

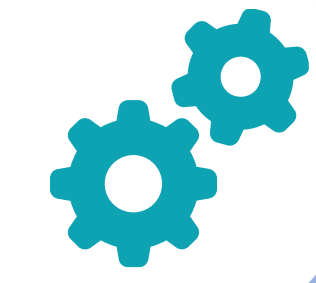
# Inhaled corticosteroids and COVID-19 – a potential protective effect on disease severity and survival

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## BACKGROUND

- Inhaled corticosteroid therapy (ICS) is an **important therapeutic modality** in chronic respiratory diseases
- COPD patients are **significantly affected with adverse COVID-19 outcomes**
- The role of ICS in COVID-19 has been previously examined, with **inconclusive findings**, especially in COPD patients.



## METHODS

- From 1 Jan 2020 until Dec 2020, in two study populations - general population and COPD patients
- three study cohorts were observed:
  - 1. all group subjects,
  - 2. COVID-19 diagnosed individuals
  - 3. hospitalized COVID-19 patients.
- **Outcomes studied were COVID-19 diagnosis, hospital admission, ICU admission, and fatal outcome.**



## AIM

- To investigate whether ongoing regular inhaled corticosteroid exposure affects the risk, severity, or outcome of SARS-CoV-2 infection using a large linked Swedish population register database.



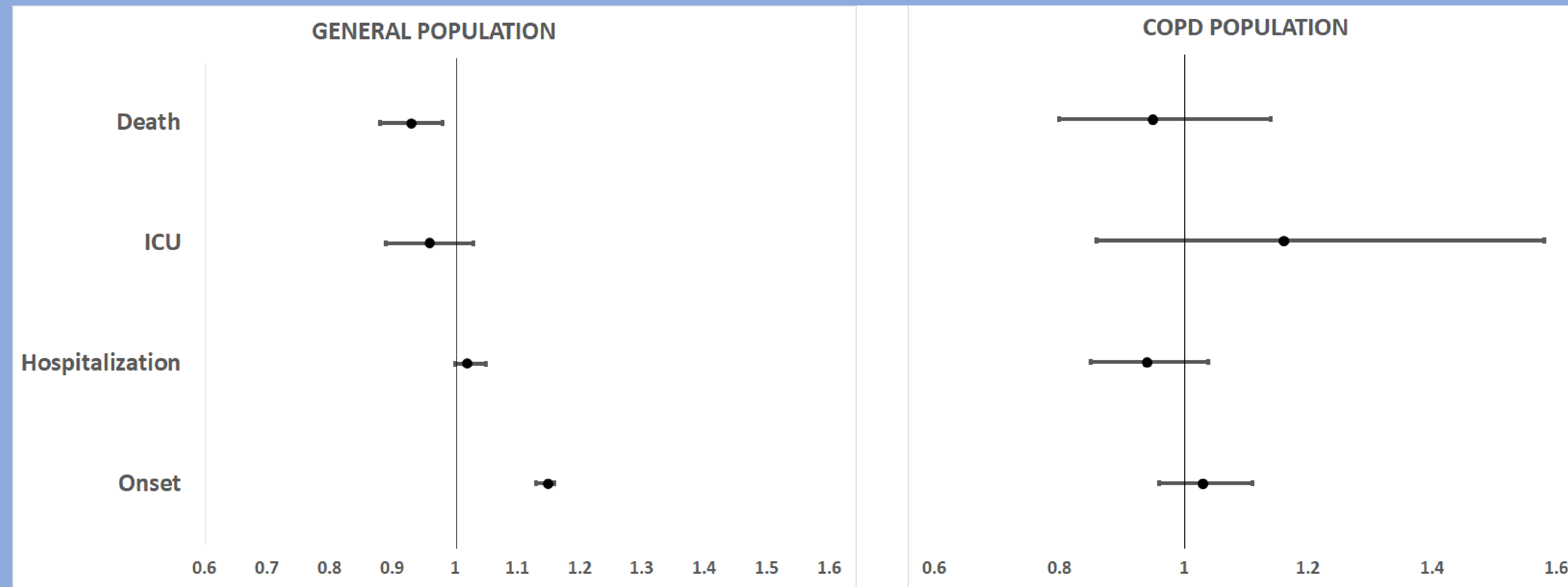
## TAKE-AWAY

- **the benefits of ongoing ICS therapy in COPD patients outweighs the potential associated risks reducing major adverse clinical outcomes**

