



Public Health
England

Protecting and improving the nation's health

Comparison of COVID-19 hospitalised patients in SARI-Watch by vaccine eligible cohorts (phase 1 and 2)

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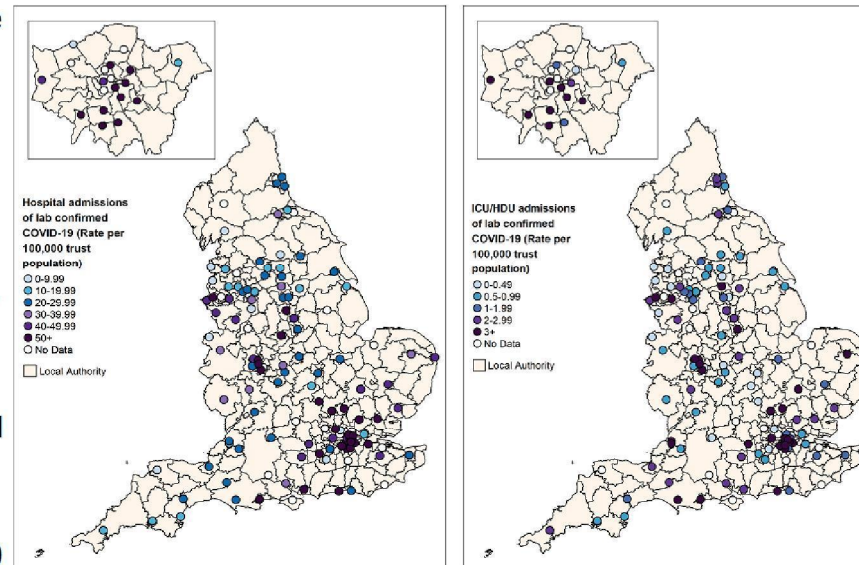
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Immunisation and Countermeasures Division, PHE

Data collection: SARI-Watch surveillance

- SARI-WATCH (previously COVID-19 Hospitalisations in England Surveillance System)
- Monitors trends in admissions
- National (mandatory) and sentinel surveillance sites coverage:
 - Approx. 110-115 trusts reporting COVID-19 **aggregate data by age groups daily** on all hospital admissions (map, L) and critical care (map, R)
 - Approx. 80-100 sites reporting **individual level data daily on critical care admissions**
 - Approx. 25-54 sites (increased over time) reporting **individual level data daily on lower level of care admissions**
- Rates based on population denominator of Trust, reporting for that data collection each day



