

Additional file 3. Definitions of participants and outcomes of included studies

Studies (author, year)	Participants	Outcome
Lieu, 1999	<p>Asthma</p> <ol style="list-style-type: none"> 1. A hospitalization, ED visit, or outpatient clinic visit with an ICD-9 code of 493.XX 2. Adult aged 18-44 years who used asthma medications 3. Exclude adults aged 45 and older unless they had an ICD-9-coded diagnosis of asthma 	<p>Asthma-related hospitalization or ED visit: a principal diagnosis of 493.XX; 2. Any diagnosis of 493.XX + a principal diagnosis of an asthma-related respiratory condition; Asthma-related ED visit: a diagnosis of asthma or a related respiratory condition</p>
Schatz, 2004	<p>Asthma</p> <ol style="list-style-type: none"> 1. An ICD-9 code of 493.XX 2. ≥ 2 asthma-related medication dispensing in 1 year 3. Any ED or regular clinic asthma-related visit in the diagnosis and procedures database 4. 5-56 years old 	<p>Asthma hospitalization (primary diagnosis of asthma, ICD code of 493.xx) or ED visit for asthma.</p>
Schatz, 2006	<p>Asthma</p> <ol style="list-style-type: none"> 1. A hospital discharge principal diagnosis of asthma (ICD-9code 493.xx). 2. An ED visit with asthma as the principal diagnosis (ICD-9code 493.xx). 3. Four or more asthma-related medication dispensing 	<p>Emergency hospital utilization for asthma: at least 1 hospitalization or ED visit for asthma (ICD-9 code of 493.xx).</p>
Xu, 2011	<p>Asthma (mild-moderate):</p> <ol style="list-style-type: none"> 1. Asthma symptoms and/or medication use for ≥ 6 months in the previous year 2. Airway responsiveness with a provocative concentration 	<p>Severe asthma exacerbation: an emergency room visit or a hospitalization for asthma symptoms (questionnaire during screening visits).</p>

	dose (PC20) of methacholine \leq 12.5mg/ml.	
van Vliet, 2017	Asthma: 1. 6-18yr 2. Diagnosed based on GINA and the guidelines of the Dutch Society of Pediatrics	Moderate to severe asthma exacerbation: based on the criteria of the ATS/ERS recommendation.
Luo, 2020	Asthma: Patient had one or more diagnosis codes of asthma (ICD-10 code of J45.x; ICD-9 code of 493.0x, 493.1x, 493.8x,493.9x).	An asthma-related hospital encounter: ED visit or hospitalization with asthma as the principal diagnosis (ICD-10: J45.x; ICD-9: 493.0x,493.1x, 493.8x, 493.9x).
Luo, 2020	Asthma: Patient had one or more diagnosis codes of asthma (ICD-10 code of J45.x; ICD-9 code of 493.0x, 493.1x, 493.8x,493.9x).	An asthma-related hospital encounter: ED visit or hospitalization with asthma as the principal diagnosis (ICD-10: J45.x; ICD-9: 493.0x,493.1x, 493.8x, 493.9x).
Tong, 2021	Asthma 1. \geq 18yr 2. \geq 1 asthma diagnosis code (ICD-9 code of 493.0x, 493.1x, 493.8x, 493.9x; ICD-10 code of J45.x)	Asthma hospital encounter: a hospitalization or an ED visit that has asthma as its principal diagnosis (ICD-9: 493.0x, 493.1x, 493.8x, 493.9x; ICD-10: J45.x)
Zein, 2021	Asthma: 1.18-80 yr 2. ICD9 codes of 493.xx or TenthRevision of J45.xx	Nonsevere asthma exacerbation: oral glucocorticoid burst Severe asthma exacerbations: Requiring an ED visit or hospitalization for asthma
Noble, 2021	Asthma: 1. 12-80 yr 2. Physician-diagnosed and recorded asthma	\geq 1 hospitalization(s) within 12 months
Hond, 2022	Asthma (stable mild-moderate): 1.12-75 yr 2. Stable asthma: exclude patients with \geq 4 courses of oral prednisone in the previous 12 months, admission to the hospital because of asthma in the previous 6 months or to the	Severe asthma exacerbations: the need for a course of oral corticosteroids (prednisone) for a minimum of 3 days, as documented in medical records

	intensive care unit because of asthma at any time in the past	
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ATS/ERS: American Thoracic Society and European Respiratory Society

ICD: International Classification of Diseases

GINA: Global Initiative for Asthma

