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Weekly Influenza and COVID-19 Surveillance graphs

UKHSA publishes a weekly national influenza and COVID-19 surveillance report which summaries the information from the surveillance systems which are used to monitor influenza, COVID-19 and other seasonal respiratory viruses in England.

Additional figures based on these surveillance systems are included in this slide set.

The figures presented in this slide set are based on data from week 04 (between 23 January and 29 January 2023).

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Confirmed COVID-19 episodes in England

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Confirmed COVID-19 episodes in England

Data Information

- From the week 32 report onwards, case rates have been updated to use the latest ONS population estimates for mid-2020. Previously case rates were calculated using the mid-2019 population estimates
- From 11 January 2022 the requirement for confirmatory PCR testing in individuals who test positive using a lateral flow device was temporarily removed.
- Rates by ethnicity and IMD quantile will continue to be presented using the mid-2019 estimates, until the mid-2020 estimates become available.
- From 31 January 2022, UKHSA moved all COVID-19 case reporting in England to use a new episode-based definition which includes possible reinfections. Each infection episode is counted separately if there are at least 91 days between positive test results (PCR or LFD). Each infection episode begins with the earliest positive specimen date. Further information can be found on the UK COVID-19 dashboard.
- Since 1 April 2022, free universal symptomatic and asymptomatic testing for the general public in England is no longer available, as outlined in the plan for living with COVID-19. As such, there will be a reduction in the reporting of data obtained through Pillar 2 from April 2022 onwards. Data in this report should be interpreted in the context of this change to testing. Public health guidance remains in place for cases and their close contacts

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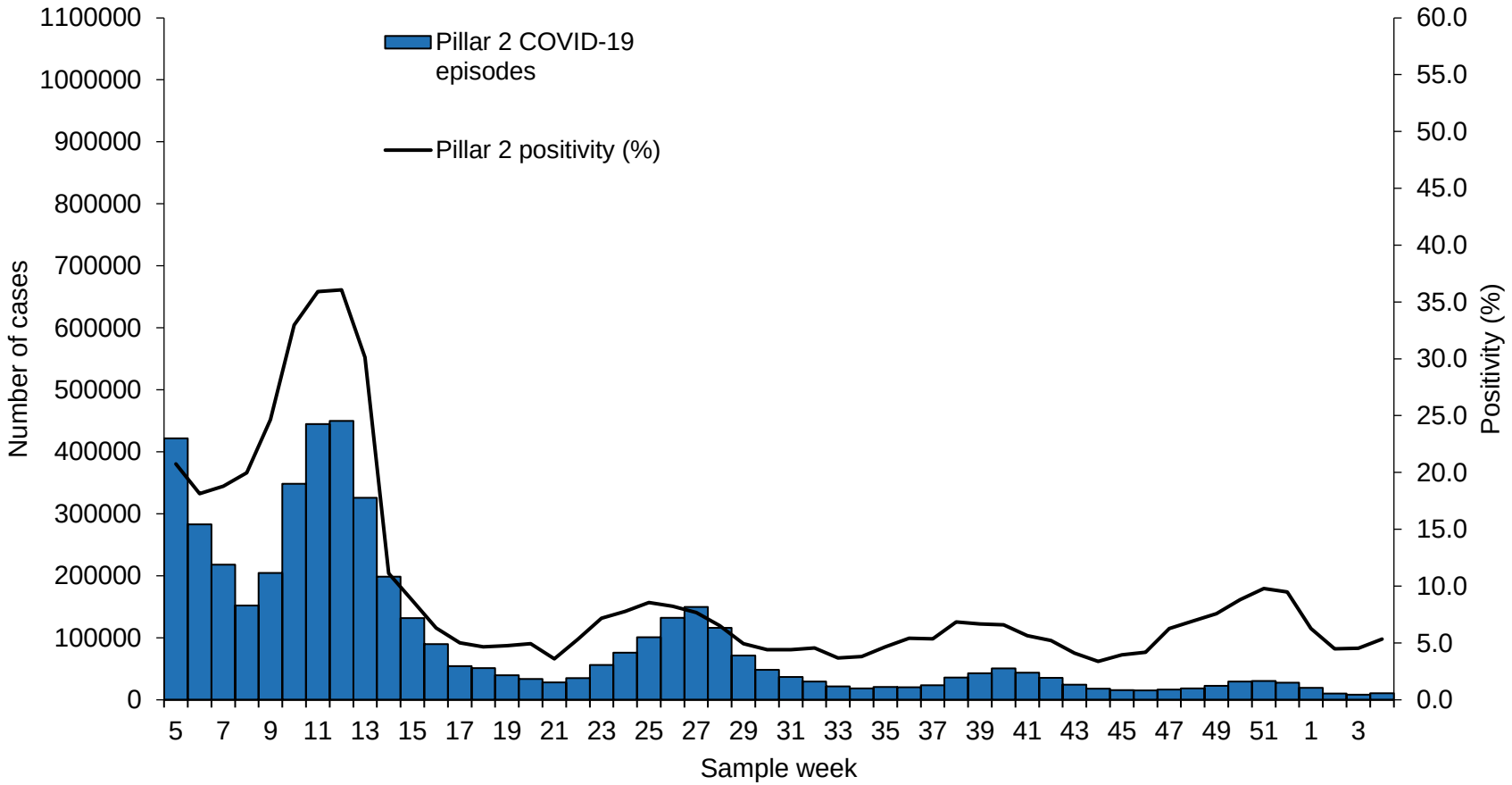
Confirmed COVID-19 episodes tested under Pillar 2, based on sample week with overall weekly PCR positivity for Pillar 2 (%)



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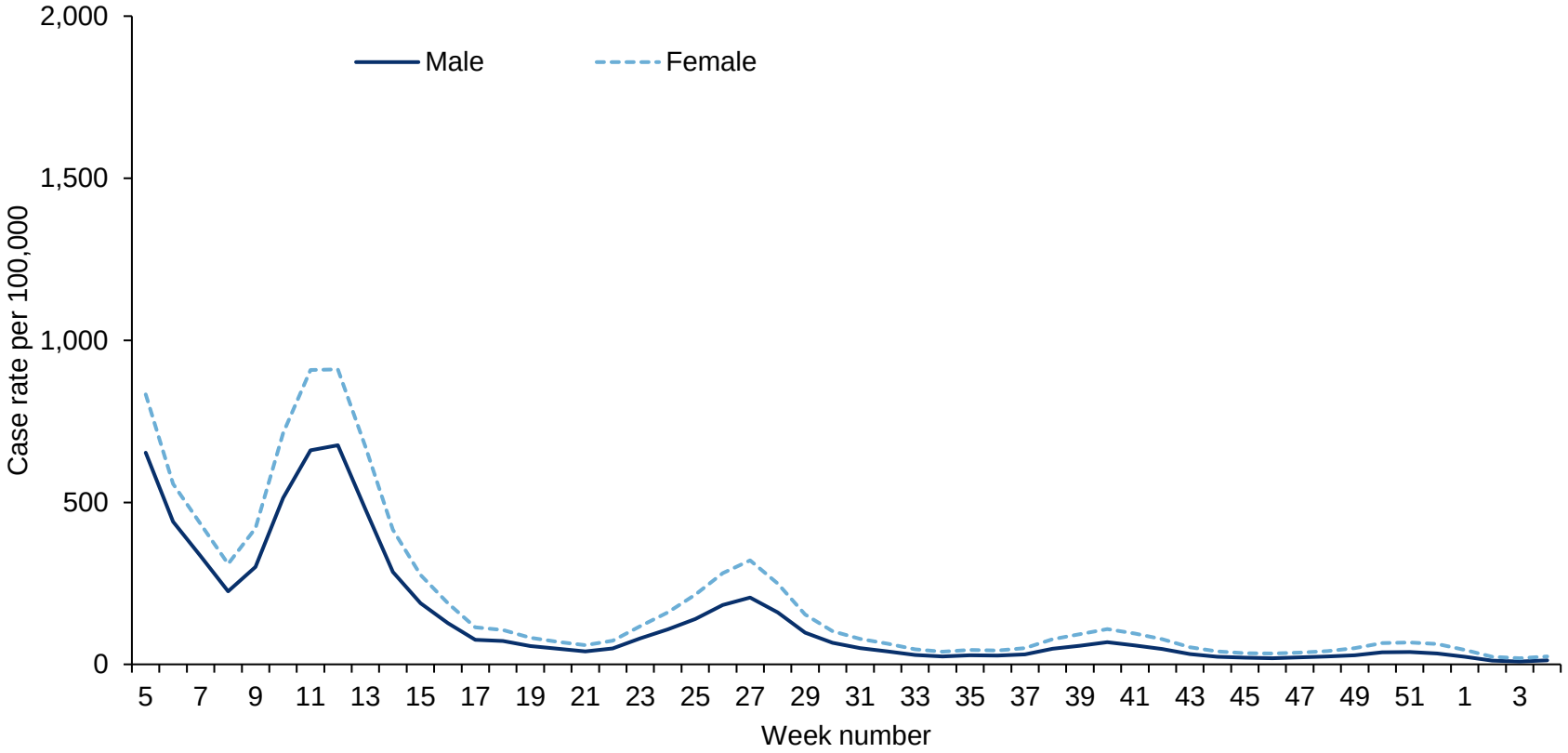
Weekly confirmed COVID-19 case rates per 100,000, by episode, tested under Pillar 2, by sex



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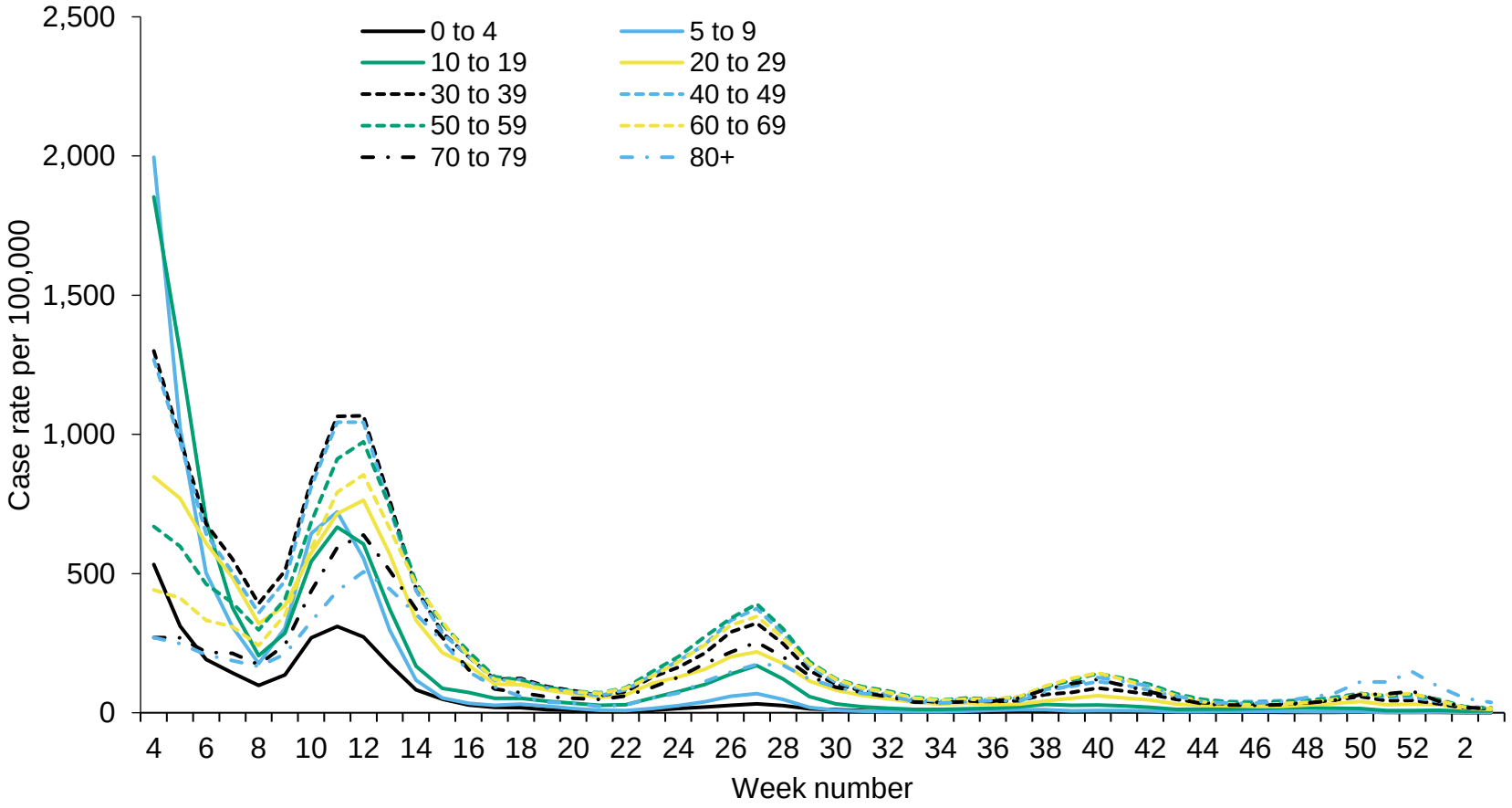
Weekly confirmed COVID-19 case rates per 100,000, by episode, tested under Pillar 2, by age group



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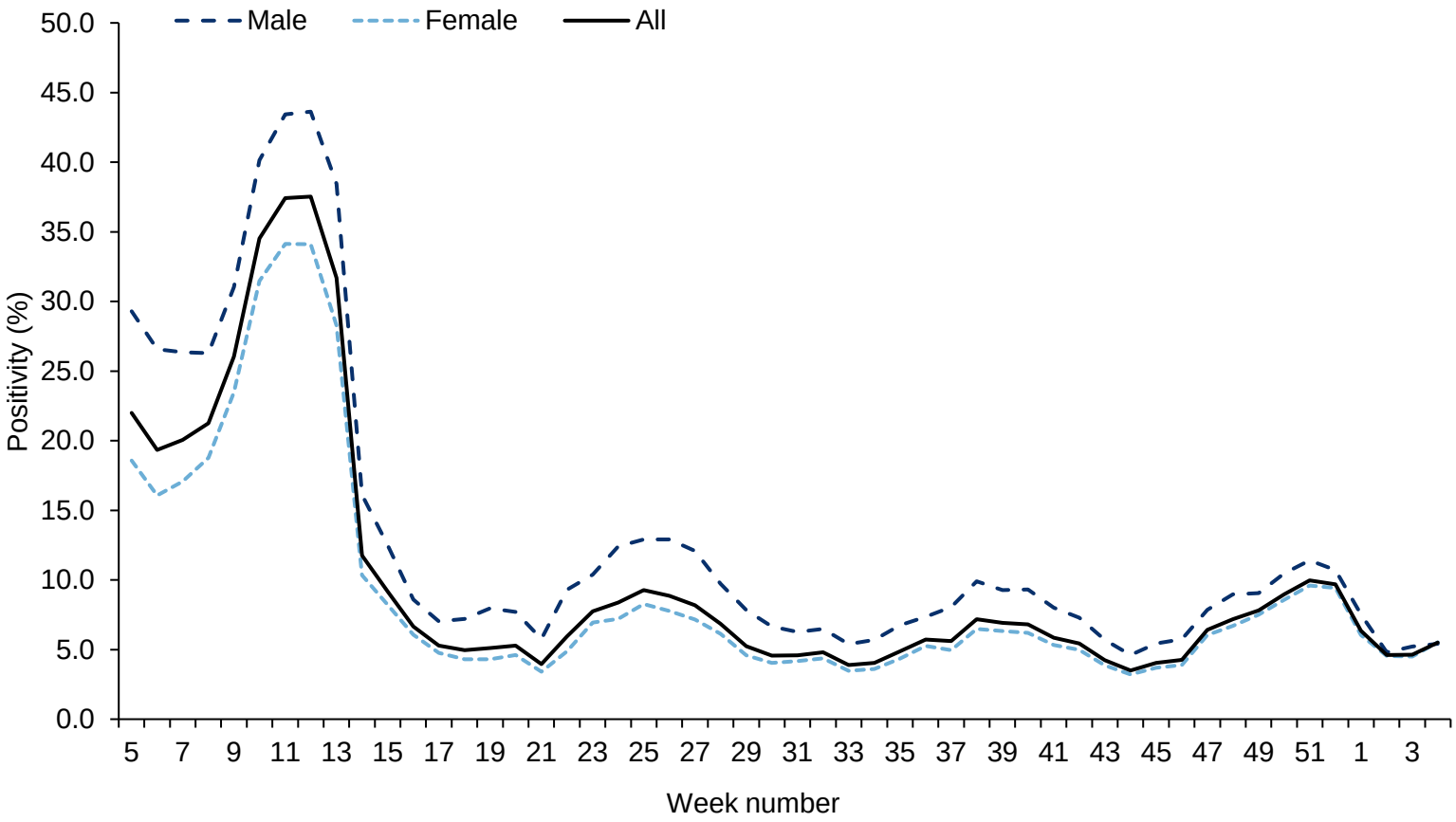
Weekly PCR positivity (%) of confirmed COVID-19 cases tested overall and by sex under Pillar 2



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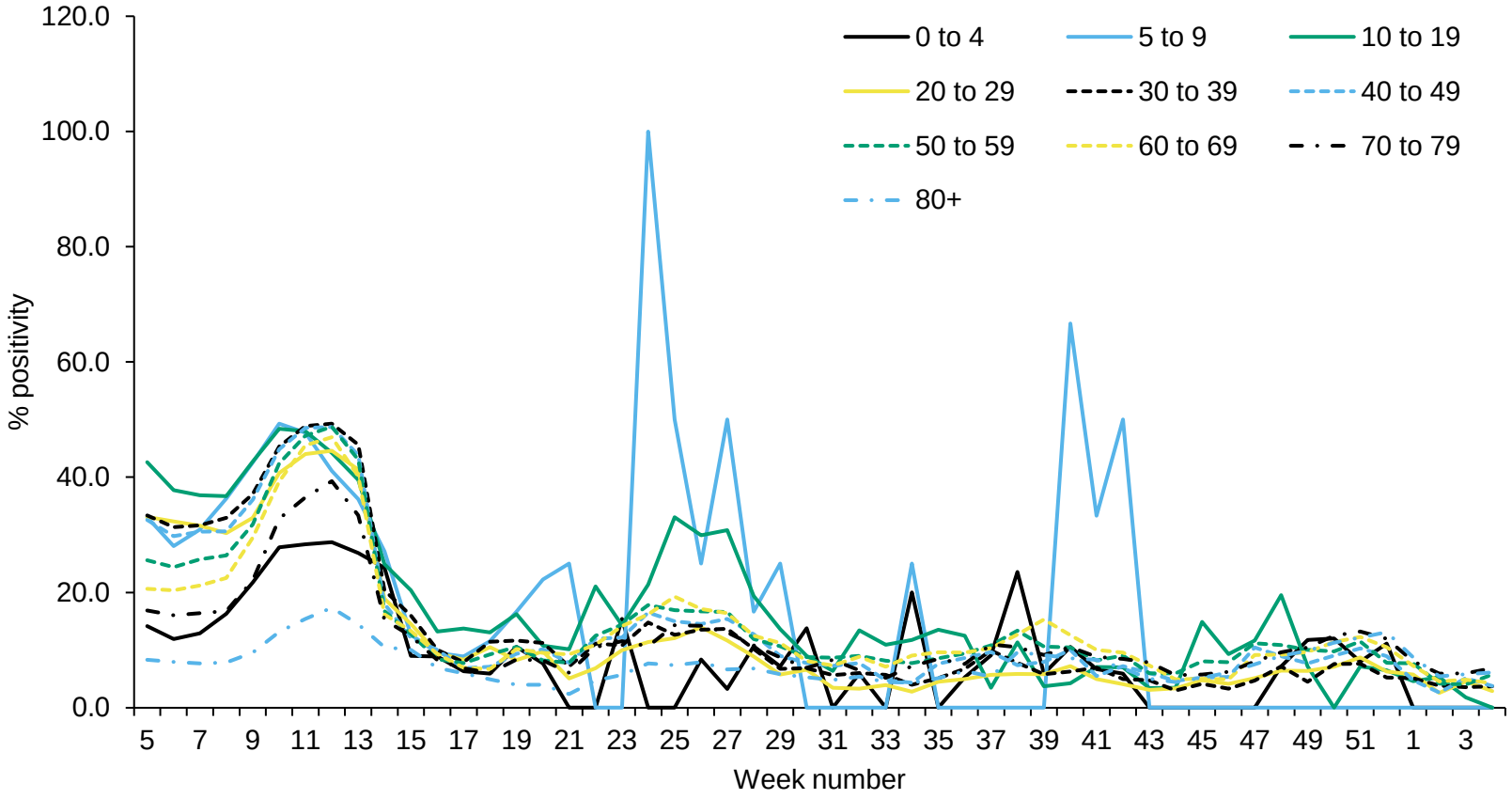
Weekly PCR positivity (%) of confirmed COVID-19 cases tested under Pillar 2, by male and age group