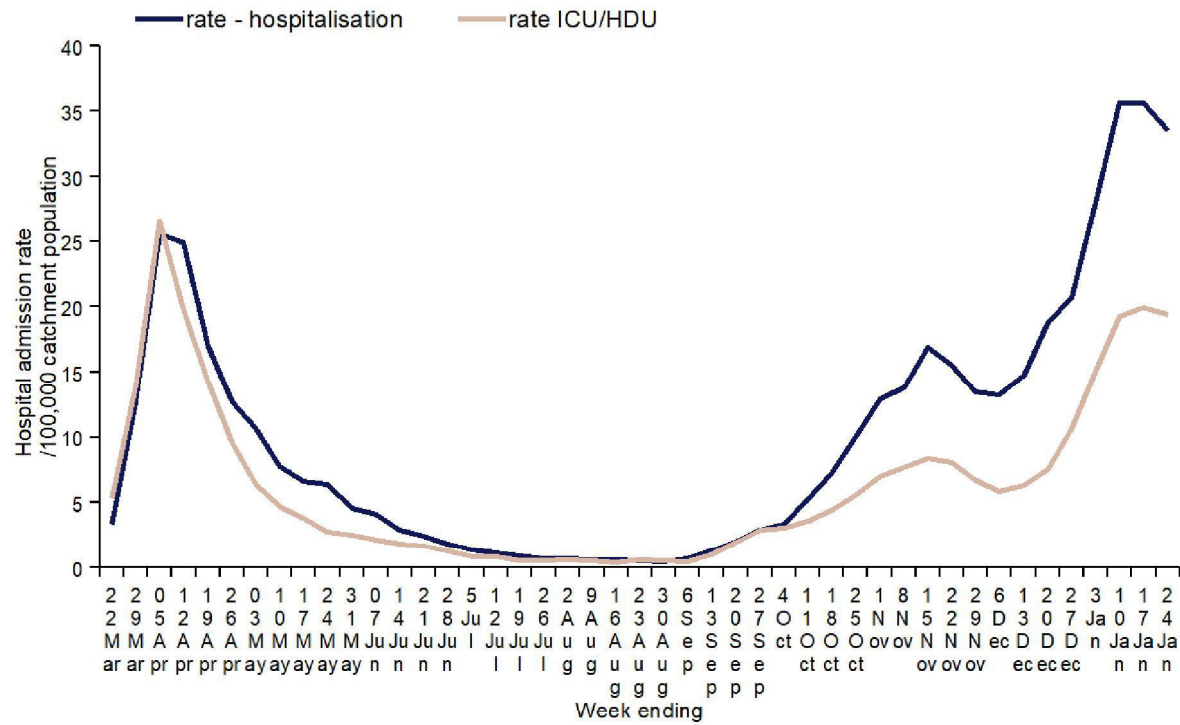
Methods – data extract and linkage

- SARI-Watch time period for main analysis: **15 March to 30 November 2020** (weeks 12 to 48)
- Waves:
 - wave 1 up to 28 June 2020
 - wave 2 from 29 June 2020
- **Two separate cohorts of admitted patients (all ages):**
 - **Lower level of care: n=24,900 from 51 Trusts**
 - **ICU/HDU: n=10,227 records from 87 Trusts**
- Regional distribution:
 - Wave 1 (>35% data from London for lower level and ICU/HDU)
 - Wave 2 (>28% of data from NW for lower level of care and ICU/HDU (possibly reflecting hotspots))
- **Linkage for data enrichment:**
 - **HES supplements ethnicity and co-morbidities**
 - **EpiCell deaths database for COVID-19 (EpiCell link to ONS and NHSE)**
- Right-censored data with incomplete outcome follow-up

