

Hospital onset COVID-19 cases in Scotland

Week ending 01 March 2020
to week ending 18 September 2022

12 October
2022

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Introduction

Antimicrobial Resistance and Healthcare Associated Infection (ARHAI) Scotland, part of National Services Scotland, works closely with Public Health Scotland to deliver the COVID-19 response. This release provides data for COVID-19 hospital onset cases in Scotland from week ending 01 March 2020 to week ending 18 September 2022.

A system for monitoring COVID-19 is critical to tracking hospital transmission and will inform infection prevention and control measures. The published data can be used to improve care of patients. The transmission of COVID-19 is thought to occur mainly through respiratory droplets generated by coughing and through contact with contaminated surfaces. As sustained community transmission has occurred as the pandemic has progressed, it has become more challenging to identify true cases of hospital transmission. [Further information on the epidemiology of COVID-19 in healthcare settings can be found in the National Infection Prevention and Control Manual.](#)

This report includes all hospital onset cases of COVID-19 regardless of variant, such as Delta and Omicron. Further information on COVID-19 variants in Scotland can be found here: <https://publichealthscotland.scot/publications/covid-19-statistical-report/>.

The report also includes cases of reinfection with COVID-19.

ARHAI Scotland is working with NHS boards to validate COVID-19 hospital onset cases to ensure the data are robust. Data are provided for the 14 NHS boards and one NHS special health board.

Due to the cessation of almost all population testing for SARS-CoV-2 at the end of April 2022, the inclusion of community onset cases in this report has been discontinued. Percentages are now presented as a percentage of all hospital onset cases rather than all COVID-19 cases, and therefore appear higher than in previous reports due to the decreased size of the denominator. Hospital onset cases are cases diagnosed during an inpatient stay in hospital and do not represent all hospitalised cases of COVID-19 (cases diagnosed prior to hospital and admitted are not included in this report). The hospital onset COVID-19 surveillance system is currently under review due to changes in asymptomatic patient testing policy announced on 14 September 2022, which were due to be implemented at the end of September. These changes will impact on the number of cases identified and reported in hospital settings.

Results and Commentary

Breakdown of COVID-19 cases by hospital onset status – cumulative data

The total number of hospital onset COVID-19 cases reported to ARHAI Scotland, with specimen dates up to 18 September 2022, was 44,849. Of these:

- 24,740 (55.2% of all hospital onset COVID-19 cases) were reported as non-hospital onset (first positive specimen of COVID-19 episode on day 1 or 2 of inpatient admission to NHS board).
- 4,487 (10.0% of all hospital onset COVID-19 cases) were reported as indeterminate hospital onset (first positive specimen of COVID-19 episode on days 3 to 7 of admission to NHS board).
- 4,530 (10.1% of all hospital onset COVID-19 cases) were reported as probable hospital onset (first positive specimen of COVID-19 episode on days 8 to 14 of admission to NHS board).
- 11,092 (24.7% of all hospital onset COVID-19 cases) were reported as definite hospital onset (first positive specimen of COVID-19 episode 15 or more days after admission to NHS board).

Breakdown of COVID-19 cases by hospital onset status – weekly data

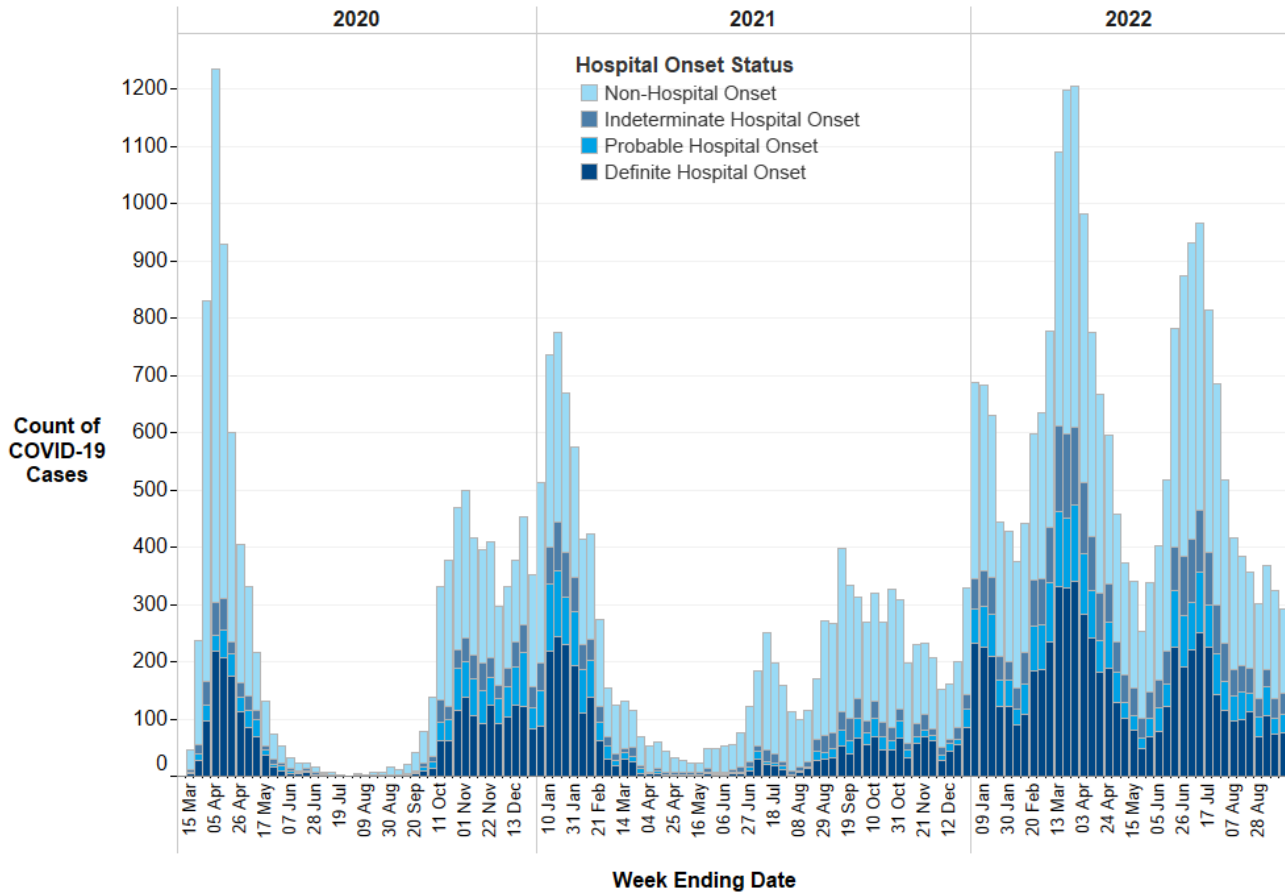
The total number of hospital onset COVID-19 cases reported to ARHAI Scotland this week (week ending 18 September 2022) was 293. Of these:

