

Table S1 Descriptive summary of literature: 2010–2014

Year	First author	Study design	Sample size	Risk factors		Outcome	Risk adjusted
				Increase	Decrease		
2012	Nantsupawat	Retrospective cohort	81 patients	Comorbidities (coronary artery disease & unilateral infiltrate)		30-day all cause readmission	No
2013	Baker	Retrospective cohort	6,095 patients	30- & 90-day: comorbidities (liver disease, metastatic tumor, heart failure, diabetes); number ICU days during index; pre-index hospitalization (2/+). 90-day: comorbidities (renal disease, myocardial infarction, malignancy); insurance (HMO vs. comprehensive); at least 1 pre-index hospitalization; ED visits (2/+) pre index; number ICU days in index; medication (systemic corticosteroids)		30- & 90-day all cause readmission	No
				30 & 90-day: Pre-index hospitalization (2/+); comorbidities (liver disease & metastatic tumor); at least 1 pre-index hospitalization; number ICU days at index. 30-day: comorbidities (chronic pulmonary disease). 90-day: insurance (HMO); medication (bronchodilator corticosteroids); outpatient visits pre index (2/+)		30- & 90-day COPD (primary/secondary diagnosis) readmission	
2013	Bollu	Retrospective cohort	2,463 patients		Treatment (arformoterol vs. nebulized short-acting beta agonists); APR DRG severity (major & extreme)	30-day all cause readmission	Yes
2013	Moran	Retrospective cohort	1,214 patients	Comorbidity (diabetes); social services referral		30-day all cause readmission	No
				Comorbidities (anemia & airway disease); social services referral		30-day same cause readmission	
2014	Chawla	Cohort	54 patients	Higher MRC dyspnea; 1/+ exacerbations in past year; 2/+ hospitalization for exacerbation in past year; 2/+ outpatient treatment for exacerbation in past year; chronic renal disease; 1/+ days outside of house 1 week before hospitalization		30-day all cause readmission	No
2014	Nguyen	Retrospective cohort	4,596 patients	Pneumococcal vaccine; systemic corticosteroids; new oxygen after index admission; previous hospitalization (COPD and non-COPD related); Charlson index (3+); comorbidity (anemia); palliative care LOS (1-46, 7-13, 14/+); ED or observational stay; discharge location (other than home, hospice or post acute/hospital)		30-day all cause readmission	Yes
2014	Sharif	Retrospective cohort	8,263 patients	Patient factors: comorbidities (heart failure, lung cancer, anxiety, depression, osteoporosis). System factors: LOS (1-2 & 7+ vs. 3-4 days);		30-day all cause readmission	No
				Patient factors: sex (female). Provider factors: prescriptions 1 year before index (ACE inhibitor & statins); prescriptions within 30 days of discharge (SABA/SAMA, oral steroid, antibiotic). System factors: number of hospitalizations vs. 3/+ admissions (0, 1, & 2); follow up visits within 30 days of discharge			
2014	Sjoding	Retrospective cohort	3,018 hospitals	Major teaching hospital; many low SES patients; high COPD volume		30-day COPD related readmission	Yes

ICU, Intensive Care Unit; ED, Emergency Department; HMO, Health Maintenance Organization; COPD, Chronic Obstructive Pulmonary Disease; LOS, Length of Stay; MRC, Medical Research Council; APR DRG, All Patient Refined Diagnosis-Related Groups; ACE, angiotensin-converting enzyme; SABA, short-acting β agonist; SAMA, short-acting muscarinic antagonist.