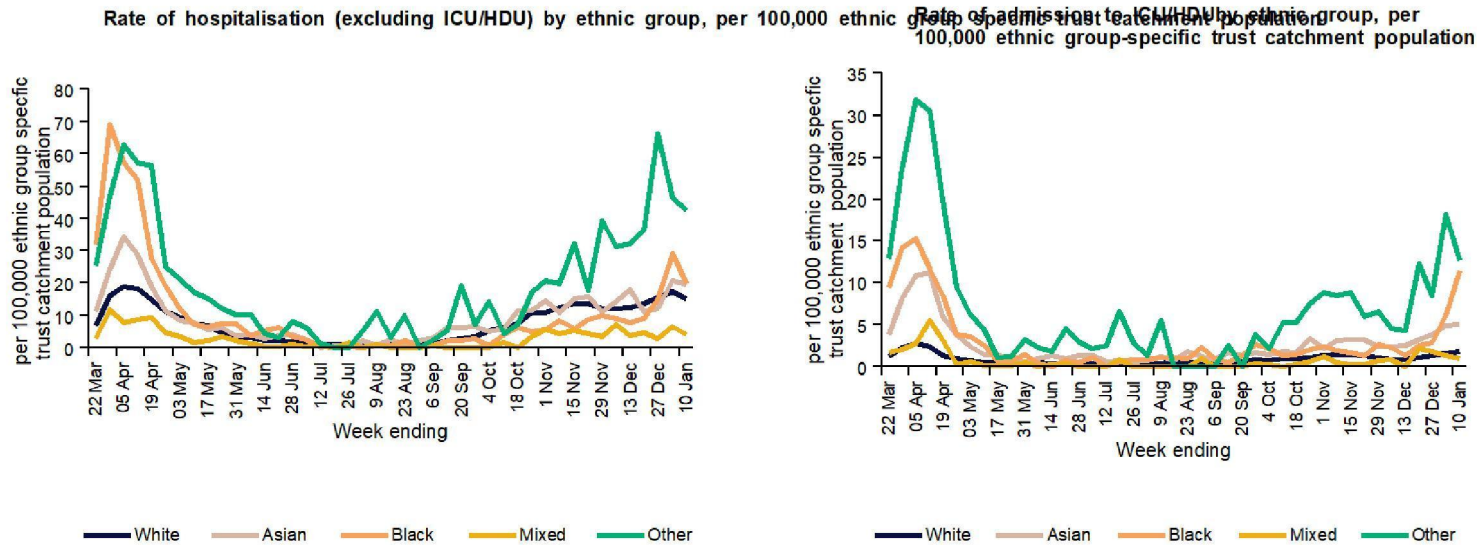
Methods – analysis by vaccine cohorts

- **Phase 1 cohort:**
 - all persons aged >50 years, and
 - all persons aged >16 years with at-risk underlying health condition
- **Phase 2 cohort:**
 - aged 16 to 50 years with no underlying health conditions
- **Descriptive epidemiology comparing phase 1 and phase 2 cohorts**
 - ICU/HDU admissions (% or rates), analysed separately from lower level of care
 - case fatality ratio (CFR) by sex, ethnicity, residual co-morbidities
- **Caveats ALL DATA ARE PROVISIONAL**
 - Under-reporting from Trusts
 - Potential selection biases in reported patients
 - Incomplete dates for outcomes (transfer/discharge/death) as not always updated in real-time;
 - Right-censored data with incomplete outcome follow-up for last cohort
 - Co-morbidities in SARI-Watch may not directly match with at-risk underlying health conditions in JCVI prioritisation

