation, menstruation, drugs, infections, irritants, weather, emotional, smoke, food, specific allergens, non-allergic, air pressure, cold, COPD overlap Smoking status[†] Pack years[†] Years since the patient stopped smoking[†]
Medical history: Procedures	Bronchial thermoplasty[†]
Hospital resource use	Hospital visits[†] Emergency department visits[†] Asthma exacerbations[‡] • Exacerbation date* • Rescue steroid used: dose and frequency* Invasive ventilation[†]
Comorbidities	Eczema Allergic rhinitis[†] Chronic rhinosinusitis[†] Nasal polyps[†] Atopic disease[†]

Category	ISAR Variable
Core variables (ISAR-led Delphi study)[a]	
Diagnostic tests	Chest CT scan[†] Bone densitometry (DEXA) scan[†]
Laboratory tests	Highest blood eosinophil count details[†] Highest blood eosinophil count not during an exacerbation details[†] Current blood eosinophil count details Blood IgE count Sputum eosinophil count[†] Allergen test[†] • Serum allergen test[†]Skin prick test[†] FeNO test[†]
Lung function	Bronchial provocation test[†] • Adenosine monophosphate, exercise, histamine, hypertonic saline, mannitol, methacholine, prednisolone Pre-bronchodilator FEV_1[†] Pre-bronchodilator FVC[†] Post-bronchodilator FEV_1[†] Post-bronchodilator FVC[†] Pre- and post-bronchodilator: Percentage of predicted FEV_1 and FVC[†] Pre- and post-bronchodilator: FEV_1/FVC ratio[†]
Asthma control	GINA Asthma Control Questionnaire[†]
Asthma medications	OCS[†] • OCS dose* ICS (only)[†] • ICS dose* ICS + LABA combination therapy[†] • ICS + LABA dose* LABA (only)[†] LAMA[†] Theophyllines[†] Leukotriene receptor antagonist (LTRA)[†] Anti-IgE treatment[†] Anti-IL5 treatment[†] Anti-IL4 treatment[†] Macrolide antibiotic treatment[†] Steroid sparing agents[†]
Treatment adherence and clinical management	Adherence to treatment[‡] Current management plan[†] Reason for medication switch between biologics/OCS* • Lack of efficacy, side-effects, drug access influences/restrictions, patient preferences, federal/regional/national/hospital drug provision, compassionate program for drugs, insurance coverage

Category	ISAR Variable
Optional steroid-related comorbidity variables (as established by ISAR)[b]	
Steroid-related comorbidities*	Obstructive sleep apnoea[†] Depression[†] Anxiety[†] Circulatory system disease (Heart failure, myocardial infarction, pulmonary embolism/venous thromboembolism)[†] Osteoporosis[†] Type 2 diabetes[†] Pneumonia[†] Ocular diseases (Cataract, glaucoma)[†] Chronic Kidney Disease (report collecting under the variable name "Renal Failure" in ISAR)[†] Peptic ulcer[†]
Optional safety variables (as established by ISAR)[b]	
Safety of biologics	Serious infection[†] Anaphylaxis[†] Cancer[†]

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Characterization of Severe Asthma Worldwide

Data From the International Severe Asthma Registry

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TABLE 1] Demographic Characteristics of All Patients in the ISAR Database

Characteristic	Data
Sex, No. (%) (n = 4,986)	
Female	2,957 (59.3)
Male	2,029 (40.7)
Age, y (n = 4,967)	
Mean (SD)	55.0 (15.9)
18-34, No. (%)	658 (13.2)
35-54, No. (%)	1,510 (30.4)
55-79, No. (%)	2,588 (52.1)
≥ 80, No. (%)	211 (4.2)
Ethnicity, No. (%) (n = 4,912)	
White	3,568 (72.6)
Asian	589 (12.0)
African	263 (5.4)
Mixed	31 (0.6)
Other	130 (2.6)
Unknown	331 (6.7)
BMI, No. (%), kg/m^2 (n = 4,901)	
Underweight (< 18.5)	105 (2.1)
Normal (≥ 18.5 to < 25)	1,345 (27.4)
Overweight (≥ 25 to < 30)	1,531 (31.2)
Obese (≥ 30)	1,920 (39.2)
Smoking status, No. (%) (n = 4,947)	
Current smoker	294 (5.9)
Exsmoker	1,656 (33.5)
Never smoked	2,997 (60.6)

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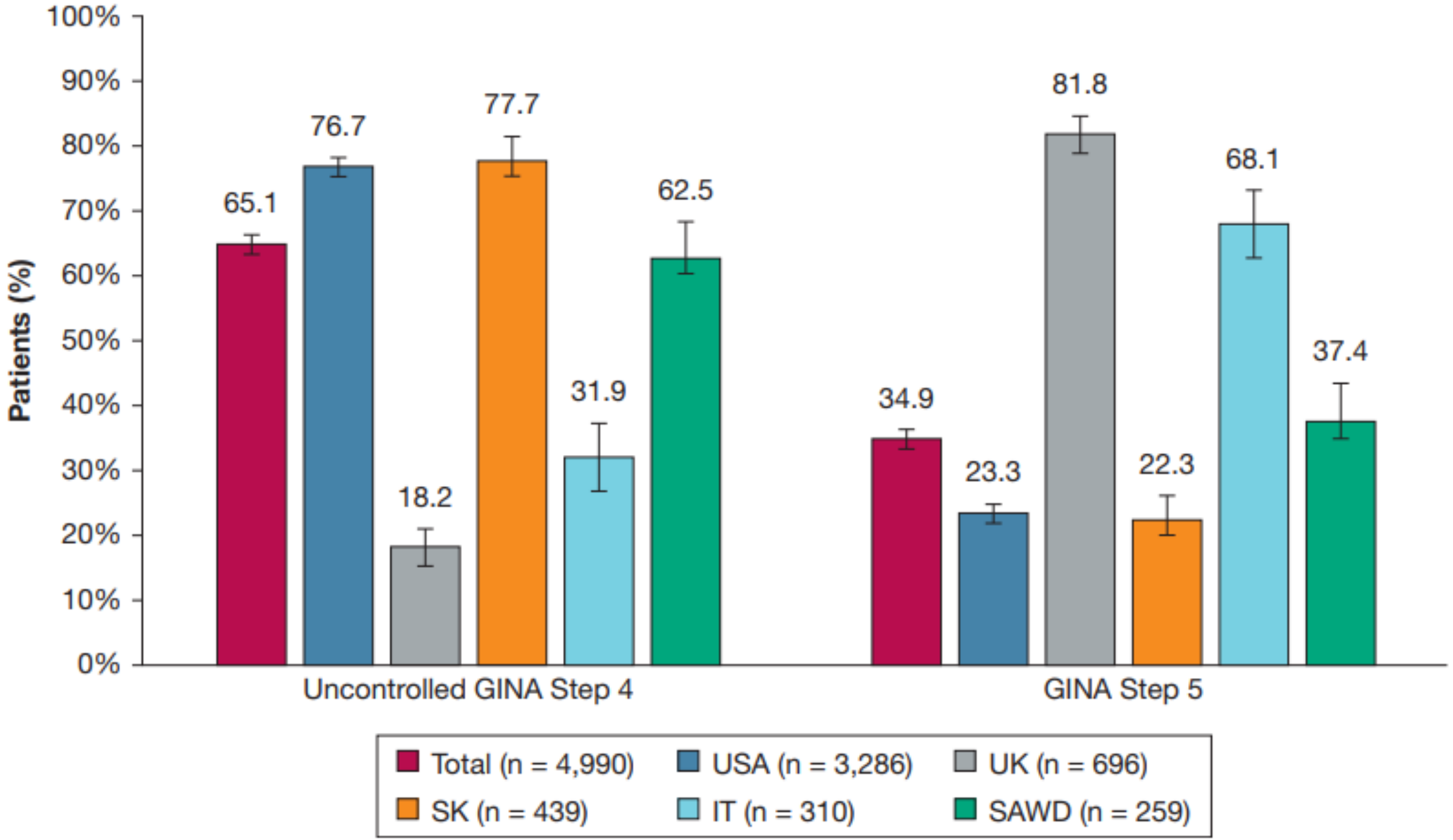

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TABLE 2] Lung Function in Patients With Uncontrolled Asthma at GINA Step 4 or Asthma at GINA Step 5 Included in ISAR and According to Country and Registry

Country or Registry	Uncontrolled Asthma at GINA Step 4					
	Prebronchodilator			Postbronchodilator		
	FEV_1 (SD)	FVC (SD)	FEV_1/FVC (SD)	FEV_1 (SD)	FVC (SD)	FEV_1/FVC (SD)
All	71.9 (15.3) (n = 2,801)[a]	78.7 (14.9) (n = 2,936)	0.69 (0.12) (n = 2,633)	75.6 (16.0) (n = 2,104)	81.8 (14.6) (n = 2,501)	0.71 (0.13) (n = 1,755)
United States	72.3 (13.7) (n = 2,244)	78.2 (14.1) (n = 2,382)	0.70 (0.11) (n = 2,512)	75.8 (14.1) (n = 1,591)	81.4 (13.6) (n = 1,639)	0.71 (0.13) (n = 1,732)
United Kingdom	72.5 (22.3) (n = 117)	85.2 (17.8) (n = 114)	…[b]	77.5 (22.5) (n = 73)	91.5 (18.1) (n = 71)	…[b]
South Korea	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)
Italy	74.2 (20.5) (n = 99)	91.5 (18.8) (n = 99)	0.65 (0.11) (n = 109)	77.1 (19.1) (n = 99)	…[c]	0.59 (0.14) (n = 11)
	GINA Step 5					
All	70.4 (19.0) (n = 1,437)[a]	82.5 (17.3) (n = 1,484)	0.68 (0.12) (n = 1,045)	76.2 (19.2) (n = 975)	84.5 (17.3) (n = 775)	0.69 (0.13) (n = 530)
United States	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)
United Kingdom	65.2 (22.0) (n = 503)	84.5 (20.4) (n = 487)	…[b]	71.1 (21.9) (n = 276)	89.9 (20.5) (n = 264)	…[b]
South Korea	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)
Italy	70.7 (18.8) (n = 211)	88.3 (18.4) (n = 211)	0.66 (0.13) (n = 297)	86.0 (20.5) (n = 211)	…[c]	0.68 (0.14) (n = 77)

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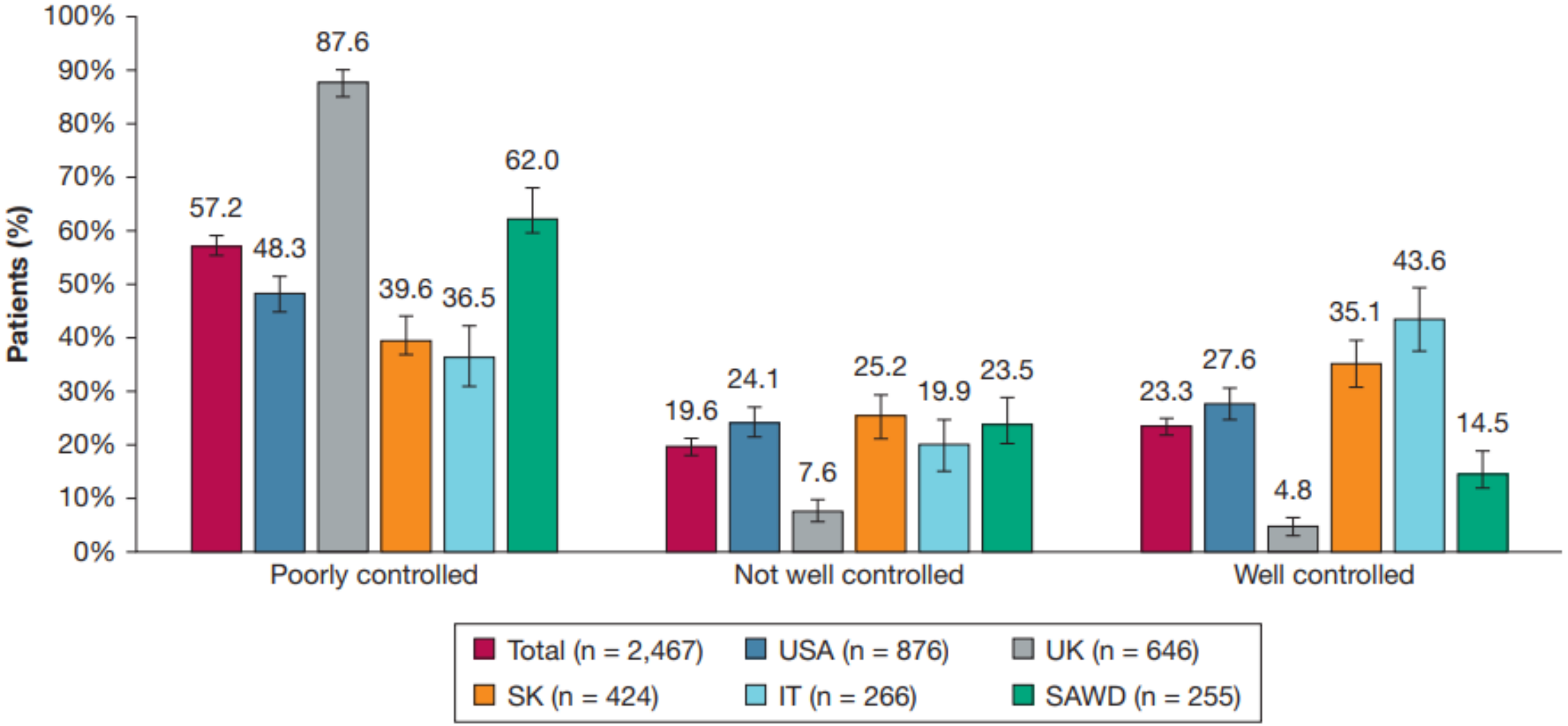
TABLE 4] Demographic and Clinical Characteristics for All Patients Included in ISAR and According to Country and Registry

	Patients With Uncontrolled Asthma at GINA Step 4 or at GINA Step 5							Patients at GINA Step 5 Only[a]	
Country or Registry	Age, Mean (SD), y	Overweight or obese, % (95% CI)	Age at Onset, Mean (SD), y	Exacerbations per Year, Mean (SD)	Receiving Repeated Intermittent OCS, % (95% CI)	Receiving Regular OCS, % (95% CI)	Receiving Biologics (Anti-IgE or Anti-IL-5), % (95% CI)	Receiving Regular OCS, % (95% CI)	Receiving Biologics (Anti-IgE or Anti-IL-5), % (95% CI)
All (N = 4,990)	55.0 (15.9)	70.4 (69.1-71.7)	30.7 (17.7)	1.7 (2.7)	51.1 (49.8-52.5)	30.1 (24.5-35.7)	25.4 (24.2-26.6)	48.8 (38.8-58.7)	72.6 (63.8-81.5)
United States (n = 3,286)	55.5 (16.7)	74.2 (70.0-78.3)	…[b]	0.8 (1.6)[c]	26.8 (25.3-28.4)	23.3 (21.8-24.7)	16.2 (15.0-17.5)	20.4 (17.5-23.2)	69.8 (60.7-78.9)
United Kingdom (n = 696)	48.3 (14.1)	78.2 (74.3-82.1)	25.4 (18.7)	5.0 (4.0)	100.0 (0-0)	59.6 (56.0-63.3)	67.3 (63.8-70.8)	72.9 (69.3-76.6)	82.4 (74.8-89.9)
South Korea (n = 439)	62.4 (14.1)	35.1 (30.6-39.6)	41.0 (17.1)	1.1 (1.5)	48.3 (43.6-53.0)	20.7 (16.9-24.5)	1.4 (0.3-2.4)	92.9 (87.8-98.0)	6.1 (1.4-10.9)
Italy (n = 310)	54.5 (13.8)	54.6 (49.9-59.3)	34.4 (17.1)	3.7 (7.2)	92.3 (89.3-95.2)	63.1 (56.5-69.1)	69.3 (64.2-74.5)	61.4 (54.9-68.0)	100.0 (0-0)
SAWD (n = 259)[d]	55.1 (15.3)	80.6 (76.9-84.3)	22.7 (17.1)	3.3 (2.9)	85.3 (81.0-89.6)	24.7 (19.5-30.0)	17.0 (12.4-21.6)	66 (56.6-75.4)	45.4 (35.5-55.2)



