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I-MOVE-COVID-19 Network

Multidisciplinary European network for research, prevention and control of the COVID-19 pandemic

COVID-19 European hospital surveillance:

First surveillance bulletin

including data from all sentinel sites

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Authors: Georgia Ladbury (1), Angela Rose (1, 2), James McMahon (1), Mark Hamilton (1), Diogo Marques (1), Jim McMenamin (1)
Affiliations: (1) – Public Health Scotland; (2) – Epiconcept

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Abbreviations

COVID-19	Coronavirus disease 2019
EEA	European Economic Area
ECDC	European Centre for Disease Prevention and Control
EU	European Union
GP	General practitioner
HCW	Healthcare worker
HDU	High Dependency Unit
ICD	International classification of diseases
ICU	Intensive care unit
ILI	Influenza-like illness
I-MOVE	Influenza – Monitoring Vaccine Effectiveness in Europe
MS	Member States
OR	Odds ratio
RT- PCR	Real-time polymerase chain reaction
SARI	Severe acute respiratory infection
SARS-CoV-2	Severe acute respiratory syndrome – coronavirus 2
VE	Vaccine effectiveness

Summary

This surveillance report summarises the information from the I-MOVE-COVID-19 hospital surveillance network to monitor the COVID-19 pandemic in nine European countries. The I-MOVE-COVID-19 hospital surveillance aims to reinforce and complement the COVID-19 epidemiological data in the EU/EEA and the UK, compiled and reported by ECDC. Throughout this surveillance bulletin, persons who were hospitalised with confirmed or probable SARS-CoV-2 virus infection are referred to as "COVID-19 cases".

From February to August, surveillance data was provided by nine participating hospital surveillance sites in seven countries. In two sites/countries, COVID-19 hospital surveillance is underway and clearance for data transmission to the I-MOVE-COVID-19 consortium is expected.

Data for the I-MOVE-COVID-19 hospital surveillance is collected following a generic protocol. However, there may be differences between countries in the data collected, due to differences in health care systems, hospital admission policy, or coding of data.

A total of 19,971 COVID-19 cases were reported by nine participating sites for the period February to August. The majority of cases (78%) were reported by England.

- The distribution of cases reflects the course of the pandemic, with most cases reported in March and April (weeks 12–16), 2020
- More male than female COVID-19 cases were reported in all age groups, except for the youngest age-group (0–14 years), where the ratio of females to males was approximately 1
- The most frequently reported symptom was cough (73%), followed by shortness of breath (69%) and fever (65%). Less frequently reported symptoms were diarrhoea (26%), ageusia (7%) and anosmia (5%). Almost all COVID-19 cases from the six sites reporting symptoms had febrile illness or respiratory symptoms, 94% had neurological symptoms and 93% experienced gastrointestinal symptoms
- Median length of hospital stay was 10 days
- A little over one quarter (27%) of COVID-19 cases required ICU/HDU admission; however, for sites excluding England, this was 11%. Most ICU/HDU admissions (53%) were in the 45–64 age-group
- A little over one quarter (27%) of COVID-19 cases died in hospital, with more men dying in hospital than women (p=0.0000) and with most deaths (53%) occurring in the ≥75 age group
- Of all deaths, fewer than 5% were of healthcare workers and <1% were pregnant women
- A little over half (56%) of the COVID-19 cases, in sites reporting this information, had never smoked
- For all sites, 60% of hospitalised COVID-19 cases were hospitalised within 4 days of symptom onset, 17% between 5 and 9 days, 14% >9 days and 10% had onset of symptoms while in hospital.
- For all sites excluding England, 38% were hospitalised within 4 days, with 34% being hospitalised between 5 and 9 days from onset of symptoms, 23% >9 days and 6% having symptoms onset while in hospital.

Participating sites and data submission

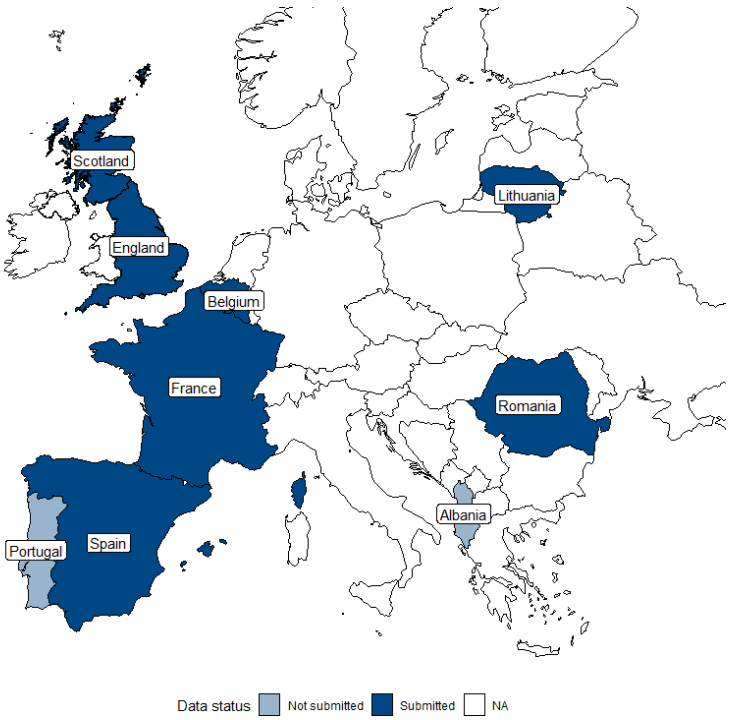
The I-MOVE WP3 hospital surveillance for COVID-19 is coordinated by Public Health Scotland (PHS) with Epiconcept support. The hospital network comprises 11 surveillance sites in nine countries: six EU Member States (Belgium, two sites in France, Lithuania, Portugal, Romania, and two sites in Spain), Albania, England and Scotland (see Figure 1).

Erreur ! Source du renvoi introuvable. describes participating sites and their contribution of data to this report. Note that the period for which data were submitted do not necessarily reflect the total duration of the epidemic in that country.

The data presented in this report comprise confirmed (n=19,882) and probable cases (n=89). The number of suspected cases submitted was too small to include in analysis[1].

Figure 1 **Map of countries participating in I-MOVE-COVID-19 WP3 hospital surveillance**

Countries which were able to submit data for this report are coloured dark blue; those which are yet to submit data are coloured light blue. Note that ES and FR both have two separate sites in different areas/regions of the country.



[1] See Annex C for case definitions

Table 1 **Countries participating in I-MOVE-COVID-19 WP3 hospital surveillance and their respective contribution to this bulletin**

Country	Region	Participating hospitals	Number (%) of cases	Onset of first reported case[2]		Onset of last reported case	
				Date	Week	Date	Week
Albania (AL)	-	Two hospitals, all wards	-	-		-	
Belgium (BE)	-	One hospital, all wards	445 (2.2)	22 Feb 2020	8	20 Aug 2020	34
England (EN)	National	All hospitals, including mandatory reporting from ICUs/HDUs	15,522 (77.7)	1 Feb 2020	5	01 Aug 2020	31
France (FR)	Two sites:						
	FR-I (REIVAC)	Five hospitals, all wards	-	-		-	
	FR-V (ViVI)	Two hospitals, all wards	<15	09 May 2020	19	12 Jun 2020	24
Lithuania (LT)	-	Two hospitals	<15	04 Mar 2020	10	04 Aug 2020	19
Portugal (PT)	-	Three hospitals, all wards	-		-	-	
Romania (RO)	-	Two hospitals, all wards	91 (0.5)	06 Mar 2020	10	26 Jul 2020	30
Scotland (SC)	National	All hospitals, all wards	2,060 (10.3)	1 Feb 2020	5	09 Aug 2020	32
Spain (ES)	Two sites:						
	NA	Navarra region: six hospitals, all wards	1,573 (7.9)	24 Feb 2020	9	17 May 2020	20
	ES	Two hospitals, all wards	265 (1.3)	05 Mar 2020	10	18 May 2020	21
Total			**19,971**	**1 Feb 2020**	**5**	**20 Aug 2020**	**34**