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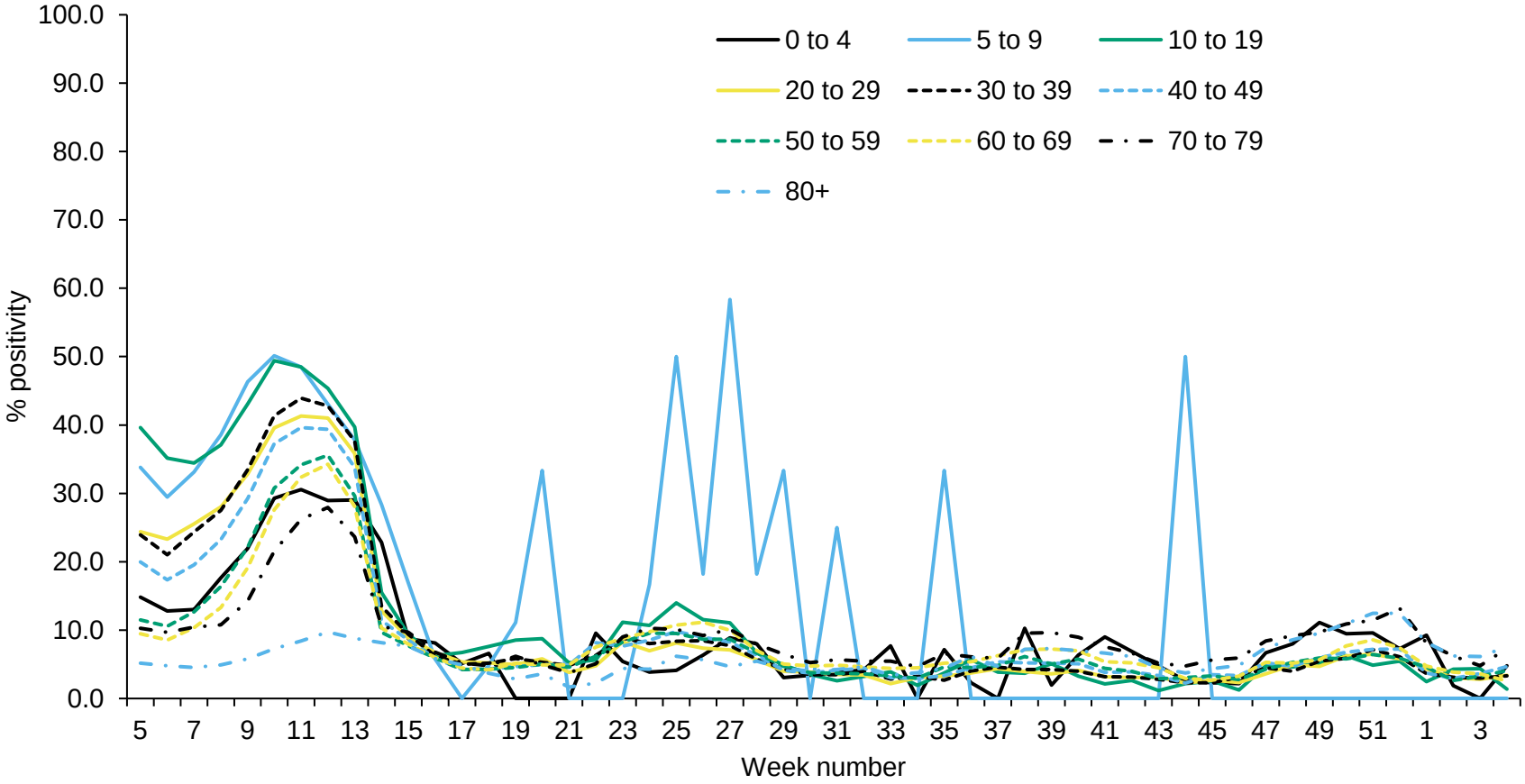
Weekly PCR positivity (%) of confirmed COVID-19 cases tested under Pillar 2, by female and age group



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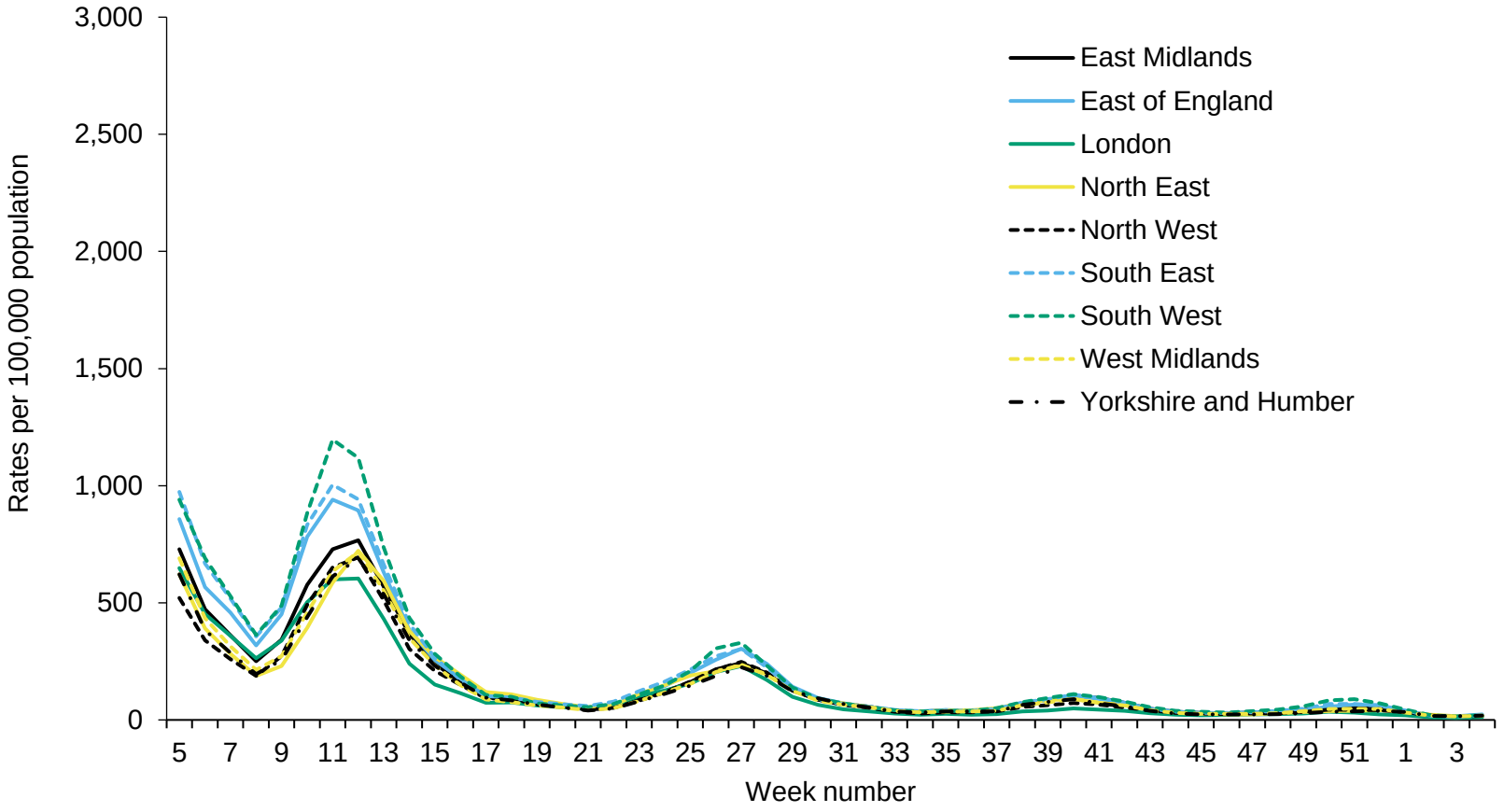
Weekly confirmed COVID-19 case rates by episode, per 100,000 population (Pillar 2), by UKHSA centres and sample week



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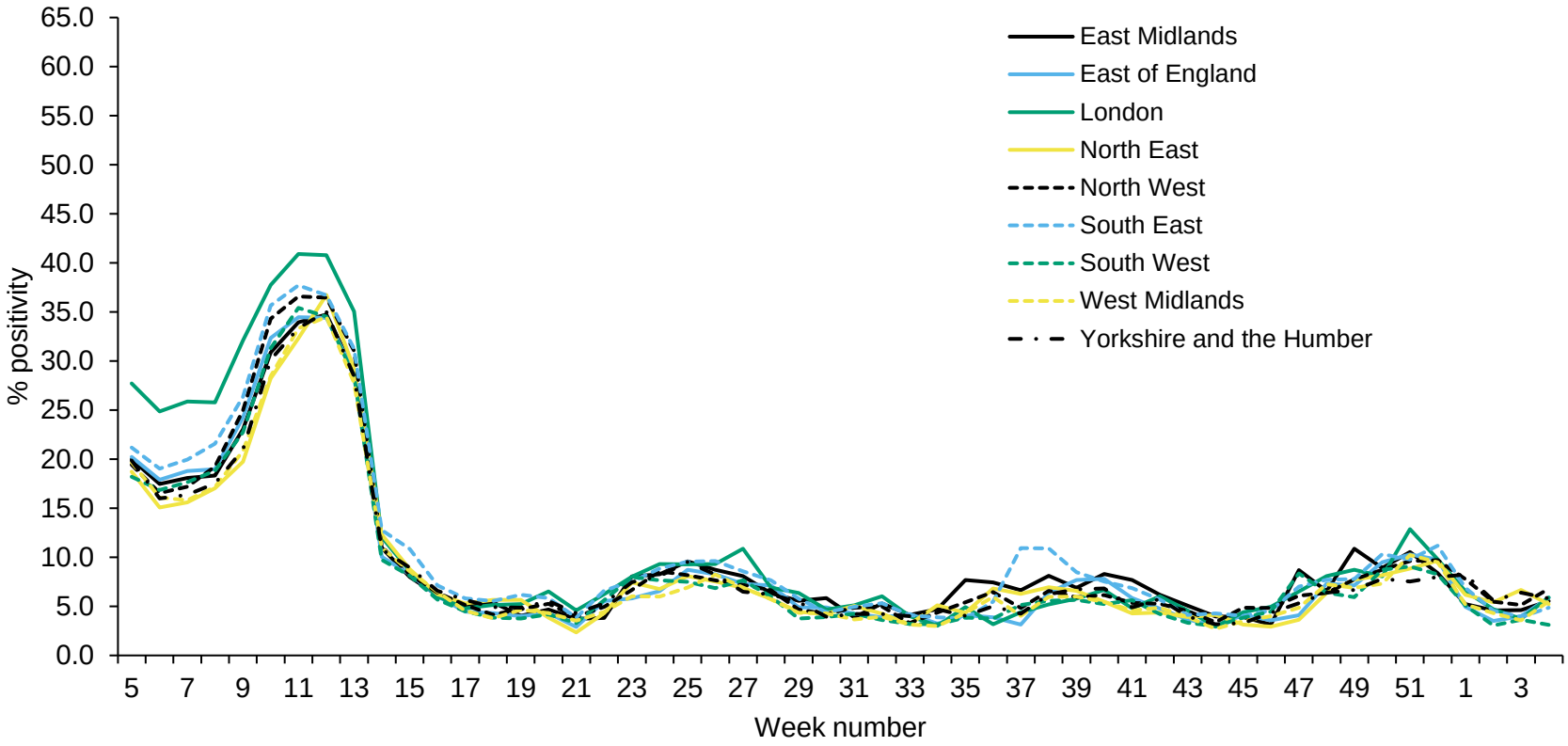
Weekly PCR positivity of confirmed COVID-19 cases tested under Pillar 2 (%) by UKHSA centres and sample week



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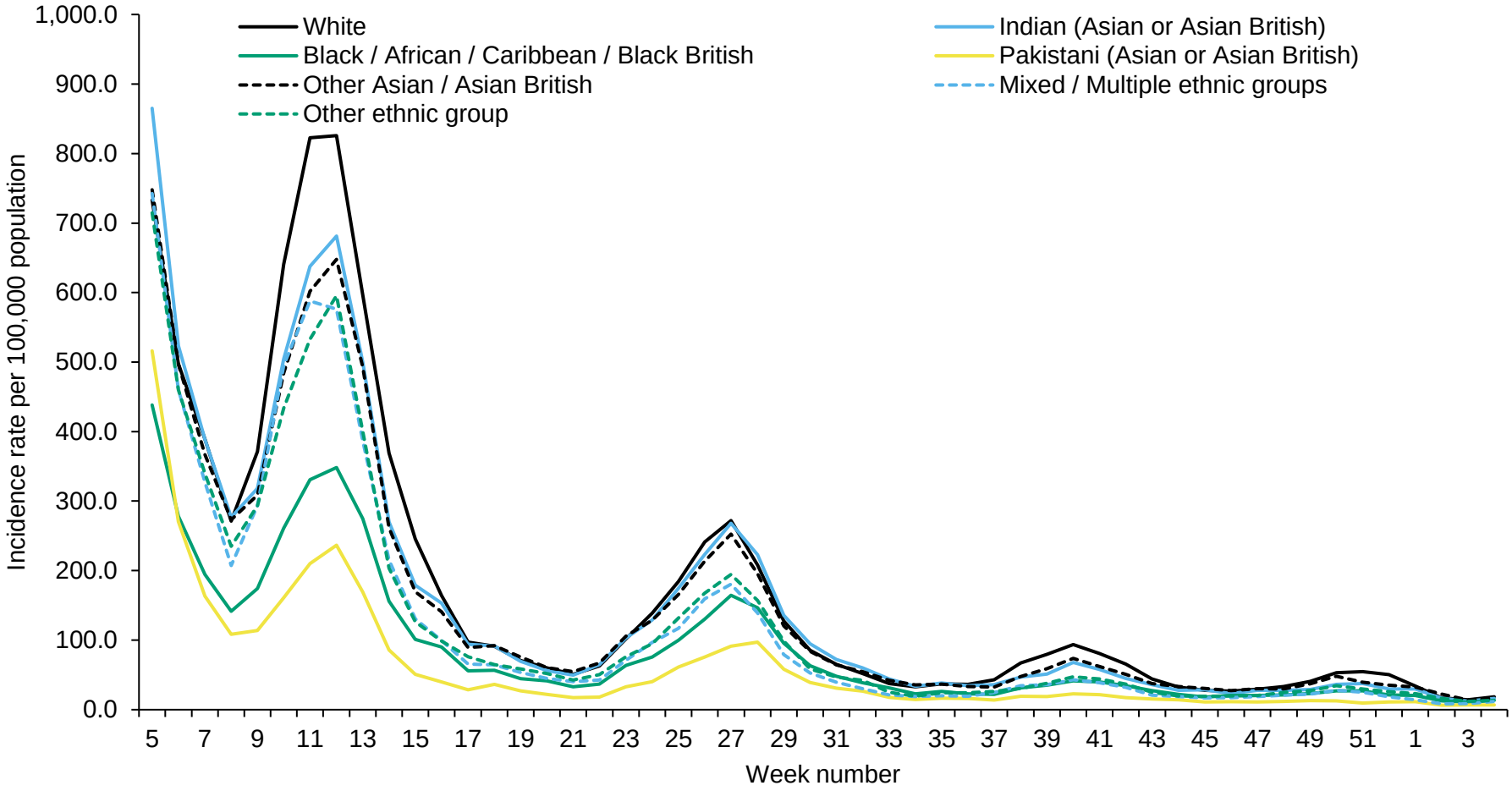
Weekly incidence per 100,000 population by ethnicity (Pillar 2), England



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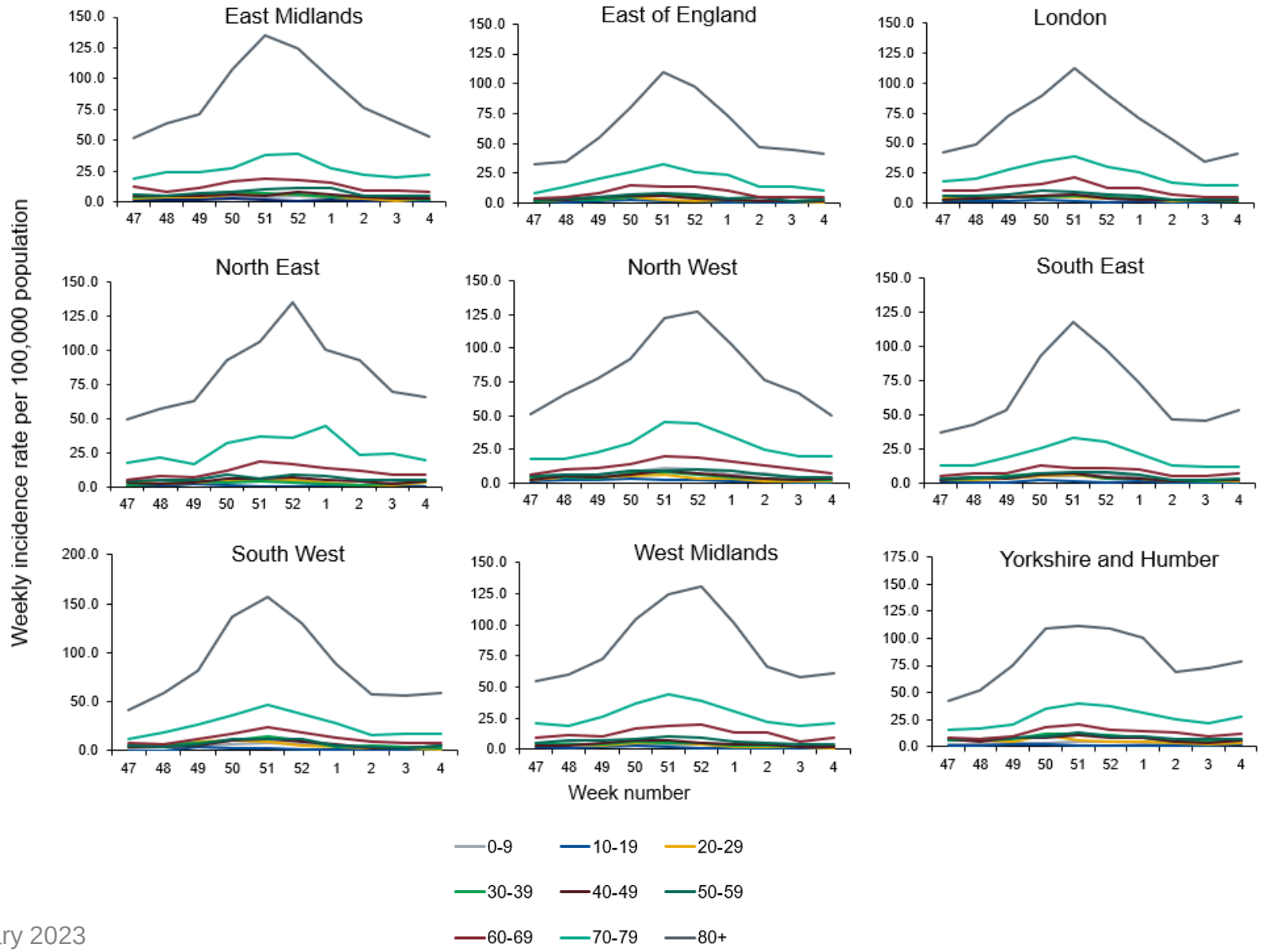
Weekly COVID-19 episodes tested under Pillar 1, per 100,000 population by age group and region, weeks 47 to 4



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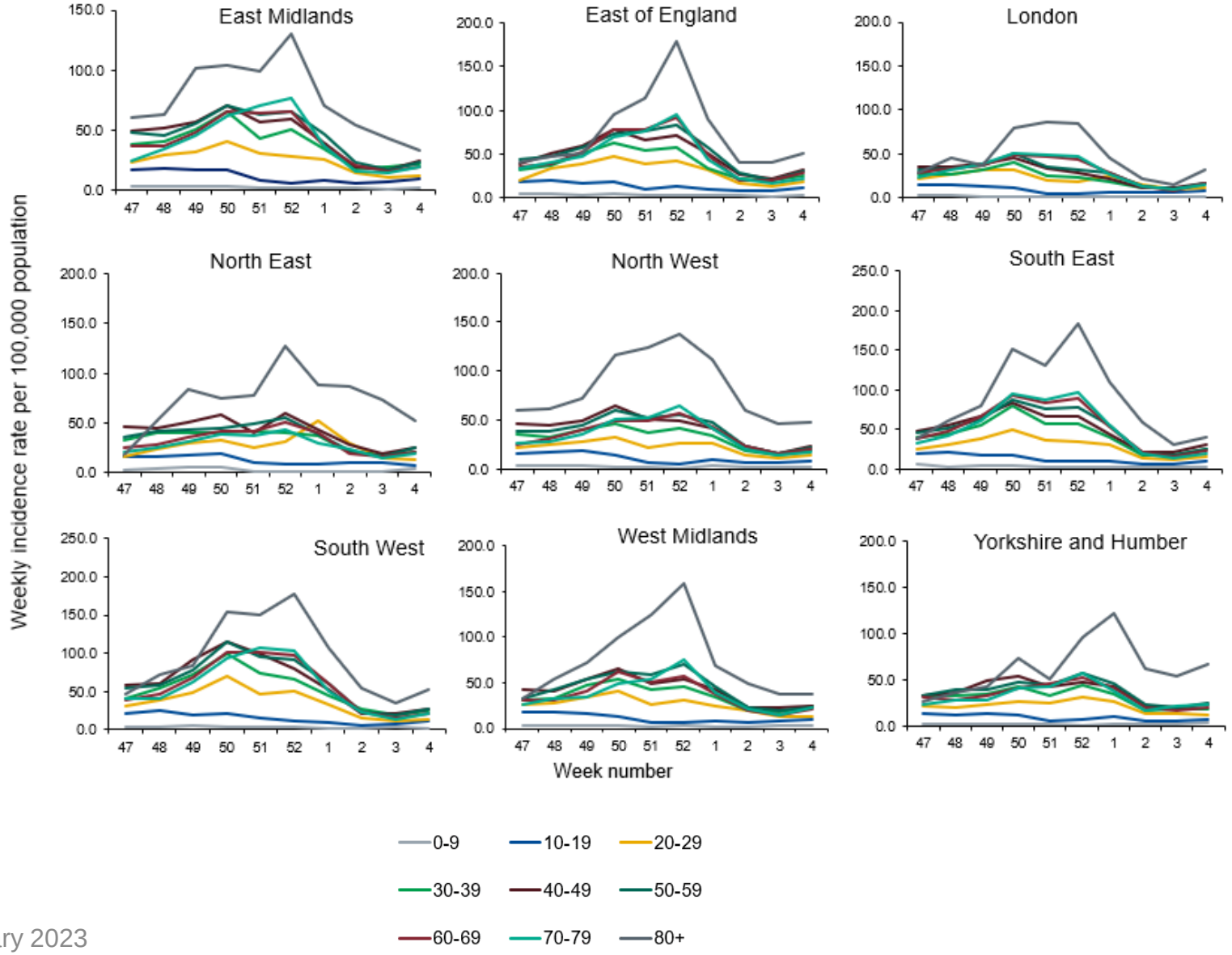
Weekly COVID-19 episodes tested under Pillar 2, per 100,000 population by age group and region, weeks 47 to 4