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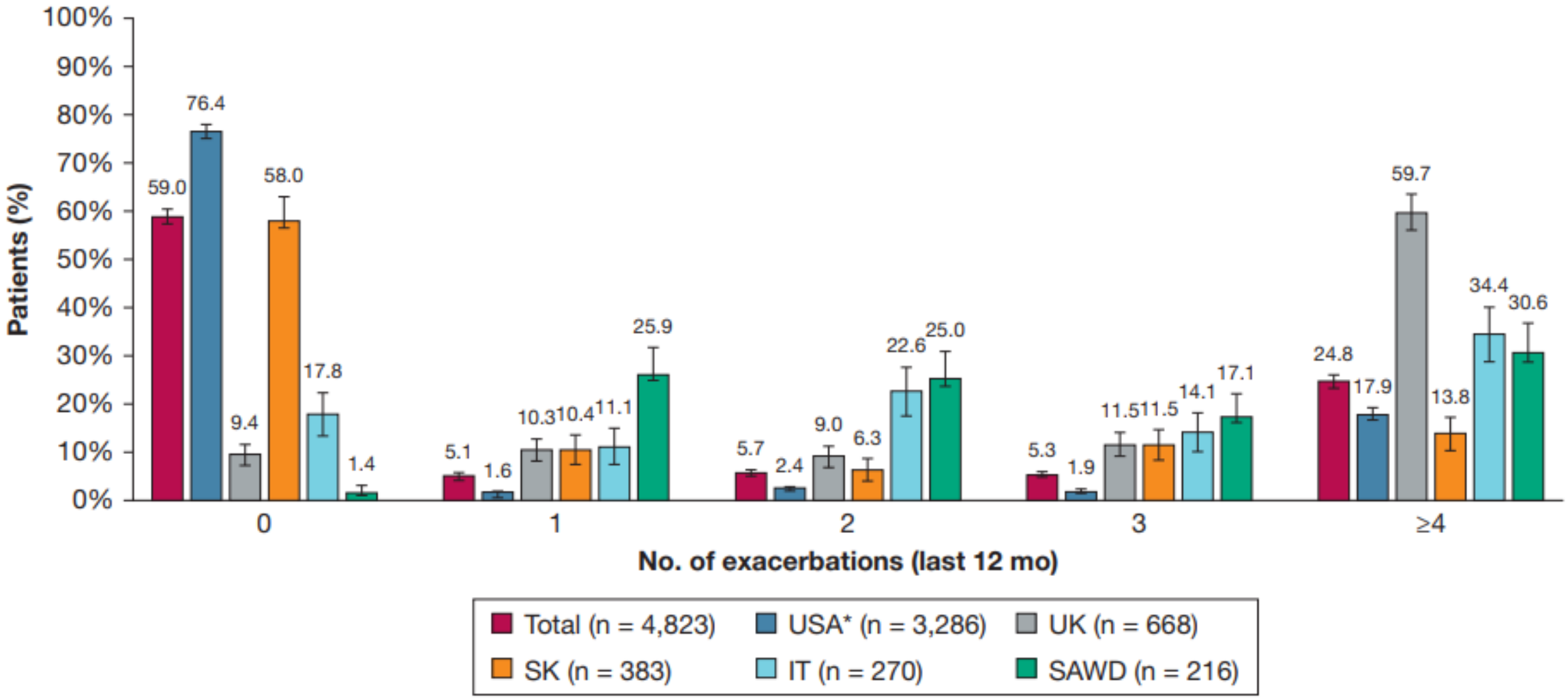

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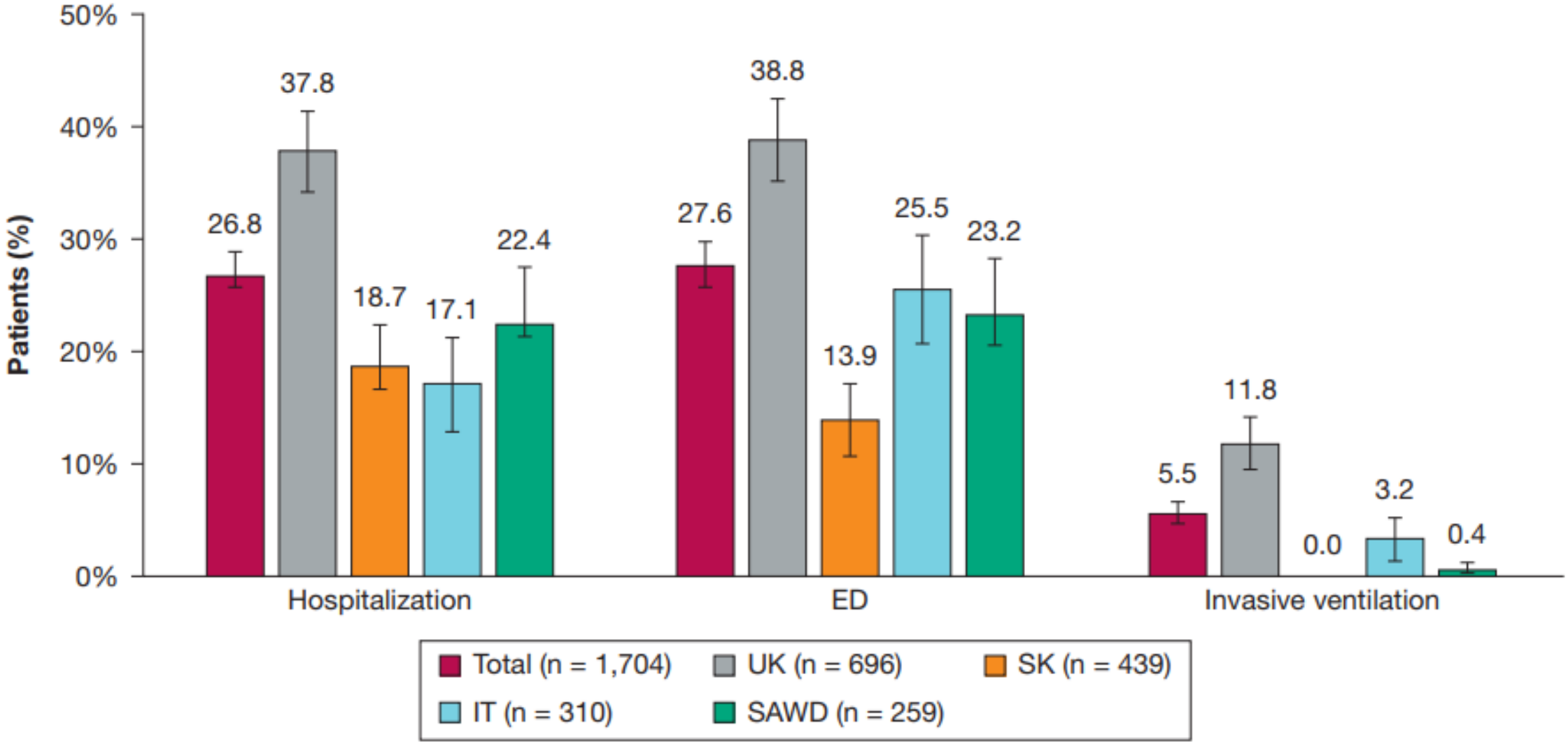

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International Variation in Severe Exacerbation Rates in Patients With Severe Asthma

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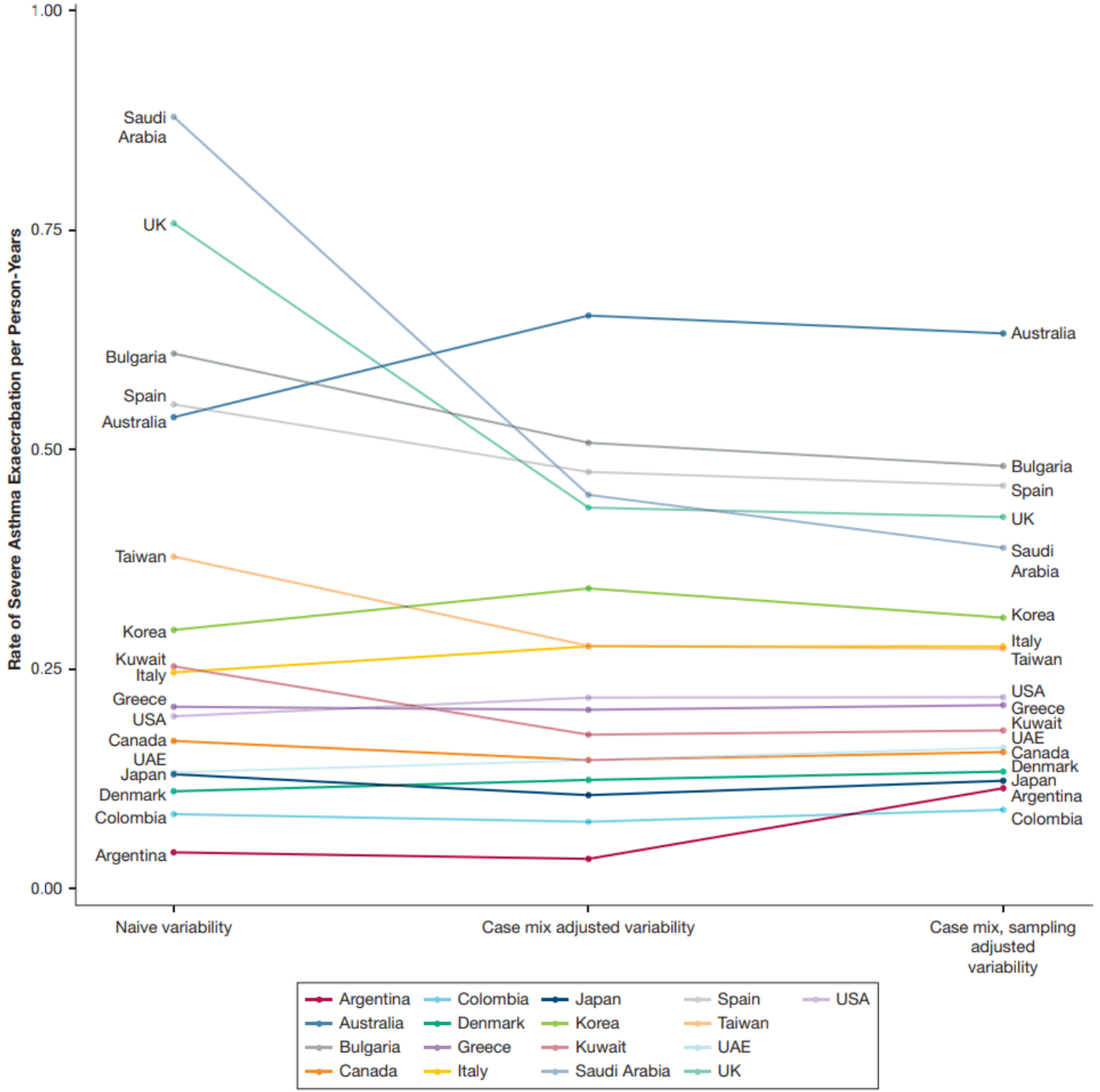
Chest. 2024 Feb 21:S0012-3692(24)00264-2.

TABLE 1] Heterogeneity in Patient Characteristics (Average Values) and Severe Exacerbation Rates Between Countries

Country	Sample Size	Severe Exacerbations During Follow-Up	Average Follow-Up, y	Severe Exacerbation Rate (Per y)	Baseline Severe Exacerbation Rate (Per y)	Use of Biologics During Follow-Up, %
Argentina	26	1	0.98	0.04	0.81	0
Australia	394	191	0.94	0.52	0.46	0
Bulgaria	180	74	0.76	0.54	1.08	1
Canada	149	25	1.00	0.17	0.81	7
Colombia	204	17	0.99	0.08	0.82	7
Denmark	229	25	0.99	0.11	0.03	9
Greece	94	18	0.92	0.21	0.67	9
Italy	800	186	0.95	0.25	0.29	13
Japan	107	14	1.00	0.13	0.89	14
South Korea	38	11	0.99	0.29	0.11	32
Kuwait	163	41	1.00	0.25	2.33	25
Saudi Arabia	45	33	0.80	0.92	4.60	11
Spain	209	108	0.94	0.55	1.00	14
Taiwan	141	48	0.93	0.37	0.99	29
United Arab Emirates	117	13	0.88	0.13	0.79	4
United Kingdom	434	328	1.00	0.76	4.86	22
United States	4,180	806	0.98	0.20	0.19	5
Total	7,510	1,939	0.97	0.27	0.67	8

Chest. 2024 Feb 21:S0012-3692(24)00264-2.



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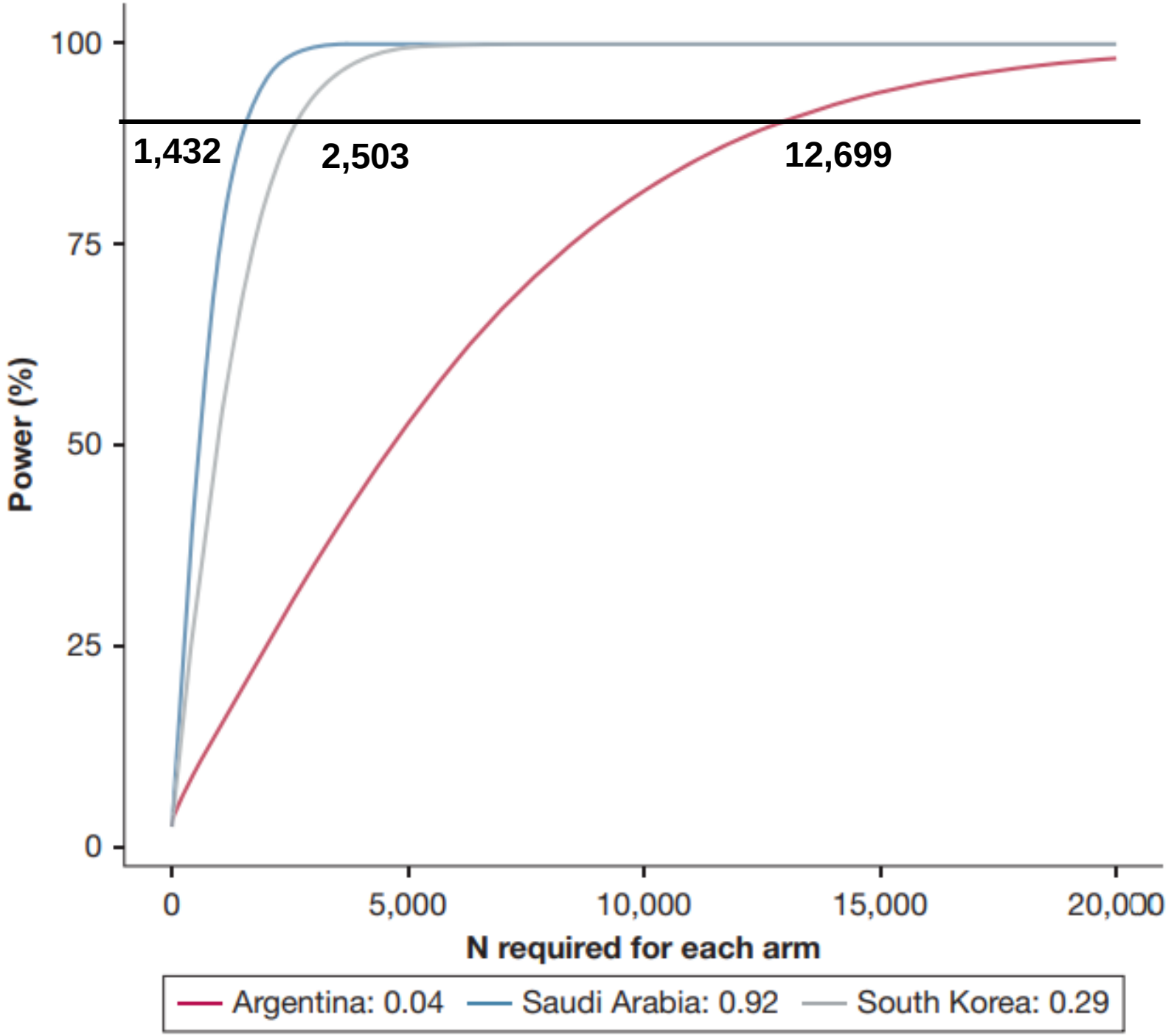

