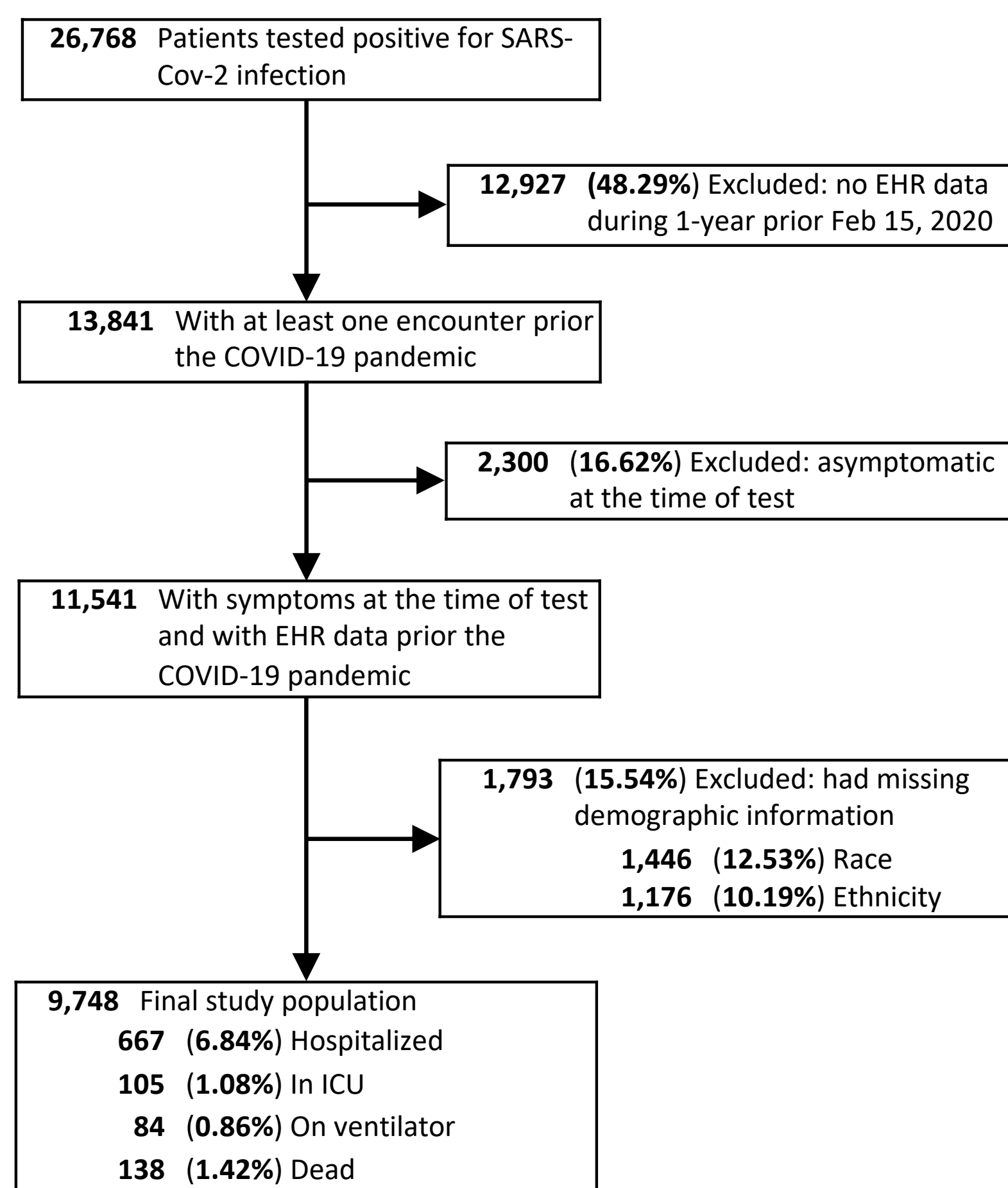


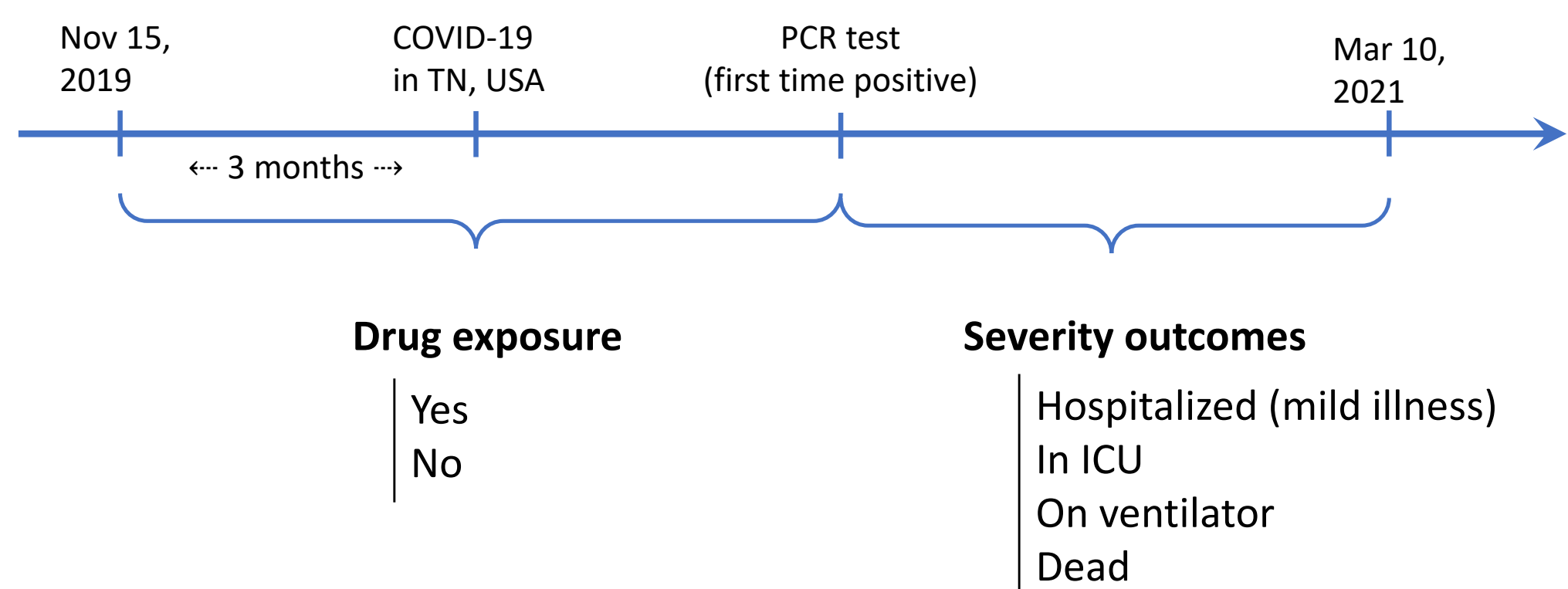
Study highlights

- The study used electronic health records to search for drug candidates that could be repurposed to treat COVID-19
- The study found 17 drug ingredients that are significantly associated with a decreased risk of death and other severe COVID-19 outcomes
- The list of drugs proposed by this study could provide additional insights into developing new candidates for COVID-19 treatment