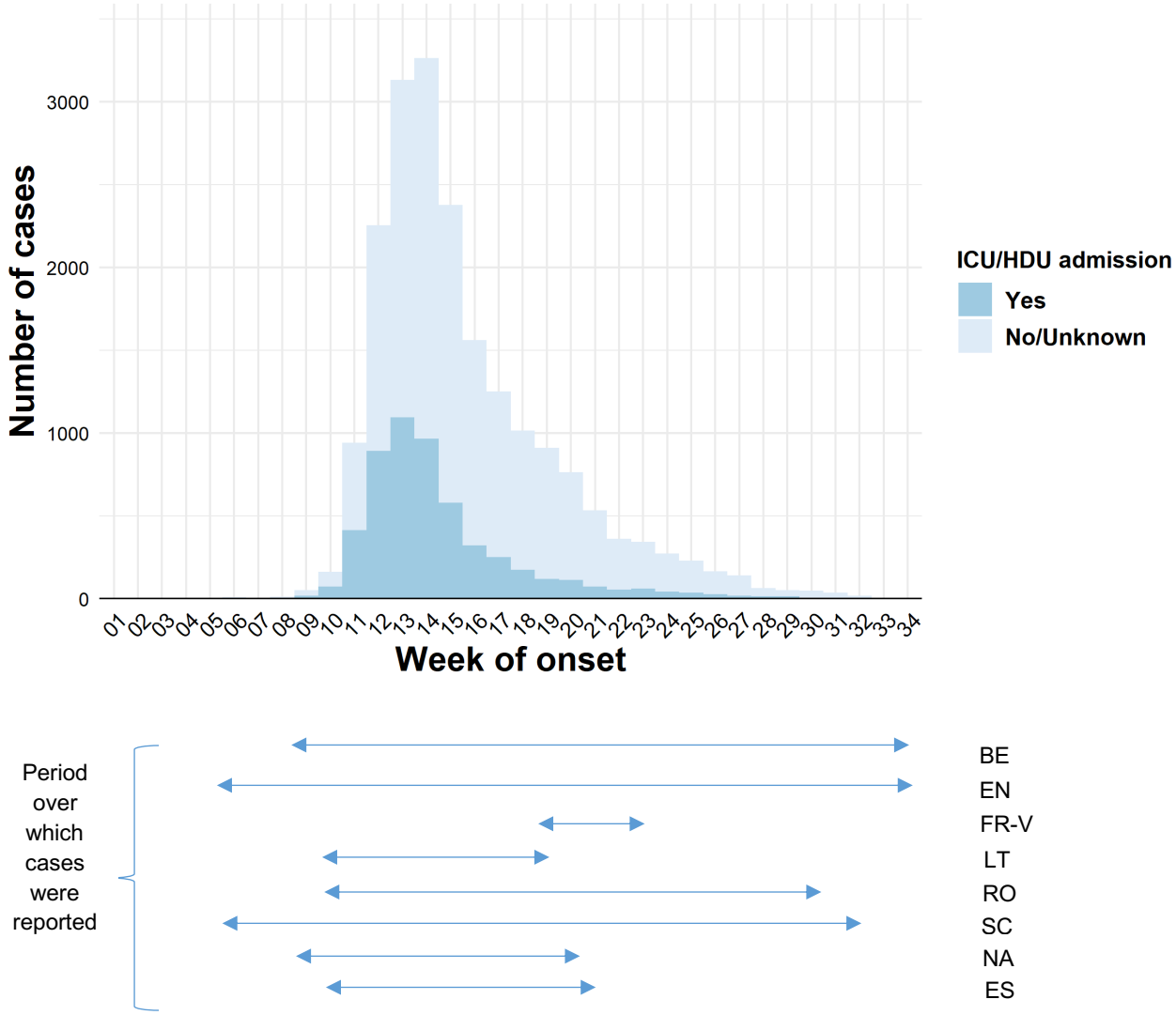
[2] NB Data have been censored to remove cases with date of onset of symptoms prior to 1 February 2020 for data quality reasons

Cases over time

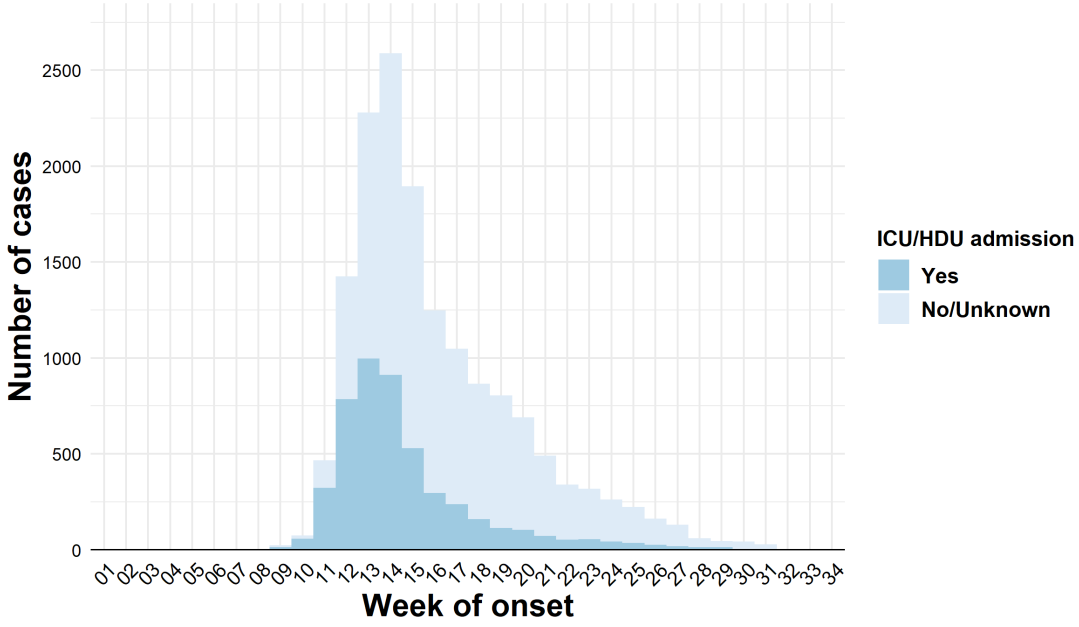
Figure 2 shows the number of confirmed and probable cases reported overall and by participating site by date of onset of symptoms, overall and by participating country, categorised by known ICU/HDU admission. Please note that the y-axes differ between countries owing to the large difference in number of cases reported, and not all countries were able to submit data covering the entire surveillance period. Owing to the small number of cases, results are not presented for LT and FR-V.

Figure 2 **Number of confirmed and probable cases reported overall and by participating site by date of onset of symptoms**

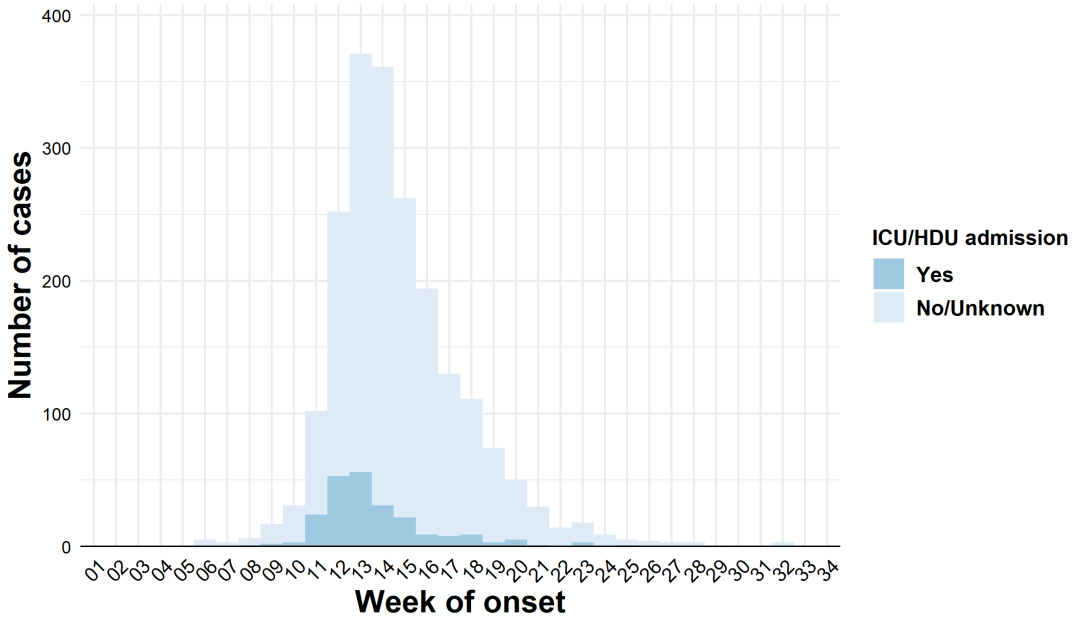
All sites (N=19,971)