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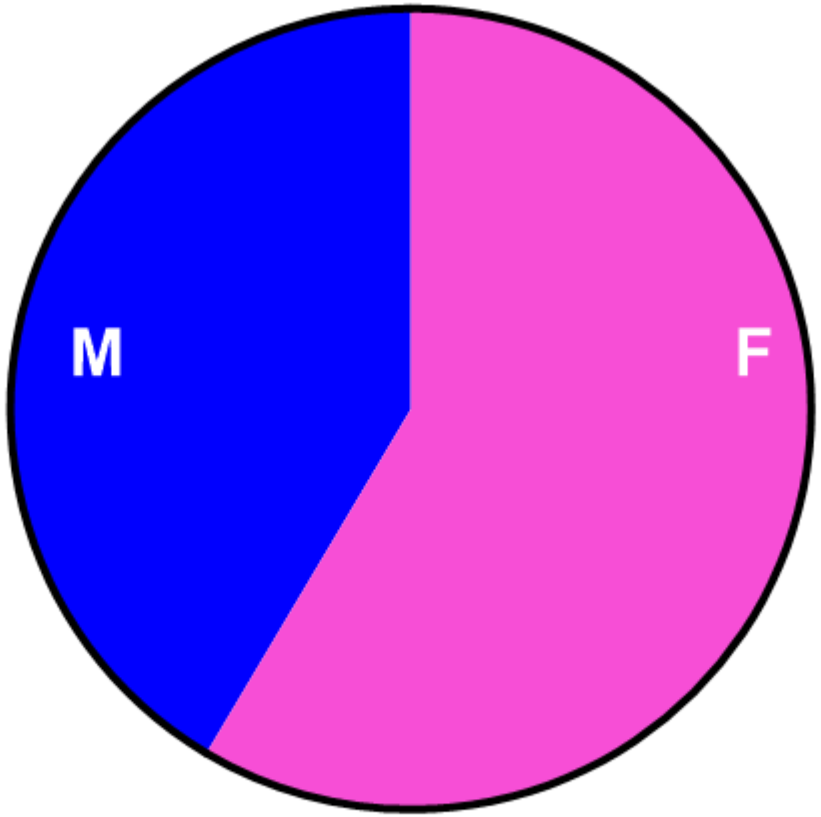
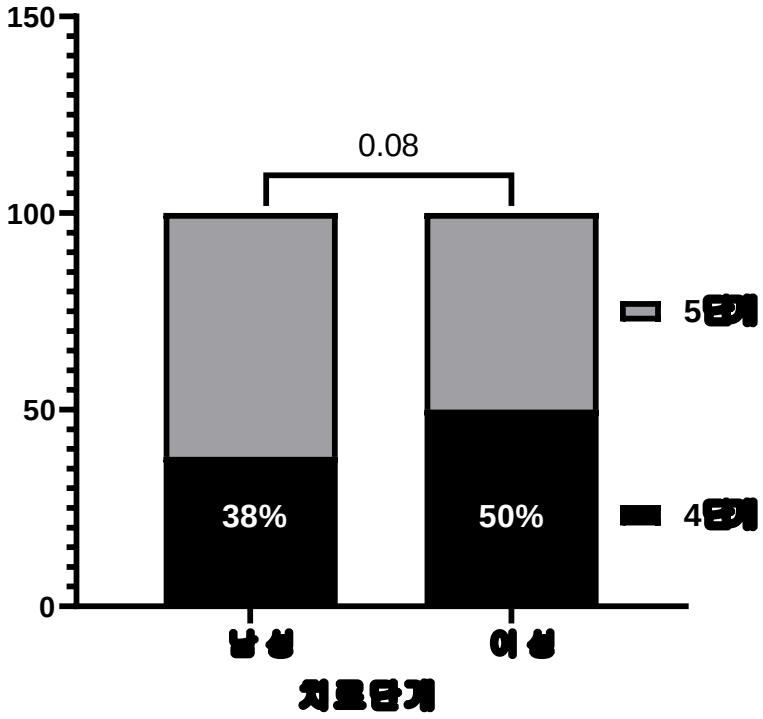
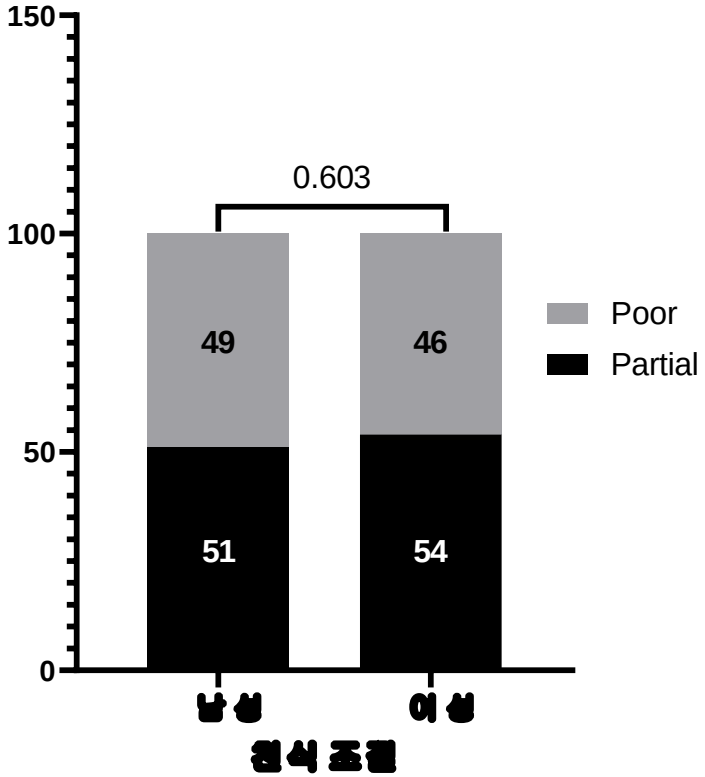
Baseline chracteristics

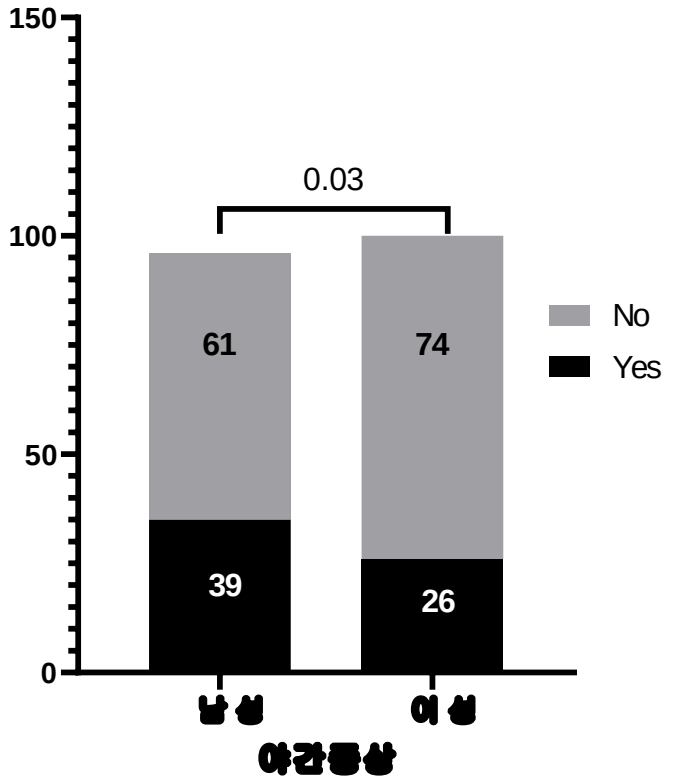


Total=205, male=85(41.5), female 120 (58.5)