- 147 (50.2% of all hospital onset COVID-19 cases) were reported as non-hospital onset (first positive specimen of COVID-19 episode on day 1 or 2 of admission to NHS board), of which 21 (14.3% of non-hospital onset cases) were reinfections. In the previous week (week ending 11 September 2022) there were 189 (58.2% of all hospital onset COVID-19 cases), of which 28 (14.8% of non-hospital onset cases) were reinfections.
- 39 (13.3% of all hospital onset COVID-19 cases) were reported as indeterminate hospital onset (first positive specimen of COVID-19 episode on days 3 to 7 of admission to NHS board), of which 4 (10.3% of indeterminate hospital onset cases) were reinfections. In the previous week (week ending 11 September 2022) there were

35 (10.8% of all hospital onset COVID-19 cases), of which 6 (17.1% of indeterminate hospital onset cases) were reinfections.

- 31 (10.6% of all hospital onset COVID-19 cases) were reported as probable hospital onset (first positive specimen of COVID-19 episode on days 8 to 14 of admission to NHS board), of which 3 (9.7% of probable hospital onset cases) were reinfections. In the previous week (week ending 11 September 2022) there were 28 (8.6% of all hospital onset COVID-19 cases), of which 1 (3.6% of probable hospital onset cases) was a reinfection.
- 76 (25.9% of all hospital onset COVID-19 cases) were reported as definite hospital onset (first positive specimen of COVID-19 episode 15 or more days after admission to NHS board), of which 9 (11.8% of definite hospital onset cases) were reinfections. In the previous week (week ending 11 September 2022) there were 73 (22.5% of all hospital onset COVID-19 cases), of which 7 (9.6% of definite hospital onset cases) were reinfections.

Figure 1: Epidemic curve of COVID-19 cases with first positive specimen of COVID-19 episode taken during an inpatient stay, by onset status: week-ending 01 March 2020 to week-ending 18 September 2022 (n=44,849).^{1,2}