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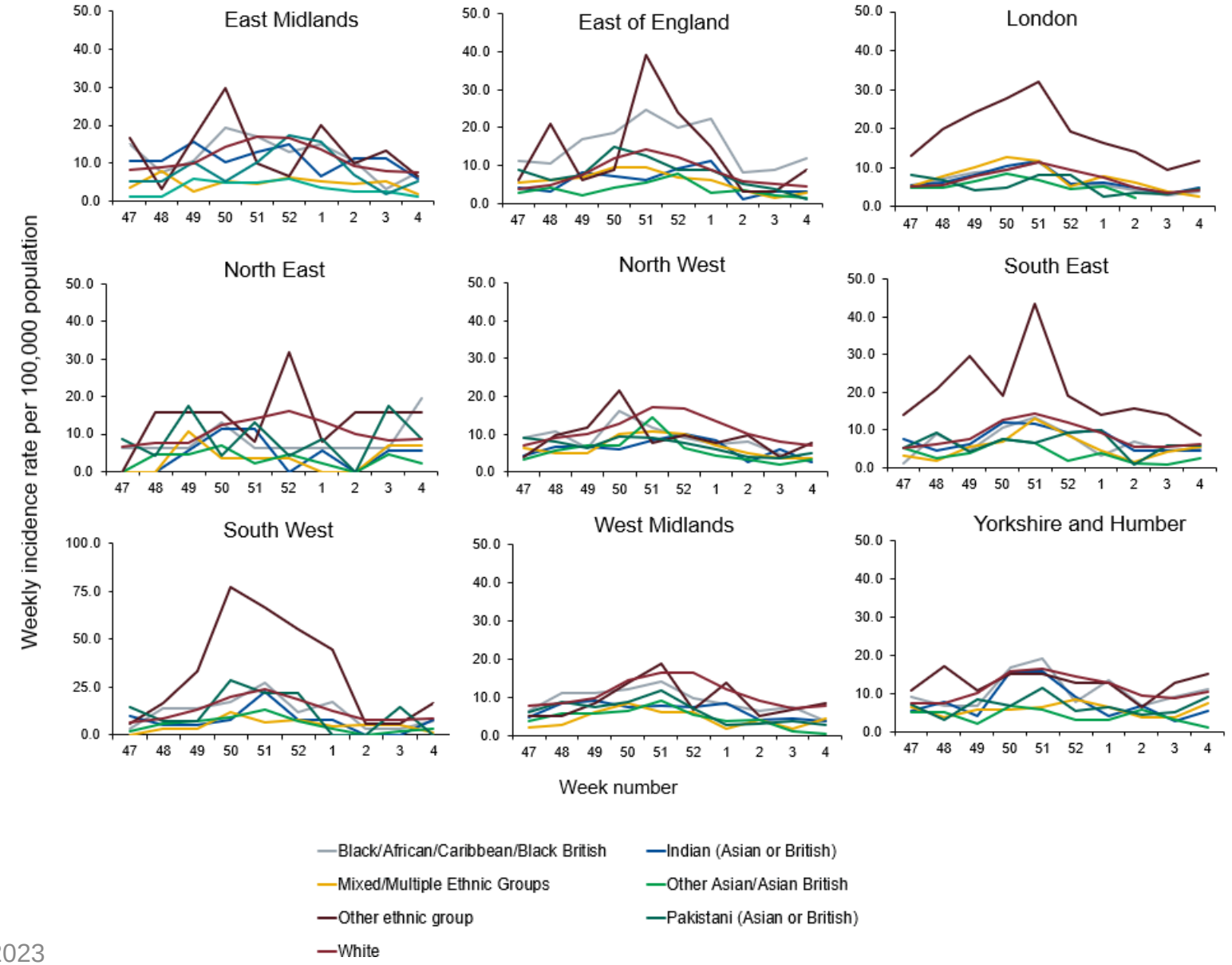
Weekly COVID-19 episodes tested under Pillar 1, per 100,000 population by ethnicity and region, weeks 47 to 4



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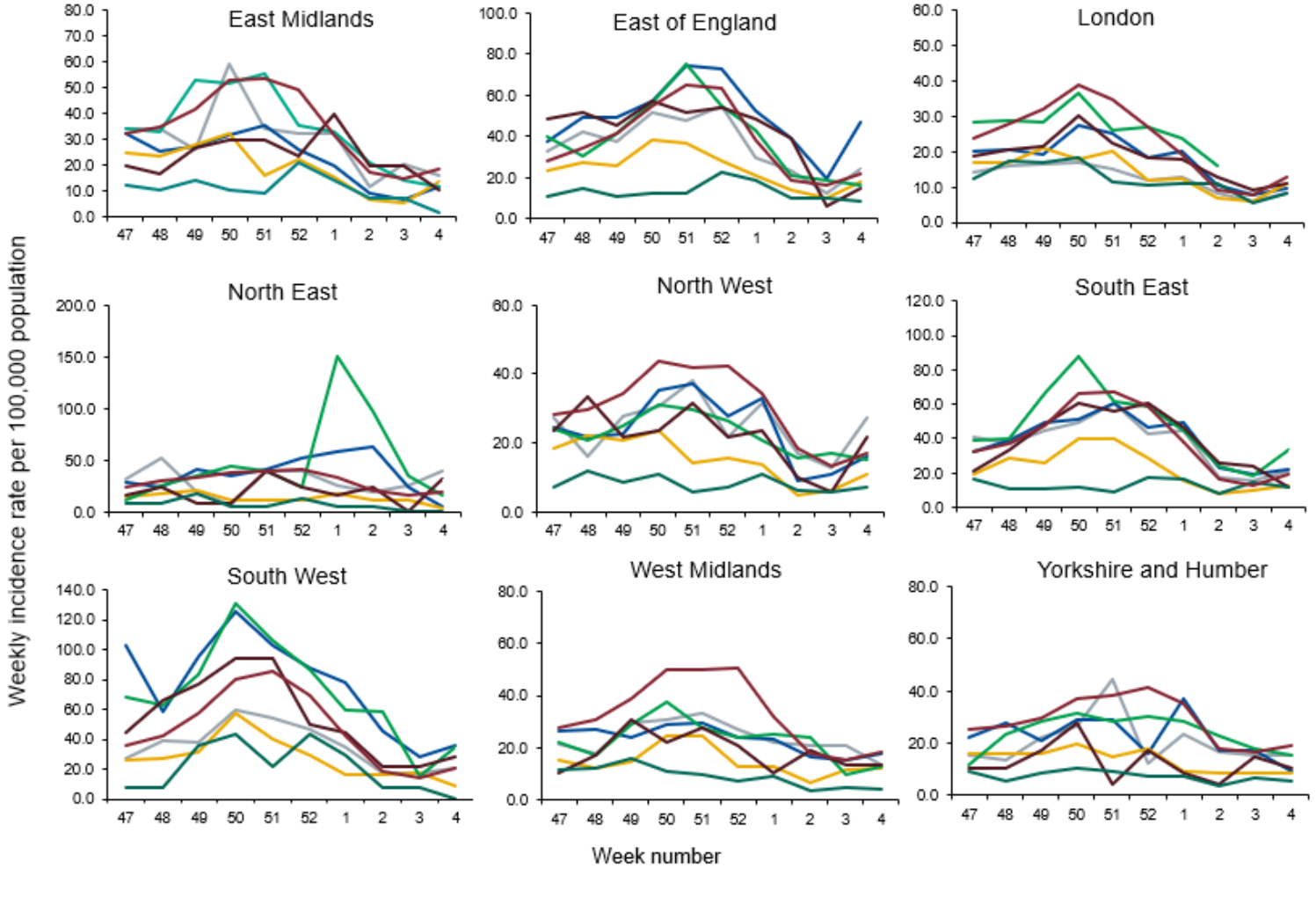
Weekly COVID-19 episodes tested under Pillar 2 per 100,000 population by ethnicity and region, weeks 47 to 4



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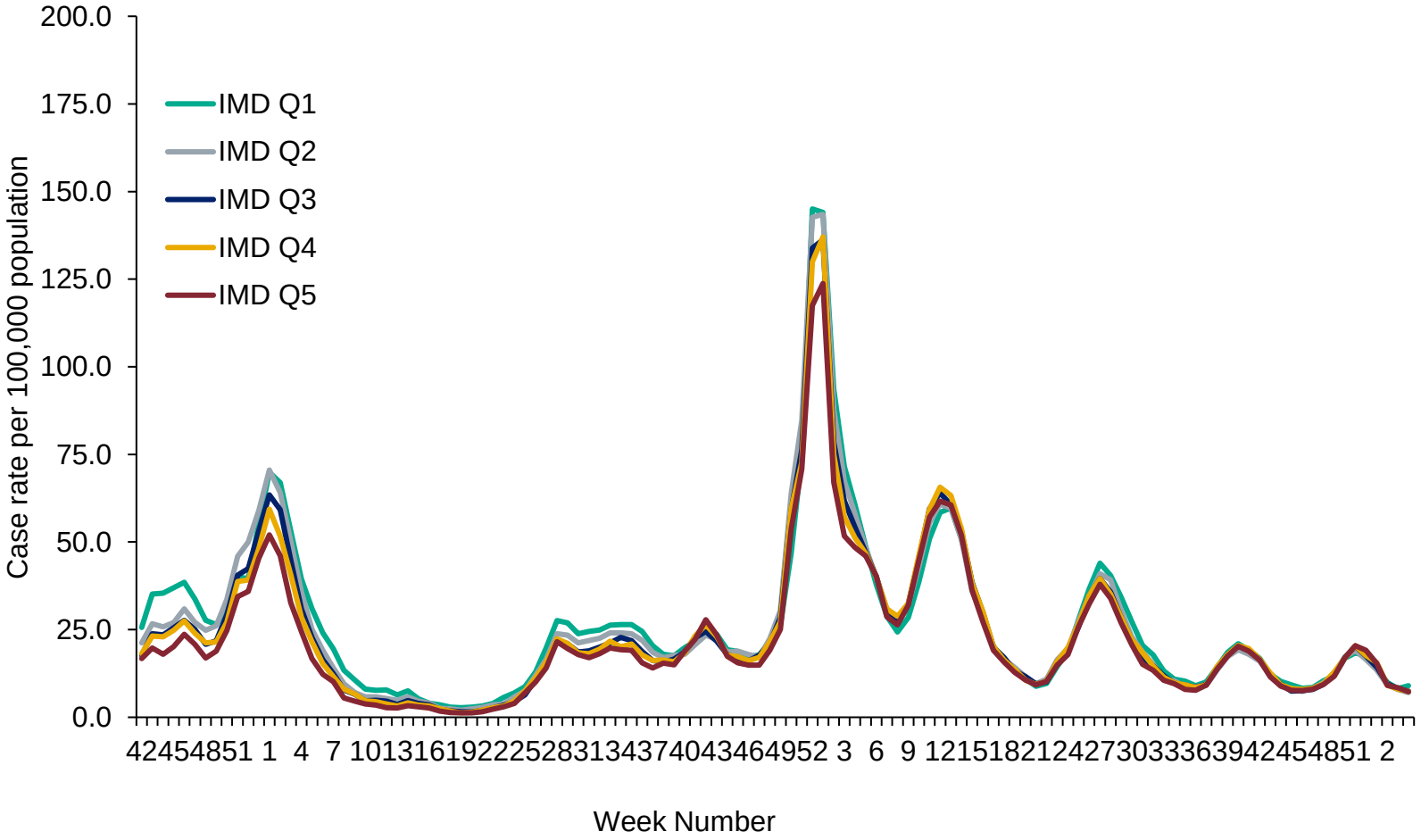
Weekly COVID-19 rate tested under Pillar 1, per 100,000 population by IMD quintile (1 being the most deprived and 5 being the least deprived)



*incidence rates have been calculated using the mid-2019 ONS population estimates

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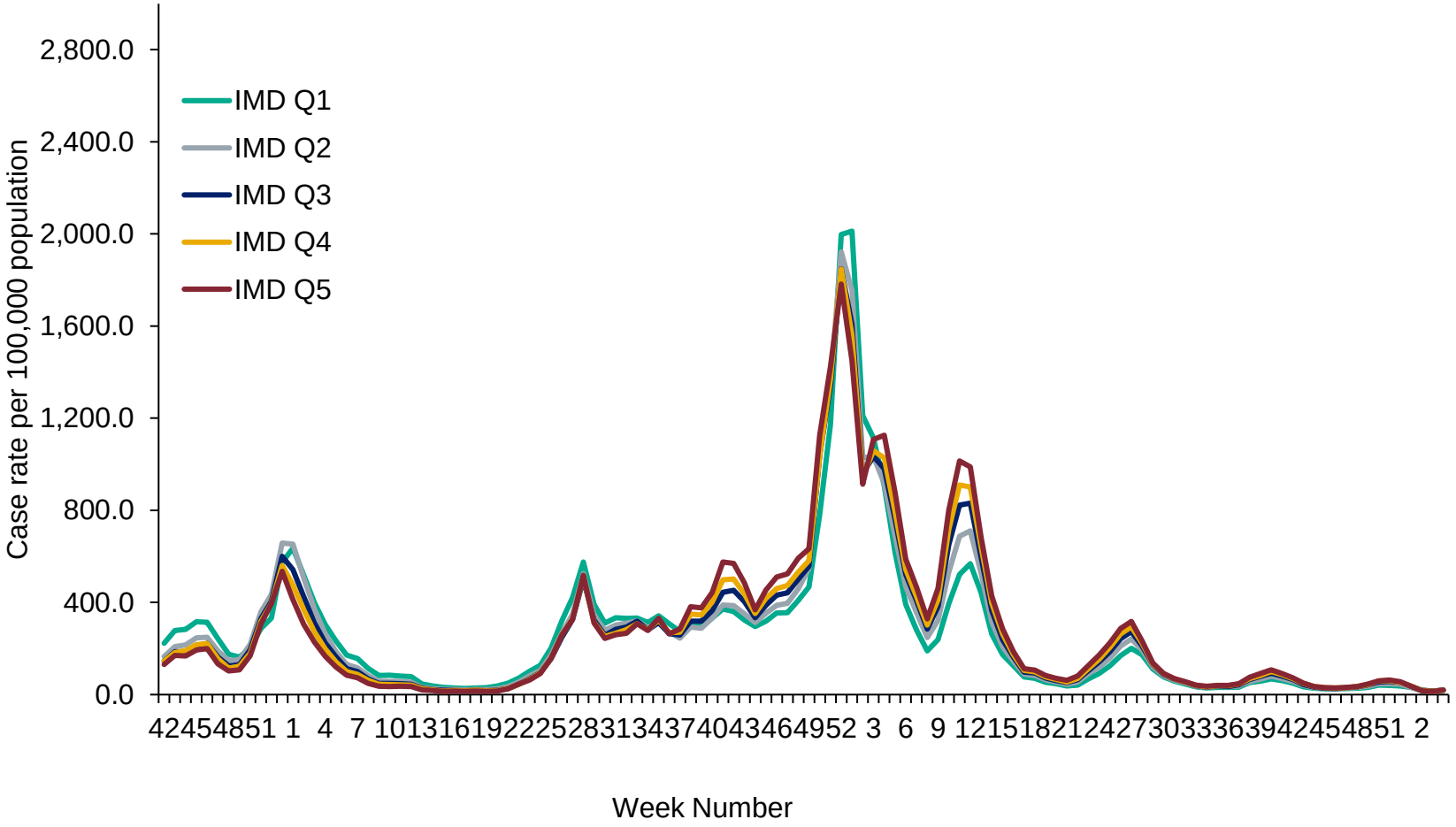
Weekly COVID-19 rate tested under Pillar 2, per 100,000 population by IMD quintile (1 being the most deprived and 5 being the least deprived)



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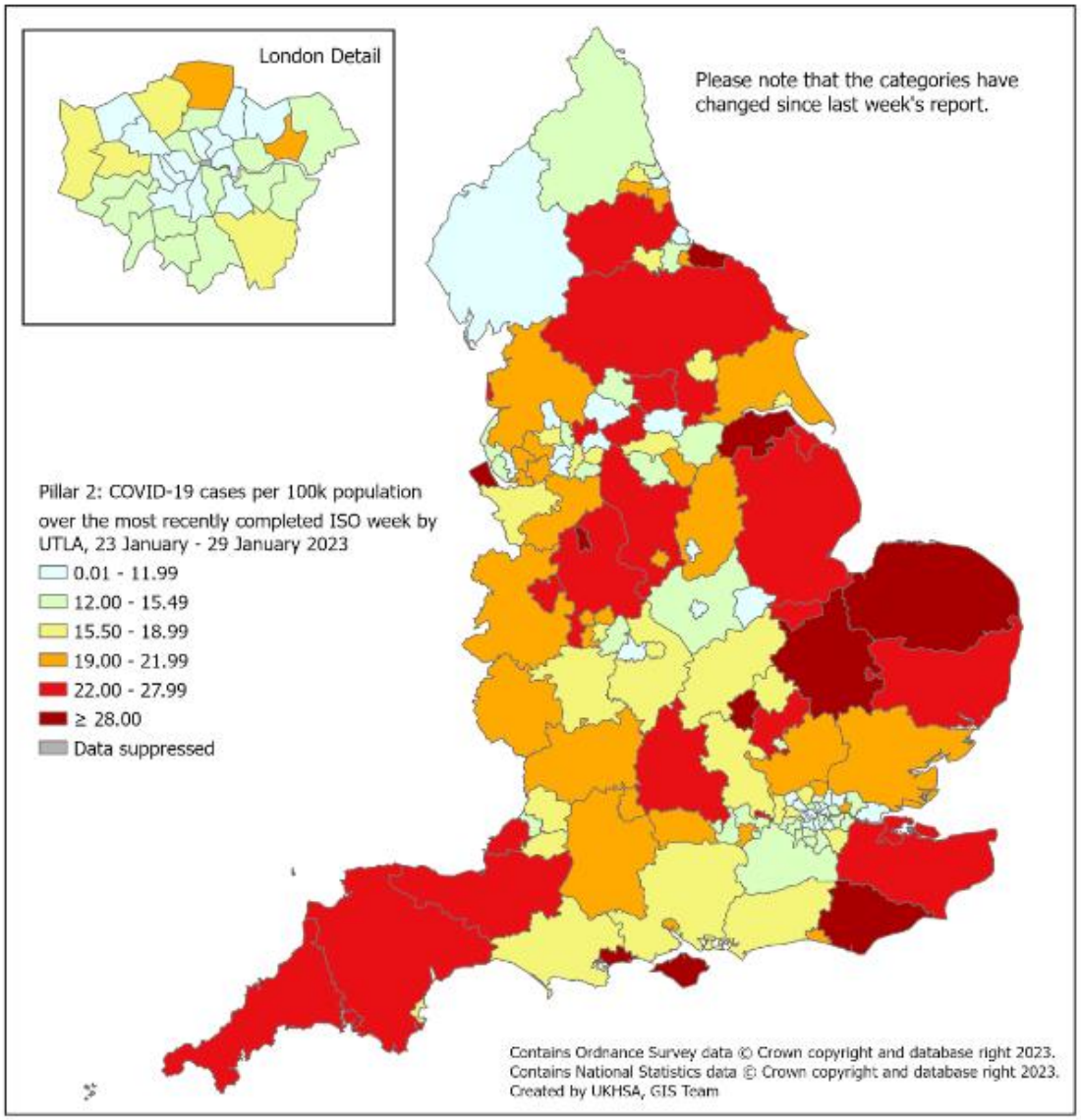
Weekly rate of COVID-19 episodes per 100,000 population (Pillar 2), by upper-tier local authority, England (box shows enlarged map of London area)



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Respiratory Datamart system (England)

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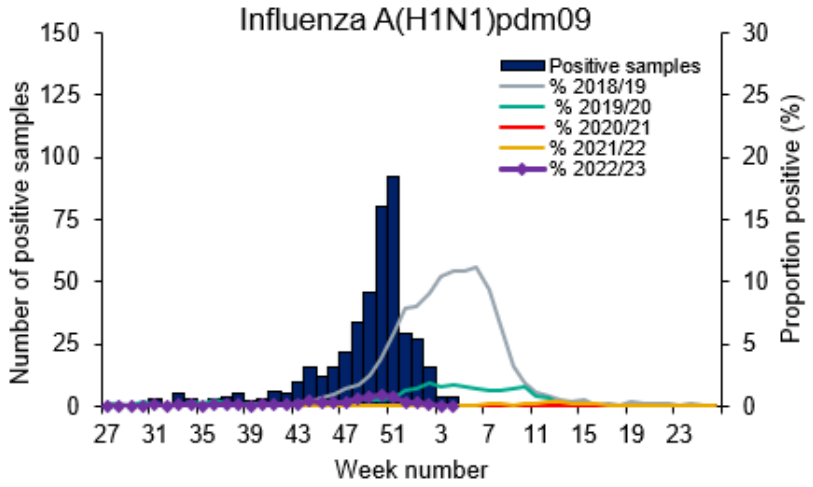
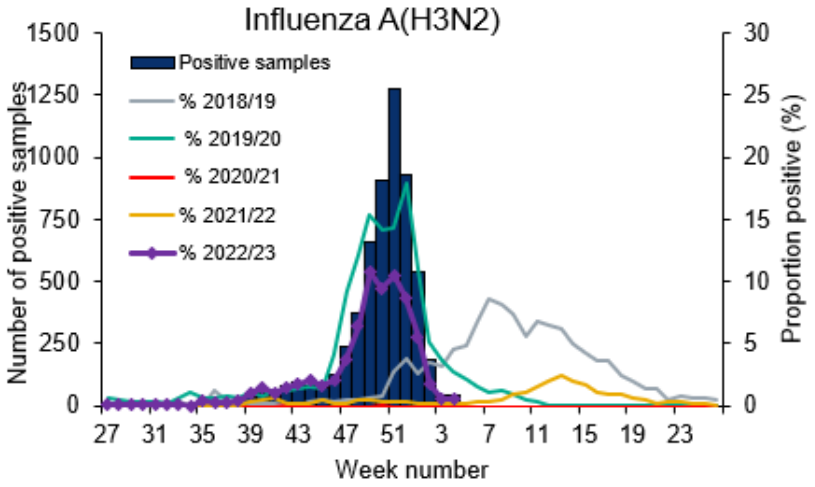
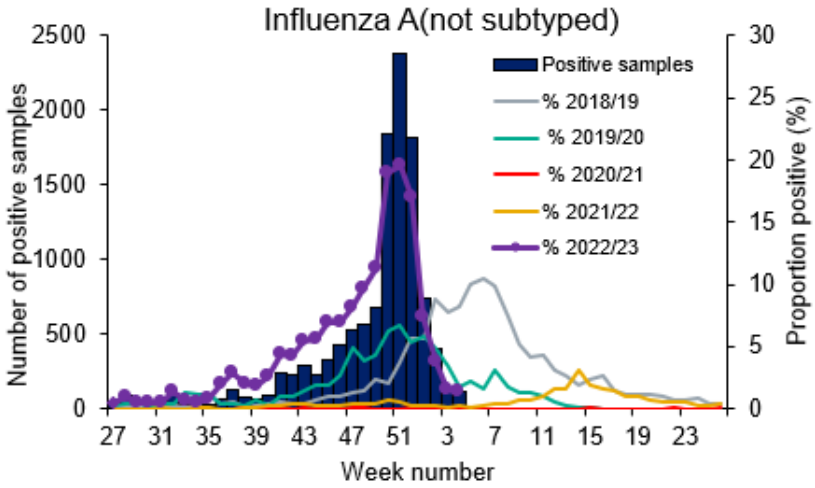
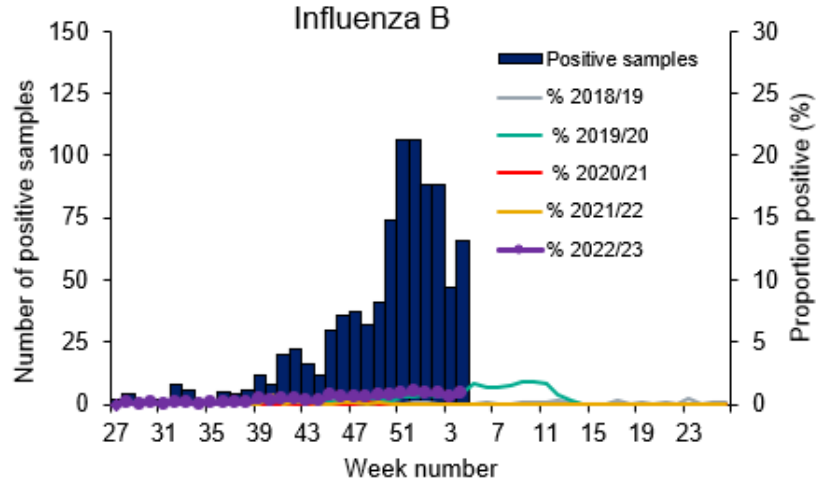
Respiratory DataMart – Influenza subtypes