Background: trends in hospital and ICU/HDU admission rates

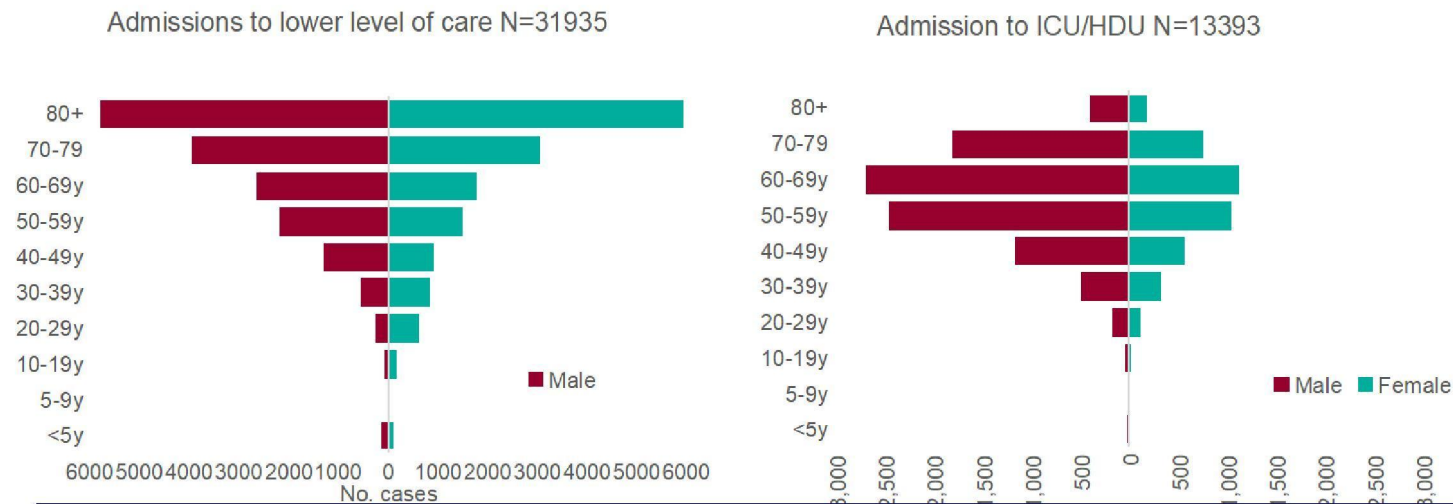


Background: admission rates by ethnicity



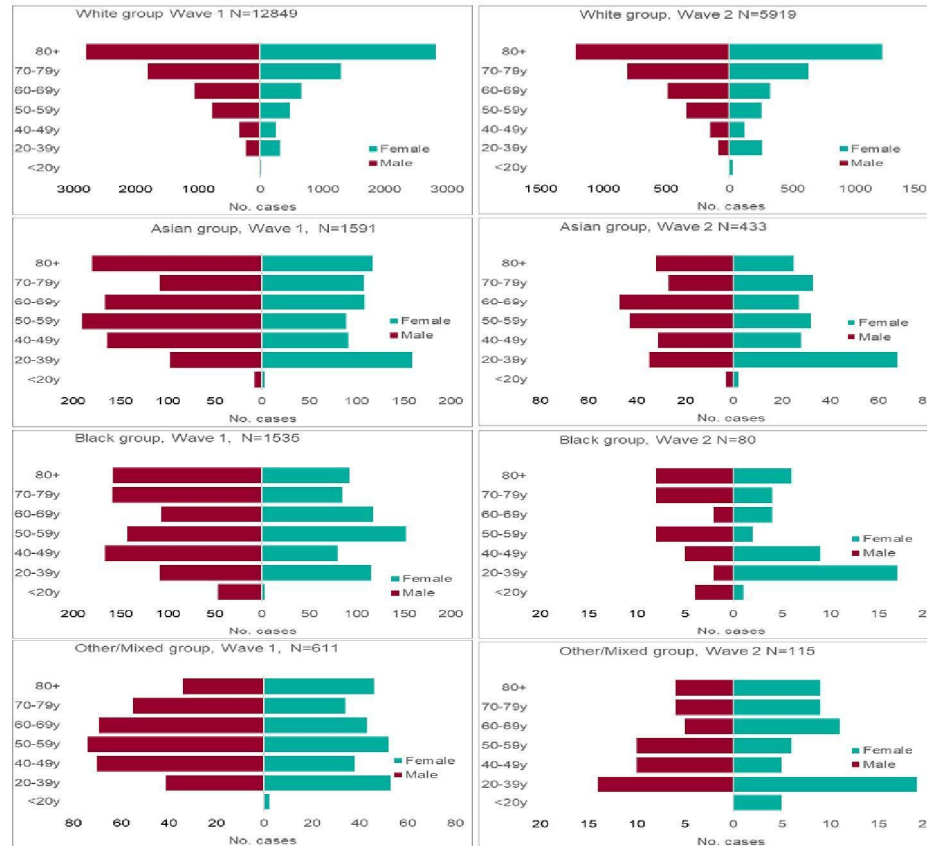
Highest rates of admission in Other ethnic group, followed by Asian and Black across waves 1 and 2.