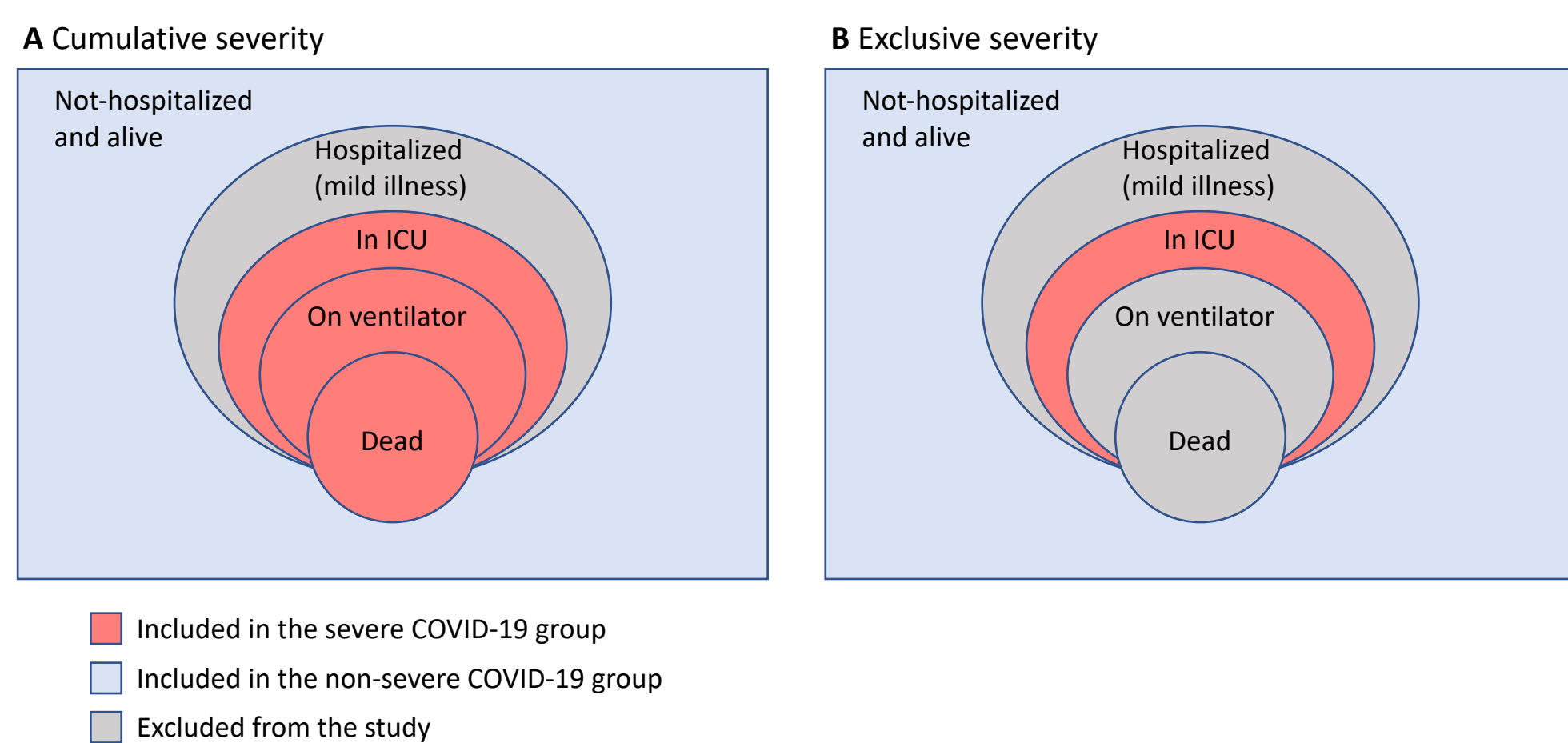
Patient selection



Study design



Outcomes



Statistical analysis

- The study applied the overlap weighing with a propensity score method to adjust for differences between the patients exposed to the drug prior to being diagnosed with SARS-CoV-2 (exposed group) and those not exposed (unexposed group)
- The propensity score for being exposed to a drug was estimated by a multivariable logistic regression model