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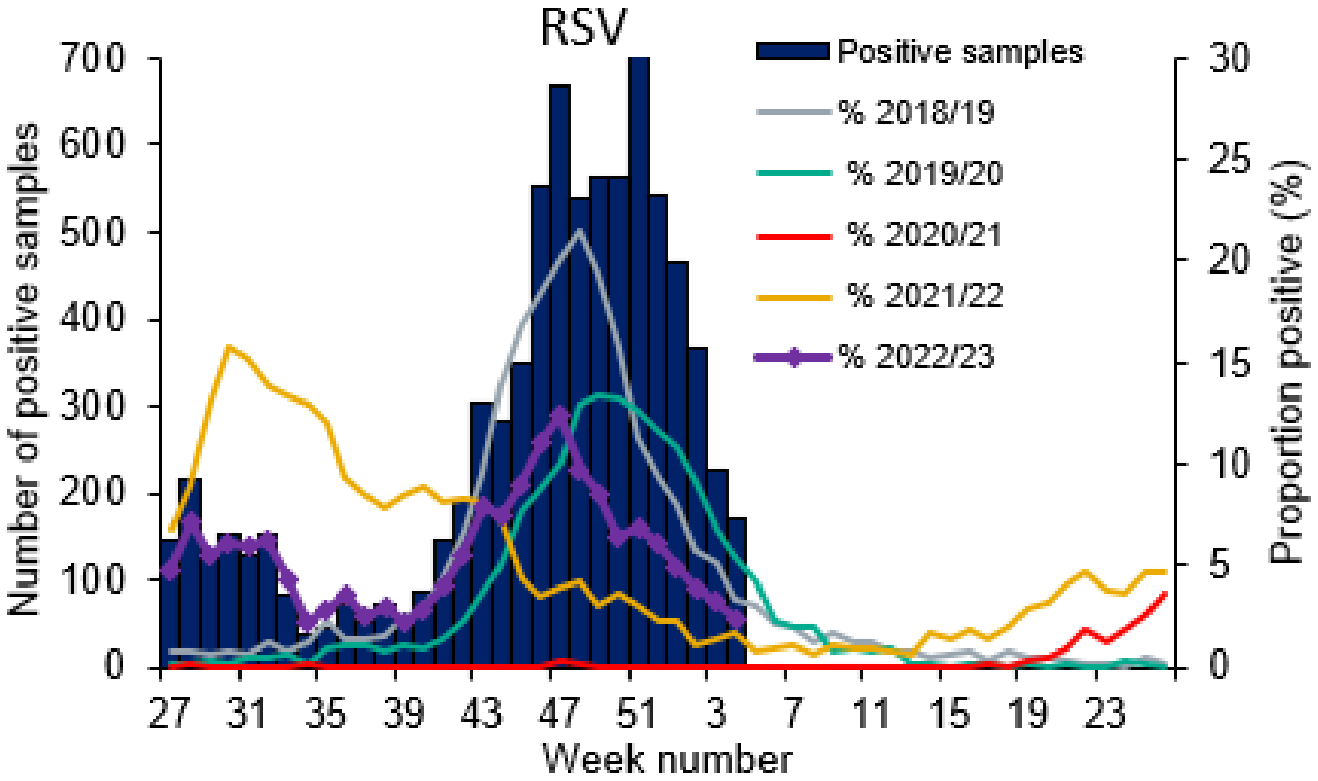
Respiratory DataMart – Respiratory syncytial virus (RSV)



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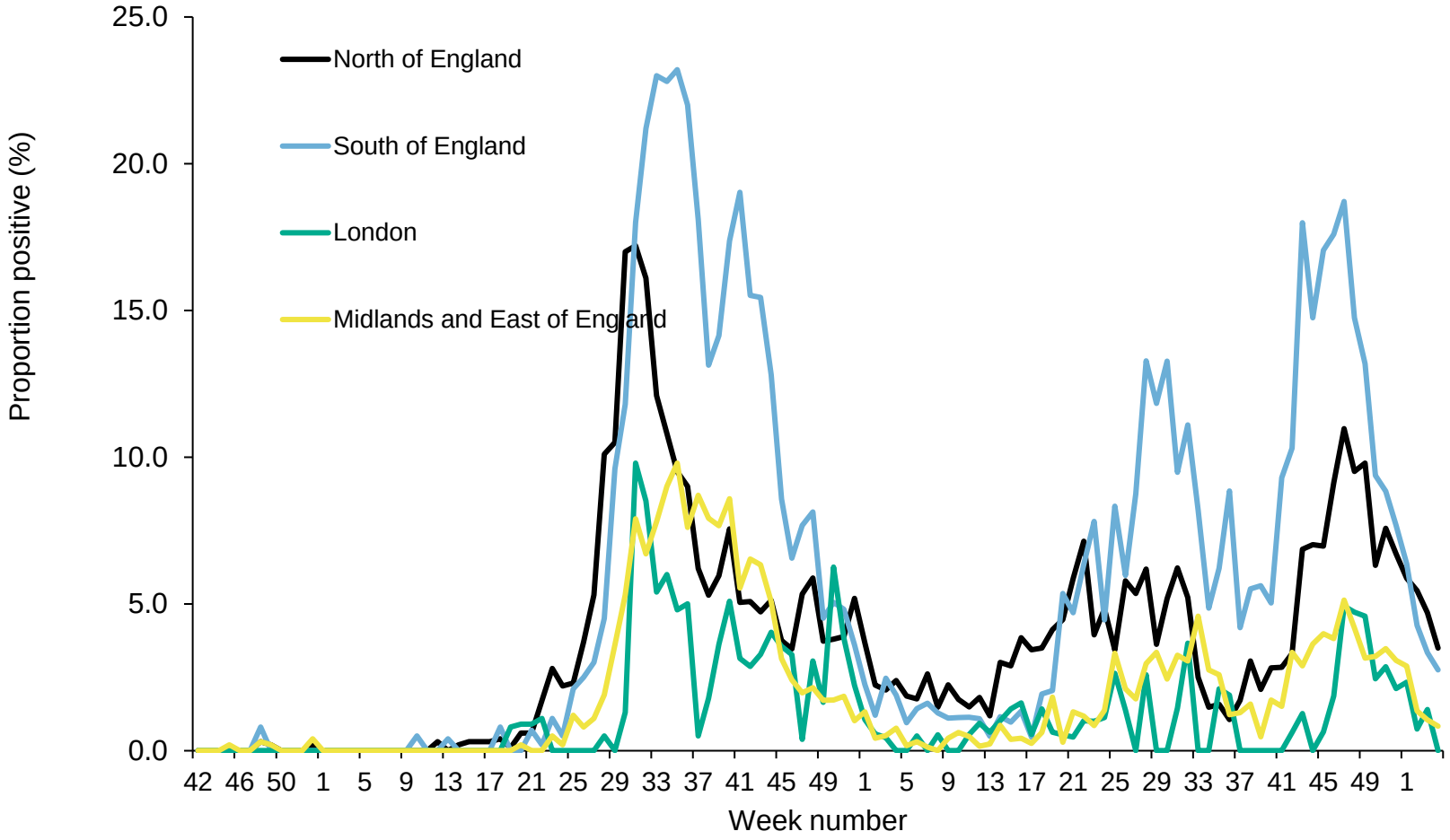
Respiratory DataMart – Respiratory syncytial virus (RSV) weekly positivity by UKHSA region



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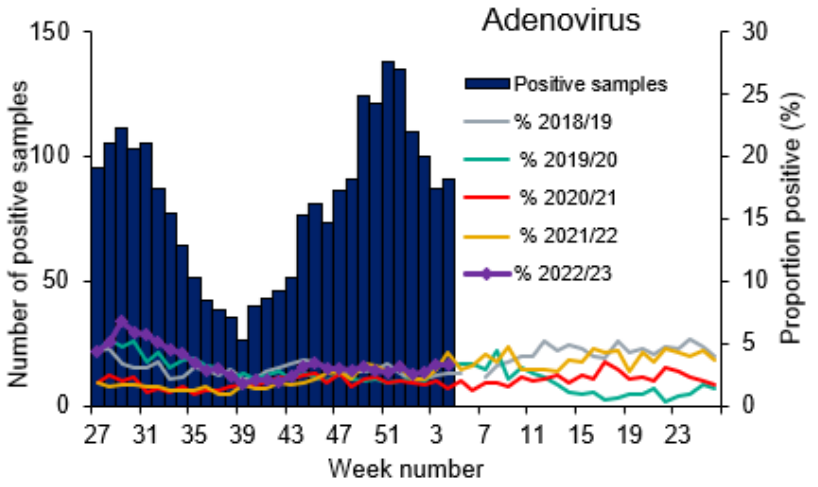
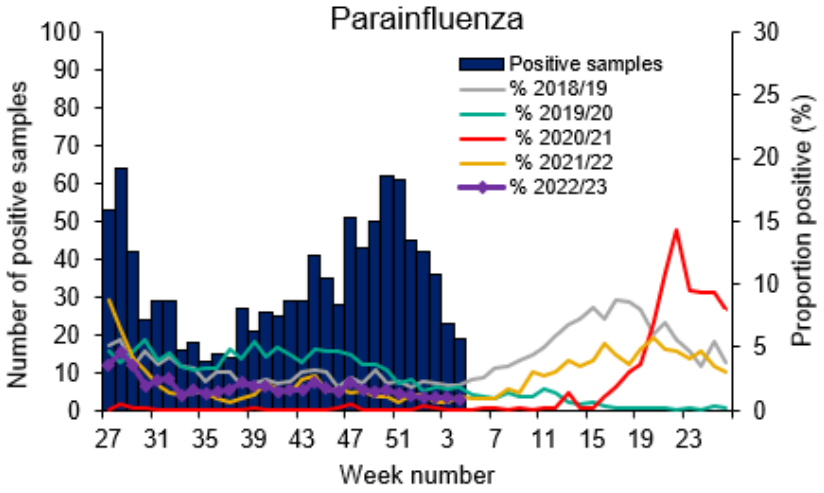
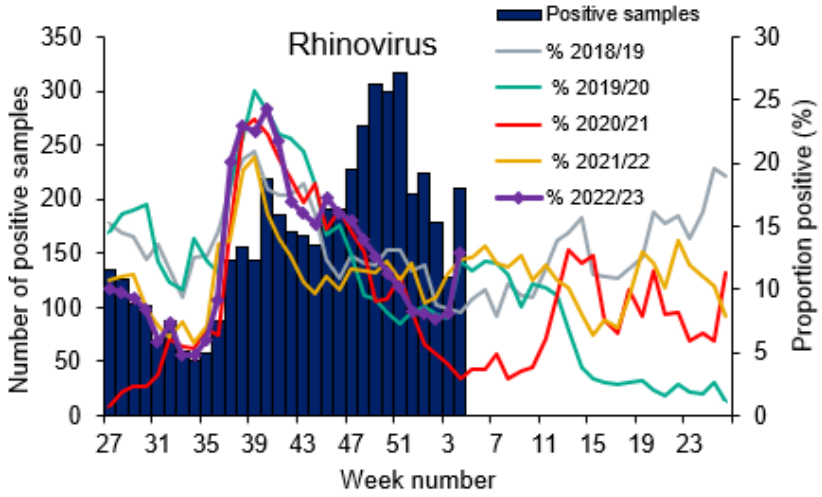
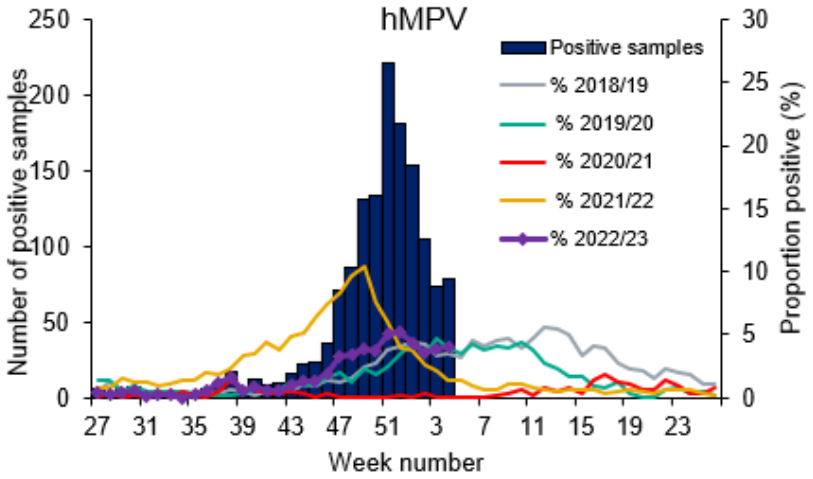
Respiratory DataMart – other respiratory viruses









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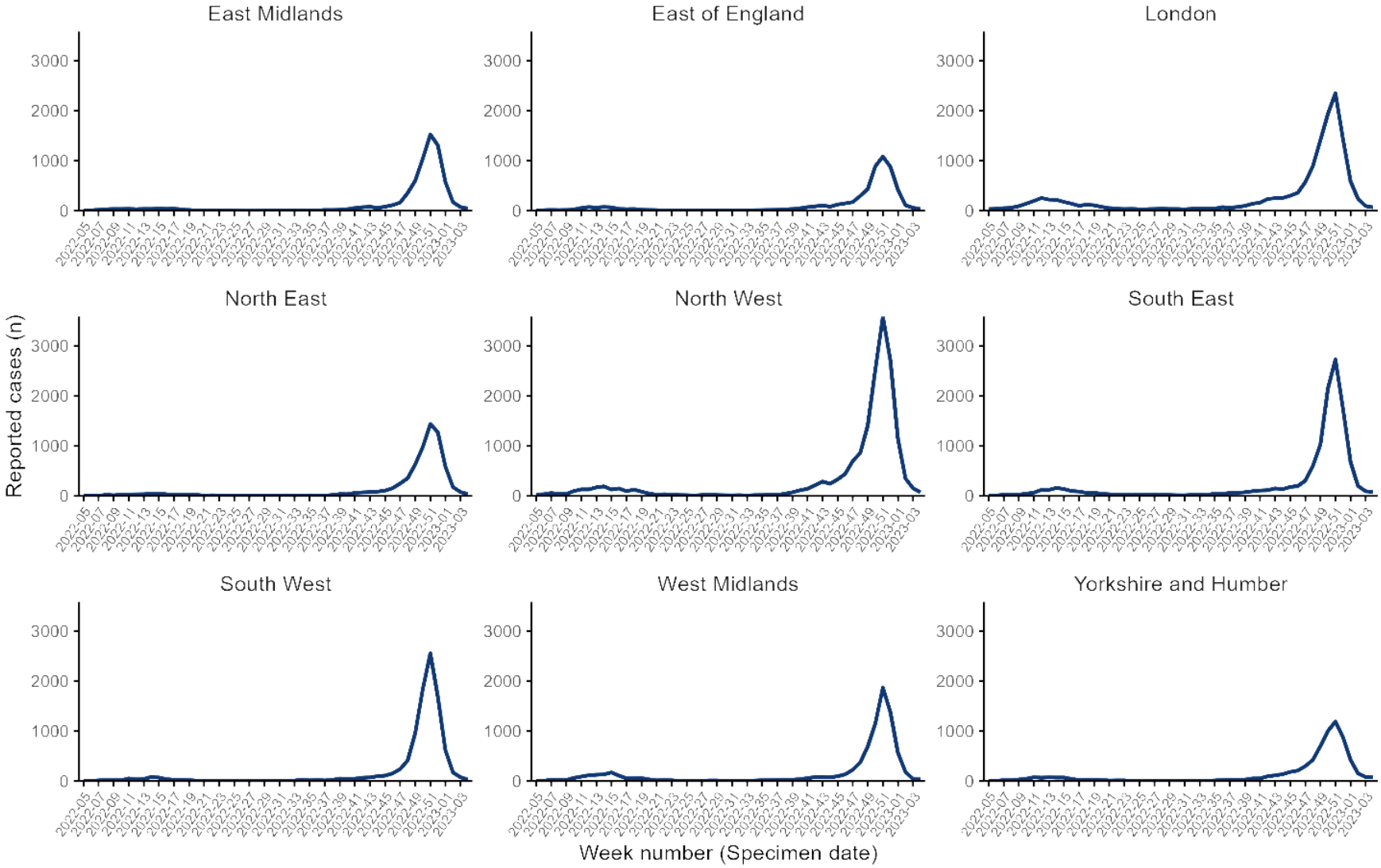
Second generation surveillance system (SGSS)

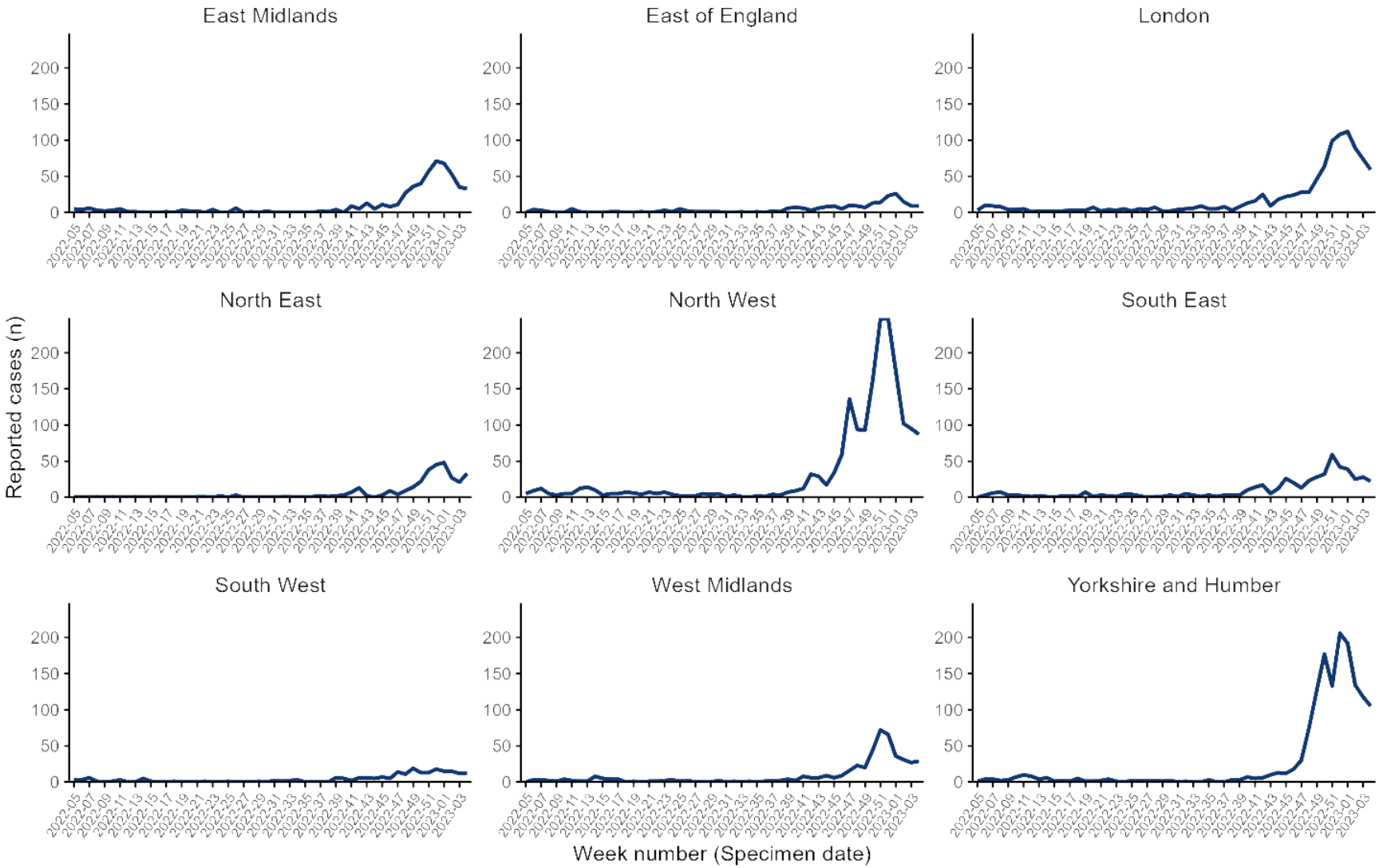
SGSS reported Influenza A cases by region (all ages)



The presented figures are based on laboratory reports through SGSS. Testing and reporting procedures vary by virus, UKHSA centre and over time, including short-term trends in testing. Therefore comparisons should be done with caution.

Previously, this data was presented by report date however is now presented by specimen date.

SGSS reported Influenza B cases by region (all ages)



The presented figures are based on laboratory reports through SGSS. Testing and reporting procedures vary by virus, UKHSA centre and over time, including short-term trends in testing. Therefore comparisons should be done with caution.
Previously, this data was presented by report date however is now presented by specimen date.