Background: age-sex pyramids for admissions to lower level of care and ICU/HDU

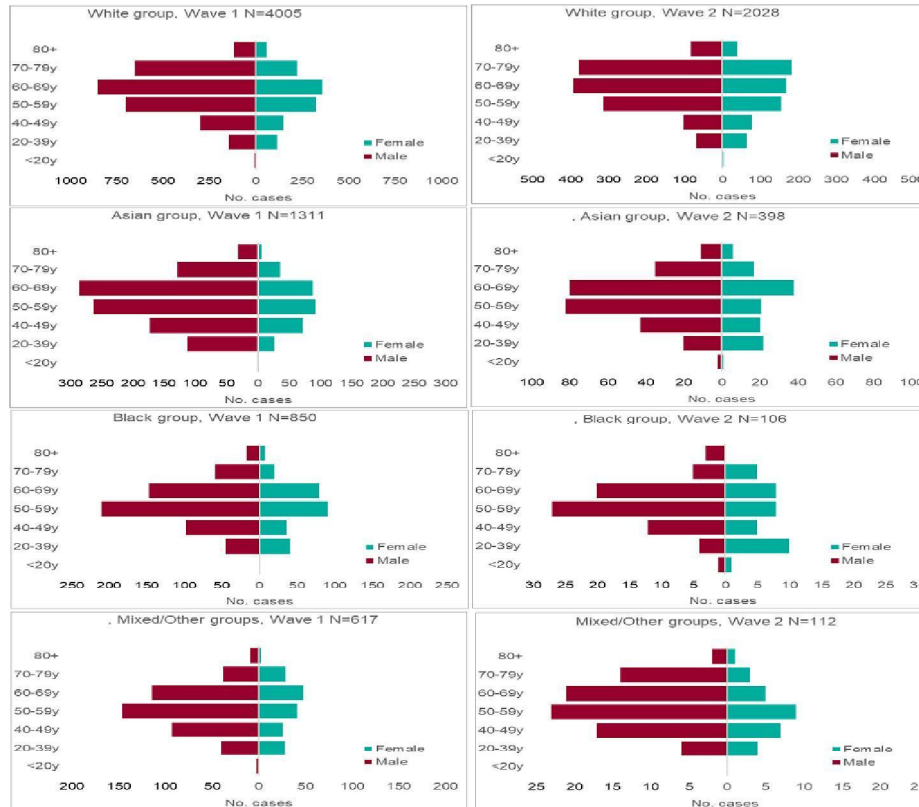


Age-sex pyramid for lower level of care hospitalisations has slightly higher male: female ratio and increasing numbers with age; in ICU/HDU admissions see more exaggerated male: female ratio and very low numbers in 80+ age group (reflecting admission criteria and survival probabilities)

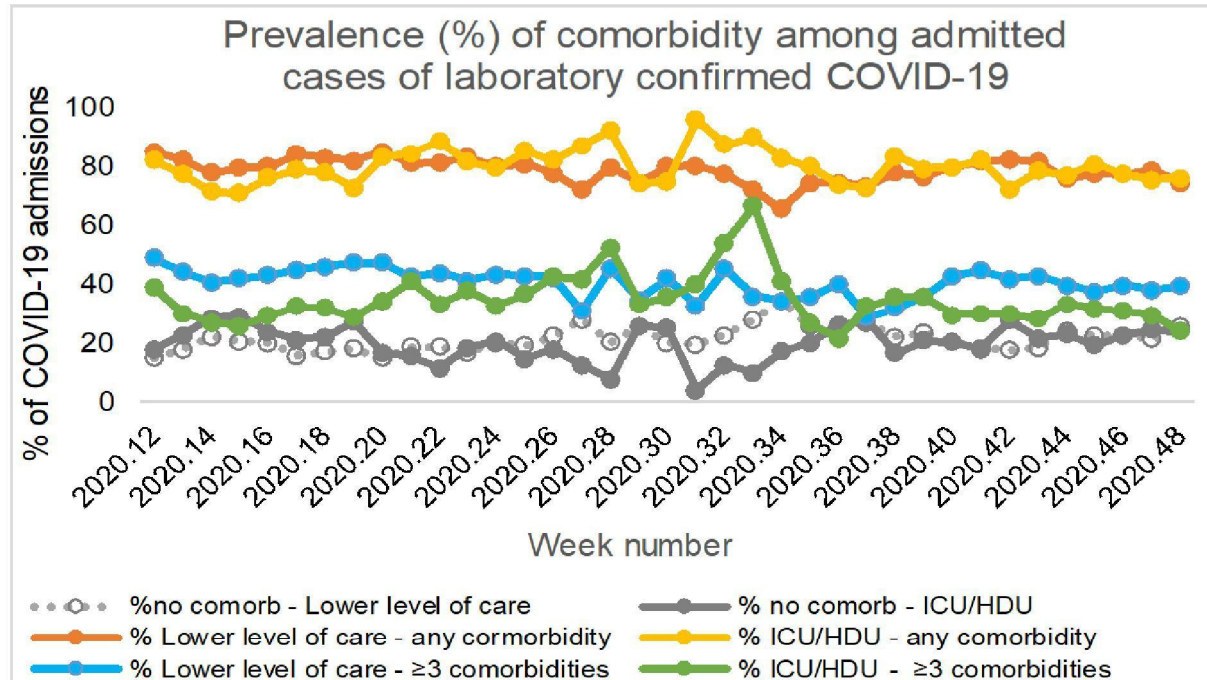
Background: age-sex pyramids by ethnicity wave 1 vs wave 2, lower level of care