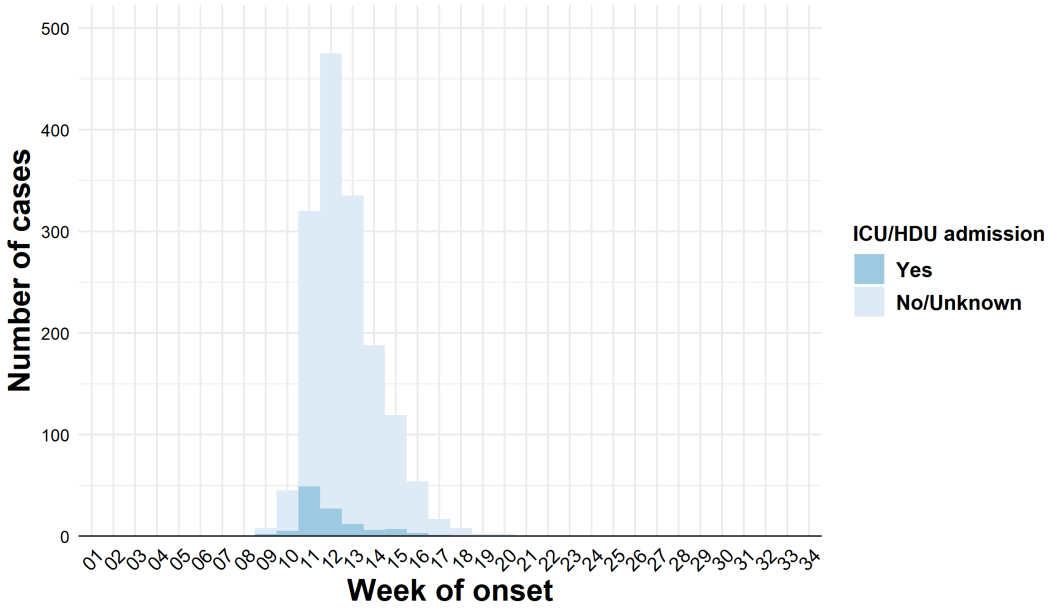
EN (N=15,522)



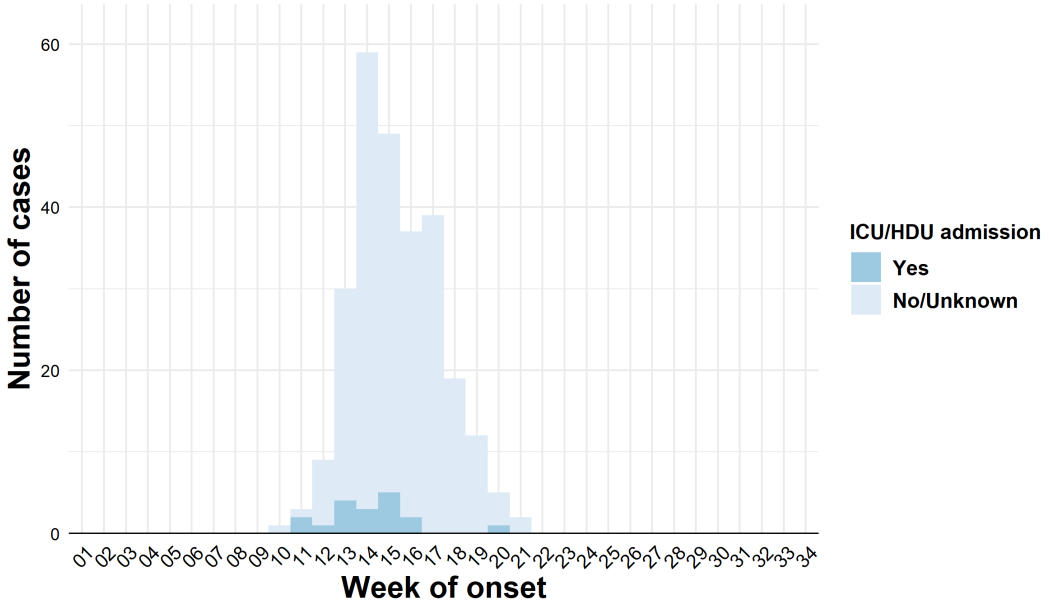
SC (N=2,060)



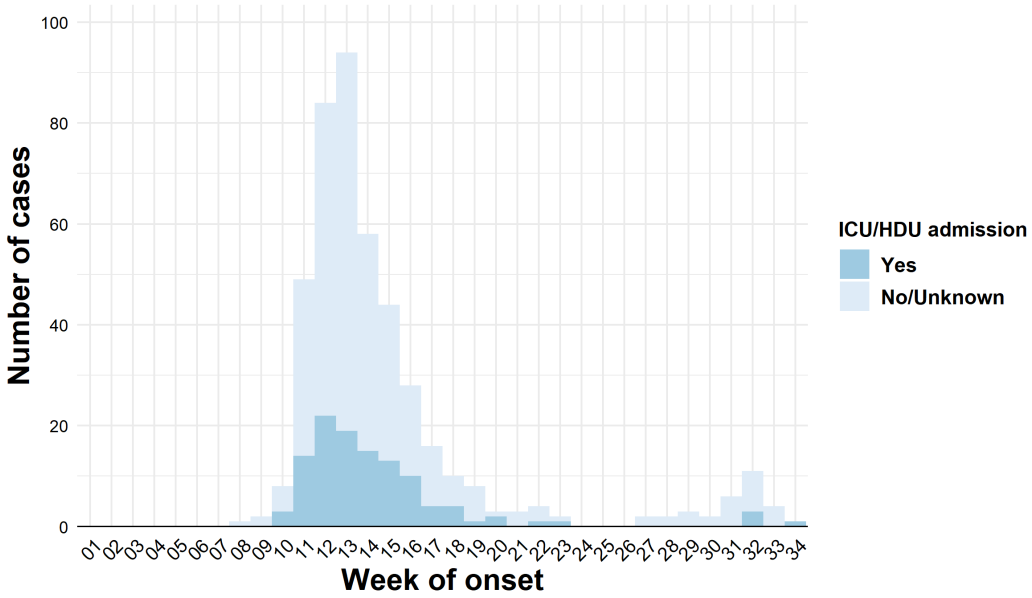
NA (N=1,573)



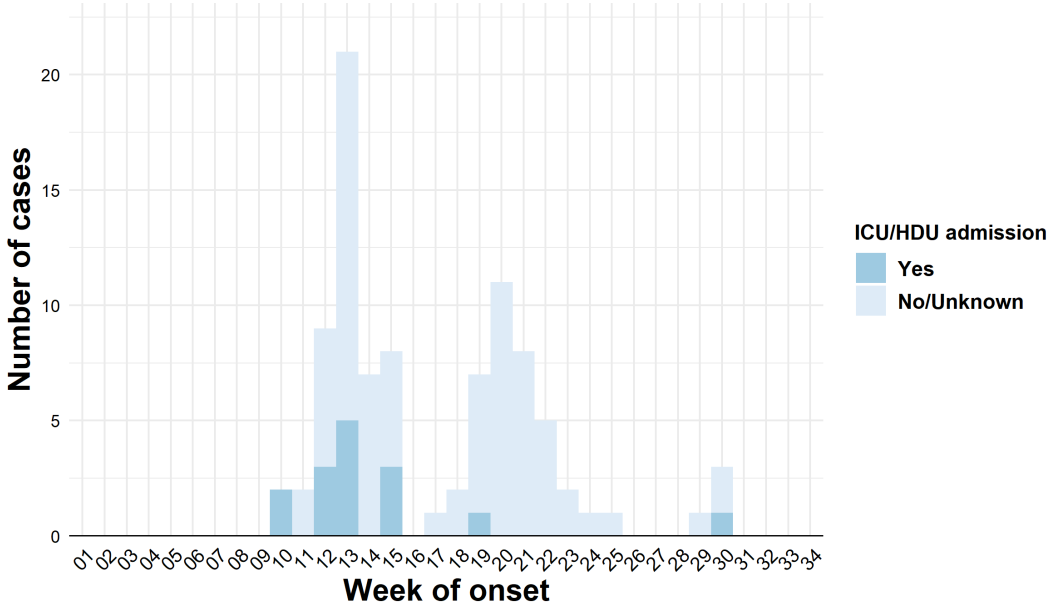
ES (N=265)