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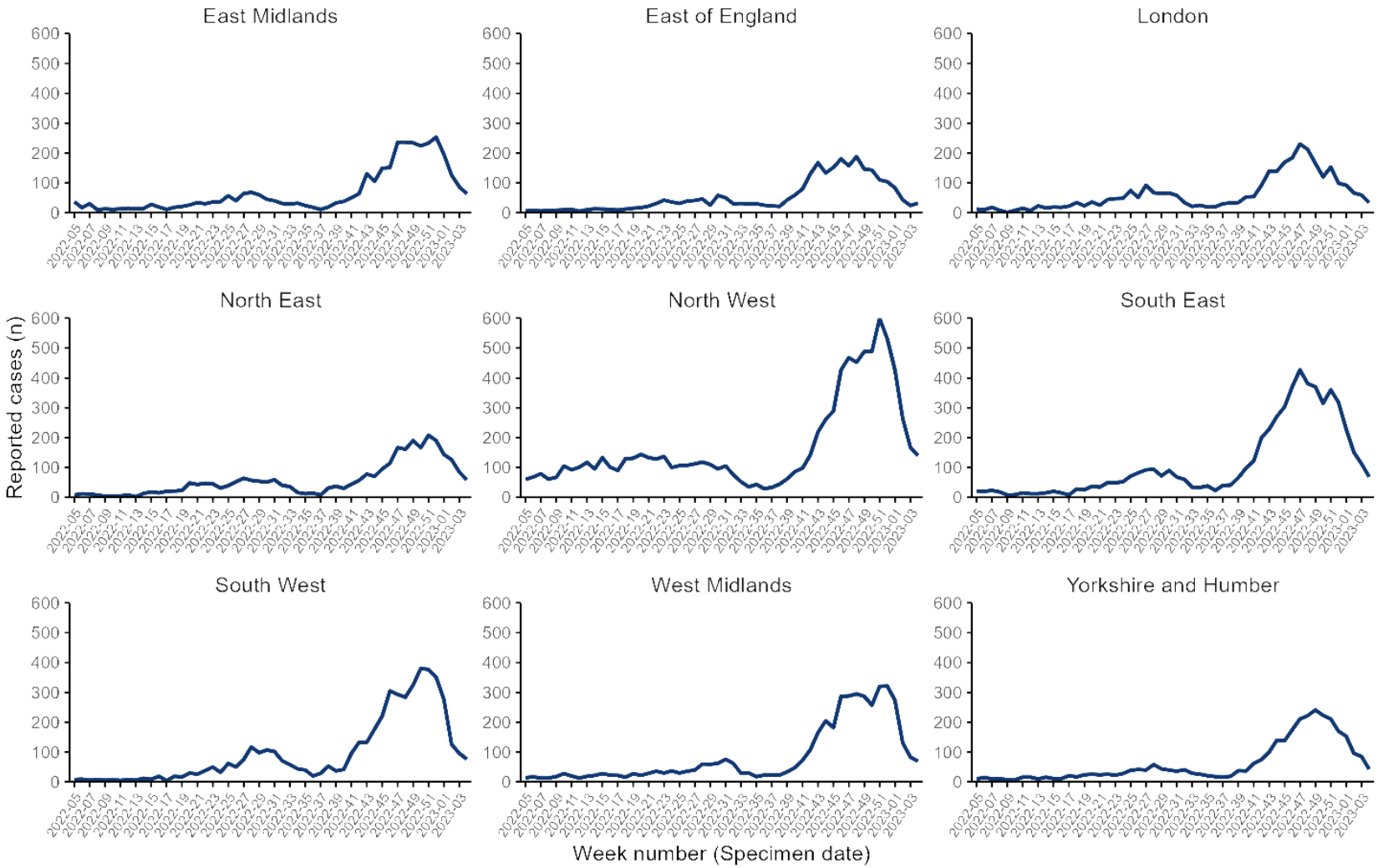
SGSS reported RSV cases by region (all ages)



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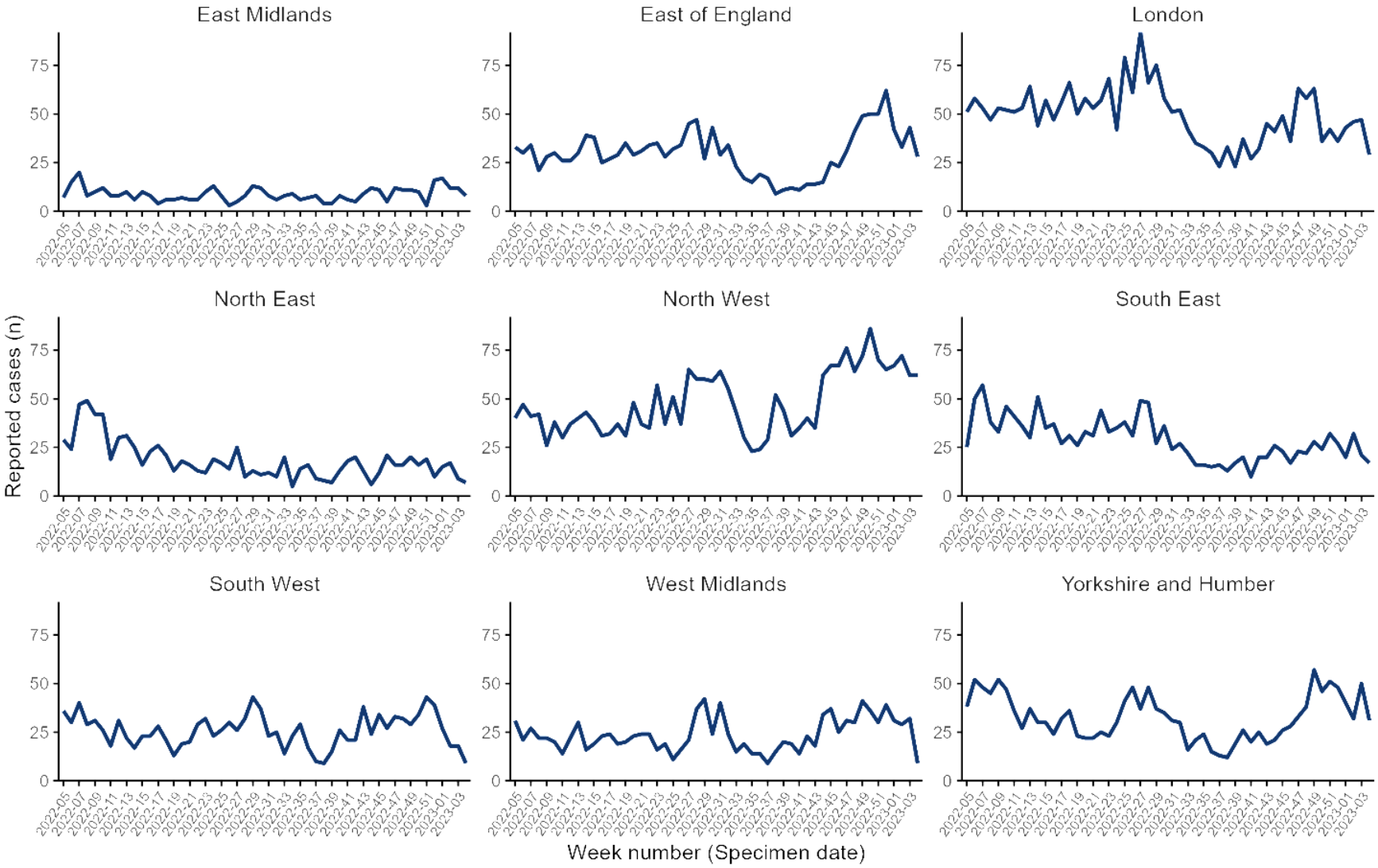
SGSS reported Adenovirus cases by region (all ages)



The presented figures are based on laboratory reports through SGSS. Testing and reporting procedures vary by virus, UKHSA centre and over time, including short-term trends in testing. Therefore comparisons should be done with caution.

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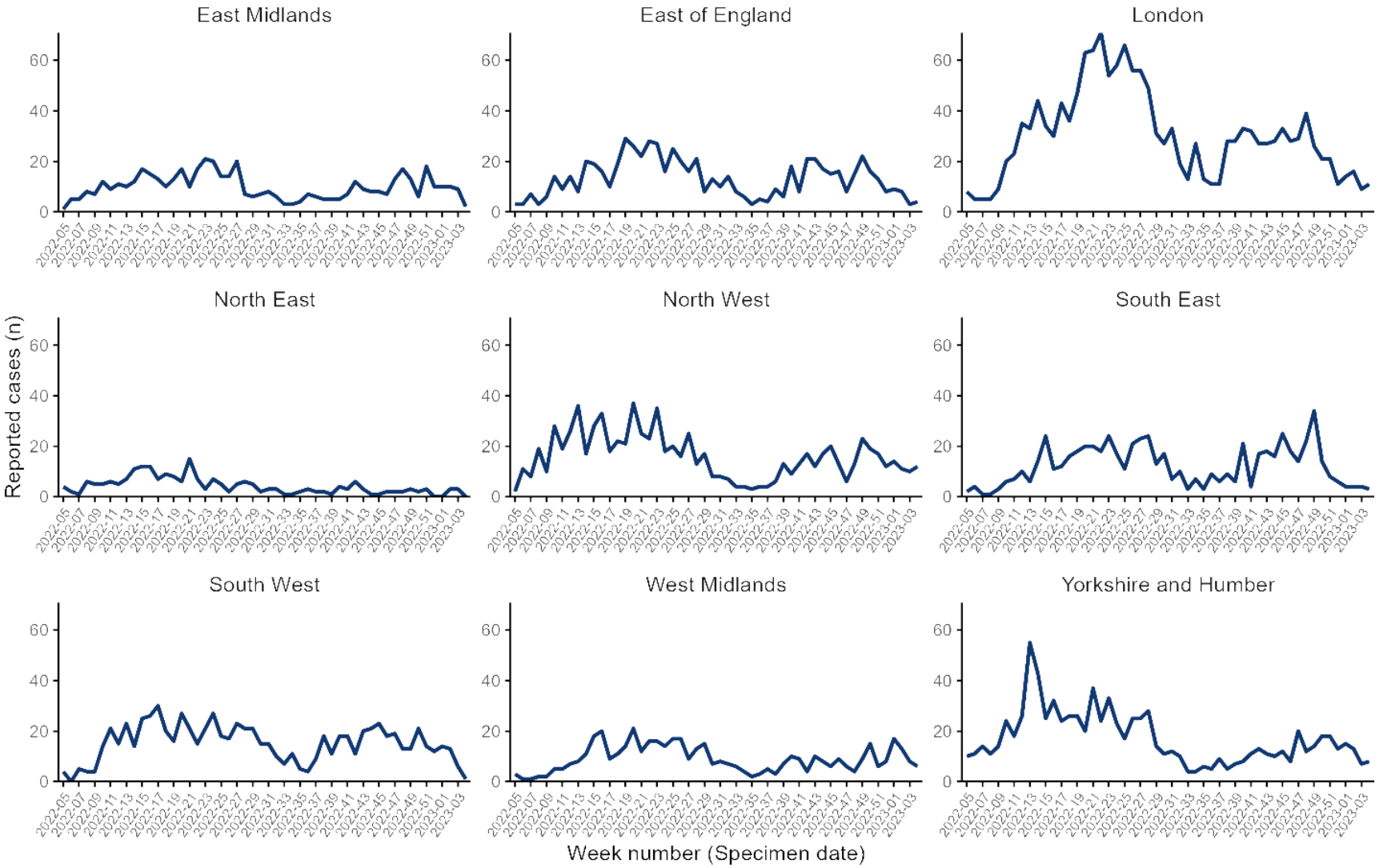
SGSS reported Parainfluenza cases by region (all ages)



The presented figures are based on laboratory reports through SGSS. Testing and reporting procedures vary by virus, UKHSA centre and over time, including short-term trends in testing. Therefore comparisons should be done with caution.

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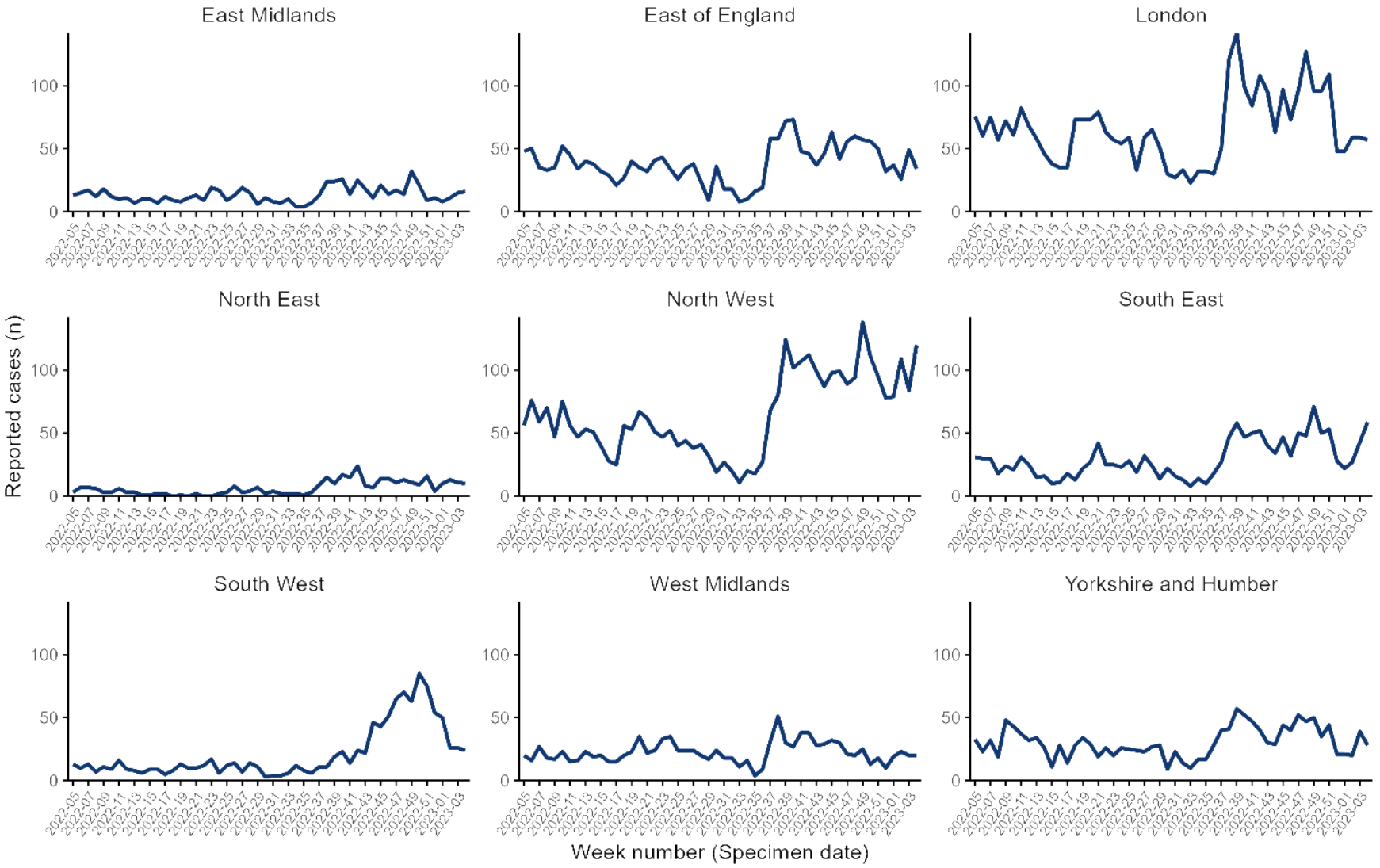
SGSS reported Rhinovirus cases by region (all ages)



The presented figures are based on laboratory reports through SGSS. Testing and reporting procedures vary by virus, UKHSA centre and over time, including short-term trends in testing. Therefore comparisons should be done with caution.

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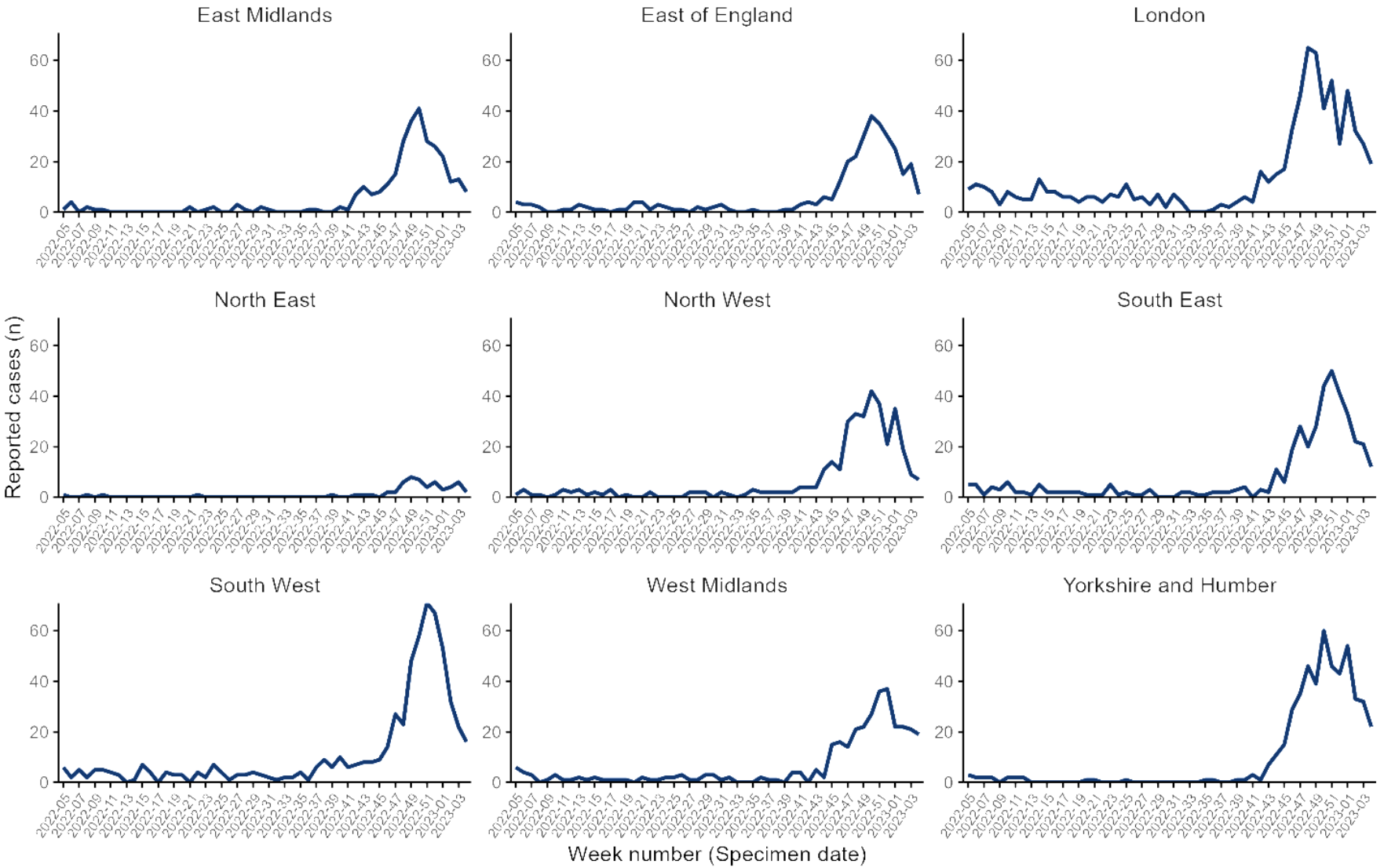
SGSS reported hMPV cases by region (all ages)



The presented figures are based on laboratory reports through SGSS. Testing and reporting procedures vary by virus, UKHSA centre and over time, including short-term trends in testing. Therefore comparisons should be done with caution.

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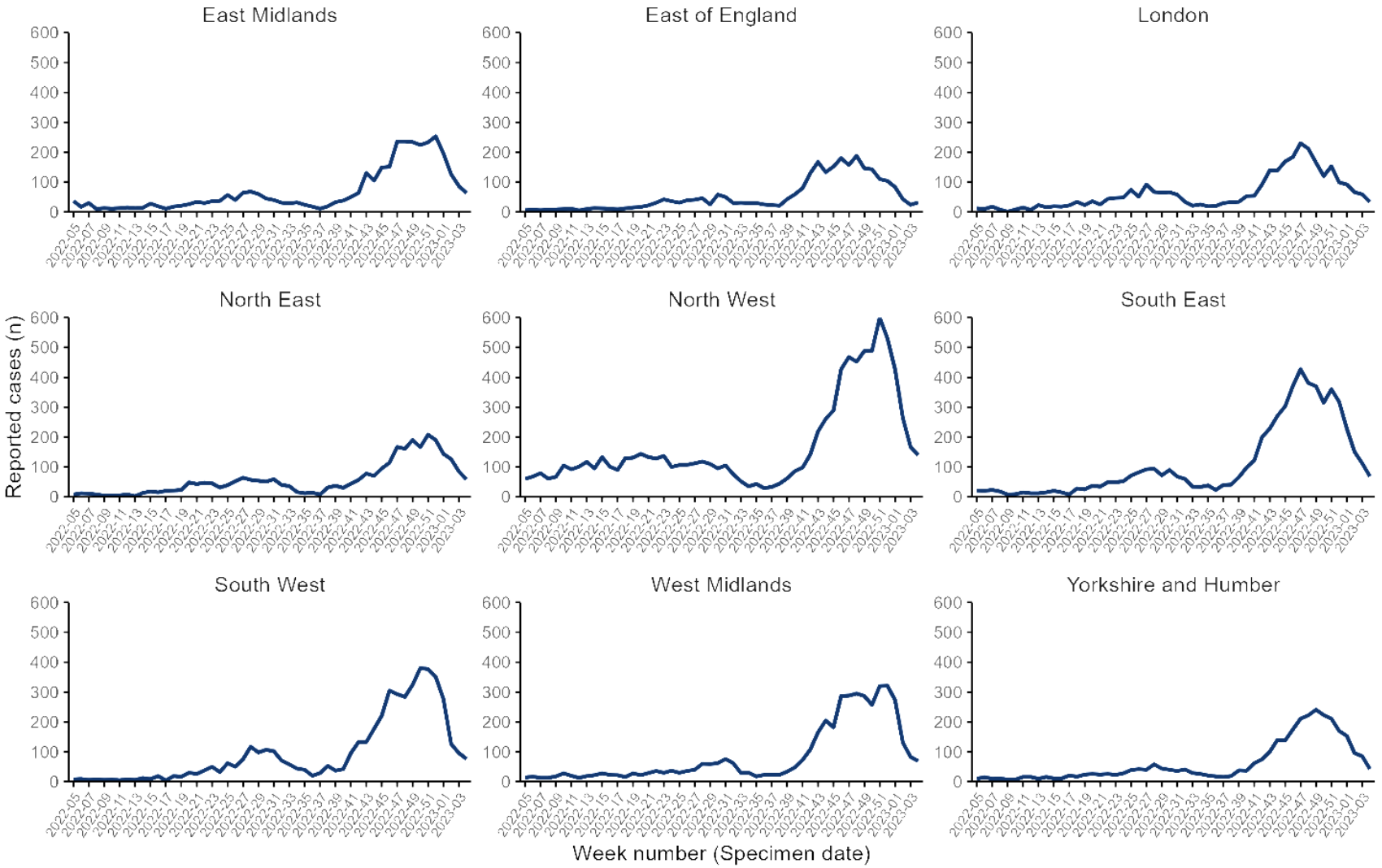
SGSS reported RSV cases by region (all ages)



The presented figures are based on laboratory reports through SGSS. Testing and reporting procedures vary by virus, UKHSA centre and over time, including short-term trends in testing. Therefore comparisons should be done with caution.