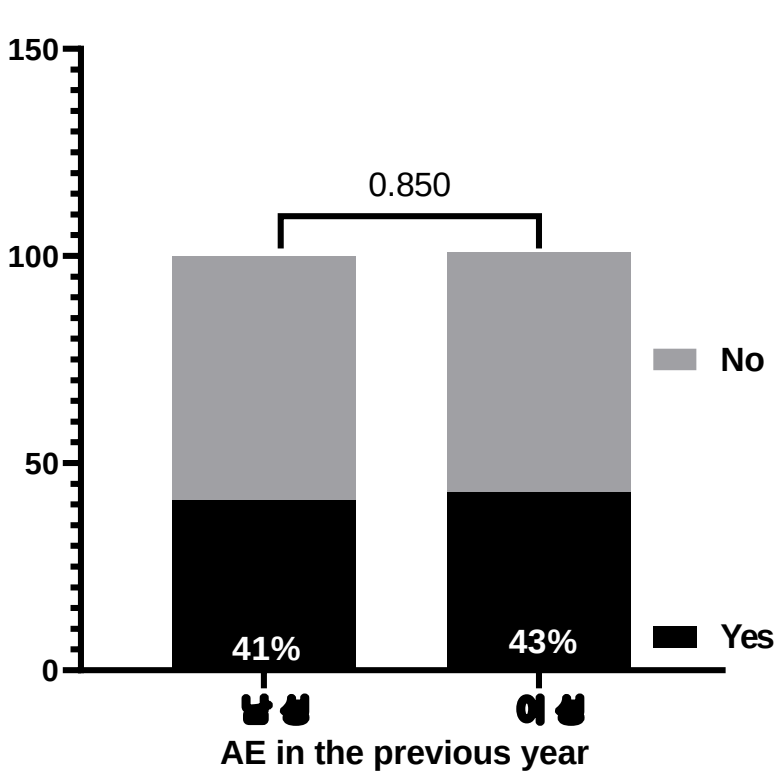
Sex and Athma control

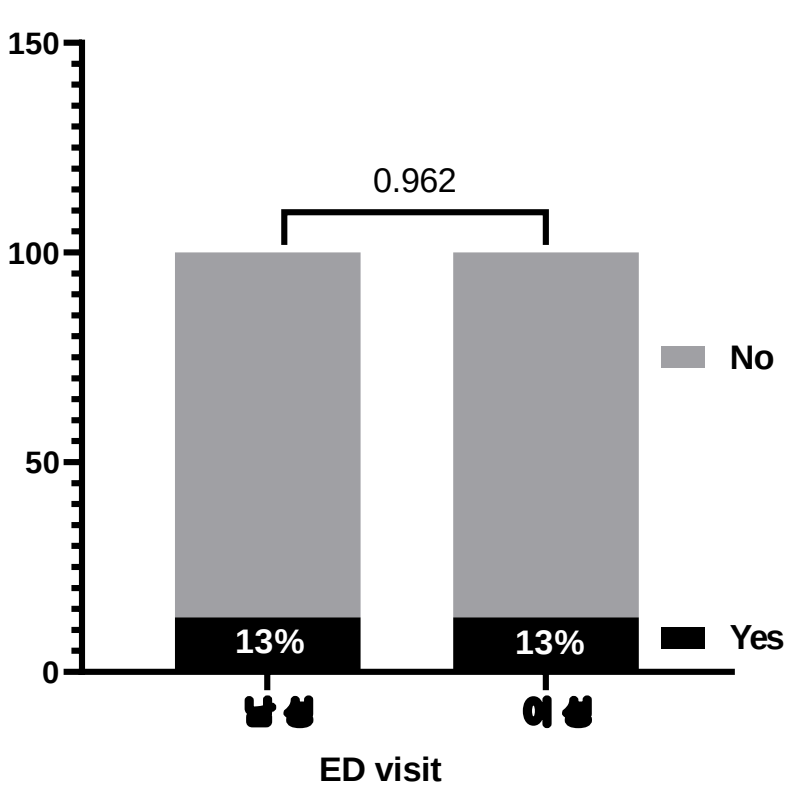


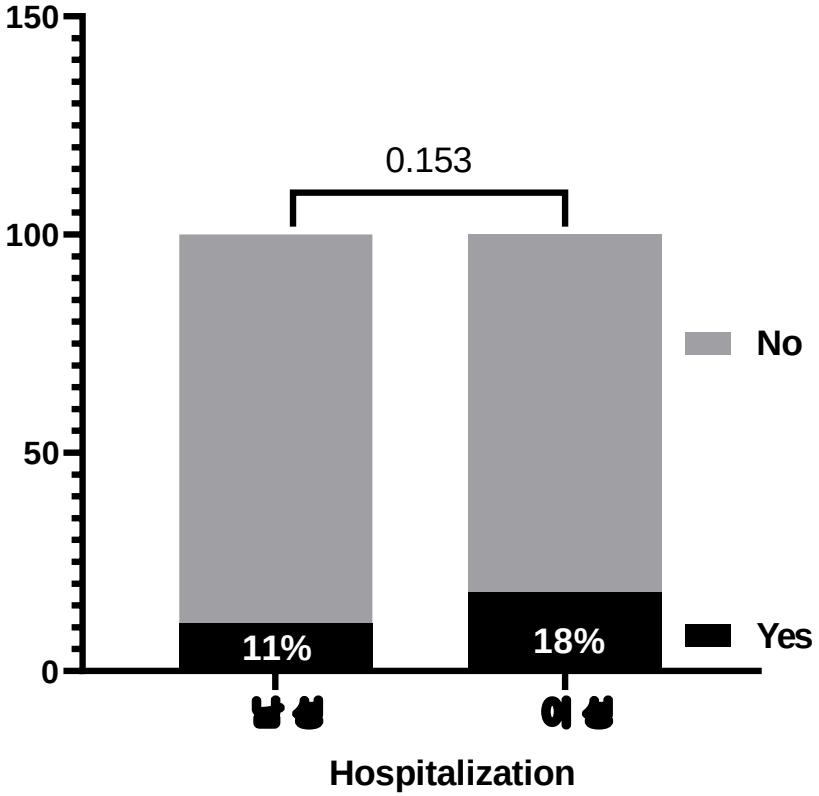




Sex and Acute Exacerbation



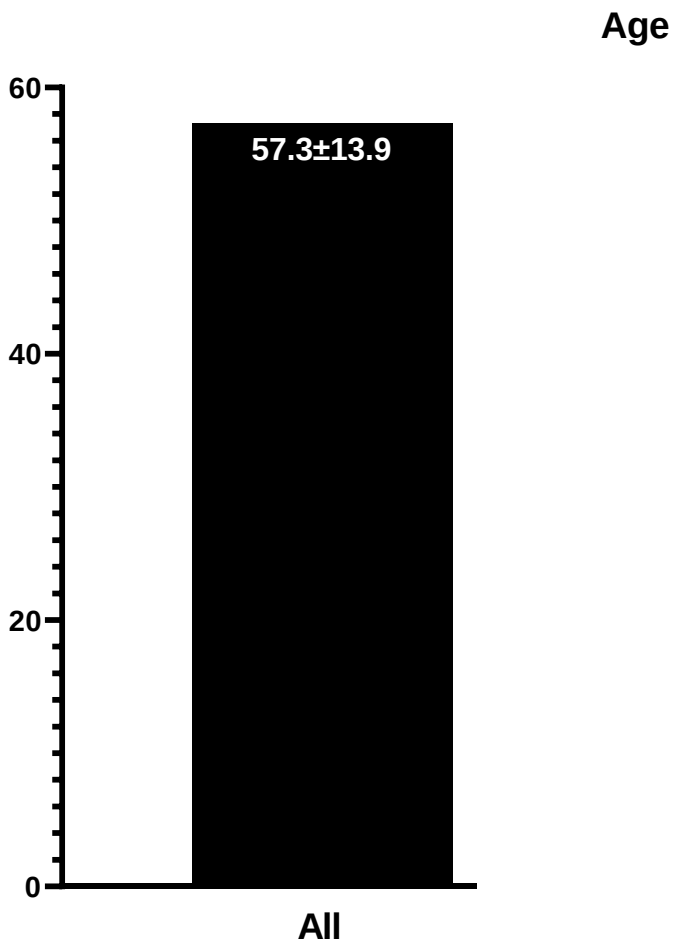




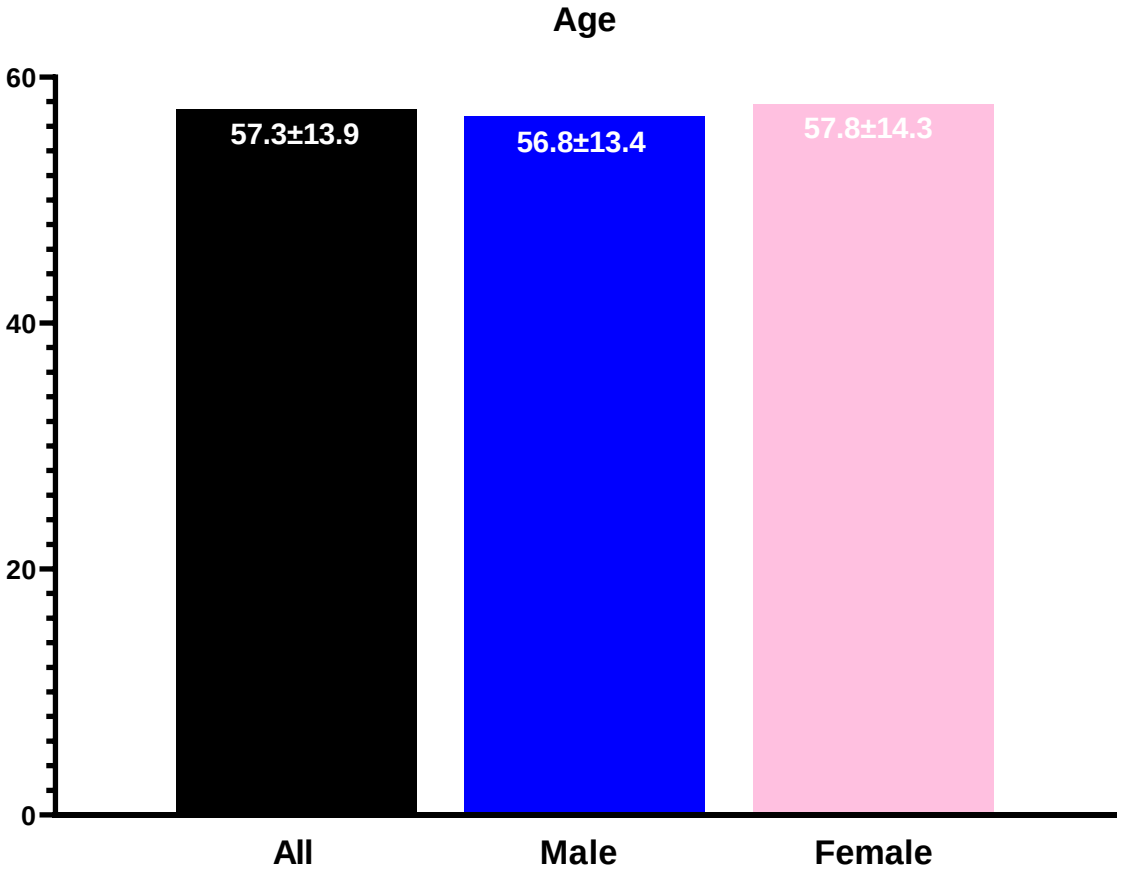
Sex and Pulmonary function Test

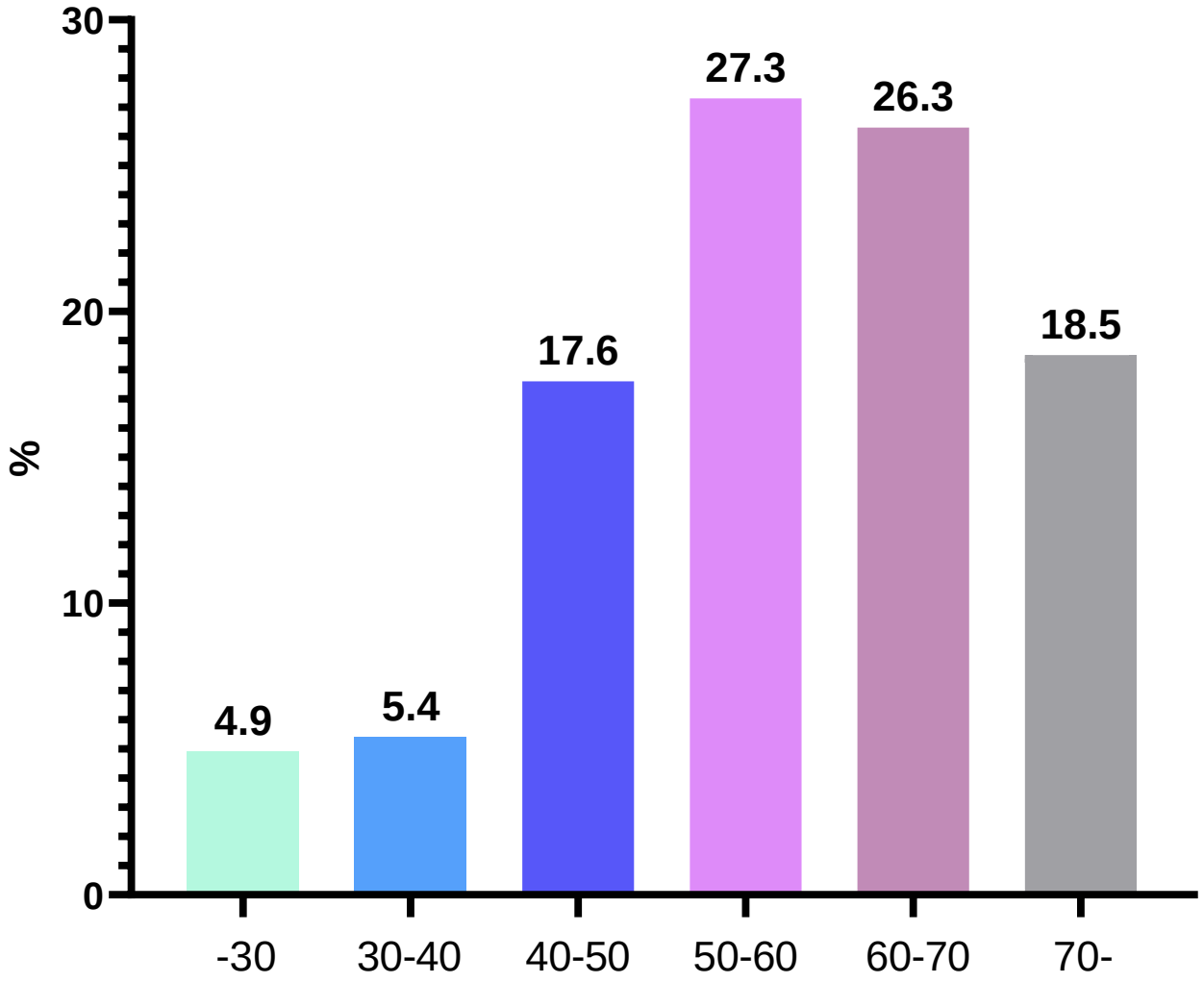
	Pre-bronchodilator			Post bronchodilator		
	FEV_1	FVC	FEV_1/FVC	FEV_1	FVC	FEV_1/FVC
Sex						
Male (83)	**67.3±21.3**	**92.1±15.2**	**58.3±15.6**	**68.2±20.6**	**92.2±15.2**	**59.4±15.6**
Female (115)	**79.6±22.9**	**102.5±20.3**	**64.7±13.2**	**81.2±22.9**	**102.9±20.9**	**65.9±13.8**
	<0.001	<0.001	<0.002	<0.001	0.001	0.006