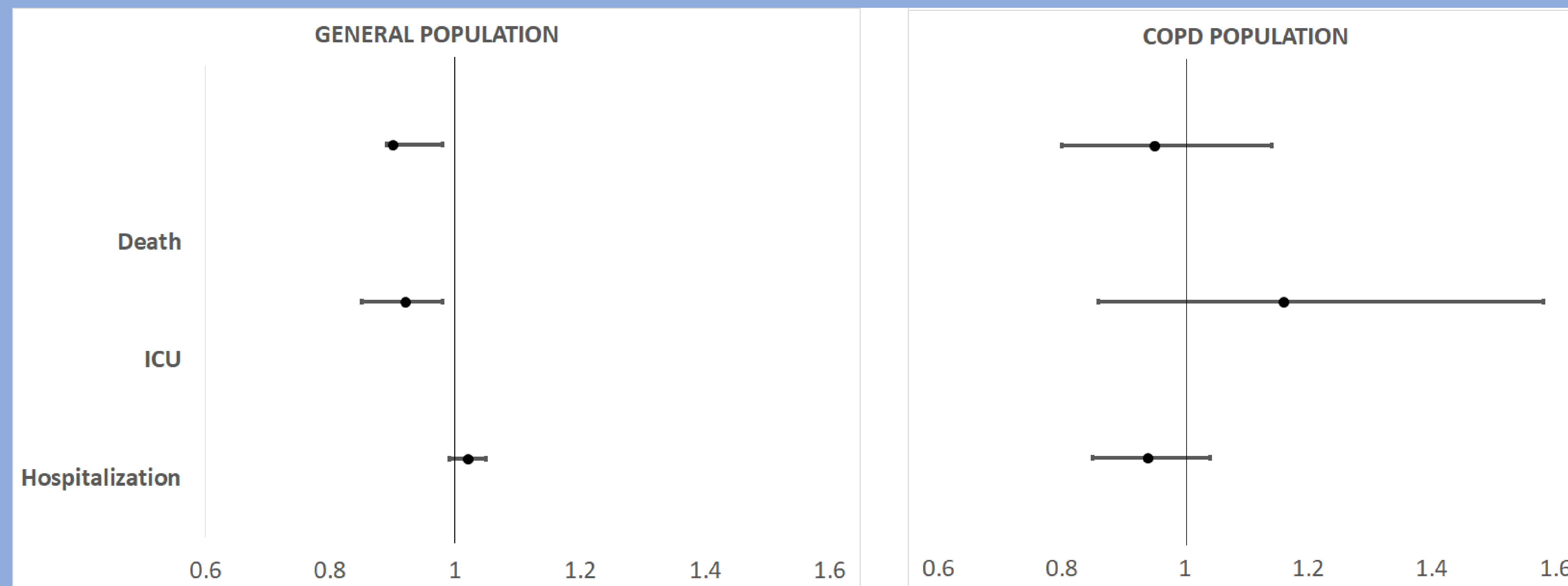


## PRELIMINARY RESULTS

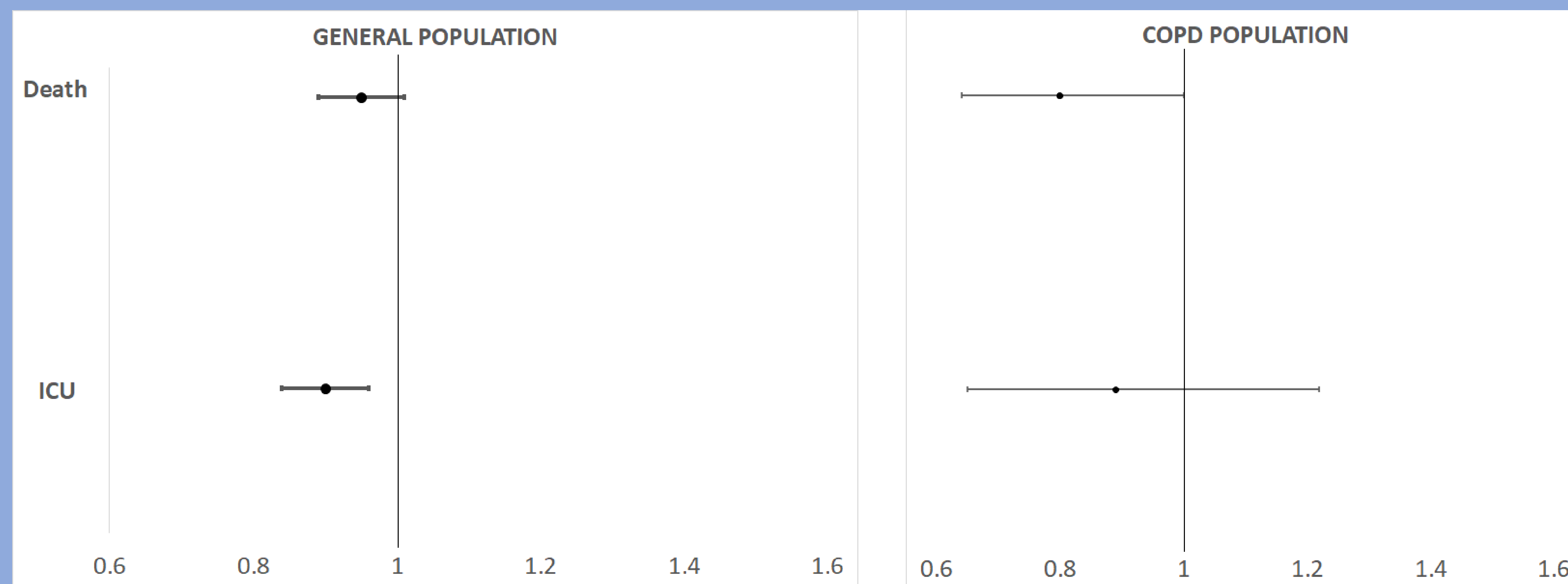
### GENERAL POPULATION



### ONSET COHORT



### HOSPITALIZED COHORT



- In the general population previous ICS exposure decreased fatal outcomes HR 0.93 [0.88-0.99] and an increased risk for diagnosed COVID-19 was observed HR 1.15 [1.13-1.16]

- In the general population with COVID-19-diagnosis, previous ICS exposure decreased risk of ICU admission (HR 0.92 [0.85-0.98]), and death (HR 0.93 [0.89-0.98])

- In hospitalized general population cohort, previous ICS exposure reduced ICU admission (HR 0.9 [0.84-0.96]), and among COPD patients, previous ICS therapy was related to better survival (HR 0.8 [0.64-1.00]).



# FINAL RESULTS

**Table 1. Number of patients included in the study**

	General population		COPD patients	
	ICS exposure			
	Non-exposed to ICS	Exposed	Non-exposed to ICS	Exposed
<b>General population</b>	550083	22965	4872	3900
<b>COVID-19 positive patients</b>	241871	11808	1600	1645
<b>Hospitalized patients</b>	45795	4459	920	1008

**Table 2.**

		General cohort		COVID-19 onset		Hospitalized	
		GENERAL POPULATION	COPD RESTRICTED	GENERAL POPULATION	COPD RESTRICTED	GENERAL POPULATION	COPD RESTRICTED