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Community surveillance

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Acute respiratory infection (ARI) outbreaks linked to educational settings

Data Information

- We report on new acute respiratory infection (ARI) incidents reported to UKHSA Health Protection Teams (HPTs) and entered on HPZone in the previous reporting week by setting and locality.

- Daily and weekly aggregated surveillance reports are extracted from HPZone to generate the line listing.

- The weekly extracts include incidents reported in the previous epidemiological week (Monday to Sunday) by locality and context (setting e.g. school)

- The ARI incidents captured on HPZone represent a subset of all ongoing clusters and outbreaks in England rather than an exhaustive listing.

- SARS-CoV2 testing policies and public health guidance for different settings changed over time. This means that any interpretation of seasonal and temporal trends since March 2020 should take this into account.
-
- From week 14 2022 all reported outbreaks are considered suspected, in line with changes in reporting and the implementation of the living with COVID-19 plan. (Prior to this, individual cases notes for situations associated with educational settings were reviewed by an epidemiologist and an assessment made about whether the criteria for a confirmed COVID-19 cluster or outbreak were met).

- The ARI definition includes presentations of both of influenza-like illness (ILI) and other acute viral respiratory infections (AVRI). Causal pathogens can include Influenza A and B, Respiratory Syncytial Virus (RSV), adenovirus, rhinovirus, parainfluenza, human metapneumovirus (hMPV) and SARS-CoV-2.

- For further info please contact: respscidsc@ukhsa.gov.uk

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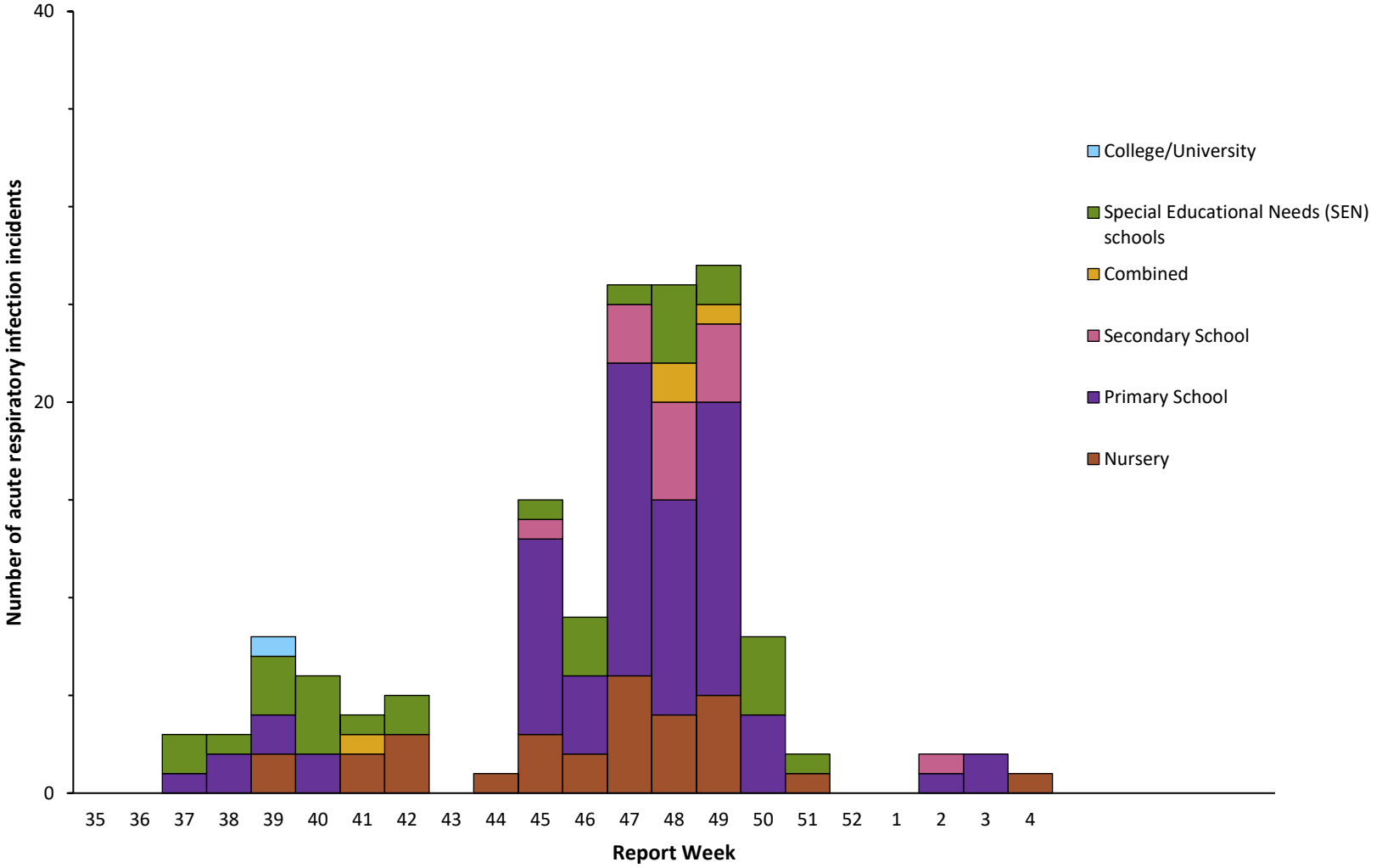
Number of acute respiratory infection outbreaks reported to UKHSA by type of educational setting, England



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Number of acute respiratory infection outbreaks by type of educational setting, England

End of academic year total

Week 35 2021- 34 2022

UKHSA Centres	Cumulative number of suspected acute respiratory infection outbreaks by type of educational setting for the 2021/22 academic year Week 35 2021- 35 2022						
	Nursery	Primary School	Secondary School	Combined	Special Educational Needs (SEN) schools	College University	Total
Total	540	1761	596	161	1306	59	4423

Week 04 2023

Main table

UKHSA Centres	Cumulative number of suspected acute respiratory infection incidents by type of educational setting for the 2022/23 academic year from Week 35 2022						
	Nursery	Primary School	Secondary School	Combined	Special Educational Needs (SEN) schools	College University	Total
East Midlands Centre	3 (0)	2 (0)	0 (0)	0 (0)	1 (0)	0 (0)	**6 (0)**
East of England Centre	0 (0)	0 (0)	1 (0)	0 (0)	1 (0)	0 (0)	**2 (0)**
London Centre	17 (1)	26 (0)	3 (0)	2 (0)	12 (0)	1 (0)	**61 (1)**
North East Centre	3 (0)	3 (0)	0 (0)	0 (0)	1 (0)	0 (0)	**7 (0)**
North West Center	0 (0)	5 (0)	0 (0)	0 (0)	5 (0)	0 (0)	**10 (0)**
South East Centre	0 (0)	1 (0)	2 (0)	0 (0)	0 (0)	0 (0)	**3 (0)**
South West Centre	1 (0)	3 (0)	1 (0)	0 (0)	4 (0)	0 (0)	**9 (0)**
West Midlands Centre	5 (0)	18 (0)	4 (0)	1 (0)	0 (0)	0 (0)	**28 (0)**
Yorkshire & the Humber	1 (0)	12 (0)	3 (0)	1 (0)	5 (0)	0 (0)	**22 (0)**
Total	**30 (1)**	**70 (0)**	**14 (0)**	**4 (0)**	**29 (0)**	**1 (0)**	**148 (1)**

* Number of acute respiratory infection for the most recent week in brackets

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Primary Care surveillance

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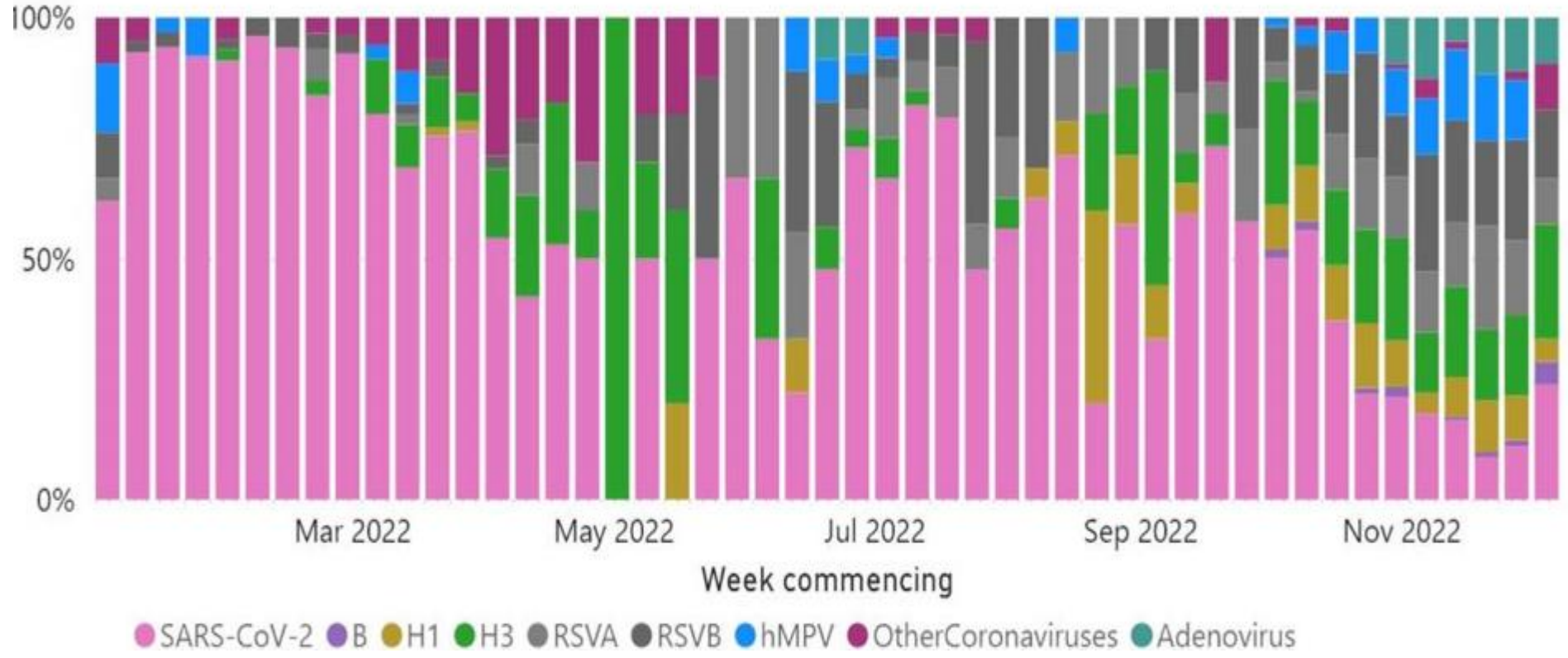
Proportion of detections of SARS-CoV-2, influenza and other respiratory viruses amongst virologically-positive respiratory surveillance samples in primary care in England by week

Last updated 15 December 2022



Since October 2021 the UKHSA Respiratory Virus Unit has been undertaking extended respiratory virus testing of samples submitted from primary care surveillance, covering the viruses listed in the figure. Samples which test positive are summed and presented in the figure to indicate recent trends in detections.

Source: RCGP Research and Surveillance Centre sentinel primary care practices and the UKHSA Respiratory Virus Unit

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Secondary Care surveillance

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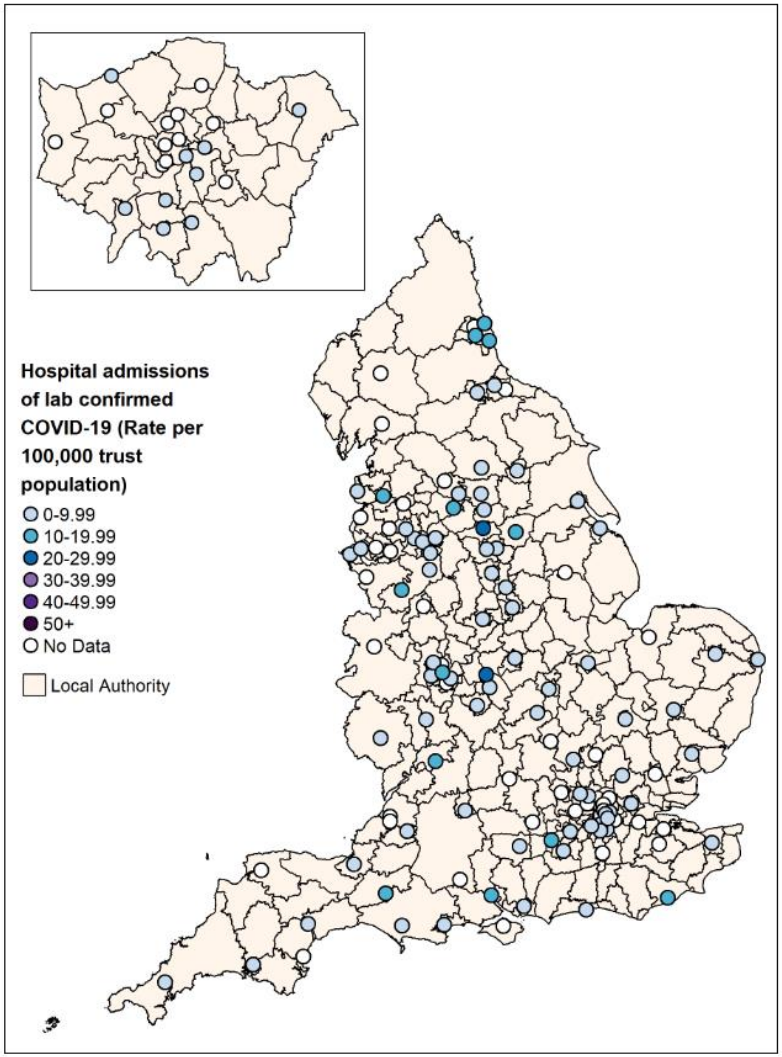
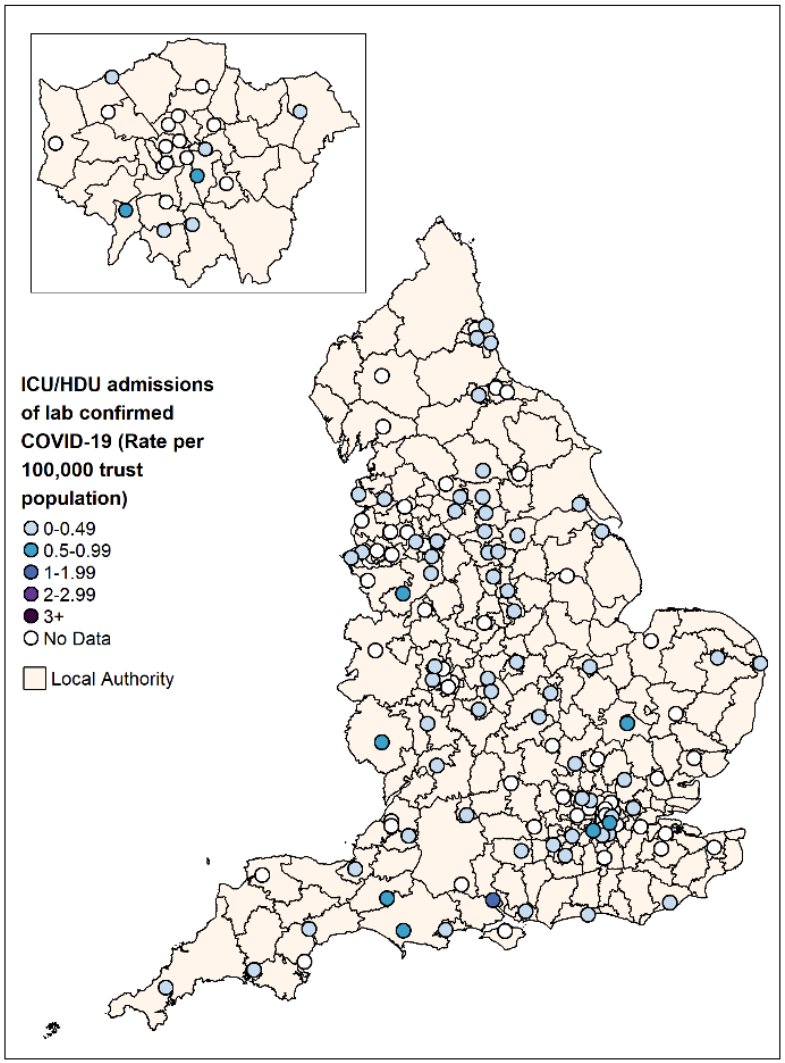
Weekly admission rates for hospital and ICU/HDU laboratory confirmed COVID-19 cases reported through SARI Watch, week 04



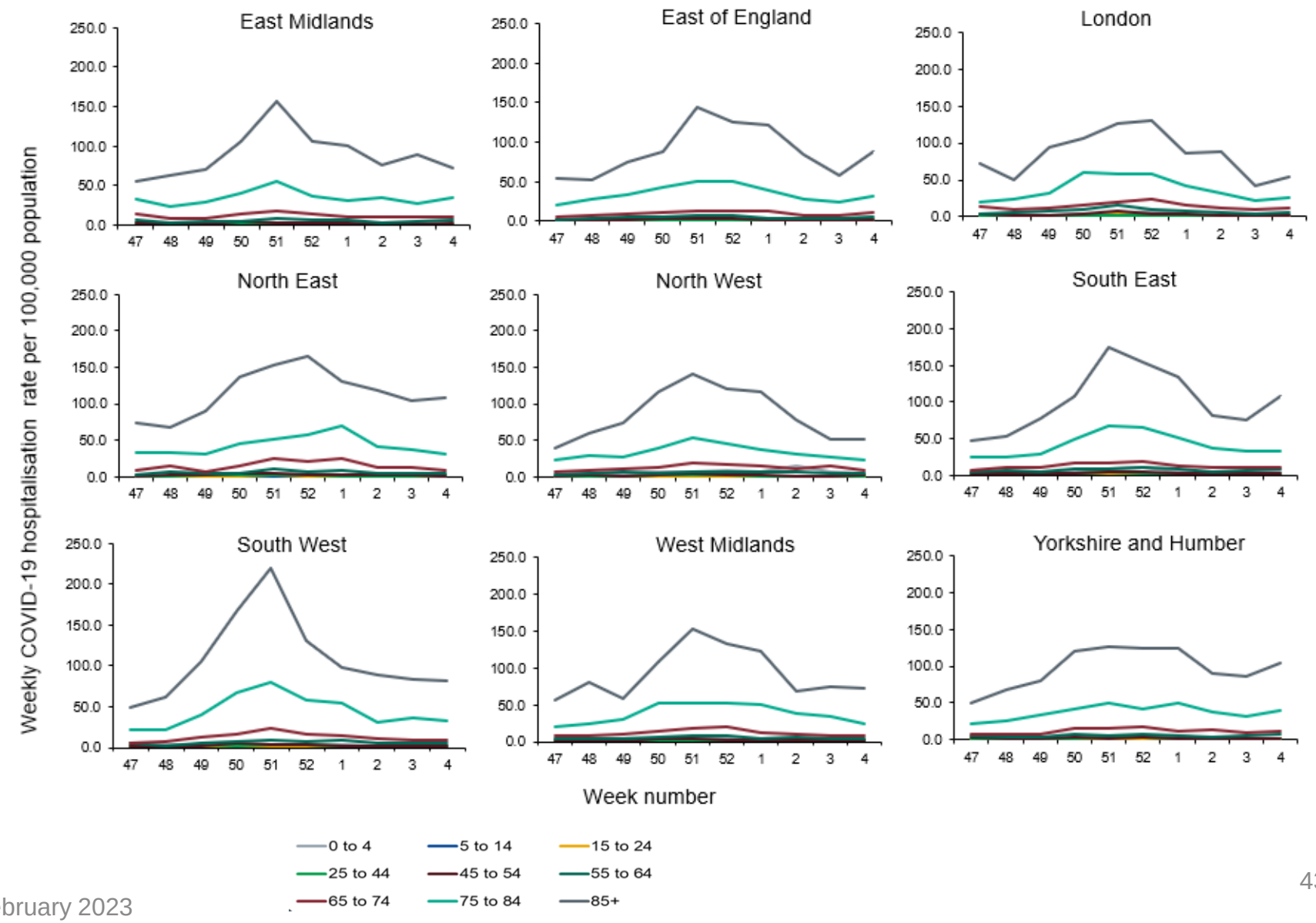


Source: UKHSA SARI-Watch (Severe Acute Respiratory Infection-Watch, formerly CHESS).

*Only NHS Acute trusts that have reported **≥1** day in the past week; excludes Specialist trusts. Acute NHS trusts (including Specialist trusts) reporting into SARI-Watch COVID-19 hospitalisation surveillance are typically around 100 per week. This was 88 for the hospitalisation (all levels of care) indicator in week 23 January 2023 to 29 January inclusive and 78 trusts for the ICU/HDU indicator. For the maps, as Specialist trusts are excluded, the number of trusts providing data on COVID-19 hospitalisations in week ending 29 January 2023 was 79 and 70 for ICU/HDU admissions for COVID-19.