Baseline chracteristics: Age

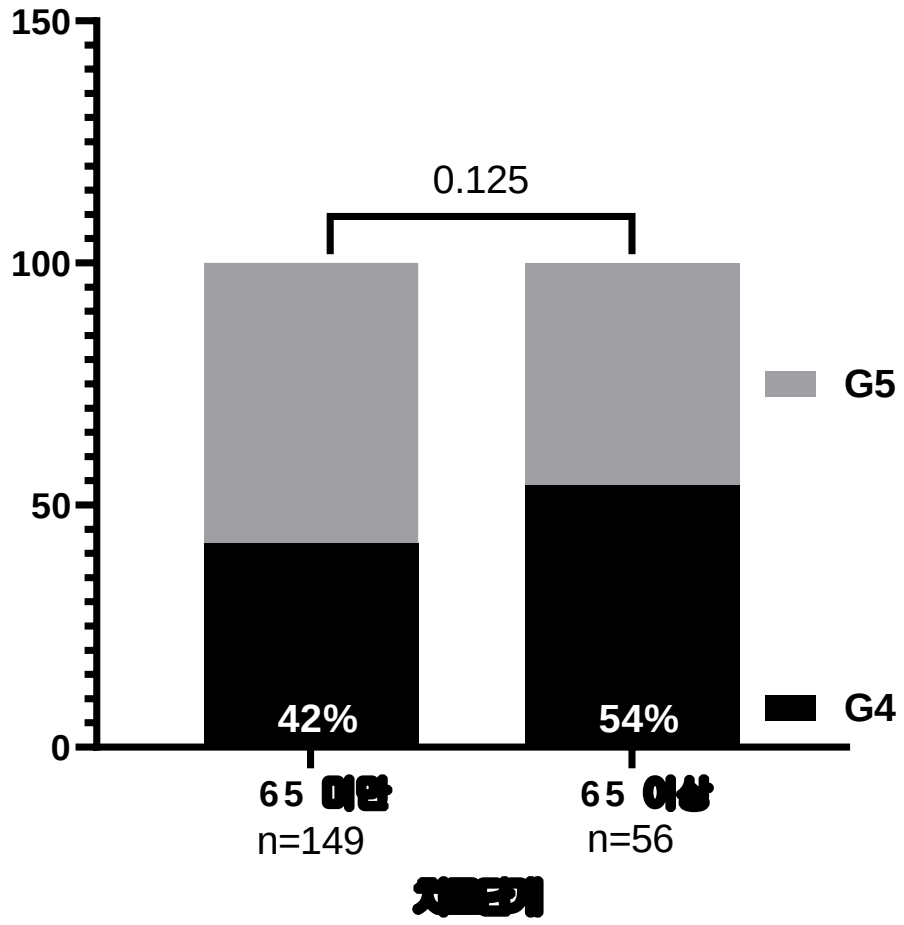


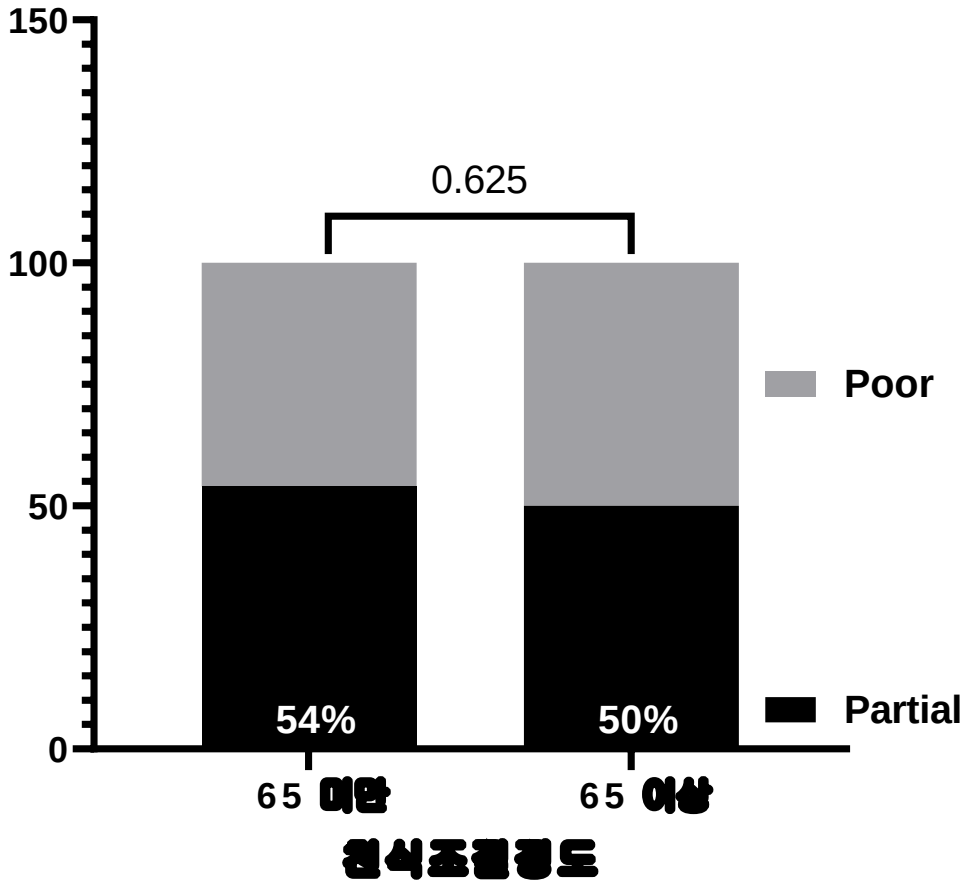
Baseline chracteristics: Age



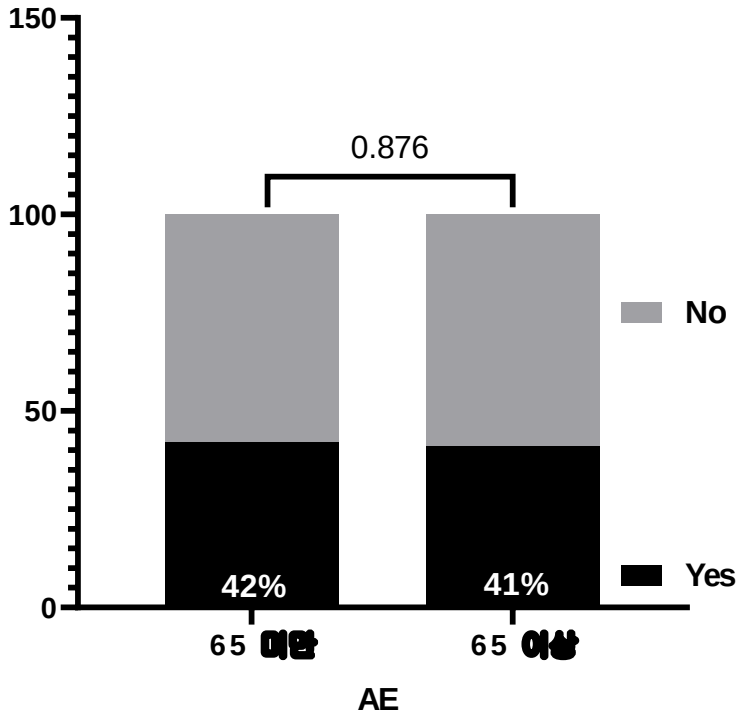


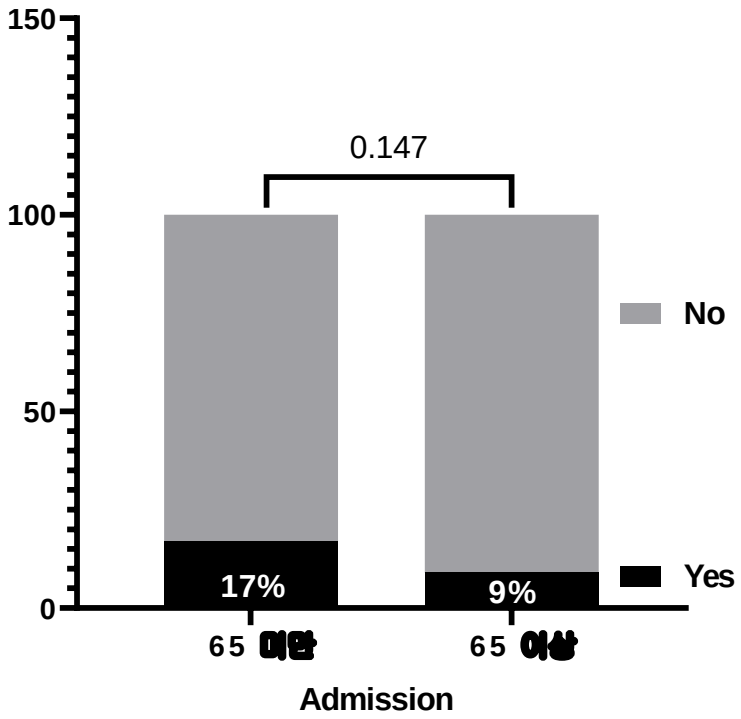
Elederly and Asthma Control

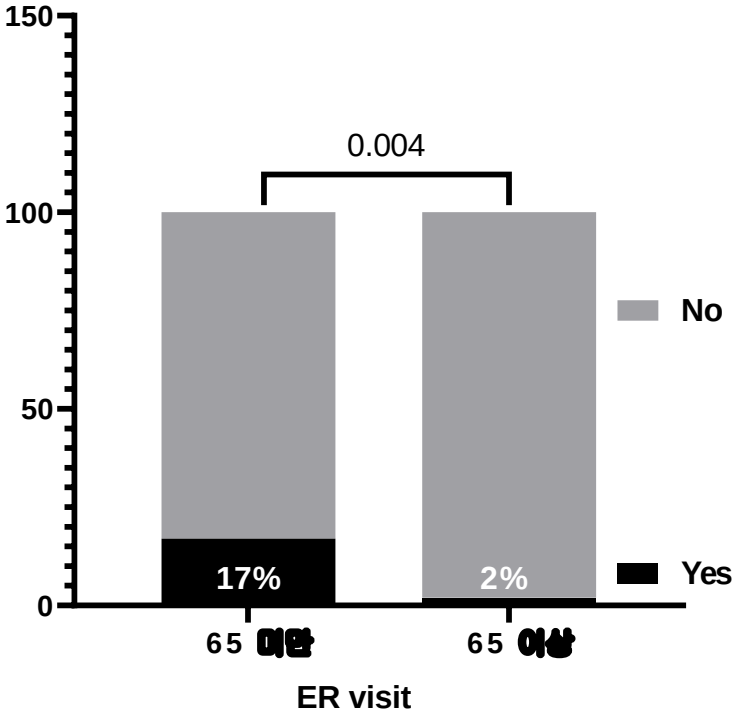




Elederly and Acute Exacerbation

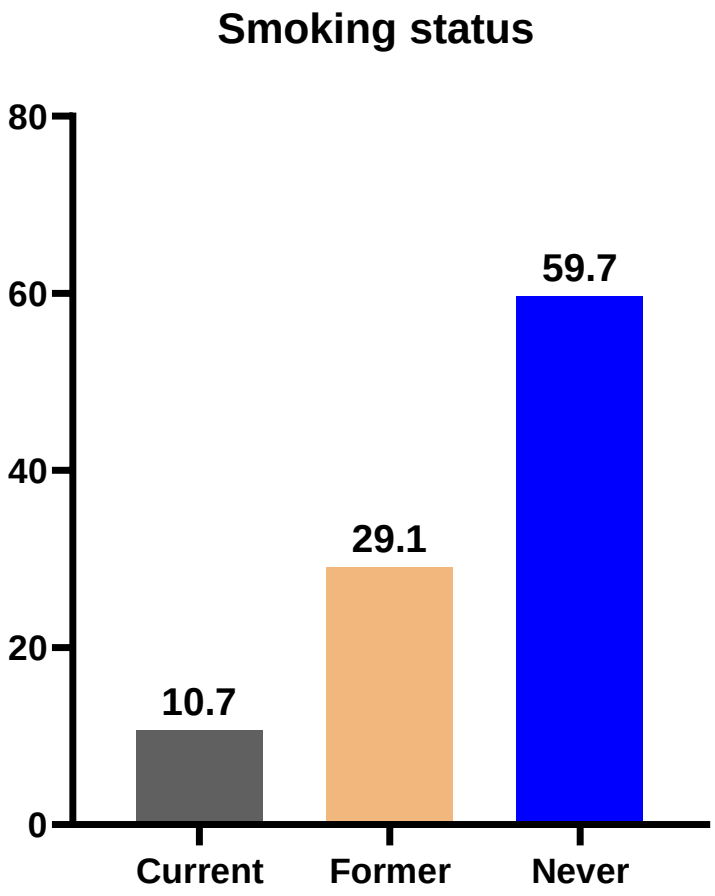


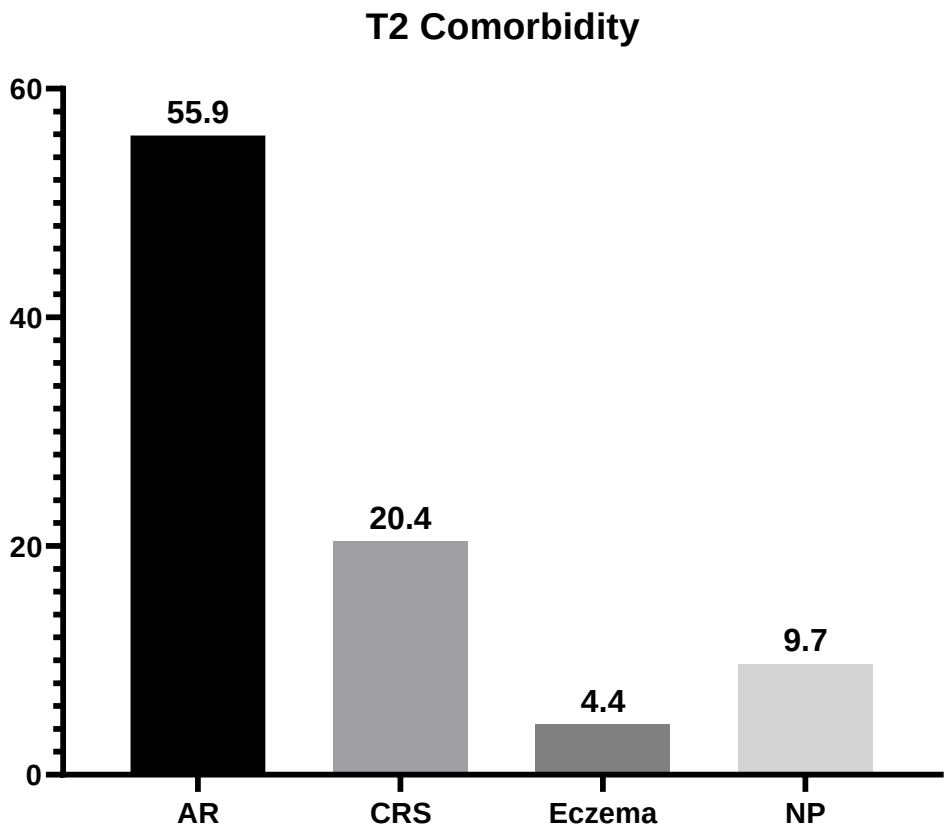




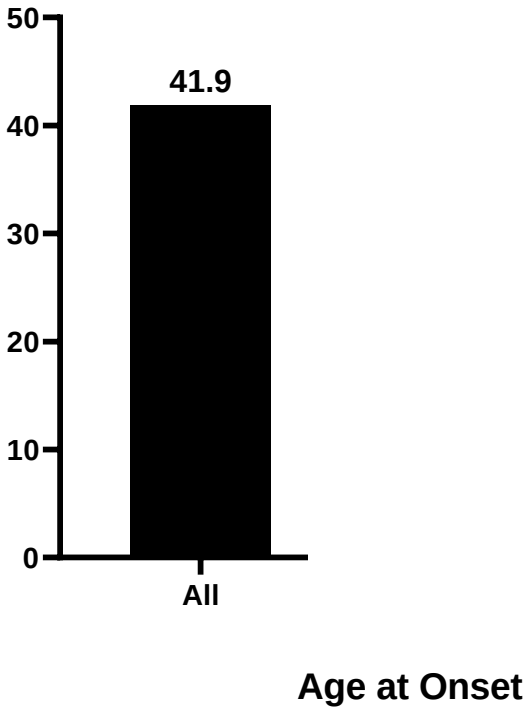
Elederly and Pulmonary function test

	Pre-bronchodilator			Post bronchodilator		
	FEV_1	**FVC**	**FEV_1/FVC**	**FEV_1**	**FVC**	**FEV_1/FVC**
Age						
<65 (100)	76.4±22.9	100.6±18.3	62.2±15.0	77.4±22.7	100.4±18.7	63.5±15.6
≥65 (94)	**69.1±22.7**	**91.2±19.6**	61.5±13.4	71.6±23.2	**92.8±21.0**	62.7±12.6
	0.050	0.003	0.779	0.164	0.030	0.759