Table S2 Descriptive summary of literature: 2015–2020

Year	First author	Study design	Sample size	Risk factors		Outcome	CMS data or method	Risk adjusted
				Increase	Decrease			
2015	Candrilli	Retrospective observational	140,981 patients	30- & 90-day for all cause & COPD-related readmissions: long LOS, older age, & high comorbidity index. 30 & 90-day: Comorbidities (cancer-not lung, pneumonia, renal failure); severe COPD complexity. 90-day: comorbidity (heart disease)	30-day: moderate COPD complexity. 30- & 90-day: comorbidities (lung cancer & asthma)	30- & 90-day all cause readmission	No	No
				30- & 90-day: comorbidities (renal failure & pneumonia); COPD complexity (severe & moderate). 90-day: comorbidity (asthma)	30- & 90-day: cancer (not lung)	30- & 90-day COPD-related readmission		
2015	Coughlin	Retrospective cohort	397 patients	Inhaled steroids	Inhaled antimuscarinic; positive airway pressure therapy	30-day all cause readmission & mortality composite score	No	Yes
						30-day all cause readmission		
2015	Nguyen	Retrospective cohort	2,910 patients	Oxygen prescription at discharge, LOS (13+ days). Patients with low mobility (bed bound, able to sit, able to stand); past hospitalization in 1 year; comorbidities (anemia & chronic pain); ED/observational stay prior to readmission but within 30 days or discharge	Discharge location (hospice)	30-day all cause readmission	No	Yes
2015	Roberts	Retrospective	306 patients	Prior hospitalization; All Patient Refined (APR) DRG (3/+). Short acting muscarinic antagonist (SAMA) inhalers preadmission; oral corticosteroids at discharge	Oral corticosteroids at discharge	30-day all cause readmission	No	Yes
				APR DRG (3/+)	Oral corticosteroids at discharge	90-day all cause readmission		
2015	Shah	Retrospective	26,798,404 inpatient admissions	Medicare & Medicaid dually-enrolled; discharge location (home without home care & SNF)		30-day all cause readmission	No	Yes
2015	Yu	Retrospective	18,282 patients	Comorbidities (heart failure/heart disease); COPD severity score		30-day all cause readmission; 30-day readmission, COPD primary diagnosis; 30-day COPD any diagnosis	No	No
2016	Bashir	Retrospective case control	461 patients	Gender (male); discharge location (SNF); 4-6 comorbidities; 4/+ past visits to ER in 6 months		30-day all cause readmission	No	Yes
2016	Qing	Retrospective cohort	995 patients		Early roflumilast treatment	30-, 60-, 90-day all cause readmission	No	Yes
					Early roflumilast treatment	30-, 60-, 90-day COPD readmission		
2016	Simmering	Retrospective	480 hospitals 17,918,374 patients 28,265,070 visits	Younger age (40-64 vs. 65+); Younger Medicaid patients (vs. older Medicaid); discharge location (home health care); leave against medical advice		30-day COPD readmission	No	Yes
2016	Singh	Retrospective	80,088 patients	Comorbidities (depression, anxiety, psychosis, alcohol abuse, drug abuse)		30-day all cause readmission	No	Yes
2017	Lau	Retrospective	597,502 patients	Validation cohort: comorbidities (alcohol abuse & diabetes)		30-day COPD readmission	No	No
2017	Rinne	Retrospective observational	33,558 patients 130 VA hospitals	Patient LOS (medium & long, with odds increasing)		30-day all cause readmission	No	Yes
2018	Jacobs	Retrospective	1,055,830 hospitalizations	Patient insurance (Medicaid); household income (low); high comorbidity burden; longer LOS, discharge location: home healthcare & SNF	Older age	30-day all cause readmission *for AECOPD	Method	Yes
2018	Rezaee	Retrospective cohort	1,574 patients	Outpatient prescriptions (albuterol, fluticasone/salmeterol, inhaled steroids, tiotropium); breathing difficulty chief complaint; tests conducted (arterial blood gas & B-type natriuretic peptide)		30-day all cause ED readmission, index COPD	No	No
				Charlson score; albuterol; previous smoker; high pulse in ED		30-day all cause ED readmission, index COPD patients with breathing difficult as chief complaint		
2018	Spece	Retrospective cohort	2,391 VA patients	Charlson index		30-day all cause readmission and/or mortality	No	Yes
2018	Yang	Retrospective	4,535 hospitals; 3,513 hospitals reported COPD readmission data		Better staff responsiveness	30-day COPD readmission	No	Yes
2019	Keshishian	Retrospective cohort	7,892 patients		Arformoterol tartrate (ARF) treatment	30-day all cause & COPD specific readmission	No	Yes
2019	Nastars	Retrospective	298,676 patients		Race (Hispanic & African American)	30-day all cause readmission	No	Yes
2019	Stallings-Smith	Retrospective	1,788 counties	County characteristics: rurality; poverty; average median age. Hospital characteristics: HHI; number hospitals part of a system; number of hospital tobacco services	Full & partial smoke free policies (vs. none). County characteristics: older age with 4/+ years of college; average percent older females; average entropy index. Hospital characteristics: number of hospital beds, Medicaid percentage, number of teaching hospitals	30-day all cause readmission	Data	Yes
2020	Goto	Retrospective cohort	905 patients	Adding social factors to predictive models improved prediction of readmission risk. Reference & optimized models: Comorbidity (cardiac disease & respiratory); poverty. Optimized model: poverty level (optimized model)		8-30-day 'Late readmission'	Method	No
				Reference & optimized models: comorbidity (heart disease)		Full 30-day readmission		
2020	Lin	Retrospective cohort	9,982 patients		Patients with comorbidities (vs. without); 1-3 comorbidities; gender (female); high income; insurance (Medicare & Medicaid) with comorbidities (vs. no comorbidities); female with 1 comorbidity (vs. female with no comorbidities)	30-day COPD readmission	No	Yes
2020	Roberts	Retrospective observational	10,405 patients		Long-acting muscarinic receptor antagonist (LAMA) therapy	COPD readmission and/or death	No	Yes

ED, Emergency Department; COPD, chronic obstructive pulmonary disease; LOS, length of stay; SNF, Skilled Nursing Facility; ER, Emergency Room; HHI, Herfindahl-Hirschman Index; APR DRG, All Patient Refined Diagnosis-Related Groups.