using age, sex, race, ethnicity, and weighted Elixhauser comorbidity score.
- The effect of drug exposure on COVID-19 outcomes was estimated using weighted multivariable logistic regression
- All drugs with corresponding effect estimates indicating reduced severity risk (OR < 1) were reported as potential candidates for COVID-19 treatment repurposing.

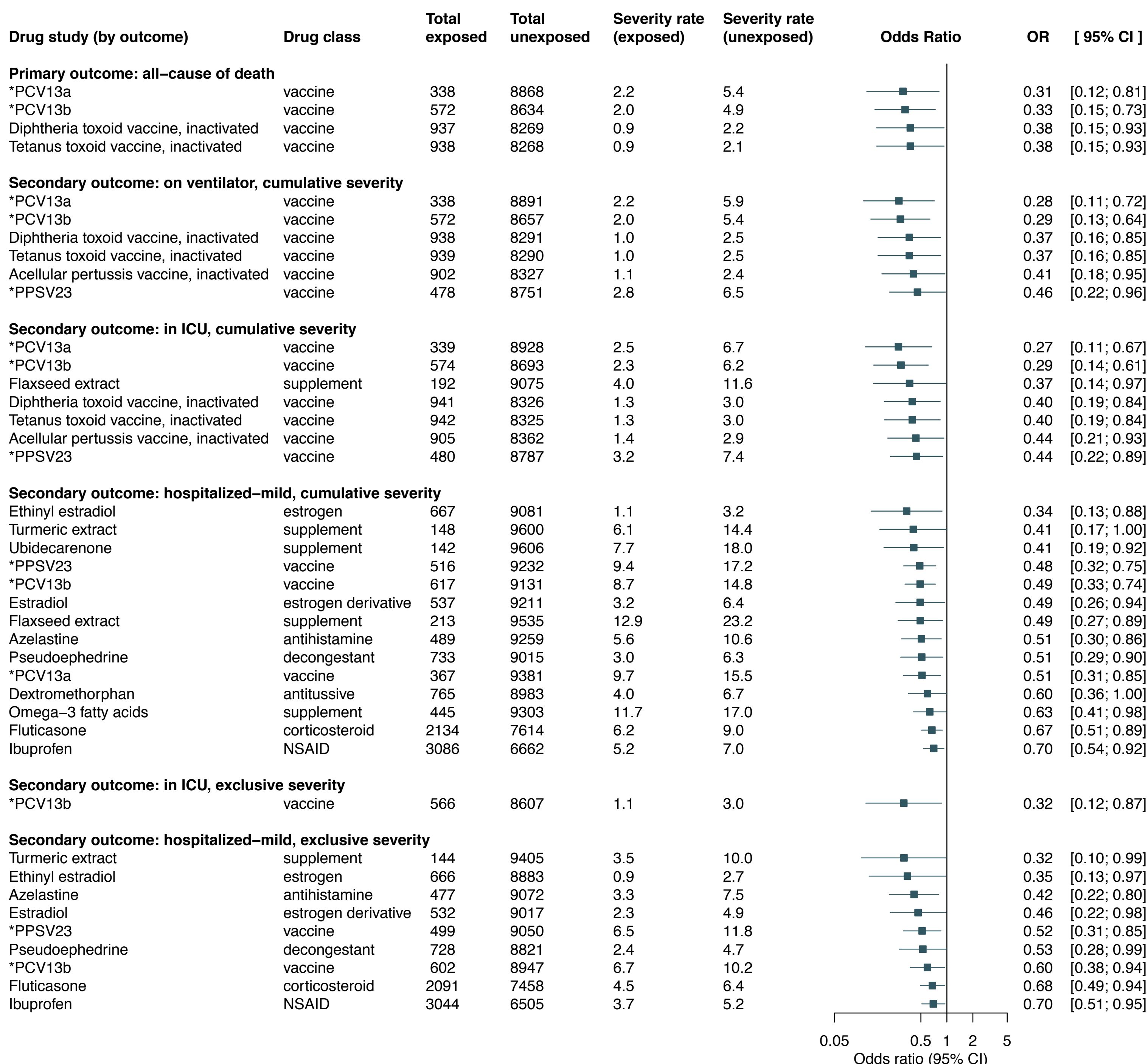
Associations conducted for primary and secondary outcomes