BE (N=445)



RO (n=91)



Demographics

- 57.9% of cases were **male** (11,534/19,937; 34 records missing sex)

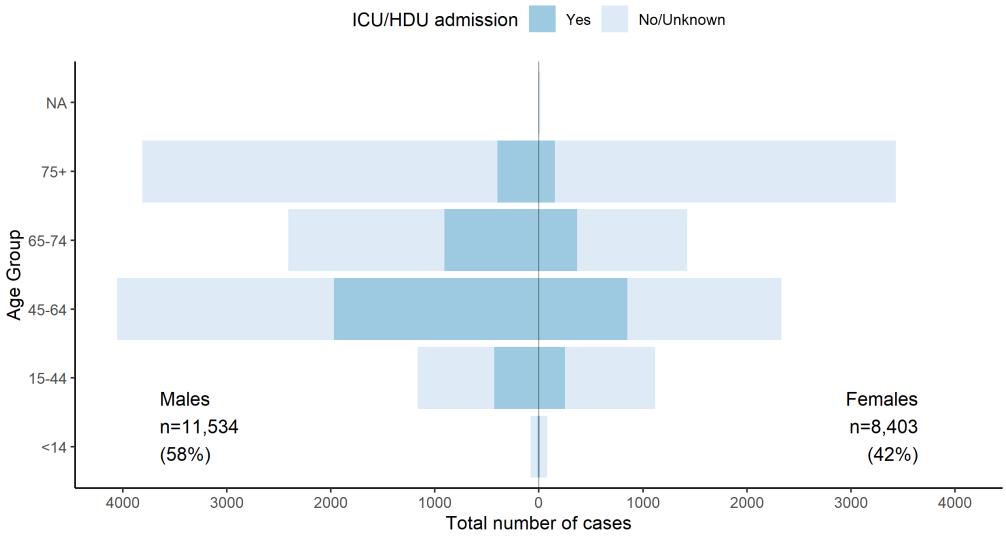
- Median **age** of cases was 67 years, range 0–104 years (23 records missing age)

- 12.2% of cases had **supported living arrangements**[3] prior to admission (1774/14,561; 5,410 records missing/unknown)

Figure 3 shows the sex and age distribution of confirmed and probable cases overall and in each participating site, categorised by known ICU/HDU admission. Note that these figures show absolute numbers and are not age-adjusted according to a country's population structure, and not all sites receive paediatric patients/collect data on paediatric cases (<18 years of age).

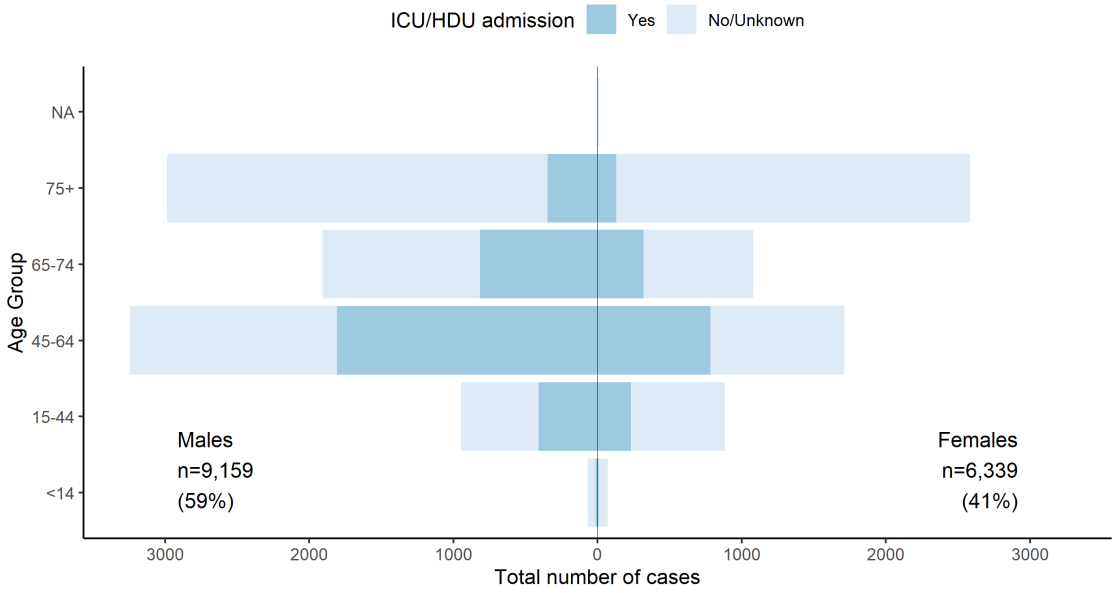
Figure 3 **Age and sex distribution of probable and confirmed COVID-19 cases by country and ICU/admission**