Background: age-sex pyramids by ethnicity wave 1 vs wave 2, ICU/HDU



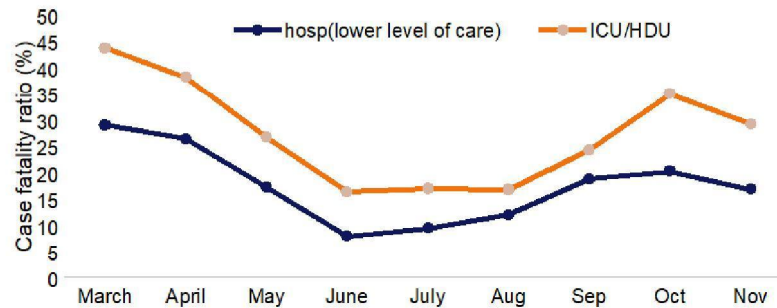
Background: prevalence of comorbidities in admitted cases



The proportion of admitted cases – for both ICU/HDU and lower level of care - with at least one comorbidity reported is high (around 80%) but stable. Those with ≥ 3 conditions was lower around 30-40% and also stable

Background: CFR in hospitalised cases of COVID-19, within 60 days of admission, death due to COVID-19

Case fatality ratio in hospitalised patients per month by level of care, England



- CFR consistently higher among ICU/HDU patients higher than hospitalised patients
- High CFR during wave 1 and wave 2 when high numbers of admitted patients, with decrease in CFR during nadir of hospital admissions in June.
- Decreasing CFR may reflect impact of national lockdowns and shielding such that clinically vulnerable people were less likely to become infected, high staff: patient ratios, and improved therapeutics; however, increasing CFR follows relaxation of restrictions and may be associated with certain subgroups of clinically vulnerable and complex patients being admitted and hospitals becoming overstretched.
- In wave 2, the decrease in CFR in November concurs with other PHE surveillance systems including the COVID-19 ICU/HDU admission rate based on aggregate data. – impacts were seen 2 weeks into the lockdown.
- The decrease in November may also in part reflect right censoring effect when not all patients in later part of November had complete follow up by the time of extract/analysis. Addition of December data in due course will help interpretation.

Phase 1 and 2 vaccine cohorts in hospitalised patients, lower level of care and ICU/HDU

		Lower level of care		ICU/ HDU	
		n	%	n	%
Phase 1	16-64y with comorbidity (JCVI list)	4541	19.7	3802	40.3
	>=65y	15673	68.1	3461	36.7
	50-64y no comorbidity	1436	6.2	1334	14.1
	Phase 1 combined	21650	94.1	8597	91.1
Phase 2	Phase 2 >=16-49y no comorbidity	1349	5.9	839	8.9

Ethnicity by vaccine cohorts – lower level of care (n=22999)