Study	Cumulative severity			Exclusive severity		
	Significant	Potential	Total	Significant	Potential	Total
Dead	4	58	213	4	58	213
On ventilator	6	69	223	0	21	164
In ICU	7	81	238	1	35	178
Hospitalized-mild	14	89	304	9	72	289

Patient counts for each severity group included in the study

Severity group	Cumulative severity	Exclusive severity
Dead	138	138
On ventilator	161	84
In ICU	199	105
Hospitalized-mild	680	481
Not hospitalized, alive	9068	9068

Significant drug associations grouped by outcome



Patient characteristics

Characteristic	All patients		Hospitalized patients	
	N	%	N	%
Total	9,748	100	667	100
Age, y*	42	20	60	19
Sex				
Men	3,878	39.8	336	50.4
Women	5,870	60.2	331	49.6
Race				
White	8,212	84.2	495	74.2
Black	1,276	13.1	155	23.2
Asian	260	2.7	17	2.5
Ethnicity				
Not Hispanic or Latino	9,411	96.5	646	96.9
Hispanic or Latino	337	3.5	21	3.1
Weighted Elixhauser comorbidity score				
<0	1,414	14.5	71	10.6
0	4,600	47.2	147	22
1-4	1,363	14	69	10.3
5+	2,371	24.3	380	57