All sites

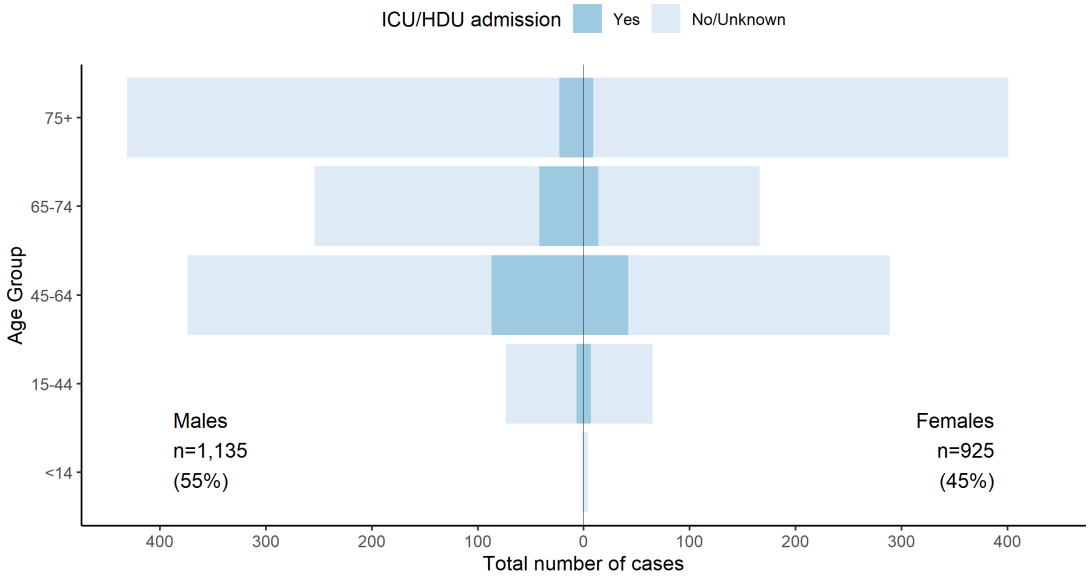


EN

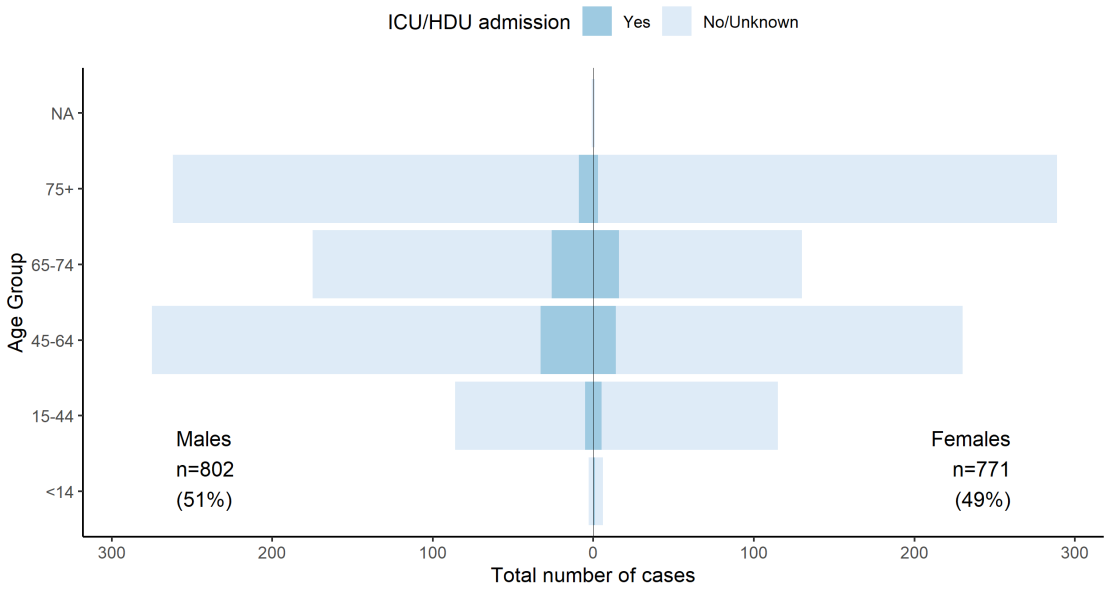
[3] Prior to admission, patient was either living at home with assistance from a carer, or resident at a care home


ICU/HDU admission
Yes
No/Unknown
NA
75+
65-74
45-64
15-44
<14
Age Group
Males
n=9,159
(59%)
Females
n=6,339
(41%)
3000
2000
1000
0
1000
2000
3000
Total number of cases

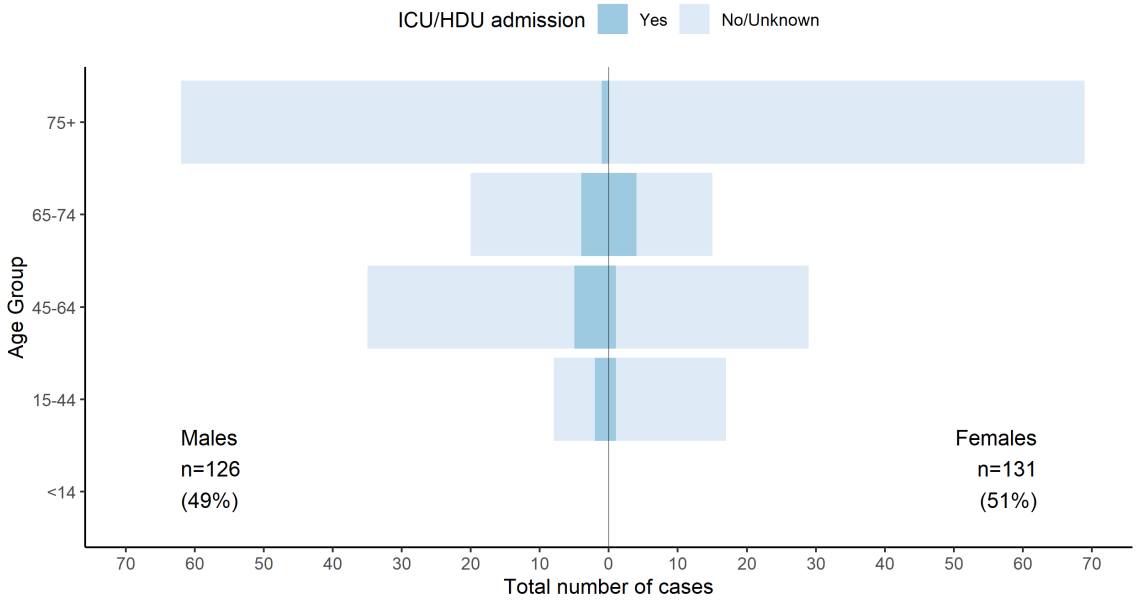
SC


ICU/HDU admission
Yes
No/Unknown
75+
65-74
45-64
15-44
<14
Age Group
Males
n=1,135
(55%)
Females
n=925
(45%)
400
300
200
100
0
100
200
300
400
Total number of cases

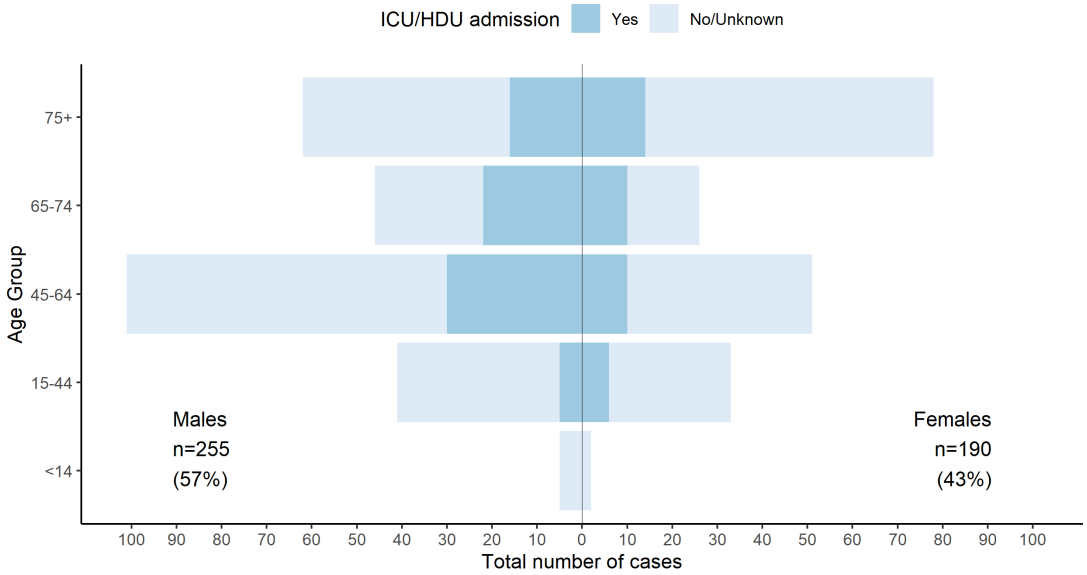
NA


ICU/HDU admission
Yes
No/Unknown
NA
75+
65-74
45-64
15-44
<14
Age Group
Males
n=802
(51%)
Females
n=771
(49%)
300
200
100
0
100
200
300
Total number of cases

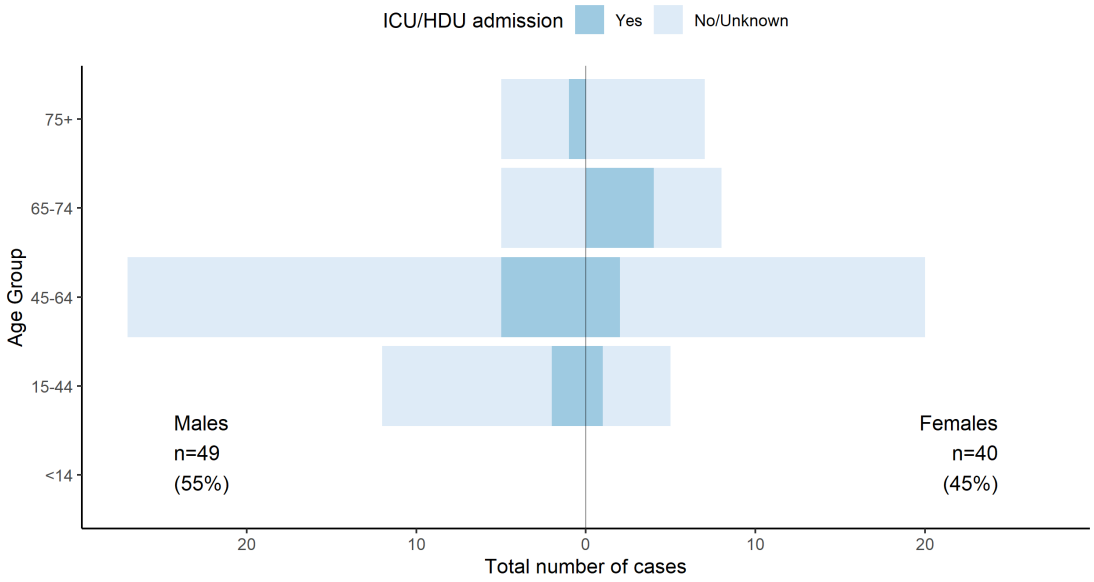
ES


ICU/HDU admission
Yes
No/Unknown
75+
65-74
45-64
15-44
<14
Age Group
Males
n=126
(49%)
Females
n=131
(51%)
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
Total number of cases

BE



RO



Note: the remainder of this report pertains only to cases where key variables (age, sex, date of symptom onset, date of admission, and date of swab) were not missing (N=19,769)

Clinical characteristics

Table 2 describes cases by their symptoms. Note that only six sites (BE, ES, FR-V, LT RO, SC) routinely collect information on symptoms, with varying degrees of data completeness, hence only data from these countries are presented in the table and therefore numbers for analysis are lower. Note also that the symptoms of anosmia and ageusia were not recognised symptoms of COVID-19 at the outset of the pandemic and thus may not have been routinely collected in the first few weeks of surveillance.