UK Health Security Agency

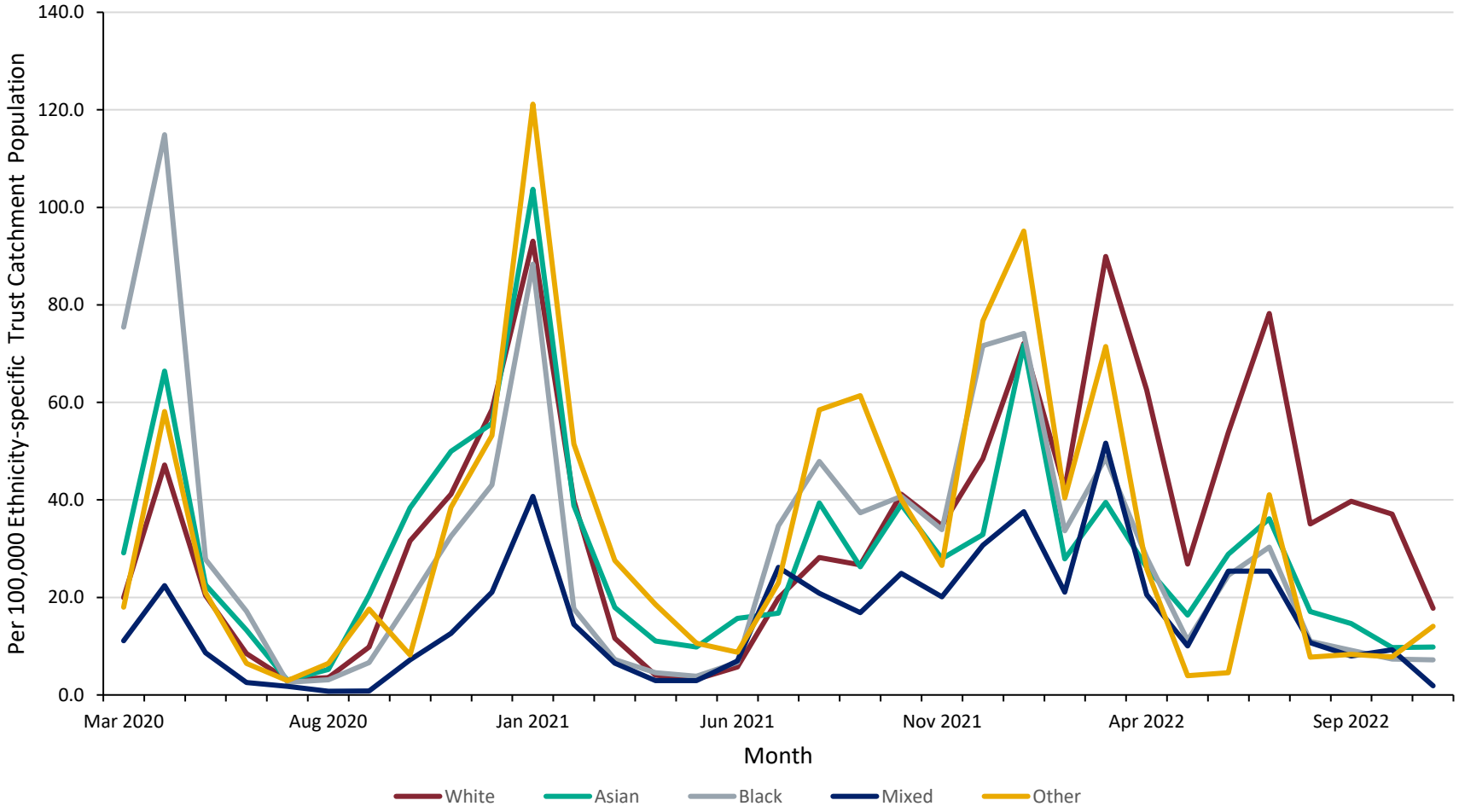
Weekly COVID-19 hospitalisation rate per 100,000 trust catchment population by age group and region, weeks 47 to 04



UK Health Security Agency

Hospital admission rate (excluding ICU/HDU) by ethnicity per 100,000 trust catchment population, by month

Last updated 08 December 2022

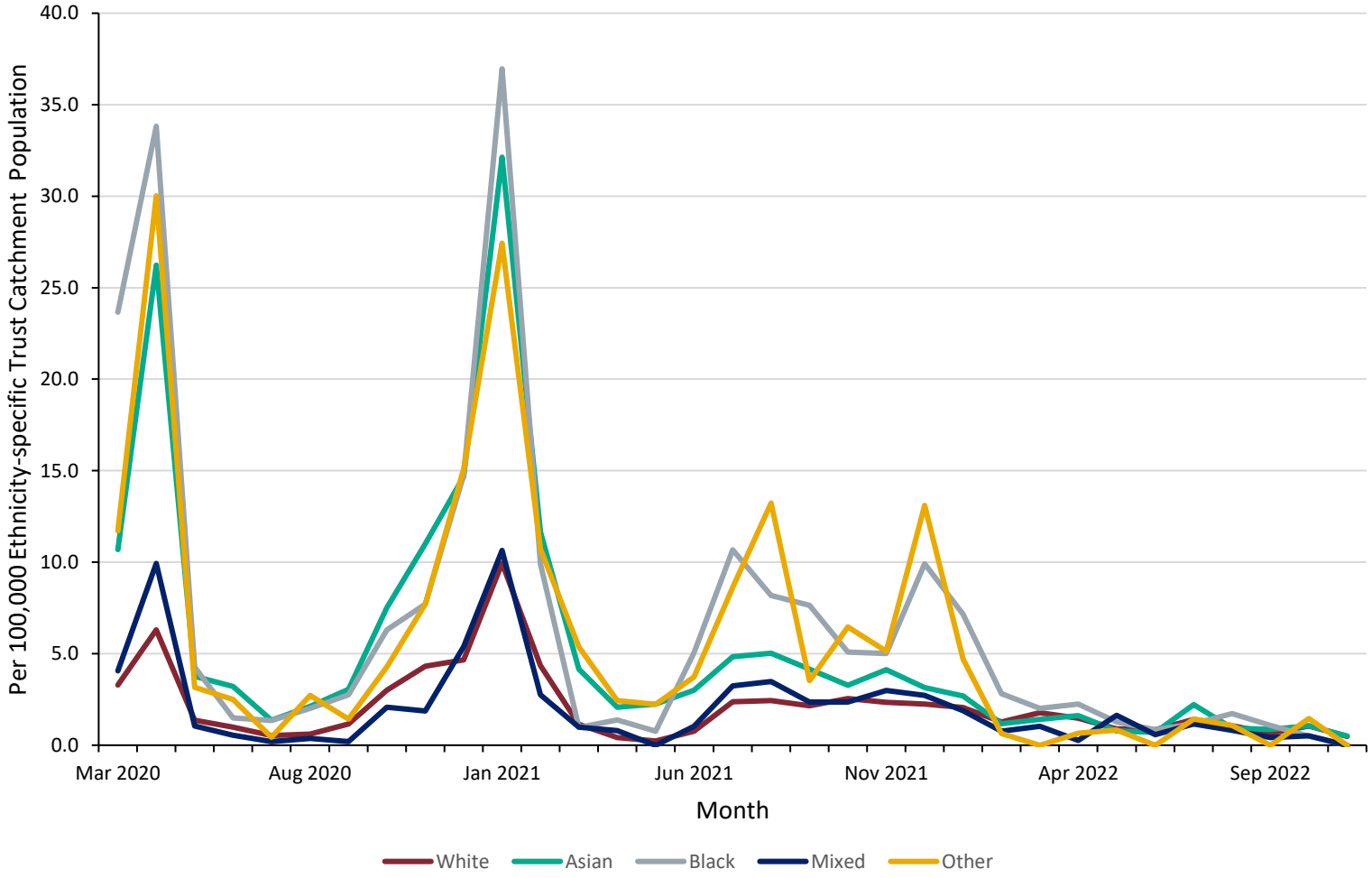


Caveat: From week 24 (2021) the ethnicity analysis is based on a new method for assigning ethnicity, developed by UKHSA. The previous method used the most recent ethnicity recorded through linkage to Hospital Episode Statistics. However, this method led to unfeasibly high rates in the 'Other' ethnic group when applied to COVID-19 cases, hospitalisation or mortality. The new method uses the most frequent ethnicity recorded through linkage to Hospital Episode Statistics, unless the most frequent was 'Other' when the second most frequent was chosen.

UK Health Security Agency

Rate of admission to ICU/HDU by ethnicity, per 100,000 trust catchment population, by month

Last updated 08 December 2022

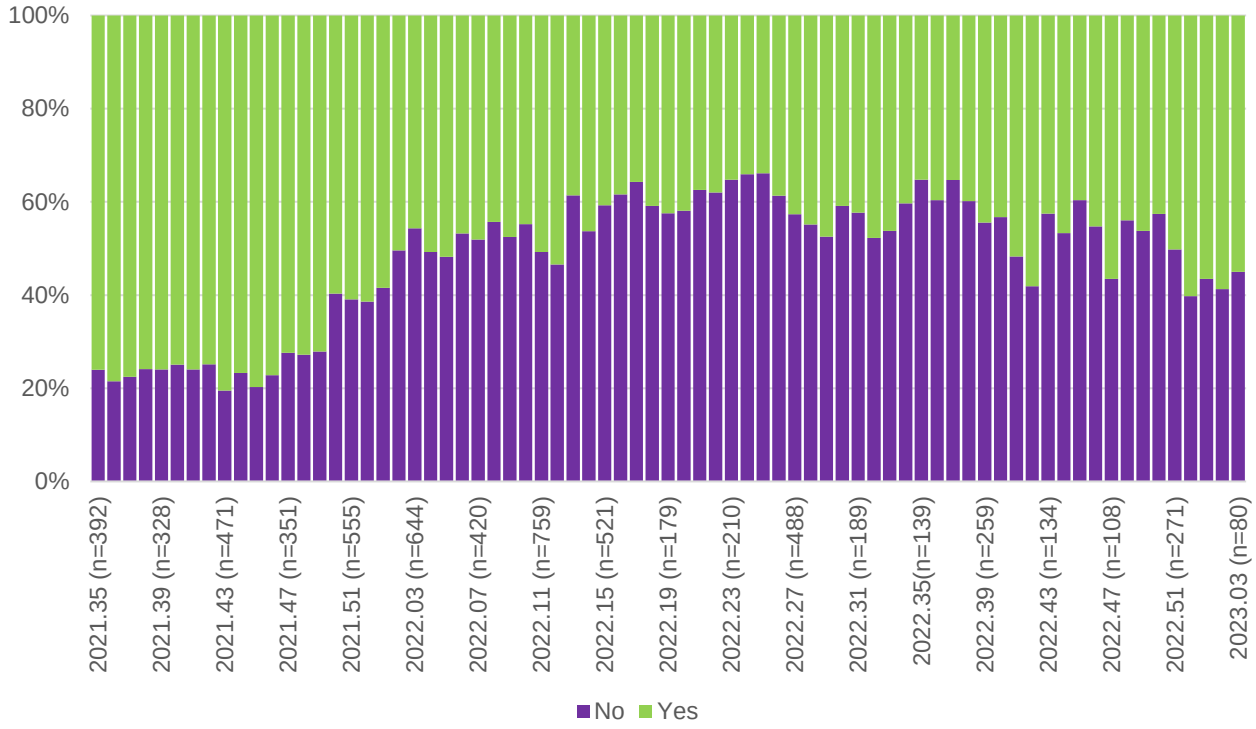


Caveat: From week (24 2021) the ethnicity analysis is based on a new method for assigning ethnicity, developed by UKHSA. The previous method used the most recent ethnicity recorded through linkage to Hospital Episode Statistics. However, this method led to unfeasibly high rates in the 'Other' ethnic group when applied to COVID-19 cases, hospitalisation or mortality. The new method uses the most frequent ethnicity recorded through linkage to Hospital Episode Statistics, unless the most frequent was 'Other' when the second most frequent was chosen.

UK Health Security Agency

COVID-19 as primary reason for admission among SARS-CoV-2 positive patient by week of admission

Last updated 26 January 2023



Notes

1) Case-level sentinel data from SARI-Watch, form week 35 2021 (commencing 30 August 2021) to week 03 2023 (ending 22 January 2023) inclusive

2) Total 32,388 records in period of analysis, of which 33% (n=10,650) had COVID-19 as primary reason for admission ('Yes').

3) SARS-CoV-2 patients with evidence of COVID-19 treatment (antivirals or respiratory support) or COVID-19 death but have 'No' or 'Unknown' for COVID-19 as primary reason for admission (n=2,948) are reassigned to COVID-19 as primary reason of admisison ('Yes').

4) Reassignment increases COVID-19 as primary reason for admission ('Yes') from 10,650 to 13,598

5) 22% (7,089/32,888) of total records in this period have missing data on the 'Admission due to COVID-19' indicator – these are excluded from analysis

6) Caveats: London trusts under-represented and most recent weeks are subject to retrospective updates

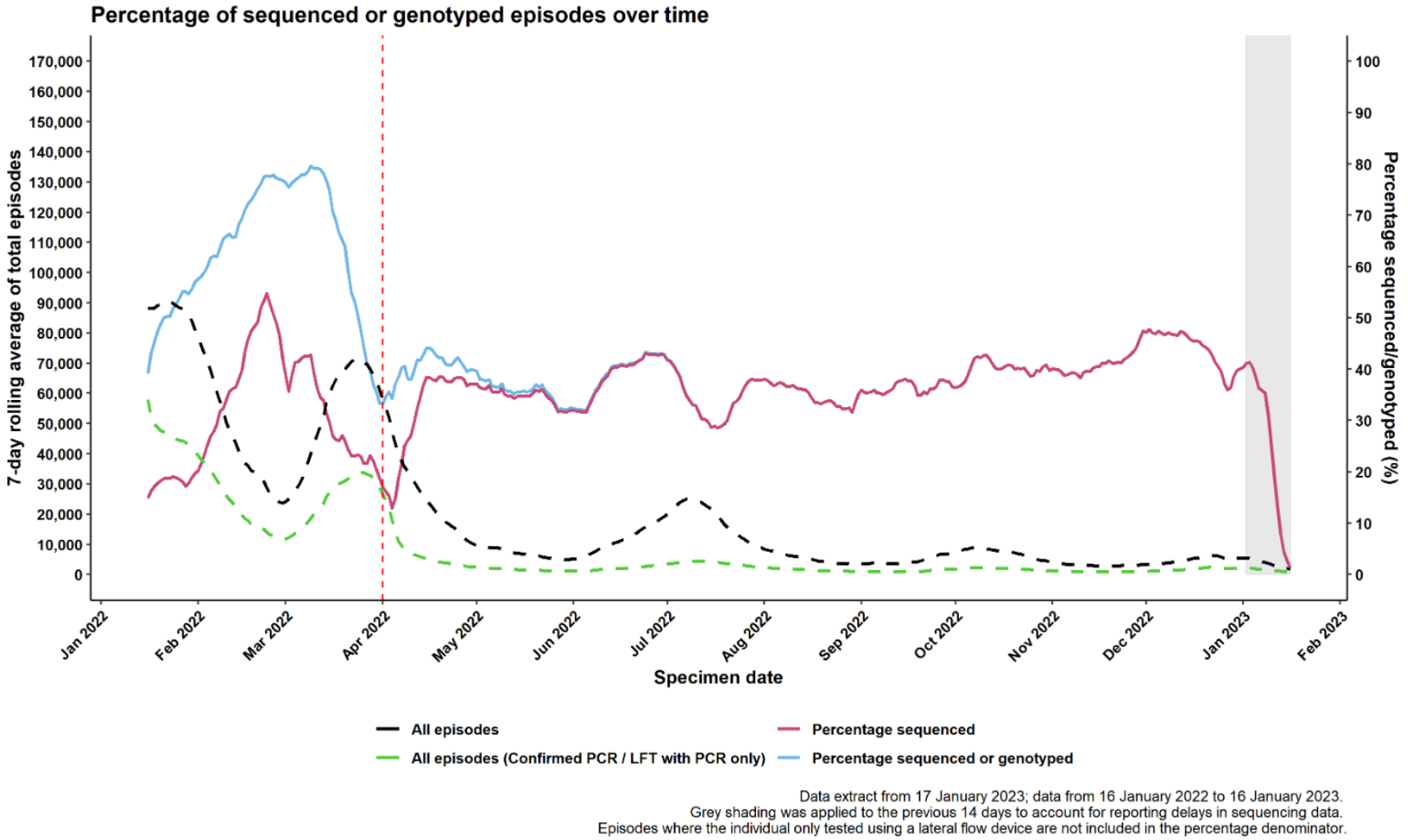
UK Health Security Agency

SARS-CoV-2 Whole Genome Sequencing (WGS) coverage, England

UK Health Security Agency

Last updated 19 January 2023

Coverage of sequencing with a valid result and genotyping over time (16 January 2022 to 16 January 2023)



Episodes where the individual only tested using a lateral flow device are excluded. Grey shading was applied to the previous 14 days to account for reporting delays in sequencing data

UK Health Security Agency

Preceding, co- and secondary infections in COVID-19 and influenza patients in England, Jul 2022 – Jan 2023

HCAI, Fungal, AMR, AMU & Sepsis Division

Preceding/co-/secondary infections with COVID-19

Background

- Numbers of preceding/co-/secondary infection remain low across UKHSA surveillance systems.
- Free community testing ended 31 March 2022 as part of the government's Living with COVID-19 plan, with asymptomatic testing continuing in some settings. As of 31 August 2022, asymptomatic testing in all settings, including hospitals, has been paused. Please use caution when comparing incidence of bacterial, fungal and viral preceding/co-/secondary infections with COVID-19 over time due to these differences in testing strategies.
- Published data analyses from pandemic wave 1 indicates increased mortality associated with COVID-19 and influenza, key bacterial and fungal infections and invasive pneumococcal disease (IPD) in comparison to patients without co/secondary infection.
- Data analysis from wave 1 indicates that *Aspergillus* and *candidemia* cases had increased risk of mortality in comparison to patients without co/secondary infection.
- For patients with severe respiratory failure requiring Extra Corporeal Membrane Oxygenation (ECMO), analysis of data from six adult ECMO centres in England indicates that among patients with severe respiratory failure due to COVID-19, clinically significant co/secondary infections were detected in 33% initially, rising to 40% in the 2021-22 season. In the current season (2022-23), influenza is now the predominant cause of severe respiratory failure, with more than two thirds having co/secondary infections detected. There have been no reports of COVID-19 admissions requiring ECMO since September 2022.

Surveillance of bacterial, fungal and respiratory viral infections, in COVID-19 and influenza patients in England

Data information

- Data are provisional and subject to change due to possible delayed reporting of microbiological samples
- Relative undertesting for other pathogens may result in an underestimate of preceding/co-/secondary infection cases. In addition, testing varies between pathogens therefore caution should be used in comparing preceding/co-/secondary infection rates between different pathogens
- Preceding/co-/secondary infections refers to when a patient has a COVID-19 or influenza infection with one or more other pathogen (Please see Appendix 1 – Preceding/co-/secondary infection definitions.)
  - Preceding infection: SARS-CoV-2 or influenza detected after another pathogen
  - Co-infection: SARS-CoV-2 or influenza and other pathogen detected at the same time
  - Secondary infection: SARS-CoV-2 or influenza detected before another pathogen
- The following outputs included in this section have been produced via the Unified Infection Dataset (UID)
- Bacterial, fungal and respiratory viral infection data sources:
  - Fungal, bacterial and respiratory viral data (excluding *Clostridioides difficile,* Invasive pneumococcal disease & *Haemophilus influenzae*): Second Generation Surveillance System (SGSS)
  - Respiratory viral data: Respiratory Datamart
  - *Clostridioides difficile*: HCAI Data Capture System
  - Invasive pneumococcal disease: reference lab
  - *Haemophilus influenzae*: reference lab

Co/secondary infections among patients with severe respiratory failure requiring Extra Corporeal Membrane Oxygenation (ECMO)

Analysis is based on cumulative data from six adult ECMO centres in England. Surveillance is all year round. Each season commences around October (ISO week 40) ending in September (ISO week 39) in the following year.

Current season 2022-23

- Data is from 3 October 2022 to 1 January 2023 inclusive (weeks 40 to 52). In this period there was a total of 64 admissions across SRFs requiring ECMO.
- Of 64, 43 were for laboratory confirmed acute respiratory infection (ARI) including n=31 influenza, n=3 RSV, n=3 *S. pyogenes* (Group A streptococcus), the remaining n=6 due to other infection aetiologies. There were no COVID-19 admissions in this season.
- Of 43 lab confirmed ARI, 56% (n=24) had clinically significant co/secondary infections reported:
  - Of 31 influenza cases, 68% (n=21) had co/secondary infections including n=9 GAS and n=4 *S. aureus.*
  - As comparison: co/secondary infections accounted for 43% of influenza cases in 2019-20 and 49% in both 2018-19 and 2017-18 seasons
  - In total this season, 10 GAS co/secondary infections were detected among 43 lab confirmed ARI.

Prior season 2021-22

Data is from 4 October 2021 to 2 October 2022. 34% (33/96) of all laboratory confirmed ARI admitted to SRFs requiring ECMO had clinically significant co/secondary infections. 80% (77/96) of laboratory confirmed ARI were due to COVID-19. Among COVID-19 admitted cases, 40% (31/77) had clinically significant co/secondary infections reported.