* Reported as age mean and standard deviation

Effect trends across COVID-19 outcomes



Drug class associations

Drug class	TCe	TCu	SRe	SRu	OR	95% CI
Primary outcome: all-cause of death						
Antidepressants	2,227	6,979	1.5	2.6	0.61	(0.31 - 1.18)
Antihistamines	2,941	6,265	1.5	2.1	0.88	(0.50 - 1.58)
NSAIDs	4,495	4,711	1.1	1.6	0.53	(0.28 - 1.00)
Omega-3 supplements	687	8,519	2.9	5.1	0.59	(0.30 - 1.18)
Sigma-1 receptor agonists	1,448	7,758	1	2.4	0.44	(0.20 - 0.97)
SNRIs	512	8,694	2.4	3.8	0.75	(0.31 - 1.83)
SSRIs	1,381	7,825	1.9	2.4	0.73	(0.36 - 1.48)
Tricyclic antidepressants	316	8,890	1.5	3.4	0.41	(0.11 - 1.50)
Secondary outcome: on ventilator, cumulative severity						
Antidepressants	2,232	6,997	1.7	3.2	0.54	(0.29 - 0.98)
Antihistamines	2,945	6,284	1.6	2.6	0.72	(0.42 - 1.22)
NSAIDs	4,507	4,722	1.3	2	0.54	(0.31 - 0.96)
Omega-3 supplements	691	8,538	3.4	5.6	0.62	(0.33 - 1.19)
Sigma-1 receptor agonists	1,448	7,781	1	2.8	0.36	(0.17 - 0.76)
SNRIs	514	8,715	2.8	4.4	0.71	(0.31 - 1.64)
SSRIs	1,384	7,845	2.1	3	0.66	(0.34 - 1.27)
Tricyclic antidepressants	318	8,911	2.2	3.9	0.51	(0.16 - 1.57)
Secondary outcome: in ICU, cumulative severity						
Antidepressants	2,242	7,025	2.1	3.9	0.53	(0.31 - 0.92)
Antihistamines	2,960	6,307	2	3.1	0.74	(0.46 - 1.19)
NSAIDs	4,528	4,739	1.6	2.5	0.53	(0.31 - 0.88)
Omega-3 supplements	694	8,573	3.8	6.5	0.58	(0.31 - 1.06)
Sigma-1 receptor agonists	1,451	7,816	1.2	3.4	0.36	(0.18 - 0.72)
SNRIs	516	8,751	3.2	5.1	0.66	(0.30 - 1.42)
SSRIs	1,389	7,878	2.5	3.6	0.65	(0.35 - 1.18)
Tricyclic antidepressants	320	8,947	2.8	4.7	0.53	(0.19 - 1.47)
Secondary outcome: hospitalized-mild, cumulative severity						
Antidepressants	2,414	7,334	7.9	9.9	0.81	(0.60 - 1.10)
Antihistamines	3,147	6,601	7.1	8.7	0.86	(0.66 - 1.13)
NSAIDs	4,820	4,928	6	7.5	0.74	(0.56 - 0.98)
Omega-3 supplements	757	8,991	11.1	15.4	0.67	(0.46 - 0.97)
Sigma-1 receptor agonists	1,520	8,228	5.5	9.1	0.56	(0.39 - 0.80)
SNRIs	572	9,176	12.1	12.9	0.93	(0.60 - 1.43)
SSRIs	1,472	8,276	7.8	10.3	0.7	(0.49 - 0.99)
Tricyclic antidepressants	355	9,393	12.1	12	1.19	(0.70 - 2.03)
Secondary outcome: on ventilator, exclusive severity						
Antidepressants	2,203	6,949	0.9	1.8	0.46	(0.21 - 1.02)
Antihistamines	2,915	6,237	0.8	1.4	0.63	(0.31 - 1.28)
NSAIDs	4,457	4,695	0.6	1.1	0.55	(0.26 - 1.17)
Omega-3 supplements	682	8,470	2.3	2.3	1.07	(0.46 - 2.48)
Sigma-1 receptor agonists	1,437	7,715	0.3	1.6	0.21	(0.07 - 0.68)
SNRIs	507	8,645	1.7	2	0.87	(0.29 - 2.60)
SSRIs	1,365	7,787	0.9	1.7	0.48	(0.20 - 1.17)
Secondary outcome: in ICU, exclusive severity						
Antidepressants	2,208	6,965	1	2.3	0.41	(0.20 - 0.85)
Antihistamines	2,927	6,246	1.1	1.7	0.76	(0.41 - 1.40)
NSAIDs	4,470	4,703	0.8	1.4	0.47	(0.24 - 0.93)
Omega-3 supplements	679	8,494	1.9	3.2	0.6	(0.26 - 1.37)
Sigma-1 receptor agonists	1,442	7,731	0.6	1.9	0.35	(0.14 - 0.86)
SNRIs	508	8,665	1.8	2.6	0.68	(0.25 - 1.85)
SSRIs	1,367	7,806	1	2	0.43	(0.18 - 1.01)
Tricyclic antidepressants	316	8,857	1.5	2.5	0.52	(0.14 - 1.95)
Secondary outcome: hospitalized-mild, exclusive severity						
Antidepressants	2,350	7,199	6	6.5	0.96	(0.68 - 1.36)
Antihistamines	3,073	6,476	5.2	6	0.92	(0.68 - 1.24)
NSAIDs	4,698	4,851	4.5	5.3	0.8	(0.59 - 1.09)
Omega-3 supplements	727	8,822	7.8	10.5	0.71	(0.46 - 1.08)
Sigma-1 receptor agonists	1,501	8,048	4.4	6.4	0.66	(0.44 - 0.98)
SNRIs	554	8,995	9.4	8.7	1.09	(0.67 - 1.76)
SSRIs	1,435	8,114	5.6	7.3	0.72	(0.48 - 1.07)
Tricyclic antidepressants	346	9,203	9.8	8.3	1.41	(0.78 - 2.55)