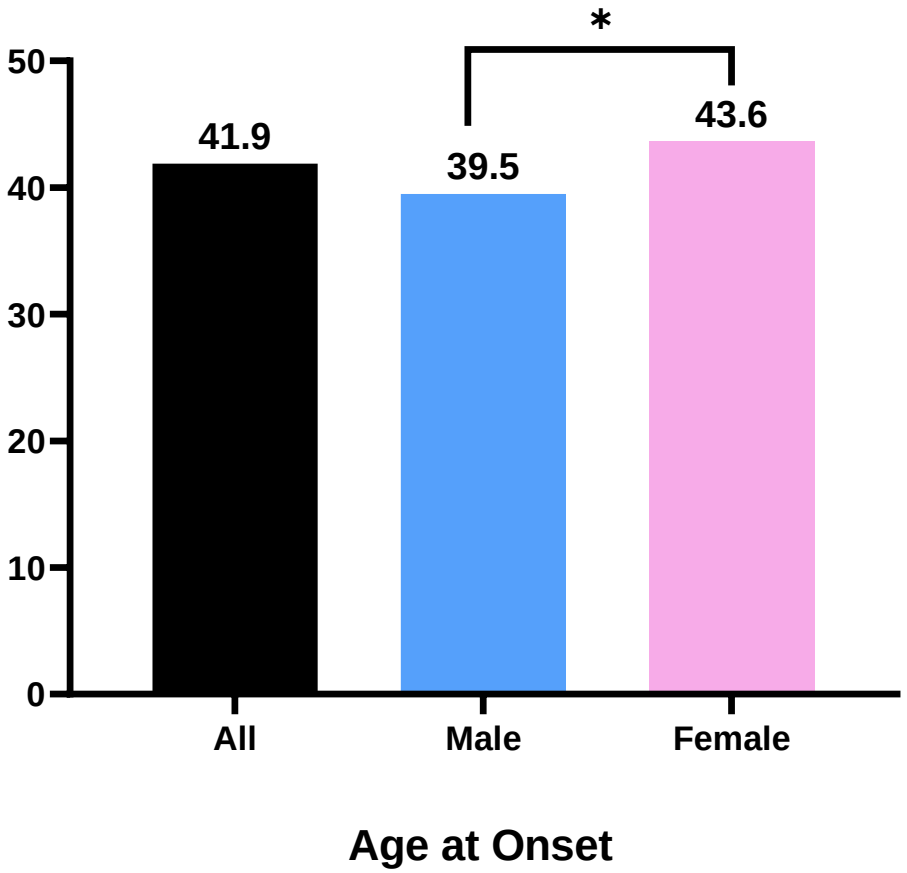

Smoking status
80
60
40
20
0
10.7
29.1
59.7
Current
Former
Never


T2 Comorbidity
60
40
20
0
55.9
20.4
4.4
9.7
AR
CRS
Eczema
NP

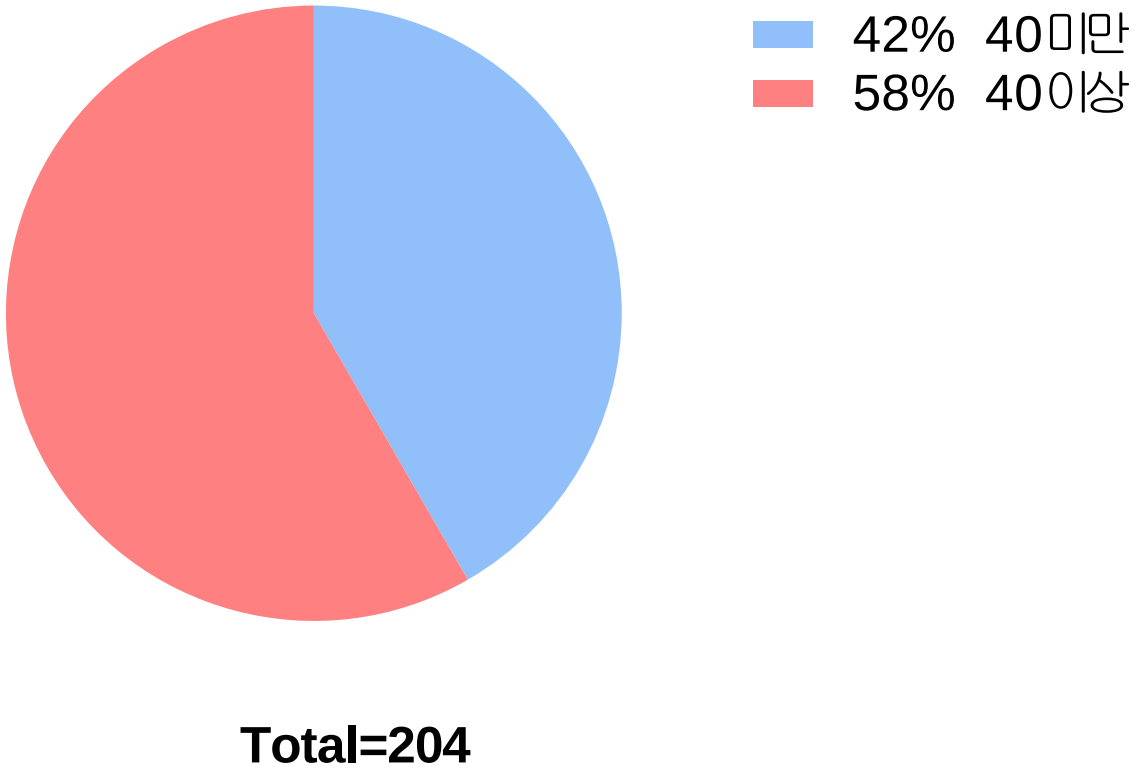
Age at onset of asthma



Age at onset of asthma

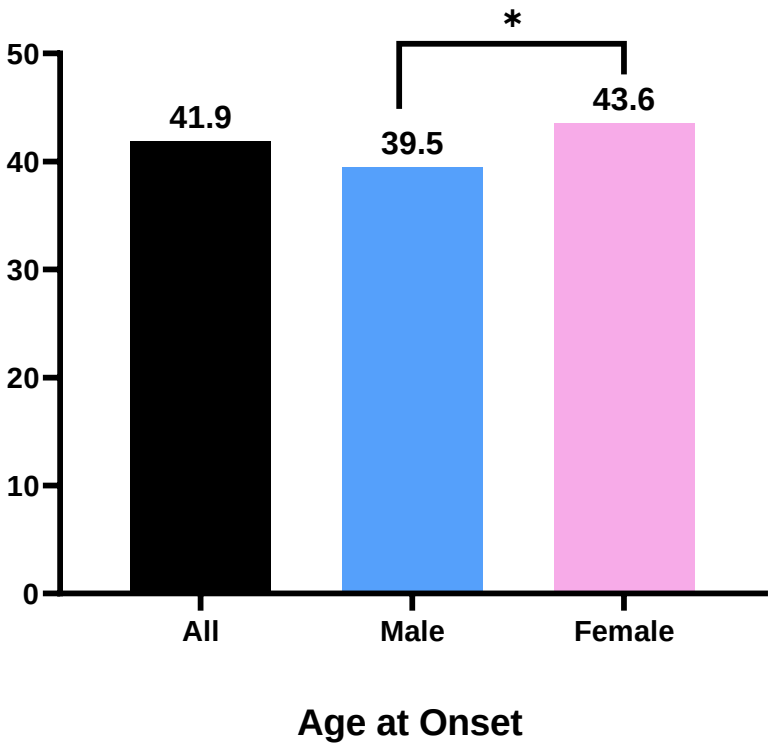


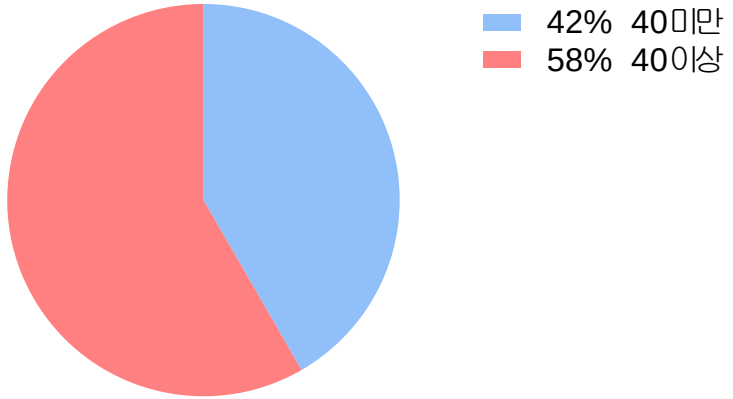
Age at Onset



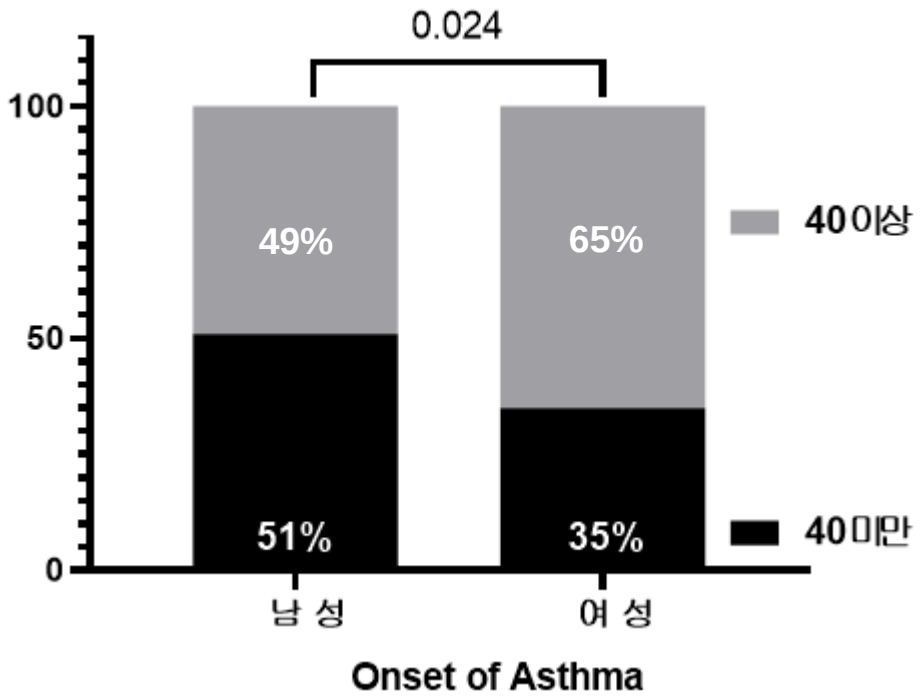
Total=204

Age at onset of asthma

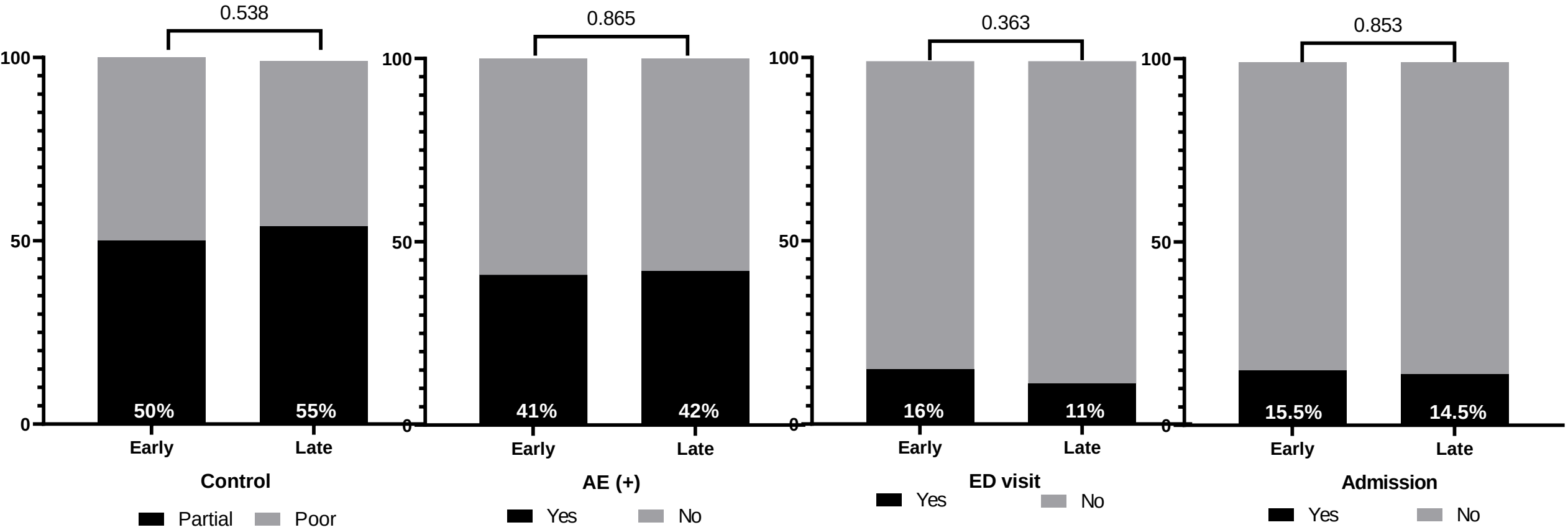




Total=204



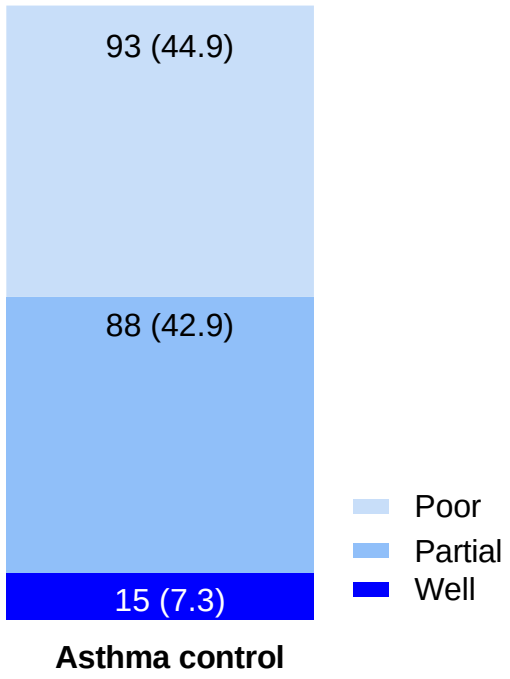
Age at onset of asthma

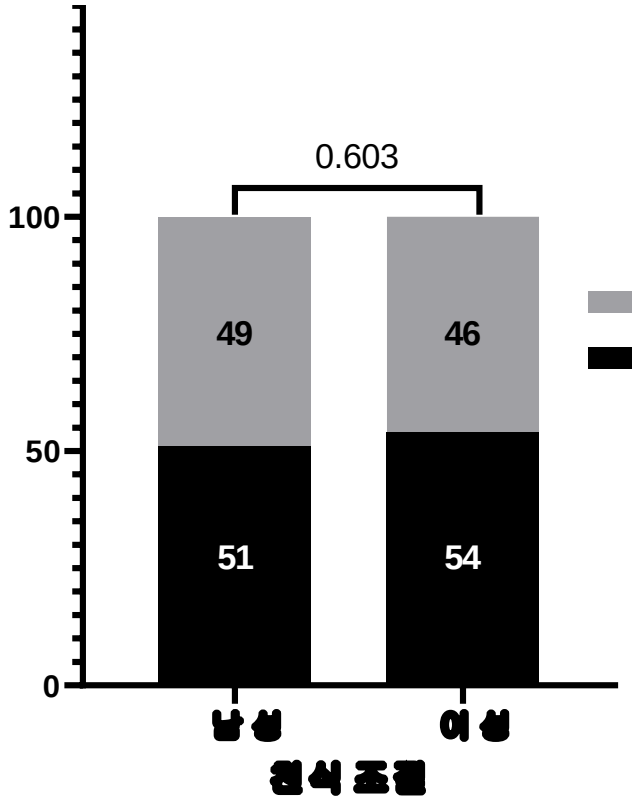


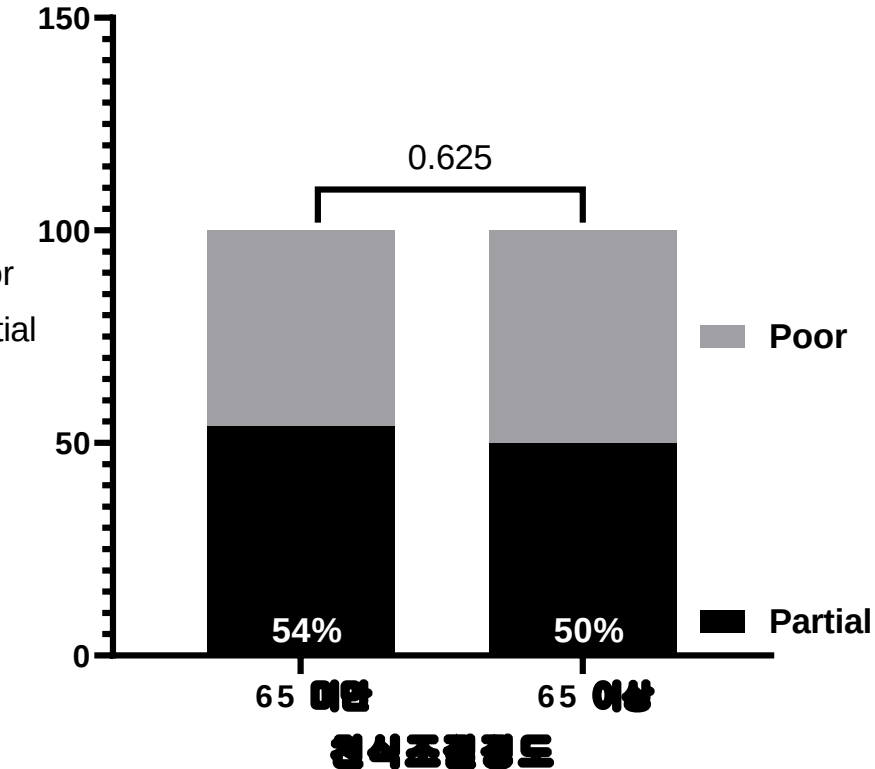
Asthma control status

A. Recent asthma symptom control (but also ask the patient/caregiver about the whole period since last review#)

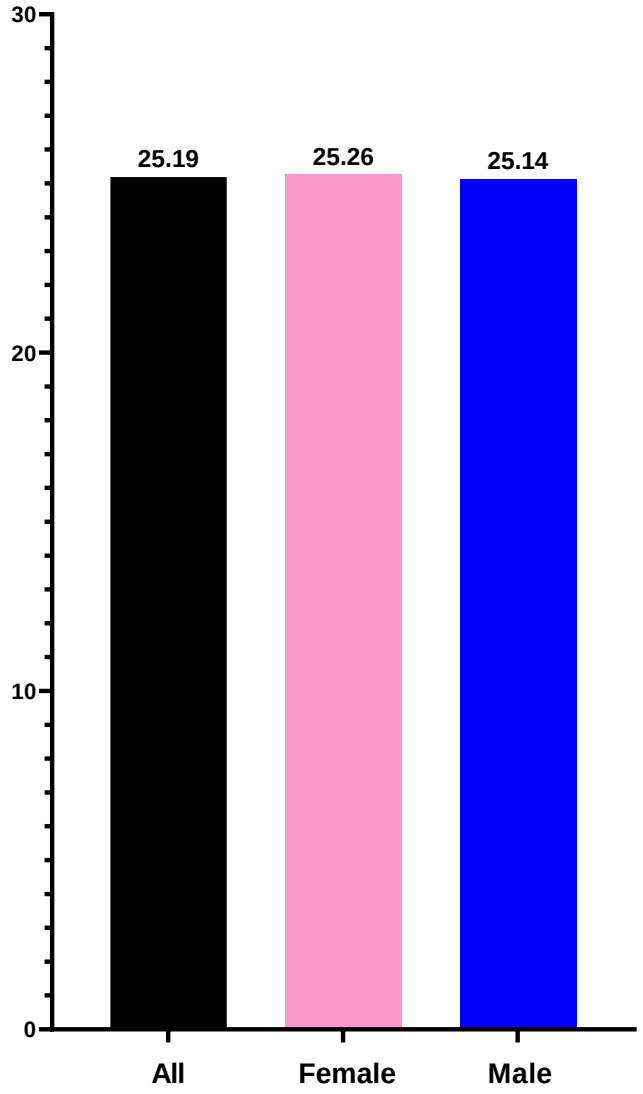
In the past 4 weeks, has the patient had:		Well controlled	Partly controlled	Uncontrolled
• Daytime asthma symptoms more than twice/week?	Yes☐ No☐	None of these	1–2 of these	3–4 of these
• Any night waking due to asthma?	Yes☐ No☐			
• SABA* reliever for symptoms more than twice/week?	Yes☐ No☐			
• Any activity limitation due to asthma?	Yes☐ No☐			