<b>Unadjusted HR [95% CI]</b>	Onset	1.27 [1.2,1.34]	1.14 [0.97,1.35]				
	Hospitalization	2.19 [2.02,2.38]	1.2 [0.97,1.48]	2.24 [2.18,2.31]	1.1 [1.01,1.21]		
	ICU admission	1.94 [1.44,2.62]	1.84 [0.78,4.29]	1.85 [1.68,2.03]	0.79 [0.57,1.08]	0.94 [0.85,1.03]	0.74 [0.54,1.02]
<b>Age-sex adjusted HR [95% CI]</b>	Onset	1.36 [1.28,1.43]	1.15 [0.97,1.35]				
	Hospitalization	1.99 [1.83,2.16]	1.21 [0.98,1.49]	1.7 [1.65,1.75]	1.08 [0.99,1.19]		
	ICU admission	2.04 [1.51,2.77]	1.95 [0.83,4.58]	1.6 [1.45,1.76]	0.79 [0.58,1.09]	1.03 [0.94,1.13]	0.74 [0.54,1.02]
<b>IPTW adjusted [95% CI]</b>	Onset	1.04 [0.96,1.13]	1.11 [0.9,1.38]				
	Hospitalization	1.06 [0.94,1.21]	1.13 [0.86,1.48]	0.98 [0.94,1.03]	1.06 [0.95,1.19]		
	ICU admission	1.49 [0.91,2.44]	1.42 [0.45,4.47]	1.09 [0.92,1.29]	0.97 [0.66,1.41]	1.22 [1.05,1.42]	1.14 [0.77,1.7]
<b>Death</b>		1.87 [1.64,2.12]	1.19 [0.83,1.7]	2.11 [1.98,2.26]	1.03 [0.86,1.24]	1.24 [1.14,1.34]	0.86 [0.69,1.06]
		1.55 [1.36,1.75]	1.2 [0.84,1.71]	1.25 [1.17,1.33]	1.01 [0.84,1.22]	1.09 [1.01,1.19]	0.86 [0.69,1.06]
<b>Death</b>		1.07 [0.87,1.31]	0.89 [0.57,1.4]	1.08 [0.96,1.21]	0.99 [0.79,1.24]	1.03 [0.88,1.2]	0.9 [0.69,1.19]