Ethnicity	Vaccine cohort		N	Total	Proportion
White	Phase 1	16-64y with comorbidity (JCVI list)	2993	18788	15.9%
		>=65y	14027		74.7%
		50-64y no comorbidity	899		4.8%
	Phase 2	>=16-49y no comorbidity	869		4.6%
Asian	Phase 1	16-64y with comorbidity (JCVI list)	709	2034	34.9%
		>=65y	816		40.1%
		50-64y no comorbidity	159		7.8%
	Phase 2	>=16-49y no comorbidity	350		17.2%
Black	Phase 1	16-64y with comorbidity (JCVI list)	594	1449	41.0%
		>=65y	576		39.8%
		50-64y no comorbidity	133		9.2%
	Phase 2	>=16-49y no comorbidity	146		10.1%
Mixed	Phase 1	16-64y with comorbidity (JCVI list)	67	190	35.3%
		>=65y	56		29.5%
		50-64y no comorbidity	29		15.3%
	Phase 2	>=16-49y no comorbidity	38		20.0%
Other	Phase 1	16-64y with comorbidity (JCVI list)	178	538	33.1%
		>=65y	198		36.8%
		50-64y no comorbidity	55		10.2%
	Phase 2	>=16-49y no comorbidity	107		19.9%

Ethnicity by vaccine cohorts admitted to ICU/HDU (n=9436)

Ethnicity	Vaccine cohort		N	Total	Proportion
White	Phase 1	16-64y with comorbidity (JCVI list)	2227	6037	36.9%
		>=65y	2580		42.7%
		50-64y no comorbidity	818		13.5%
	Phase 2	>=16-49y no comorbidity	412		6.8%
Asian	Phase 1	16-64y with comorbidity (JCVI list)	748	1710	43.7%
		>=65y	486		28.4%
		50-64y no comorbidity	251		14.7%
	Phase 2	>=16-49y no comorbidity	225		13.2%
Black	Phase 1	16-64y with comorbidity (JCVI list)	539	960	56.1%
		>=65y	214		22.3%
		50-64y no comorbidity	130		13.5%
	Phase 2	>=16-49y no comorbidity	77		8.0%
Mixed	Phase 1	16-64y with comorbidity (JCVI list)	69	146	47.3%
		>=65y	36		24.7%
		50-64y no comorbidity	22		15.1%
	Phase 2	>=16-49y no comorbidity	19		13.0%
Other	Phase 1	16-64y with comorbidity (JCVI list)	219	583	37.6%
		>=65y	145		24.9%
		50-64y no comorbidity	113		19.4%
	Phase 2	>=16-49y no comorbidity	106		18.2%

Case fatality ratios by Phase 1 and 2 vaccine cohorts - lower level of care and ICU/HDU

		Lower level of care			ICU/ HDU		
		Deaths	N	CFR %	Deaths	N	CFR %
Phase 1	<i>16-64y with comorbidity (JCVI list)</i>	375	4541	8.26	1085	3802	28.54
	<i>>=65y</i>	4906	15673	31.30	1796	3461	51.89
	<i>50-64y no comorbidity</i>	42	1275	3.29	408	1334	30.58
	Phase 1 combined	5323	21489	24.77	3289	8597	38.26
Phase 2	Phase 2 >=16-49y no comorbidity	9	1510	0.60	110	839	13.11

Case fatality ratio in hospitalised patients by vaccine cohort - lower level of care

Ethnicity	Vaccine Cohort		Deaths	N	CFR %
White	Phase 1	16-64y with comorbidity (JCVI list)	283	2993	9.46
		>=65y	4347	14027	30.99
		50-64y no comorbidity	30	899	3.34
	Phase 2	>=16-49y no comorbidity	3	869	0.35
Asian	Phase 1	16-64y with comorbidity (JCVI list)	45	709	6.35
		>=65y	295	816	36.15
		50-64y no comorbidity	7	159	4.40
	Phase 2	>=16-49y no comorbidity	3	350	0.86
Black	Phase 1	16-64y with comorbidity (JCVI list)	38	594	6.40
		>=65y	193	576	33.51
		50-64y no comorbidity	2	133	1.50
	Phase 2	>=16-49y no comorbidity	2	146	1.37
Mixed	Phase 1	16-64y with comorbidity (JCVI list)	1	67	1.49
		>=65y	24	56	42.86
		50-64y no comorbidity	1	29	3.45
	Phase 2	>=16-49y no comorbidity	1	38	2.63
Other	Phase 1	16-64y with comorbidity (JCVI list)	8	178	4.49
		>=65y	47	198	23.74
		50-64y no comorbidity	2	55	3.64
	Phase 2	>=16-49y no comorbidity	0	107	0.00