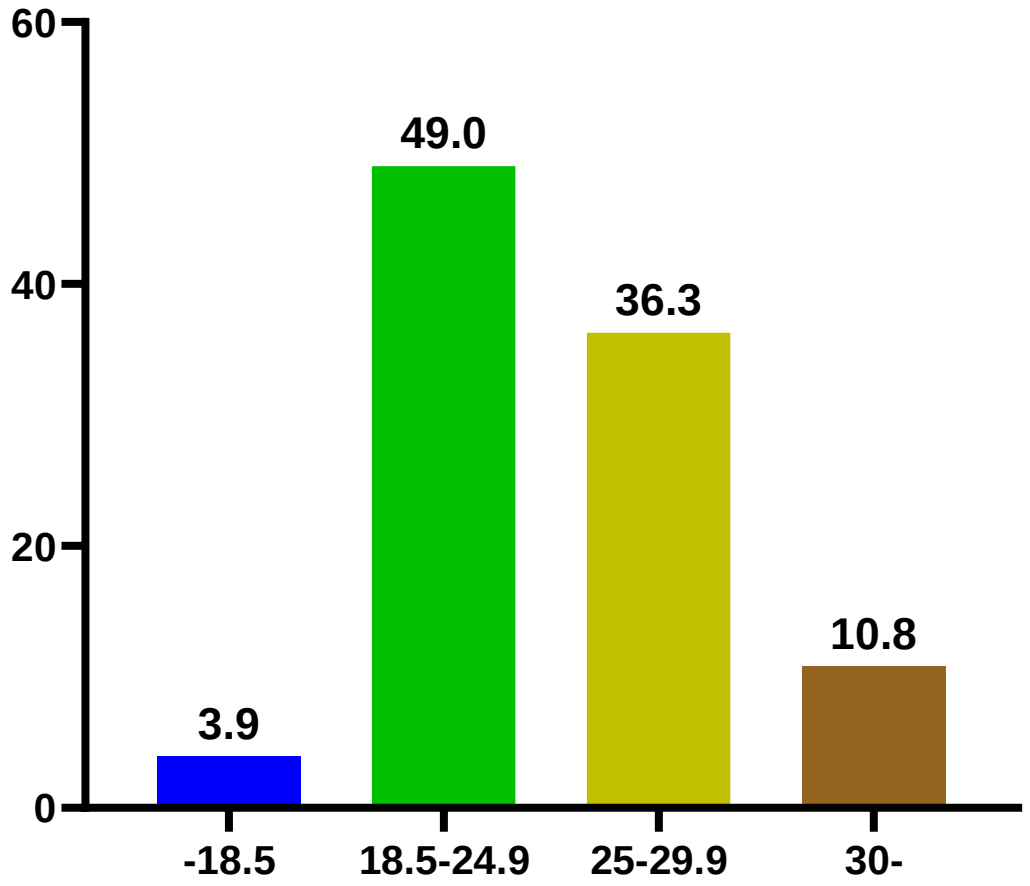




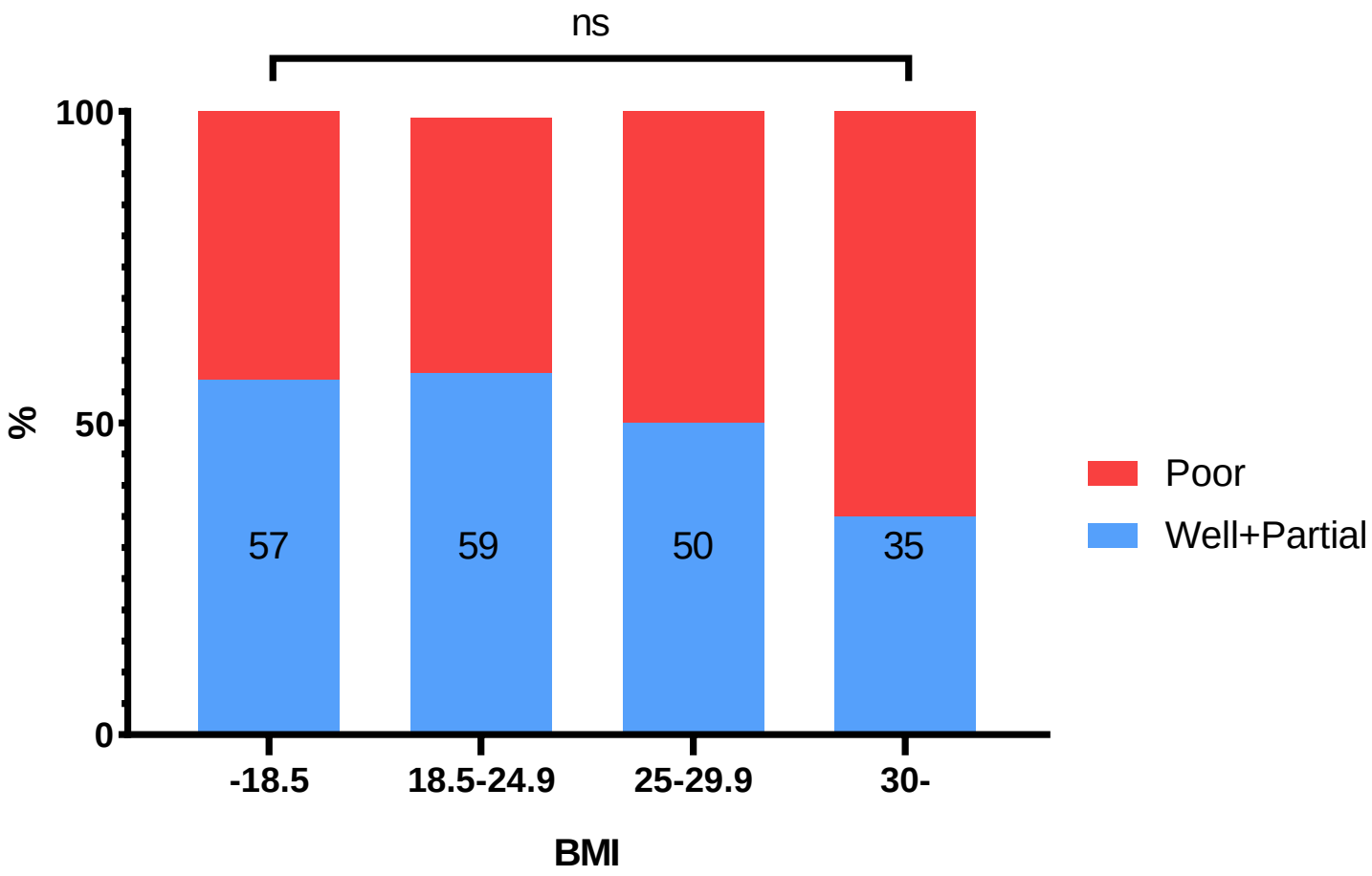
Asthma control and BMI



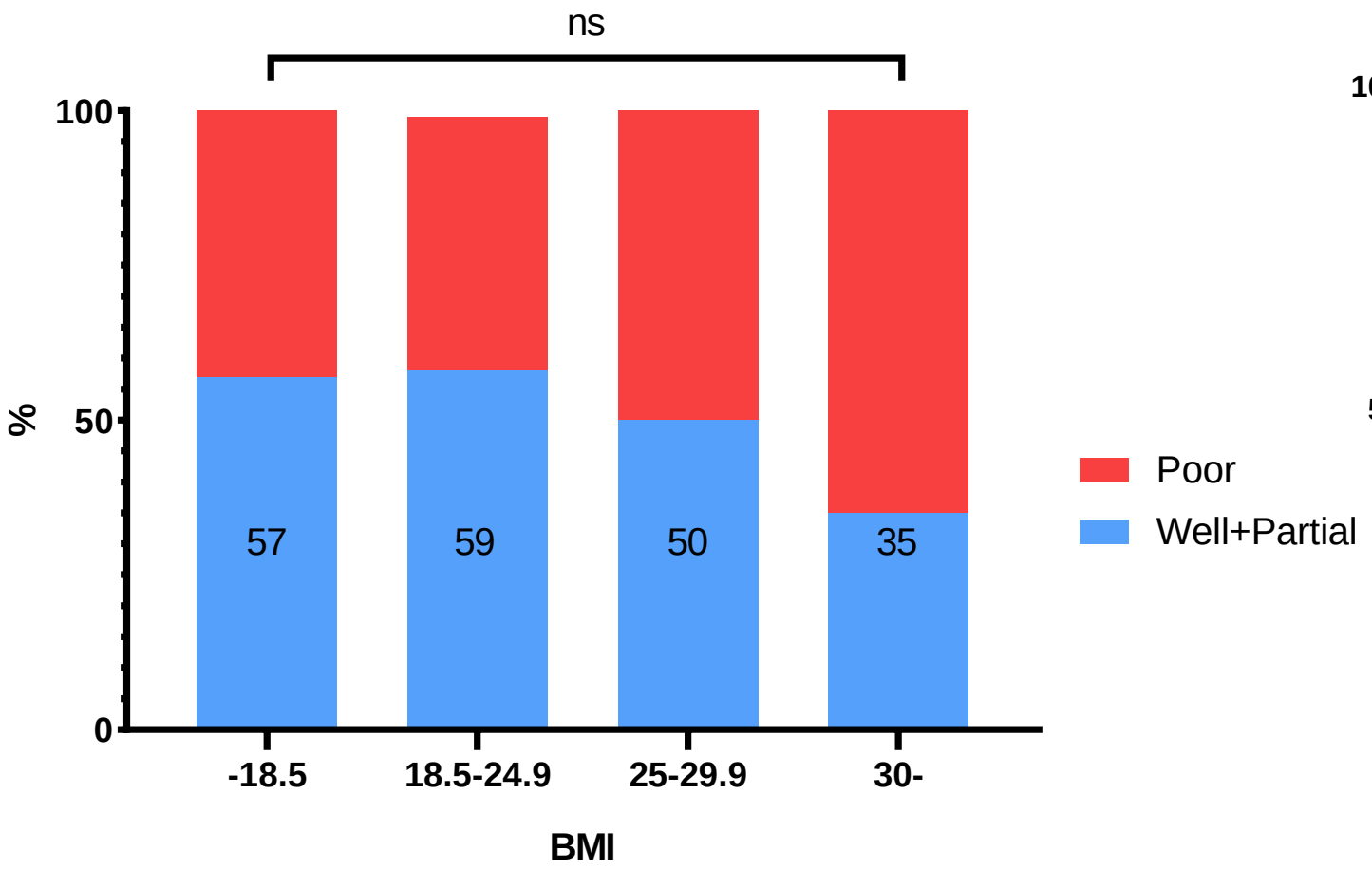
BMI

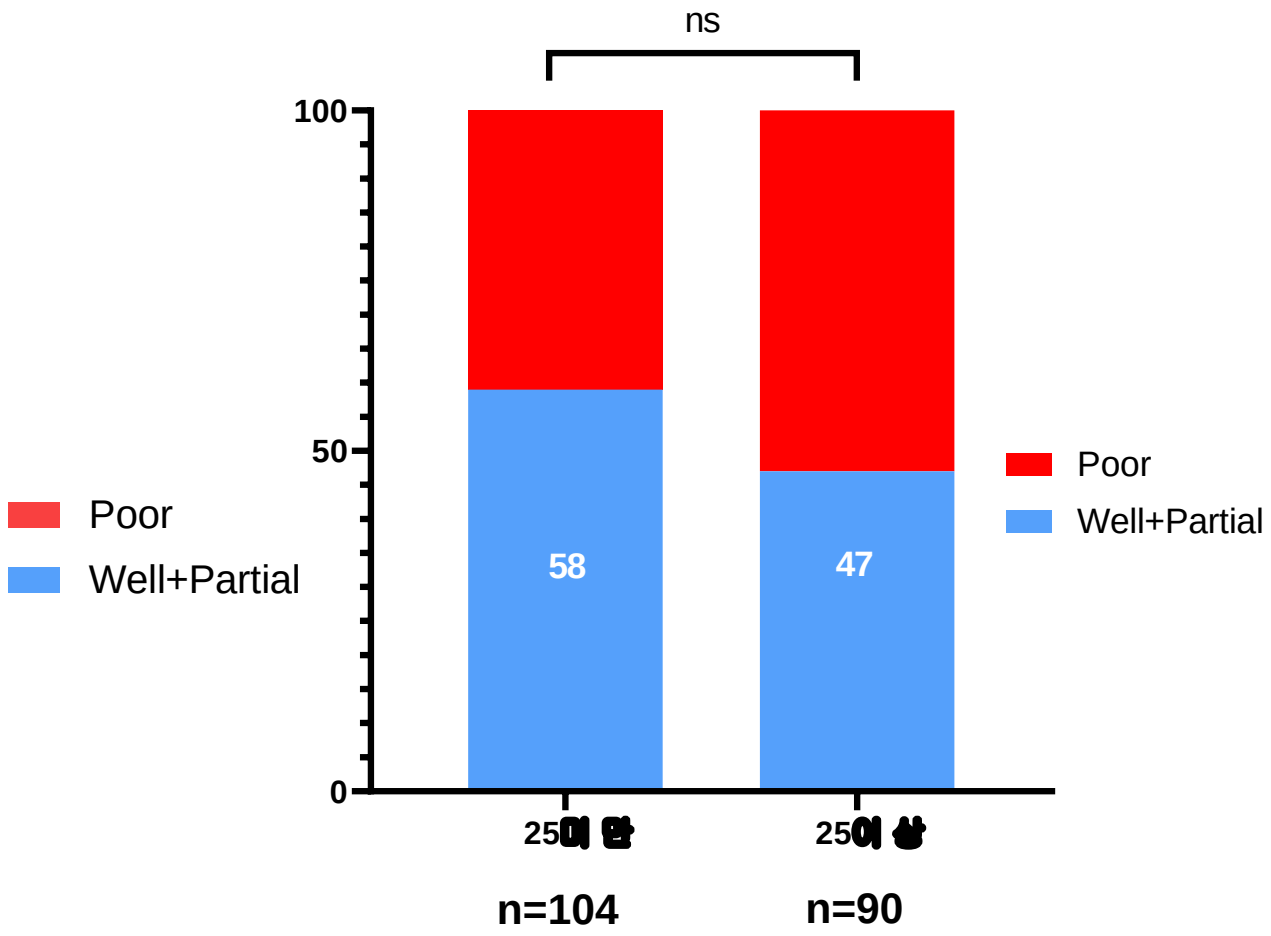


Asthma control and BMI

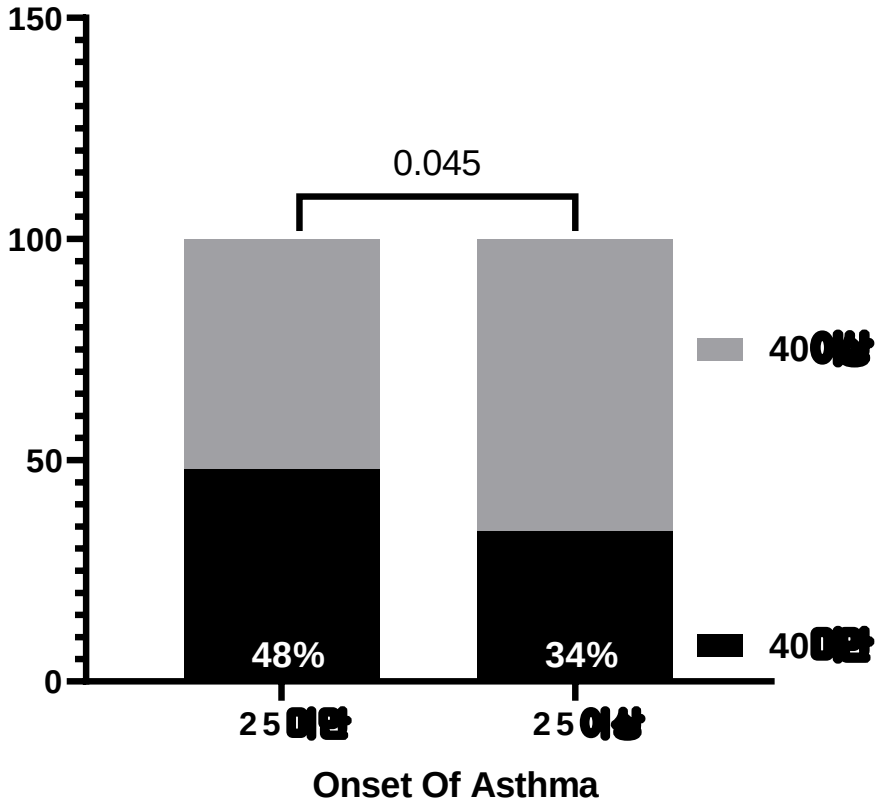


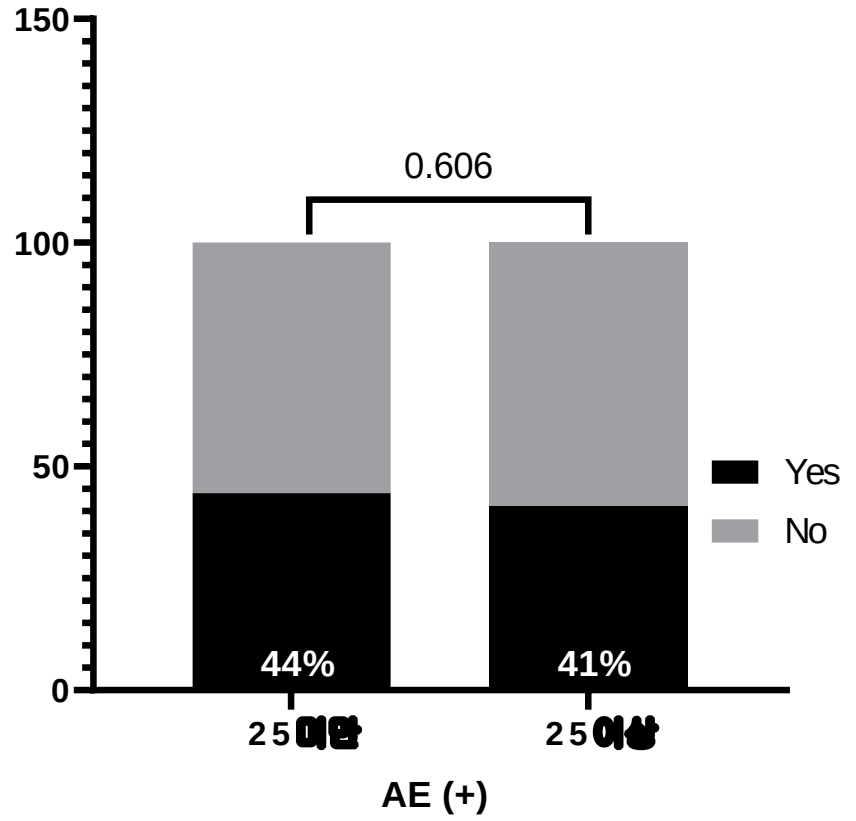
Asthma control and BMI



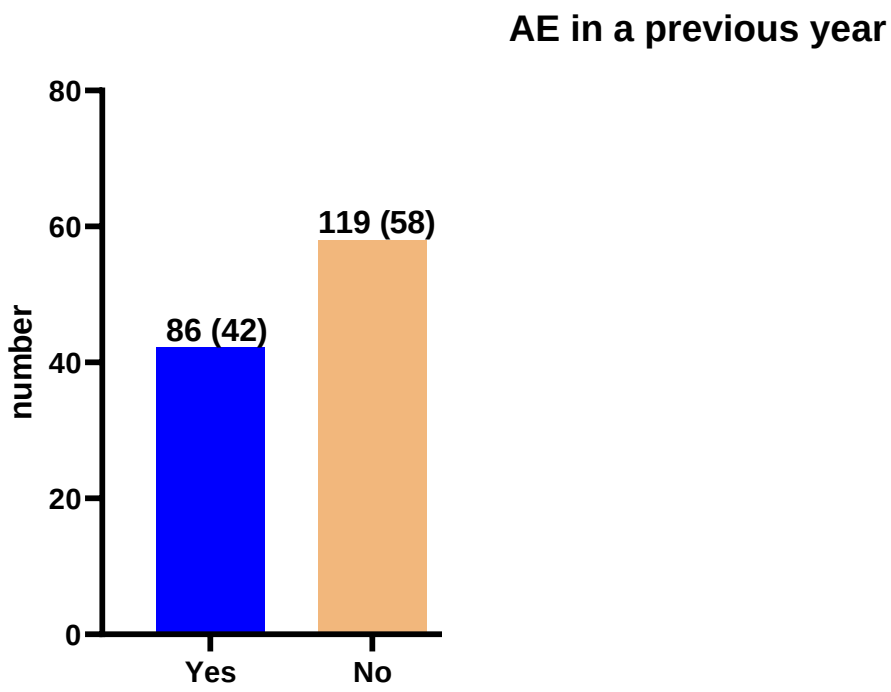


BMI and Asthma

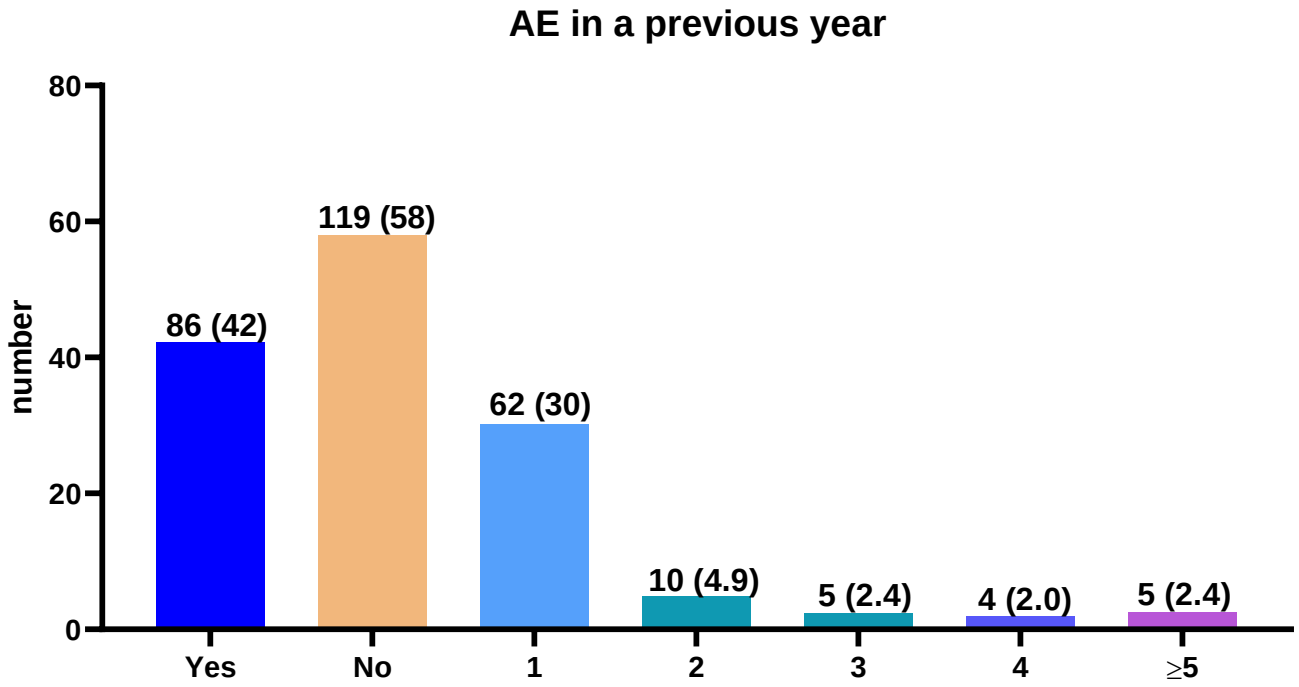


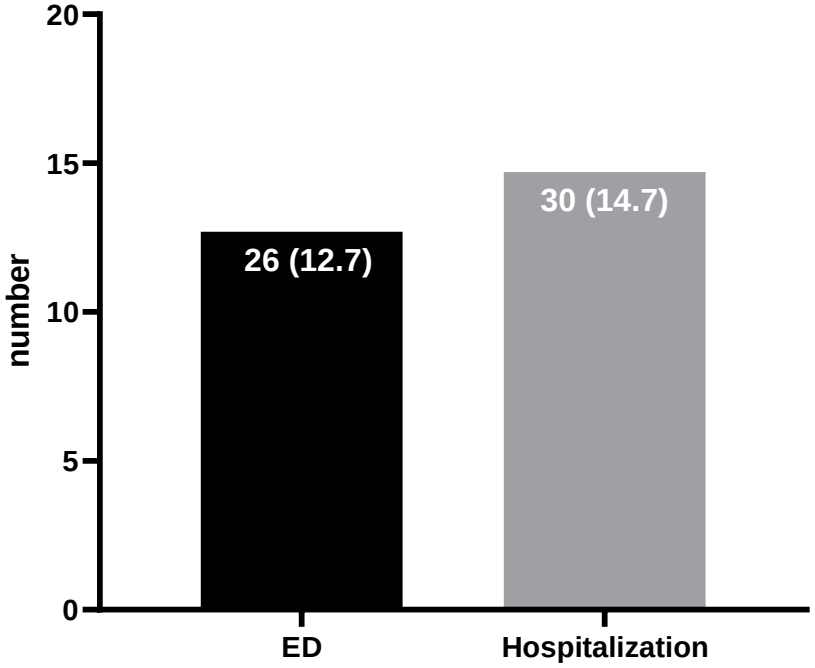


Asthma and AE



Asthma and AE





Asthma and Lung function

	Pre-bronchodilator			Post bronchodilator		
	FEV_1	FVC	FEV_1/FVC	FEV_1	FVC	FEV_1/FVC
All	74.5±23.0	98.1±19.1	62.0 ±14.6	75.9±22.9	98.5±19.5	63.3±14.8
Step						
GINA 4 (89)	77.5±22.6	100.5±18.7	63.2±14.3	77.0±22.3	100.8±20.1	63.0±15.0
GINA 5(109)	72.0±23.1	96.2±19.3	61.0±14.8	75.1±23.3	96.9±18.9	63.5±14.8
	0.092	0.115	0.279	0.596	0.208	0.855
Smoking						
Ever (80)	**69.7±24.8**	96.1±17.9	**58.0±15.9**	**70.3±23.8**	96.0±18.2	**59.2±15.9**
Never (117)	**77.8±21.3**	99.6±19.8	**64.7±13.0**	**79.9±21.6**	100.4±20.2	**66.1±13.5**
	0.016	0.199	0.002	0.008	0.158	0.004
Sex						
Male (83)	**67.3±21.3**	**92.1±15.2**	**58.3±15.6**	**68.2±20.6**	**92.2±15.2**	**59.4±15.6**
Female (115)	**79.6±22.9**	**102.5±20.3**	**64.7±13.2**	**81.2±22.9**	**102.9±20.9**	**65.9±13.8**
	<0.001	<0.001	<0.002	<0.001	0.001	0.006
Control						
Well or partial (102)	**78.1±21.5**	100.9±18.4	63.6±14.4	76.8±21.1	99.5±18.0	63.6±15.1
Poor (86)	**69.9±25.0**	94.6±20.2	59.9±15.1	74.1±25.4	97.1±21.7	62.5±15.1
	0.017	0.027	0.081	0.466	0.453	0.624
BMI						
<25 (100)	**71.2±22.7**	96.7±20.2	60.7±15.1	72.9±22.9	97.98±21.3	61.5±15.4
≥25 (94)	**78.1±22.9**	99.7±17.8	63.4±14.0	79.3±22.5	99.13±17.3	65.3±14.0
	0.035	0.261	.0160	0.078	0.708	0.106
Age						
<65 (100)	76.4±22.9	100.6±18.3	62.2±15.0	77.4±22.7	100.4±18.7	63.5±15.6
≥65 (94)	**69.1±22.7**	**91.2±19.6**	61.5±13.4	71.6±23.2	**92.8±21.0**	62.7±12.6
	0.050	0.003	0.779	0.164	0.030	0.759