Table 2 **Clinical characteristics of patients hospitalised with confirmed/probable COVID-19 (data exclusively from the six sites reporting any symptoms: BE, ES, FR-V, LT RO, SC)**

	Number (%) cases where data is missing	Number (%) of cases with symptom (out of all those with this information)
Symptom groups[4]		
Febrile illness	1,418 (50.5)	1,391 (99.9)
Respiratory	985 (35.1)	1,817 (99.6)
Neurological	2,038 (72.5)	727 (94.2)
Gastrointestinal	1,976 (70.3)	773 (92.7)
Other	1,751 (62.5)	1,030 (97.3)
Symptoms		
Cough	**739 (26.3)**	**1,518 (73.3)**
Shortness of breath	**779 (27.7)**	**1,392 (68.5)**
Fever	**663 (23.6)**	**1,386 (64.6)**
Tachypnoea	2,688 (94.9)	81 (57.0)
General deterioration	2,707 (96.3)	58 (56.3)
Feverishness	2,667 (94.9)	79 (55.2)
Malaise	981 (34.9)	852 (46.6)
Chills	2,730 (97.2)	21 (26.3)
Diarrhoea	886 (31.5)	495 (25.7)
Confusion	882 (31.4)	457 (23.7)
Myalgia	1,049 (37.3)	412 (23.4)
Vomiting	908 (32.3)	434 (22.8)
Nausea	2,716 (96.7)	16 (17.0)
Dizziness	2,732 (97.2)	12 (15.4)
Headache	1,074 (38.2)	240 (13.8)
Abdominal pain	913 (32.5)	178 (9.4)
Sore throat	1,063 (37.8)	157 (9.0)
Coryza	2,740 (97.5)	6 (8.6)
Chest pain	2,709 (96.4)	8 (7.9)
Ageusia	1,888 (67.2)	62 (6.7)
Anosmia	1,849 (65.8)	47 (4.9)
Palpitations	2,728 (97.1)	4 (4.9)
Rash/other dermatological manifestation	1,043 (37.1)	23 (1.3)
Conjunctivitis	1,081 (38.5)	6 (0.4)

[4] Respiratory = coryza, cough, sore throat, shortness of breath, tachypnoea, chest pain; Neurological = ageusia, anosmia, confusion, dizziness, headache; Gastrointestinal = abdominal pain, diarrhoea, nausea, vomiting; Febrile illness = Fever, feverishness, chills; Other = any other symptom listed in table

Outcomes

- Median **length of stay** in hospital was **10 days**, range 1–151 (6,773 records missing discharge date)
- **27.4%** cases required **ICU/HDU admission** (5,268/19,244; 515 records missing); however, without England data included, this is **11.0%** cases (482/4,378; 3 records missing)
- **26.8%** cases **died in hospital** (5,186/19,375; 384 records missing); however, without England data included, this is **16.3%** cases (712/4,366; 15 records missing)

Figure 4 depicts patient outcome by sex. There were no statistically significant differences in the proportion of men and women who remained on treatment in hospital. Differences in the proportions of men and women who either died in or were discharged alive from hospital were both statistically significant (p=0.0000, test of proportions; (data not shown)). Note that the data in Figure 4 are not censored and all cases are included even if date of admission is recent and outcome is yet to be determined.

Figure 4 **Patient outcome by sex**

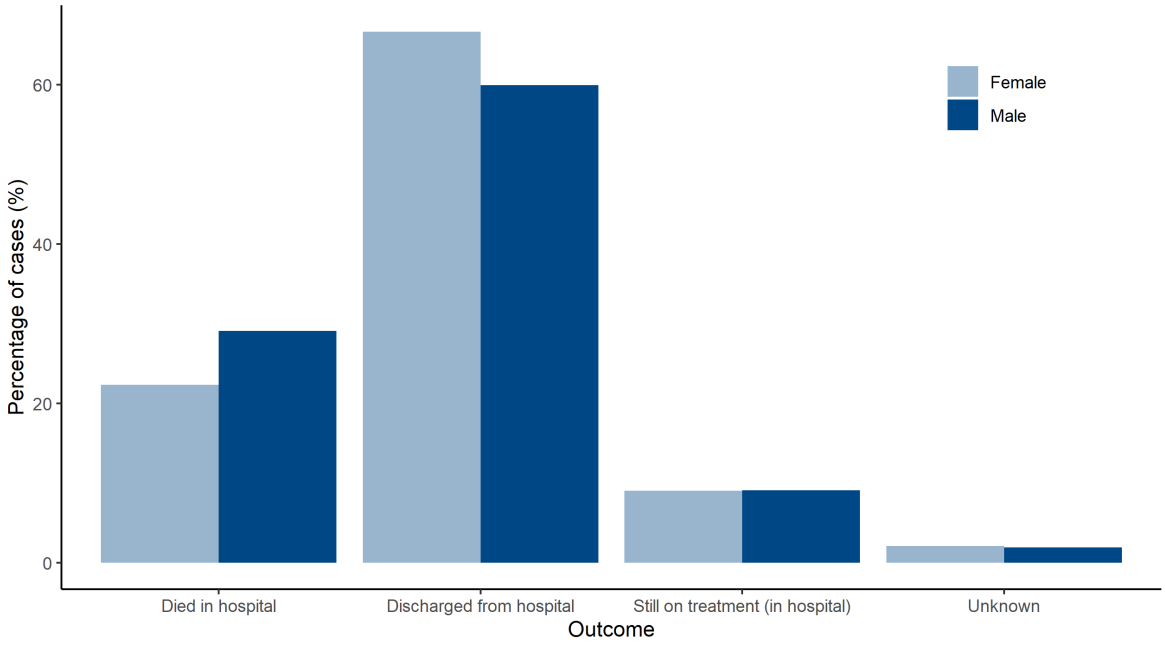


Table 3 describes patient outcomes by a range of potential risk/protective factors. As England is over-represented in the dataset (77.7%) and is biased towards patients with ICU/HDU admission (as reporting from these wards is mandatory in England), this may skew the outcomes seen in the pooled data.
Table 4 therefore describes patient outcomes by a range of potential risk/protective factors for all sites excluding England.

Note that the data in these tables are not censored and all cases are included even if date of admission is recent and outcome is yet to be determined.