Number of COVID-19 patient-episodes with bacterial, fungal or respiratory viral infections in COVID-19 patients diagnosed in England from ISO week 27 of 2022*, by infection type and timing of diagnosis

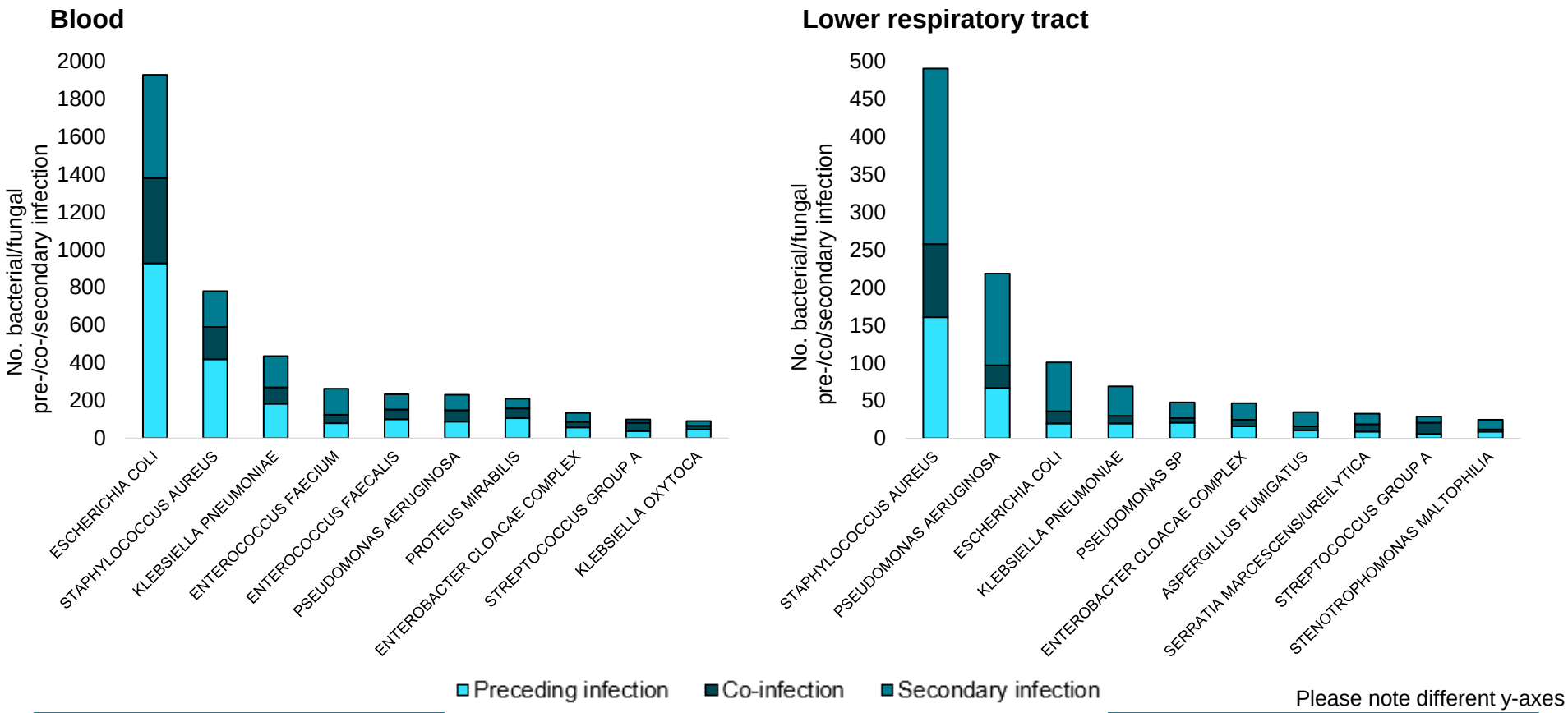
Bacterial/ fungal/ viral infection by specimen type	COVID-19 patient-episodes with bacterial/ fungal/ viral infection		Timing of bacterial/fungal/viral diagnosis in relation to COVID-19 diagnosis								
			Preceding infection			Coinfection			Secondary infection		
	n	% of COVID cases	n	% infections by site	% of COVID cases	n	% infections by site	% of COVID cases	n	% infections by site	% of COVID cases
Bacterial/fungal bloodstream & lower respiratory infection	60	0.01	17	28.33	<0.01	13	21.67	<0.01	30	50.00	<0.01
Bacterial/fungal bloodstream infection	4,873	0.41	2,430	49.87	0.20	1,155	23.70	0.10	1,288	26.43	0.11
Bacterial/fungal lower respiratory infection	946	0.08	335	35.41	0.03	186	19.66	0.02	425	44.93	0.04
***Clostridioides difficile* infection**	618	0.05	262	42.39	0.02	75	12.14	0.01	281	45.47	0.02
Other respiratory virus infection	3,472	0.29	405	11.66	0.03	2,359	67.94	0.20	708	20.39	0.06
Any site†	**9,996**	**0.84**	**3,465**	**34.66**	**0.29**	**3,789**	**37.91**	**0.32**	**2,742**	**27.43**	**0.23**

Key findings:

- 0.84% of COVID-19 patient-episodes had a bacterial, fungal or other respiratory viral infection detected in either the 28 days prior or following their COVID-19 diagnosis.
- Most infections with key organisms were categorised as preceding infections (37.91%).

Please see appendix 1 for pre-/co-/secondary infection definitions with SARS-CoV-2
Please note patients can have multiple COVID-19 infection-episodes, numbers here do not reflect the number of patients.
***SARS-CoV2 specimen dates from 4 July 2022 to 25 Dec 2022 (N=1,194,209). Last updated 28 Jan 2023.**
† other sites not listed in table but included in total: Bacterial/fungal bloodstream & *Clostridioides difficile* infection (14 preceding, 1 coinfection & 6 secondary), and Bacterial/fungal lower respiratory & *Clostridioides difficile* infection (2 preceding & 4 secondary)

Most frequent bacterial/fungal species in blood or lower respiratory tract specimens, by timing of diagnosis, in COVID-19 patients diagnosed in England from ISO week 27 of 2022

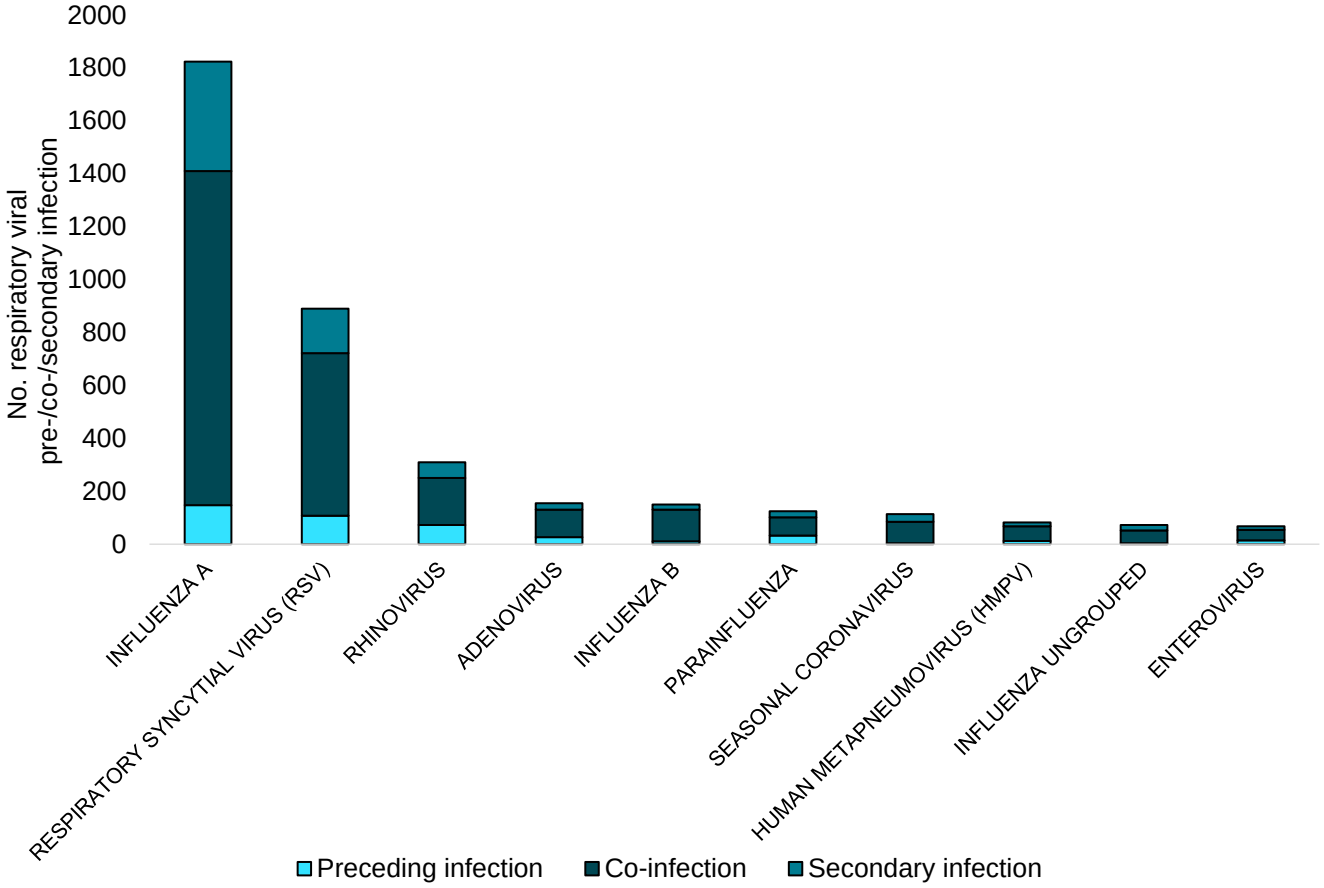


Please note different y-axes

Key findings:

From ISO week 27 of 2022, the most frequent bacterial/fungal organisms identified from blood specimens were *Escherichia coli*, *Staphylococcus aureus* and *Klebsiella pneumoniae* and from respiratory specimens were *S. aureus, Pseudomonas aeruginosa* and *E. coli*.

Most frequent viral specimens, by timing of diagnosis, in COVID-19 patients diagnosed in England from ISO week 27 of 2022



Key findings:

From ISO week 27 of 2022, the most frequent viral organisms identified from respiratory specimens were influenza A, RSV and rhinovirus.

Number of influenza patient-episodes with bacterial, fungal or respiratory viral infections in influenza patients diagnosed in England from ISO week 27 of 2022*, by infection type and timing of diagnosis

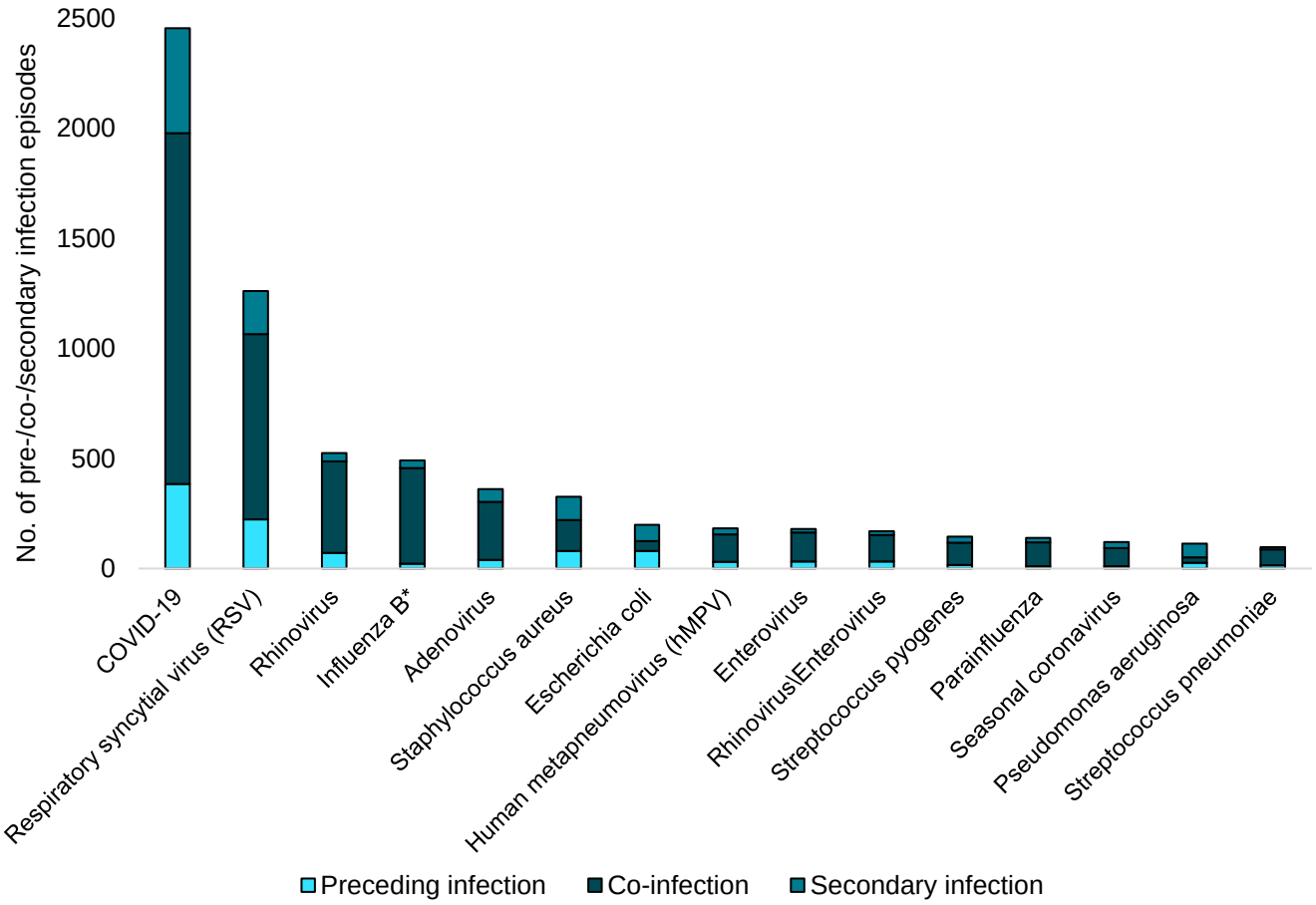
Bacterial/ fungal/ viral infection by specimen type**	Influenza patient-episodes with bacterial/ fungal/ viral infection		Timing of bacterial/fungal/viral diagnosis in relation to influenza diagnosis								
			Preceding infection			Coinfection			Secondary infection		
	n	% of Influenza cases	n	% infections by site	% of Influenza cases	n	% infections by site	% of Influenza cases	n	% infections by site	% of Influenza cases
Bacterial/fungal bloodstream infection	828	1.31	250	30.19	0.39	354	42.75	0.56	224	27.05	0.35
Bacterial/fungal lower respiratory infection	334	0.53	61	18.26	0.10	114	34.13	0.18	159	47.60	0.25
SARS-CoV-2 infection	2,395	3.78	380	15.87	0.60	1,536	64.13	2.42	479	20.00	0.76
***Clostridioides difficile* infection**	29	0.05	10	34.48	0.02	5	17.24	0.01	14	48.28	0.02
Respiratory virus infection* **	3,081	4.86	421	13.66	0.66	2,268	73.61	3.58	392	12.72	0.62
Invasive pneumococcal disease	88	0.14	10	11.36	0.02	68	77.27	0.11	10	11.36	0.02
***Haemophilus influenzae* infection**	4	0.01	2	50.00	<0.01	1	25.00	<0.01	1	25.00	<0.01
Any site	**6,759**	**10.67**	**1,134**	**16.78**	**1.79**	**4,346**	**64.30**	**6.86**	**1,279**	**18.92**	**2.02**

Key findings:

- 10.67% of influenza patient-episodes had a bacterial, fungal or other respiratory viral infection detected in either the 28 days prior or following their influenza diagnosis.
- Majority of infections with key organisms were categorised as co-infections (64.30%).
- Most influenza patients with a preceding, co- or secondary infection with key organisms were categorised as 0 to 9 years old (28.76%).

Please see appendix 1 for pre-/co-/secondary infection definitions with Influenza
Please note patients can have multiple influenza infection-episodes, numbers here do not reflect the number of patients.
***Influenza specimen dates from 4 July 2022 to 25 Dec 2022 (N= 63,371). Last updated 30 Jan 2023.**
**The baseline infection is any type of influenza (influenza A or B or both) for all bacterial/fungal/respiratory viral preceding/co-/secondary infections except for influenza B where the baseline infection is influenza A
*** Respiratory virus infection includes influenza B (where the baseline infection is influenza A)

Most frequent bacterial/fungal/respiratory viral infections, by timing of diagnosis, in influenza patients diagnosed in England from ISO week 27 of 2022



Key findings:

From ISO week 27 of 2022, the most frequent organisms identified were COVID-19, RSV and rhinovirus.

*The baseline infection is any type of influenza (influenza A or B or both) for all bacterial/fungal/respiratory viral preceding/co-/secondary infections except for influenza B where the baseline infection is influenza A

Appendix 1: Pre-/co-/secondary infection definitions

The day pertains to the date of the sample collection that yielded a positive result. These definitions do not apply to persistent COVID-19 patients. Patients with persistent COVID-19 require independent clinical assessment.

Organism	Definition co-infection with SARS-CoV-2/influenza †	Definition of infection pre-SARS-CoV-2/influenza infection (other pathogen is primary infection) or Definition of post SARS-CoV-2/influenza secondary infection (SARS-CoV-2/influenza is primary infection)
Influenza A	+/- 1d	2-28d^
Influenza B	+/- 1d	2-28d^
RSV	+/- 1d	2-28d
Adenovirus	+/- 1d	2-28d
Enterovirus	+/- 1d	2-28d
Human metapneumovirus	+/- 1d	2-28d
Parainfluenza (any subtype)	+/- 1d	2-28d
Seasonal coronavirus	+/- 1d *	2-28d
Rhinovirus	+/- 1d	2-28d
Co-infections in ECMO patient (patients with most severe clinical respiratory signs)		
ECMO patients	Individual case review	Individual case review
Blood stream and respiratory infections (bacterial and fungal)		
Achromobacter xylosoxidans	+/- 1d	2-28d
Acinetobacter spp.,	+/- 1d	2-28d
Aspergillus	+/- 1d	2-28d (pre) 2-60d (post, continually hospitalised patients only)
Bordetella pertussis	+/- 28 d Culture/PCR (based on pertussis sample date) +/- 28 Serology/Oral fluid (anti-pertussis toxin Ig) (based on pertussis symptom onset date, excluding cases without onset date)	N/A (Pertussis presentation is often delayed)
Burkholderia cepacia	+/- 1d	2-28d
Candida spp	+/- 1d	2-28d (pre) 2-60d (post, continually hospitalised patients only)
Chlamydia pneumoniae	0-7d PCR	PCR within 14-28 d (8-13d PCR*)
Enterobacter spp.,	+/- 1d	2-28d
Enterococcus spp.	+/- 1d	2-28d
E. coli	+/- 1d	2-28d
Haemophilus influenzae	+/- 2d	3-28d

Continued overleaf

Appendix 1 continued: Pre-/co-/secondary infection definitions

Organism	Definition co-infection with SARS-CoV-2/influenza †	Definition of infection pre-SARS-CoV-2/influenza infection (other pathogen is primary infection) or Definition of post SARS-CoV-2/influenza secondary infection (SARS-CoV-2/influenza is primary infection)
Blood stream and respiratory infections (bacterial and fungal)		
Klebsiella spp.	+/- 1d	2-28d
Legionella pneumophila/species	Individual case review	Individual case review
Mycoplasma pneumoniae	0-7d PCR, IgM serology 0-21d <16y	PCR within 14-28 d (8-13d PCR*)
Neisseria meningitidis	+/- 2d	3-28d
Pseudomonas spp.,	+/- 1d	2-28d
Serratia spp.,	+/- 1d	2-28d
Staphylococcus aureus	+/- 1d	2-28d
Coag-neg Staphylococcus (*S. haemolyticus*)	+/- 1d	2-28d
Stenotrophomonas spp., (*S. maltophilia)*	+/- 1d	2-28d
Streptococcus spp. ‡	+/- 1d	2-28d
Streptococcus pneumoniae	+/- 2d	3-28d
Tuberculosis		
Mycobacterium tuberculosis	Individual case review	Individual case review
Pathogens of the immunocompromised (eg HIV)		
HIV	Individual case review	Individual case review
Gastrointestinal infections		
Listeria	0-5d *	Individual case review
Campylobacter	0-5d *	Individual case review
Shiga toxin-producing *E. coli* (STEC)	0-5d *	Individual case review
Norovirus	0-5d *	Individual case review
Salmonella	0-5d *	Individual case review
Shigella	0-5d *	Individual case review
Anaerobes		
C. difficile	+/- 1d	2-28d
Bacteroides sp. (*B. fragilis* and non-fragilis Bacteroides)	+/- 1d	2-28d

See next slides for notes

Appendix 1 continued: Pre-/co-/secondary infection definitions

Notes

† From the first specimen date of a SARS-CoV-2/influenza patient episode.

* Additional data check required. (Resistance is not detailed, data for MERS is not currently available).

^ Definition post- SARS-CoV-2 secondary infection (SARS-CoV-2 is primary infection).This has been extended from prior 14d secondary infection definition for influenza used by UKHSA to account for disparities in testing throughout the 28d period after SARS-CoV-2 detection.

‡ Streptococcus species includes the following groups and species:

Group	**Species/other names**
Anginosus Group	*Streptococcus anginosus; Streptococcus constellatus (Streptococcus constellatus subspecies constellatus Streptococcus constellatus subspecies pharynges); Streptococcus* Group F; *Streptococcus intermedius; Streptococcus milleri* group; *Streptococcus sinensis*
Bovis Group	*Streptococcus alactolyticus; Streptococcus bovis* untyped; *Streptococcus equinus; Streptococcus gallolyticus subspecies gallolyticus (Streptococcus bovis* biotype I); *Streptococcus infantarius (Streptococcus infantarius sp infantarius; Streptococcus bovis* biotype II); *Streptococcus lutetiensis; Streptococcus infantarius subspecies coli (Streptococcus bovis* biotype II); *Streptococcus pasteurianus (Streptococcus bovis* biotype II)
Closely Related Genera	*Abiotrophia spp.; Aerococcus spp.; Faklamia spp.; Gemella* spp.; *Globicatella sanguinis; Granulicatella* spp.; *Leuconostoc* spp.; *Pedicoccus* spp.; *Peptostreptococcus* spp.
Mitis Group	*Streptococcus cristatus; Streptococcus mitior; Streptococcus mitis; Streptococcus oralis; Streptococcus pseudopneumoniae; Streptococcus infantis; Streptococcus peroris*
Mutans Group	*Streptococcus mutans; Streptococcus sobrinus*
Other streptococci (including but not limited to)	Anaerobic streptococcus; *Streptococcus acidominimus; Streptococcus* spp., other named/not fully identified; *Streptococcus suis; Streptococcus uberis*
Salivarius Group	*Streptococcus vestibularis; Streptococcus thermophilus*
Sanguinis Group	*Streptococcus gordonii; Streptococcus massiliensis; Streptococcus parasanguinis; Streptococcus sanguinis*
Streptococcus Group A	Group A; *Streptococcus pyogenes; Streptococcus dysgalactiae* subspecies *equisimilis*
Streptococcus Group B	Group B; *Streptococcus agalactiae*
Streptococcus Group C	Group C; *Streptococcus dysgalactiae* subspecies *equisimilis; Streptococcus equi* subspecies *zooepidemicus*
Streptococcus Group G	Group G; *Streptococcus canis; Streptococcus dysgalactiae* subspecies *equisimilis*