Asthma and Lung function

	Pre-bronchodilator			Post bronchodilator		
	FEV_1	FVC	FEV_1/FVC	FEV_1	FVC	FEV_1/FVC
All	74.5±23.0	98.1±19.1	62.0 ±14.6	75.9±22.9	98.5±19.5	63.3±14.8
Step						
GINA 4 (89)	77.5±22.6	100.5±18.7	63.2±14.3	77.0±22.3	100.8±20.1	63.0±15.0
GINA 5(109)	72.0±23.1	96.2±19.3	61.0±14.8	75.1±23.3	96.9±18.9	63.5±14.8
	0.092	0.115	0.279	0.596	0.208	0.855
Smoking						
Ever (80)	**69.7±24.8**	96.1±17.9	**58.0±15.9**	**70.3±23.8**	96.0±18.2	**59.2±15.9**
Never (117)	**77.8±21.3**	99.6±19.8	**64.7±13.0**	**79.9±21.6**	100.4±20.2	**66.1±13.5**
	0.016	0.199	0.002	0.008	0.158	0.004
Sex						
Male (83)	**67.3±21.3**	**92.1±15.2**	**58.3±15.6**	**68.2±20.6**	**92.2±15.2**	**59.4±15.6**
Female (115)	**79.6±22.9**	**102.5±20.3**	**64.7±13.2**	**81.2±22.9**	**102.9±20.9**	**65.9±13.8**
	<0.001	<0.001	<0.002	<0.001	0.001	0.006
Control						
Well or partial (102)	**78.1±21.5**	100.9±18.4	63.6±14.4	76.8±21.1	99.5±18.0	63.6±15.1
Poor (86)	**69.9±25.0**	94.6±20.2	59.9±15.1	74.1±25.4	97.1±21.7	62.5±15.1
	0.017	0.027	0.081	0.466	0.453	0.624
BMI						
<25 (100)	**71.2±22.7**	96.7±20.2	60.7±15.1	72.9±22.9	97.98±21.3	61.5±15.4
≥25 (94)	**78.1±22.9**	99.7±17.8	63.4±14.0	79.3±22.5	99.13±17.3	65.3±14.0
	0.035	0.261	.0160	0.078	0.708	0.106
Age						
<65 (100)	76.4±22.9	100.6±18.3	62.2±15.0	77.4±22.7	100.4±18.7	63.5±15.6
≥65 (94)	**69.1±22.7**	**91.2±19.6**	61.5±13.4	71.6±23.2	**92.8±21.0**	62.7±12.6
	0.050	0.003	0.779	0.164	0.030	0.759

Asthma and Lung function

	Pre-bronchodilator			Post bronchodilator		
	FEV_1	FVC	FEV_1/FVC	FEV_1	FVC	FEV_1/FVC
All	74.5±23.0	98.1±19.1	62.0 ±14.6	75.9±22.9	98.5±19.5	63.3±14.8
Step						
GINA 4 (89)	77.5±22.6	100.5±18.7	63.2±14.3	77.0±22.3	100.8±20.1	63.0±15.0
GINA 5(109)	72.0±23.1	96.2±19.3	61.0±14.8	75.1±23.3	96.9±18.9	63.5±14.8
	0.092	0.115	0.279	0.596	0.208	0.855
Smoking						
Ever (80)	**69.7±24.8**	96.1±17.9	**58.0±15.9**	**70.3±23.8**	96.0±18.2	**59.2±15.9**
Never (117)	**77.8±21.3**	99.6±19.8	**64.7±13.0**	**79.9±21.6**	100.4±20.2	**66.1±13.5**
	0.016	0.199	0.002	0.008	0.158	0.004
Sex						
Male (83)	**67.3±21.3**	**92.1±15.2**	**58.3±15.6**	**68.2±20.6**	**92.2±15.2**	**59.4±15.6**
Female (115)	**79.6±22.9**	**102.5±20.3**	**64.7±13.2**	**81.2±22.9**	**102.9±20.9**	**65.9±13.8**
	<0.001	<0.001	<0.002	<0.001	0.001	0.006
Control						
Well or partial (102)	**78.1±21.5**	100.9±18.4	63.6±14.4	76.8±21.1	99.5±18.0	63.6±15.1
Poor (86)	**69.9±25.0**	94.6±20.2	59.9±15.1	74.1±25.4	97.1±21.7	62.5±15.1
	0.017	0.027	0.081	0.466	0.453	0.624
BMI						
<25 (100)	**71.2±22.7**	96.7±20.2	60.7±15.1	72.9±22.9	97.98±21.3	61.5±15.4
≥25 (94)	**78.1±22.9**	99.7±17.8	63.4±14.0	79.3±22.5	99.13±17.3	65.3±14.0
	0.035	0.261	.0160	0.078	0.708	0.106
Age						
<65 (100)	76.4±22.9	100.6±18.3	62.2±15.0	77.4±22.7	100.4±18.7	63.5±15.6
≥65 (94)	**69.1±22.7**	**91.2±19.6**	61.5±13.4	71.6±23.2	**92.8±21.0**	62.7±12.6
	0.050	0.003	0.779	0.164	0.030	0.759

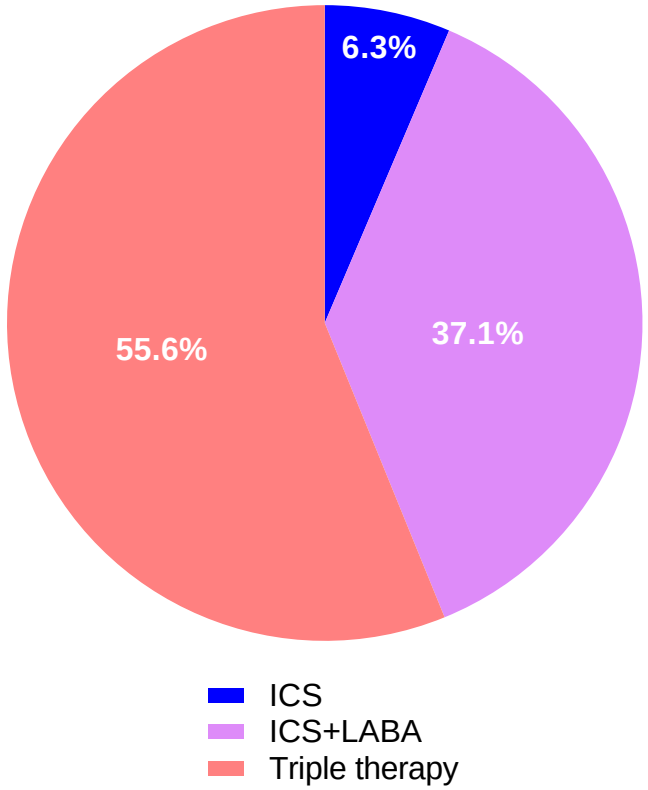
Asthma and Lung function

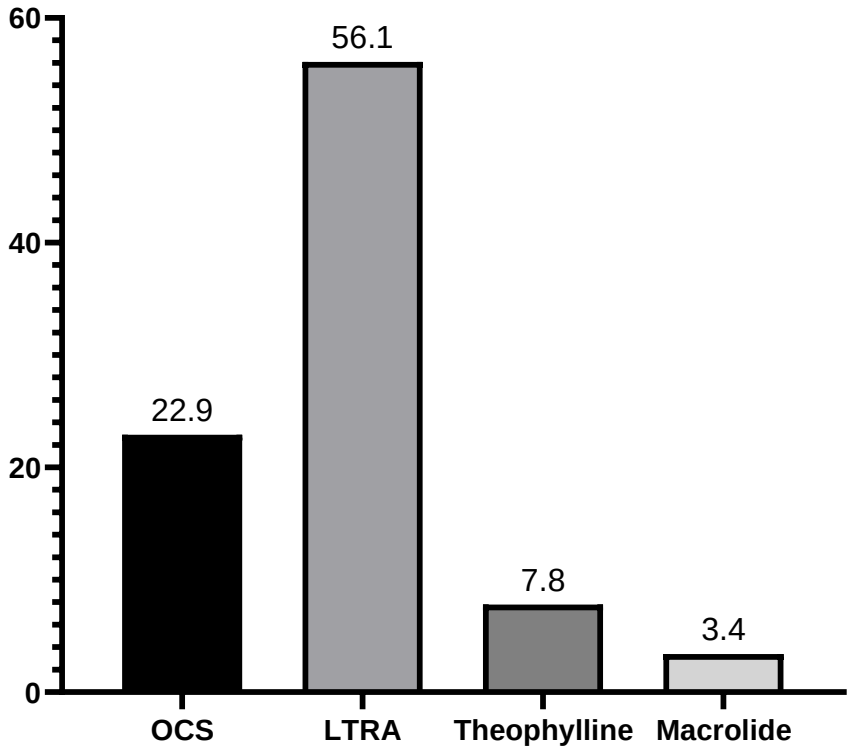
	Pre-bronchodilator			Post bronchodilator		
	FEV_1	FVC	FEV_1/FVC	FEV_1	FVC	FEV_1/FVC
All	74.5±23.0	98.1±19.1	62.0 ±14.6	75.9±22.9	98.5±19.5	63.3±14.8
Step						
GINA 4 (89)	77.5±22.6	100.5±18.7	63.2±14.3	77.0±22.3	100.8±20.1	63.0±15.0
GINA 5(109)	72.0±23.1	96.2±19.3	61.0±14.8	75.1±23.3	96.9±18.9	63.5±14.8
	0.092	0.115	0.279	0.596	0.208	0.855
Smoking						
Ever (80)	**69.7±24.8**	96.1±17.9	**58.0±15.9**	**70.3±23.8**	96.0±18.2	**59.2±15.9**
Never (117)	**77.8±21.3**	99.6±19.8	**64.7±13.0**	**79.9±21.6**	100.4±20.2	**66.1±13.5**
	0.016	0.199	0.002	0.008	0.158	0.004
Sex						
Male (83)	**67.3±21.3**	**92.1±15.2**	**58.3±15.6**	**68.2±20.6**	**92.2±15.2**	**59.4±15.6**
Female (115)	**79.6±22.9**	**102.5±20.3**	**64.7±13.2**	**81.2±22.9**	**102.9±20.9**	**65.9±13.8**
	<0.001	<0.001	<0.002	<0.001	0.001	0.006
Control						
Well or partial (102)	**78.1±21.5**	**100.9±18.4**	63.6±14.4	76.8±21.1	99.5±18.0	63.6±15.1
Poor (86)	**69.9±25.0**	**94.6±20.2**	59.9±15.1	74.1±25.4	97.1±21.7	62.5±15.1
	0.017	**0.027**	0.081	0.466	0.453	0.624
BMI						
<25 (100)	**71.2±22.7**	96.7±20.2	60.7±15.1	72.9±22.9	97.98±21.3	61.5±15.4
≥25 (94)	**78.1±22.9**	99.7±17.8	63.4±14.0	79.3±22.5	99.13±17.3	65.3±14.0
	0.035	0.261	.0160	0.078	0.708	0.106
Age						
<65 (100)	76.4±22.9	100.6±18.3	62.2±15.0	77.4±22.7	100.4±18.7	63.5±15.6
≥65 (94)	**69.1±22.7**	**91.2±19.6**	61.5±13.4	71.6±23.2	**92.8±21.0**	62.7±12.6
	0.050	0.003	0.779	0.164	0.030	0.759

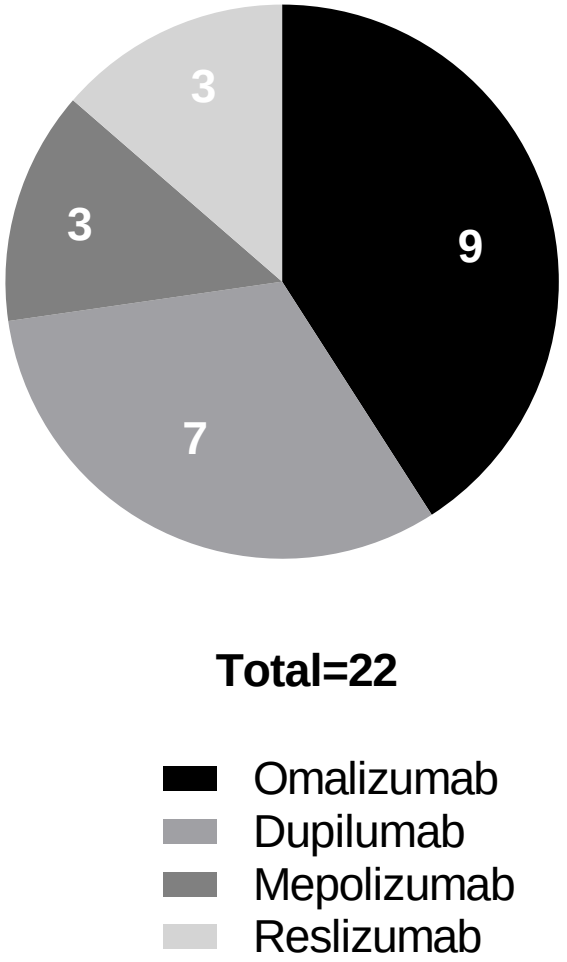
Asthma and Lung function

	Pre-bronchodilator			Post bronchodilator		
	FEV_1	FVC	FEV_1/FVC	FEV_1	FVC	FEV_1/FVC
All	74.5±23.0	98.1±19.1	62.0 ±14.6	75.9±22.9	98.5±19.5	63.3±14.8
Step						
GINA 4 (89)	77.5±22.6	100.5±18.7	63.2±14.3	77.0±22.3	100.8±20.1	63.0±15.0
GINA 5(109)	72.0±23.1	96.2±19.3	61.0±14.8	75.1±23.3	96.9±18.9	63.5±14.8
	0.092	0.115	0.279	0.596	0.208	0.855
Smoking						
Ever (80)	**69.7±24.8**	96.1±17.9	**58.0±15.9**	**70.3±23.8**	96.0±18.2	**59.2±15.9**
Never (117)	**77.8±21.3**	99.6±19.8	**64.7±13.0**	**79.9±21.6**	100.4±20.2	**66.1±13.5**
	0.016	0.199	0.002	0.008	0.158	0.004
Sex						
Male (83)	**67.3±21.3**	**92.1±15.2**	**58.3±15.6**	**68.2±20.6**	**92.2±15.2**	**59.4±15.6**
Female (115)	**79.6±22.9**	**102.5±20.3**	**64.7±13.2**	**81.2±22.9**	**102.9±20.9**	**65.9±13.8**
	<0.001	<0.001	<0.002	<0.001	0.001	0.006
Control						
Well or partial (102)	**78.1±21.5**	100.9±18.4	63.6±14.4	76.8±21.1	99.5±18.0	63.6±15.1
Poor (86)	**69.9±25.0**	94.6±20.2	59.9±15.1	74.1±25.4	97.1±21.7	62.5±15.1
	0.017	0.027	0.081	0.466	0.453	0.624
BMI						
<25 (100)	**71.2±22.7**	96.7±20.2	60.7±15.1	72.9±22.9	97.98±21.3	61.5±15.4
≥25 (94)	**78.1±22.9**	99.7±17.8	63.4±14.0	79.3±22.5	99.13±17.3	65.3±14.0
	0.035	0.261	0.160	0.078	0.708	0.106
Age						
<65 (100)	76.4±22.9	100.6±18.3	62.2±15.0	77.4±22.7	100.4±18.7	63.5±15.6
≥65 (94)	**69.1±22.7**	**91.2±19.6**	61.5±13.4	71.6±23.2	**92.8±21.0**	62.7±12.6
	0.050	0.003	0.779	0.164	0.030	0.759

Asthma and Medication







Summary of Result

Total 205

Sex: Control (-), AE (-), Lung function (m), Night Sx. (m)

Age: 57, Elderly, control (-), AE(-), ED (<65)

Onset of asthma: 42, female, BMI, Sx. (-), AE (-)

Asthma control: poor (44.9%), age, sex, BMI