Table 3 **Patient outcome by potential protective/risk factors**

Exposures (risk/protective factors)	Total cases		ICU/HDU admission		Deaths	
	N	%	N	%	N	%
All cases	19,759	-	5,268	27.4	5,186	26.8
Missing data	-	-	515	2.6	384	1.9
Age groups[5]						
0–14	160	0.8	21	0.4	2	0.0
15–44	2,274	11.5	674	12.8	129	2.5
45–64	6,327	32.0	2,772	52.6	1,121	21.6
65–74	3,805	19.3	1,256	23.8	1,203	23.2
≥ 75	7,193	36.4	545	10.4	2,731	52.7
Sex[5]						
Male	11,424	57.8	3,661	69.5	3,327	64.2
Healthcare worker	686	6.5	407	11.0	85	2.9
Missing data	9,140	46.3	9,194	-	9,355	-
Smoker	1,158	43.7	142	42.0	231	50.9
Missing data	17,107	86.6	17,109	-	17,119	-
Pregnant	190	3.8	22	1.8	5	0.4
Missing data	3,365	40.4	3,392	-	3,471	-
Close contact setting[6]	599	64.4	109	59.9	94	61.8
Missing data	18,829	95.3	18,830	-	18,832	-
Days between onset and hospitalisation						
0–4	11,789	59.7	2,260	45.2	3,290	71.0
5–9	3,434	17.4	1,629	32.6	813	17.5
10+	2,549	12.9	1,111	22.2	535	11.5
Onset in hospital	1,987	10.1	268	5.1	551	10.6

[5] Here, missing data have already been excluded (n=515 for ICU admission, n=384 for deaths).
[6] i.e. If the patient is a contact of a COVID-19 case

Table 4 **Patient outcome by potential protective/risk factors (excluding data from England)**

Exposures (risk/protective factors)	Total cases		ICU/HDU admission		Deaths	
	N	%	N	%	N	%
All cases	4,381	-	482	11.0	712	16.3
Missing data	-	-	3	<0.5	15	<0.5
Age groups[7]						
0–14	22	0.5	1	0.2	0	0
15–44	455	10.4	41	8.5	8	1.1
45–64	1,427	32.6	226	46.9	84	11.8
65–74	836	19.1	139	28.8	158	22.2
≥ 75	1,641	37.5	75	15.6	462	64.9
Sex[7]						
Male	2,341	53.4	321	66.6	418	58.7
Healthcare worker	143	6.4	9	3.9	1	0.4
Missing data	2,129	48.6	2132	-	2133	-
Smoker	1,158	43.7	142	42.0	231	50.9
Missing data	1,729	39.5	1,731	-	1741	-
Close contact setting[8]	599	64.4	109	59.9	94	61.8
Missing data	3,451	78.8	3,452	-	3,454	-
Days between onset and hospitalisation						
0–4	1,680	38.4	131	27.2	361	50.7
5–9	1,409	32.2	202	41.9	174	24.4
10+	1,016	23.2	116	24.1	107	15.0
Onset in hospital	276	6.3	33	6.9	70	9.8

Table 5 describes patient requirement for ventilation for a range of risk/protective factors, for all sites. Table 6 describes patient requirement for ventilation for a range of risk/protective factors with data from England excluded.

[7] Here, missing data have already been excluded (n=3 for ICU admission, n=15 for deaths).
[8] i.e. If the patient is a contact of a COVID-19 case

Table 5 **Level of mechanical ventilation required by risk/protective group**

Exposures (risk/protective factors)	N (%)	Any ventilation n (%)	Ventilator (non-invasive) n (%)	Ventilator (invasive) n (%)	High flow oxygen n (%)	ECMO n (%)	Other n (%)
All cases	19,759	10,960 (57.7)	1,577 (8.3)	3,537 (18.6)	898 (4.7)	136 (0.7)	4,812 (25.3)
Missing ventilation data[9]	751 (3.8)	-	-	-	-	-	-
Age groups							
0–14	159 (0.8)	55 (0.5)	7 (0.4)	10 (0.3)	2 (0.2)	1 (0.7)	35 (0.7)
15–44	2,206 (11.6)	1,192 (10.9)	190 (12.1)	384 (10.9)	61 (6.8)	63 (46.3)	494 (10.3)
45-64	6,071 (31.9)	4,077 (37.2)	620 (39.3)	1,941 (54.9)	285 31.7)	70 (51.5)	1,161 (24.1)
65–74	3,658 (19.2)	2,266 (20.7)	361 (22.9)	921 (26.0)	160 (17.8)	1 (0.7)	823 (17.1)
≥ 75	6,914 (36.4)	3,370 (30.8)	399 (25.3)	281 (7.9)	390 (43.4)	1 (0.7)	2,299 (47.8)
Male	11,005 (57.9)	6,896 (62.9)	1,035 (65.6)	2,539 (71.8)	523 (58.2)	99 (72.8)	2,700 (56.1)
Healthcare worker	684 (6.5)	478 (7.7)	97 (12.1)	244 (9.9)	29 (7.2)	23 (20.5)	85 (3.6)
Smoker	879 (43.2)	295 (44.8)	47 (52.2)	98 (42.8)	144 (43.8)	0 (0)	6 (60.0)
Pregnant	189 (1.6)	43 (0.5)	4 (0.3)	10 (0.4)	3 (0.7)	3 (2.4)	23 (0.6)
Close contact setting	488 (73.9)	182 (67.2)	7 (31.8)	46 (48.9)	120 (82.2)	2 (100)	7 (100)

[9] The results presented in this table exclude missing data

Days between onset and hospitalisation							
0–4	11,47 (60.4)	6,851 (62.5)	946 (60.0)	1,570 (44.4)	500 (55.7)	51 (37.5)	3,784 (78.6)
5–9	3,218 (16.9)	2,041 (18.6)	345 (21.9)	1,113 (31.5)	188 (20.9)	33 (24.3)	362 (7.5)
10+	2,384 (12.5)	1400 (12.8)	231 (14.7)	744 (21.0)	124 (13.8)	52 (38.2)	249 (5.2)
Onset in hospital	1,927 (10.1)	668 (6.1)	55 (3.5)	110 (3.1)	86 (9.6)	0 (0)	417 (8.7)

Table 6 **Level of mechanical ventilation required by risk/protective group (excluding England data)**

Exposures (risk/protective factors)	**N (%)**	**Any ventilation n (%)**	**Ventilator (non-invasive) n (%)**	**Ventilator (invasive) n (%)**	**High flow oxygen n (%)**	**ECMO n (%)**	**Other n (%)**
All cases	4,381	914 (25.2)	116 (3.2)	328 (9.0)	457 (12.6)	2 (0.06)	11 (0.3)
Missing ventilation data[10]	751 (17.1)	-	-	-	-	-	-
Age groups							
0–14	22 (0.5)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
15–44	455 (10.4)	59 (6.5)	6 (5.2)	27 (8.2)	26 (5.7)	0 (0)	0 (0)
45-64	1,427 (32.6)	336 (36.8)	45 (38.8)	156 (47.6)	130 (28.5)	1 (50.0)	4 (36.4)
65–74	836 (19.1)	220 (24.1)	30 (25.9)	108 (32.9)	80 (17.5)	0 (0)	2 (18.2)
≥ 75	1,641 (37.5)	299 (32.7)	35 (30.2)	37 (11.3)	221 (48.4)	1 (50.0)	5 (45.5)
Male	2,341 (53.4)	570 (62.4)	75 (64.7)	232 (70.7)	255 (55.8)	2 (100)	6 (54.6)
Healthcare worker	143 (6.4)	1 (5.1)	0 (0)	4 (2.6)	13 (7.9)	0 (0)	0 (0)
Smoker	1,158 (43.7)	295 (44.8)	47 (52.2)	98 (42.8)	144 (43.8)	0 (0)	6 (60.0)
Close contact setting	599 (64.4)	182 (67.2)	7 (31.8)	46 (48.9)	120 (82.2)	2 (100)	7 (100)
Days between onset and hospitalisation							

[10] The results presented in this table exclude missing data

0–4	1,680 (38.4)	341 (37.3)	43 (37.1)	82 (25.0)	208 (45.5)	1 (50)	7 (63.6)
5–9	1,409 (32.2)	328 (35.9)	37 (31.9)	154 (47.0)	132 (28.9)	1 (50.0)	4 (36.4)
10+	1,016 (23.2)	194 (21.2)	31 (26.7)	80 (24.4)	83 (18.2)	0 (0)	0 (0)
Onset in hospital	276 (6.3)	51 (5.6)	5 (4.3)	12 (3.7)	34 (7.4)	0 (0)	0 (0)

Limitations in the representativeness of the surveillance data

The definition of a confirmed case potentially includes patients who were hospitalised during the surveillance period for reasons other than COVID-19, but who were incidentally swab positive for SARS-CoV2 shortly prior to, during or after admission. This may bias the results e.g. in favour of less severe outcomes.

Over three quarters of the cases (15,522/19,971; 77.7%) were reported from one site (England), which submitted data on cases from all hospitals. In England, as ICU reporting of COVID-19 cases is mandatory, these patients may have been over-represented in the England dataset, and therefore in the overall pooled dataset. This may bias the results in favour of more severe outcomes.