Case fatality ratio in hospitalised patients by vaccine cohort – ICU/HDU

Ethnicity	Vaccine Cohort		Deaths	N	CFR %
White	Phase 1	16-64y with comorbidity (JCVI list)	568	2227	25.51
		>=65y	1261	2580	48.88
		50-64y no comorbidity	227	818	27.75
	Phase 2	>=16-49y no comorbidity	46	412	11.17
Asian	Phase 1	16-64y with comorbidity (JCVI list)	258	748	34.49
		>=65y	319	486	65.64
		50-64y no comorbidity	84	251	33.47
	Phase 2	>=16-49y no comorbidity	34	225	15.11
Black	Phase 1	16-64y with comorbidity (JCVI list)	180	539	33.40
		>=65y	114	214	53.27
		50-64y no comorbidity	47	130	36.15
	Phase 2	>=16-49y no comorbidity	7	77	9.09
Mixed	Phase 1	16-64y with comorbidity (JCVI list)	23	69	33.33
		>=65y	22	36	61.11
		50-64y no comorbidity	8	22	36.36
	Phase 2	>=16-49y no comorbidity	5	19	26.32
Other	Phase 1	16-64y with comorbidity (JCVI list)	56	219	25.57
		>=65y	80	145	55.17
		50-64y no comorbidity	42	113	37.17
	Phase 2	>=16-49y no comorbidity	18	106	16.98

Summary

- Preliminary descriptive analysis to estimate the residual hospital burden in 16+ year olds following completion of phase 1 vaccine roll out
 - ~95% reduction in hospitalised patients (lower level of care)
 - ~90% reduction in ICU/HDU patients
- CFR highest in >65 yo in lower level of care and ICU/HDU and BAME ethnic groups have higher CFR than White
- Following completion of phase 1 vaccine roll out
 - CFR reduced from 24% to <1% in lower level of care patients
 - CFR reduced from 38% to 13% in ICU/HDU patients
- However, this reduction in hospitalised cases and CFR is driven by large proportion of White ethnicity cases: the reductions are smaller in BAME groups (also this varies by wave 1 and wave 2- data not shown)
- Assumptions: 100% vaccine coverage (2 doses) and 100% effectiveness against hospitalisation in eligible phase 1 vaccination cohorts

Further analyses

- Update analyses with new data (e.g. December data linked to deaths to investigate most recent trends in November)
- Look at residual co-morbidities (not in JCVI list) in phase 2 group: preliminary review suggests HT prevalent
- Compare phase 1 and 2 vaccine cohorts by other characteristics:
 - Length of stay
 - Deprivation
- Compare cumulative probability of death among critical care patients by vaccine cohort and sex and ethnicity
- Suggestions from JCVI

Other SARI-Watch outputs

- SARI-Watch summary data is reported in **PHE weekly surveillance report**:
<https://www.gov.uk/government/statistics/national-flu-and-covid-19-surveillance-reports>
- **Impact of vaccination on hospital admissions** looking at cumulative incidence/numbers by age groups (data will be reported in weekly surveillance report)
- **Vaccine effectiveness against hospitalisation**: screening method and TNCC methods (latter using linked SARI-Watch/ SUS/ECDS/P2 data)
- **Mortality analysis among COVID-19 hospitalised patients** comparing wave 1 and wave 2 CFR and cumulative probability of death in ICU/HDU and lower level of care, stratified by co-variables (slides available on request)