# FINAL RESULTS

Table 3.

		General population		COPD population	
		Male	Female	Male	Female
<b>Unadjusted HR [95% CI]</b>	Onset	1.4 [1.29,1.52]	1.17 [1.09,1.26]	1.17 [0.92,1.48]	1.13 [0.9,1.42]
	Hospitalization	2.3 [2.05,2.58]	2.21 [1.97,2.47]	1.24 [0.93,1.66]	1.18 [0.87,1.61]
	ICU admission	2.1 [1.46,3.02]	2.15 [1.27,3.67]	7.62 [1.69,34.38]	0.34 [0.07,1.63]
	Death	2.05 [1.72,2.44]	1.78 [1.48,2.13]	1.31 [0.82,2.1]	1.09 [0.63,1.9]
<b>IPTW adjusted</b>	Onset	1.09 [0.97,1.23]	1.01 [0.9,1.13]	1.19 [0.89,1.59]	1.05 [0.77,1.43]
	Hospitalization	1.14 [0.96,1.36]	1 [0.84,1.21]	1.24 [0.88,1.76]	1.04 [0.69,1.57]
	ICU admission	1.67 [0.9,3.11]	1.24 [0.55,2.78]	3.36 [0.74,15.33]	0.34 [0.05,2.38]
	Death	1.17 [0.88,1.55]	0.99 [0.74,1.33]	1.16 [0.66,2.06]	0.67 [0.34,1.33]

Table 4. Unadjusted and IPTW Cox regression by sex in COVID-19 positive patients

		General population		COPD population	
		Male	Female	Male	Female
<b>Unadjusted HR [95% CI]</b>	Hospitalization	2.06 [1.96,2.16]	2.54 [2.44,2.65]	1.11 [0.97,1.26]	1.11 [0.98,1.26]
	ICU admission	1.49 [1.31,1.7]	3.19 [2.77,3.68]	0.88 [0.57,1.35]	0.71 [0.44,1.14]
	Death	2.16 [1.97,2.38]	2.17 [1.98,2.38]	1.12 [0.87,1.44]	0.96 [0.73,1.25]
<b>IPTW adjusted</b>	Hospitalization	0.97 [0.9,1.04]	1 [0.93,1.07]	1.09 [0.94,1.27]	1.05 [0.9,1.24]
	ICU admission	0.88 [0.7,1.12]	1.45 [1.15,1.83]	0.97 [0.58,1.61]	0.99 [0.57,1.72]
	Death	1.17 [0.99,1.37]	1.01 [0.86,1.19]	1.04 [0.77,1.41]	0.94 [0.68,1.31]



## FINAL RESULTS

**Table 5. Unadjusted and IPTW Cox regression by sex in Covid 19 positive hospitalized patients**

		General population		COPD population	
		Male	Female	Male	Female
<b>Unadjusted HR [95% CI]</b>	ICU admission	0.85 [0.75,0.96]	1.36 [1.18,1.57]	0.85 [0.55,1.31]	0.64 [0.4,1.03]
	Death	1.01 [0.9,1.13]	1.19 [1.06,1.33]	0.92 [0.69,1.23]	0.81 [0.59,1.11]
<b>IPTW adjusted</b>	ICU admission	1.02 [0.83,1.25]	1.55 [1.24,1.94]	1.16 [0.67,2.02]	1.12 [0.63,1.97]
	Death	1.16 [0.96,1.39]	0.93 [0.74,1.17]	0.85 [0.59,1.21]	0.98 [0.64,1.5]

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