The timeframe during which data were submitted by participating sites reflect the logistical constraints faced by those sites and do not necessarily reflect how the epidemic progressed in those countries over time.

Data for patient outcome have not been censored. This may introduce bias into the report findings by including recently hospitalised patients for whom outcome is not yet determined.

Containment and mitigation strategies for the COVID-19 pandemic have differed between country, and within countries over time, depending on the case management strategy (e.g. recommendation of contacting a GP or health centre by telephone first vs staying at home until symptoms worsen then contacting emergency services). In some cases, the management strategy will have an impact on the delay between onset of symptoms and hospitalisation. This, in turn, may have an impact on the time lag between onset and respiratory specimen collection, which may affect positivity rates between surveillance sites, and at a particular surveillance site at different points in the epidemic. For this reason, alongside the collection of dates of onset/admission/respiratory specimen collection, case-containment/mitigation strategies and dates of any changes should be described for each country.

Annexes

1.1. Annex A. The I-MOVE-COVID-19 project

1.1.1. Background

The end of 2019 saw the emergence of a novel severe acute respiratory syndrome – coronavirus 2 (SARS-CoV-2), which causes coronavirus disease 2019 (COVID-19). At the time of writing (1 September 2020) there had been 1 September 2020, there have been 25,327,098 confirmed cases of COVID-19 globally, including 848,255 deaths, reported to the World Health Organization.[11]

I-MOVE (Influenza – Monitoring Vaccine Effectiveness in Europe), first established in 2007, was the first network to monitor influenza vaccine effectiveness (VE) within and across the seasons in the European Union (EU) and the European Economic Area (EEA). The network has two components, one for primary care practices, recruiting patients with influenza-like illness (ILI) and the other for hospitals, recruiting patients with severe acute respiratory illness (SARI). In February 2020, many partners, already involved in studies within the I-MOVE network, came together as the I-MOVE-COVID-19 consortium, and were successful in a bid for the European Commission H2020 call on "Advancing knowledge for the clinical and public health response to the novel coronavirus epidemic".

The I-MOVE-COVID-19 consortium aims to obtain epidemiological and clinical information on patients with COVID-19 as well as virological information on SARS-CoV-2, through different work packages (WPs): (a) provision of a flexible surveillance platform, adaptable to the epidemiological situation, through WP2 (primary care surveillance) and WP3 (hospital surveillance), (b) research studies, through WP4 and (c) evaluation of public health interventions (e.g. vaccination, antivirals) in WP2–4, in order to contribute to the knowledge base, guide patient management, and inform the public health response. This is being achieved through adaptation and expansion of the existing I-MOVE network to include COVID-19. The network includes primary care networks, hospitals, and national laboratory reference centres in 13 countries across the WHO European Region.[12]

The WP3 hospital surveillance for COVID-19 is coordinated by Public Health Scotland (PHS) with Epiconcept support. The hospital network comprises 11 surveillance sites involving hospitals in six EU Member States (MS),[13] England, Scotland, and Albania (with two of the EU MS countries having two sites each). The laboratory component of the network includes regional and national reference centres from the participating countries. While each of the surveillance sites can analyse their data separately, pooling the

[11] Source: WHO Situation Report dashboard https://covid19.who.int/?gclid=EAIaIQobChMIw5bL57HI6wIVkOvtCh0XQwZ9EAAYASAAEgL2qPD_BwE, accessed 1 September 2020

[12] Albania, Belgium, Croatia, France, Germany, Ireland, Lithuania, the Netherlands, Portugal, Romania, Spain, Sweden and the UK (England and Scotland).

[13] Belgium, France, Lithuania, Portugal, Romania, and Spain.

data for overall analysis will provide a sample size big enough to depict trend and generate hypotheses (surveillance) and answer study questions with reasonable precision (research).

This document presents the first surveillance bulletin for the hospital-based surveillance component of I-MOVE-COVID-19 for 2020. The specificities of each site's COVID-19 data collection are detailed in the individual site protocol annexes.

1.1.2. Objectives

Primary objectives

The primary objective is to describe, for nine European countries, clinical and epidemiological characteristics of patients hospitalised with COVID-19 and virological characteristics of SARS-CoV-2 in hospitalised patients, in order to contribute to the knowledge base, guide patient management, and inform the public health response.

Secondary objectives

Potential secondary objectives include:

- To strengthen preparedness to respond to COVID-19 through hospital surveillance
- To describe COVID-19 suspected, probable and confirmed cases with severe disease by sex, age-group, and other potential risk or protective factors
- To describe deaths from COVID-19 in hospital by country and pooled across the network
- To measure the incidence of hospitalised COVID-19 patients, by participating region/country (where appropriate)

  in order to measure the impact of/inform decisions on mitigation measures, and to identify at-risk groups for severe disease.

1.2. Annex B. Methods

1.2.1. Active hospital-based surveillance of COVID-19 at European level

Type of surveillance

- Multicentre population-based surveillance over several countries/regions

Population under surveillance

- The surveillance population consists of the entire population living in the catchment areas of the participating hospitals.

1.2.2. Surveillance and study period

The surveillance period started in March 2020, although some sites submitted data retrospectively from January 2020. Participating hospitals carry out surveillance throughout the year. This first report is for the period from 1 February 2020 to 20 August 2020.

1.2.3. Outcomes

The two primary outcomes of interest are laboratory-confirmed COVID-19 in patients hospitalised with suspected COVID-19, and severe COVID-19 in patients hospitalised with suspected COVID-19.

The secondary outcomes of interest are:

- Suspected COVID-19 cases
- Probable COVID-19 cases
- Laboratory-confirmed SARS-CoV-2 by viral genetic clade (where possible).

1.3. Annex C. Case definitions

Hospitalised patient

A hospitalised patient is defined as a patient who has been admitted to one of the participating hospitals during the surveillance period, and has not been discharged home or home-equivalent before 24h.

Suspected COVID-19 patient

A suspected COVID-19 patient is defined as a hospitalised person with:

- at least one systemic symptom or sign: fever or feverishness, malaise, headache or myalgia or deterioration of general condition (asthenia or loss of weight or anorexia or confusion or dizziness)

AND

- at least one respiratory symptom or sign (cough, sore throat or shortness of breath; **or** tachypnoea **or** signs of low oxygen saturation)

at admission or within 48 hours after admission.

All patients fulfilling the above criteria, until they are re-classified as COVID-19 negative, probable or confirmed (see below), are considered as suspected COVID-19 patients.

Confirmed case of COVID-19 (confirmed case)

A confirmed COVID-19 is defined as a patient hospitalised during the surveillance period with a respiratory sample positive for SARS-CoV-2.

Probable case of COVID-19 (probable case)

A probable COVID-19 case will be defined as a patient hospitalised with suspected COVID-19 during the surveillance period for whom

- testing for virus causing COVID-19 is inconclusive (according to the test results reported by the laboratory)

OR

- testing was positive on a pan-coronavirus assay

OR

- no laboratory tests are available but there is clinical confirmation with suggestive radiology

Severe COVID-19 case

For the purposes of surveillance, all patients hospitalised due to confirmed COVID-19 disease are severe COVID-19 cases. However, these hospitalised patients will be further classified as "severe hospitalised COVID-19 patients" if they have any of the following clinically, analytically or radiologically significant alterations/outcomes mentioned in the admission or discharge diagnosis:

- Bilateral pneumonia with ground-glass opacities
- Admitted to ICU/HDU
- On ventilation
    - Invasive (i.e. with intubation)
    - non-invasive (e.g. high-flow oxygen; or those needing >6L)
- Extracorporeal membrane oxygenation (ECMO)
- Death

COVID-19 death

A COVID-19 death is defined as a probable or confirmed COVID-19 case who died during his/her hospitalisation.

1.3.1. Exclusion criteria for surveillance

All COVID-19 patients will be included in the surveillance unless the surveillance site/country requires consent and s/he:

- is unwilling to participate or unable to communicate and give consent (the consent may also be given by her/his legal representative, or by specific consent procedures, acceptable according to the local ethical review process)

Note: in some countries, individual patient consent is not required for routine surveillance.