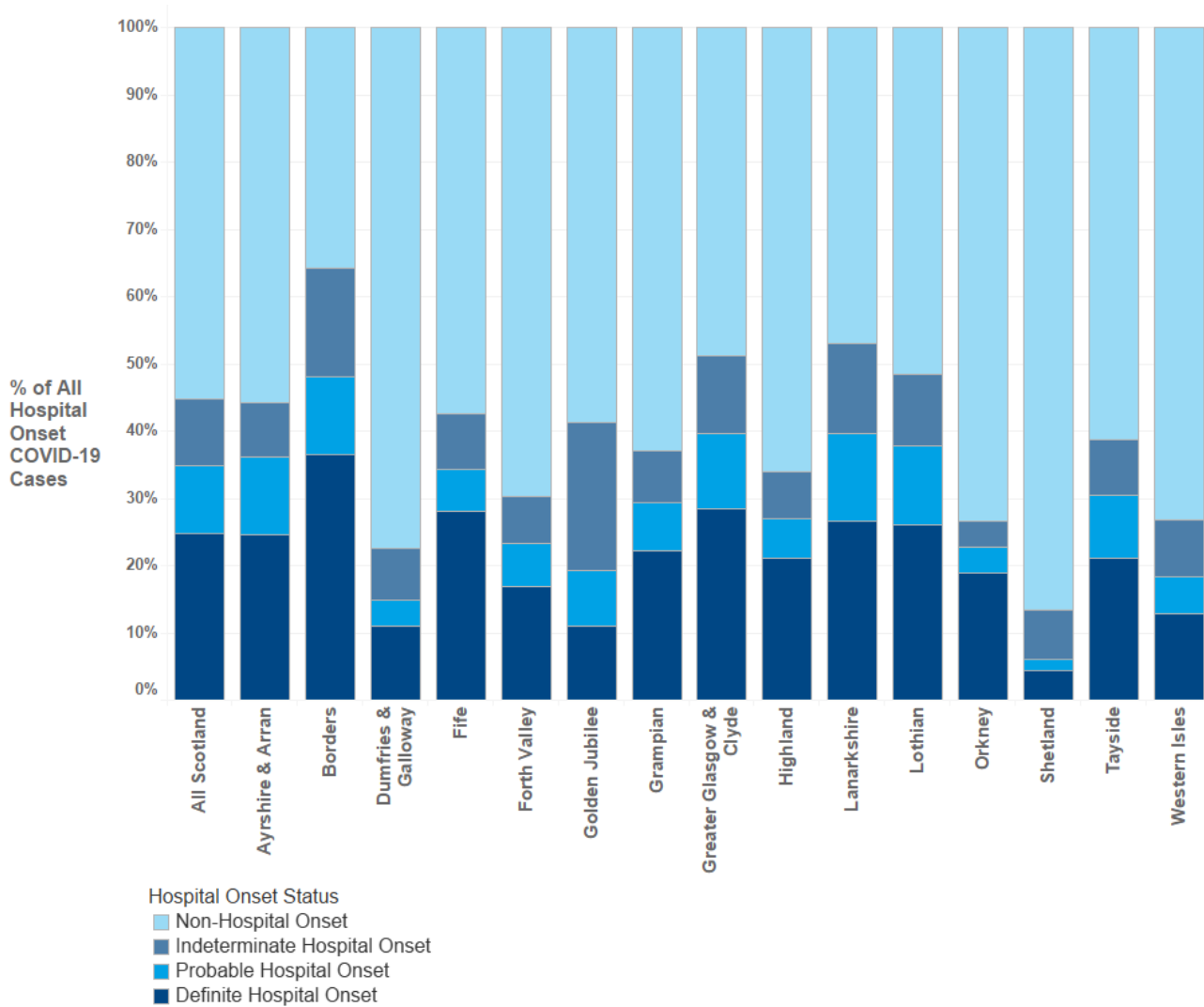
1. Source of data are Corporate Data Warehouse (CDW) that contains test results from Electronic Communication of Surveillance in Scotland (ECOSS) and Rapid Admission Preliminary Inpatient Data (RAPID) or local admission data.
2. Data include any reinfection episodes from samples taken during an inpatient stay in hospital.

Table 1: Hospital onset COVID-19 cases, by onset status and NHS board: specimen dates up to 18 September 2022.^{1,2,3}

NHS board	Total Hospital onset COVID-19 cases (n)	Non-hospital onset (n)	Indeterminate hospital onset cases (n)	Probable hospital onset cases (n)	Definite hospital onset cases (n)	Non-hospital onset (%)	Indeterminate hospital onset cases (%)	Probable hospital onset cases (%)	Definite hospital onset cases (%)
Ayrshire & Arran	4,732	2,632	389	544	1,167	55.6%	8.2%	11.5%	24.7%
Borders	602	215	97	70	220	35.7%	16.1%	11.6%	36.5%
Dumfries & Galloway	1,241	964	94	48	135	77.7%	7.6%	3.9%	10.9%
Fife	2,329	1,333	197	145	654	57.2%	8.5%	6.2%	28.1%
Forth Valley	3,026	2,102	216	193	515	69.5%	7.1%	6.4%	17.0%
Golden Jubilee	111	64	25	9	13	57.7%	22.5%	8.1%	11.7%
Grampian	2,888	1,820	220	209	639	63.0%	7.6%	7.2%	22.1%
Greater Glasgow & Clyde	11,856	5,785	1,375	1,338	3,358	48.8%	11.6%	11.3%	28.3%
Highland	1,761	1,163	121	104	373	66.0%	6.9%	5.9%	21.2%
Lanarkshire	4,717	2,205	633	626	1,253	46.7%	13.4%	13.3%	26.6%
Lothian	7,082	3,644	753	837	1,848	51.5%	10.6%	11.8%	26.1%
Orkney	79	58	3	3	15	73.4%	3.8%	3.8%	19.0%
Shetland	67	58	5	1	3	86.6%	7.5%	1.5%	4.5%
Tayside	4,179	2,566	344	393	876	61.4%	8.2%	9.4%	21.0%
Western Isles	179	131	15	10	23	73.2%	8.4%	5.6%	12.8%
Scotland	44,849	24,740	4,487	4,530	11,092	55.2%	10.0%	10.1%	24.7%

1. Source of data are Corporate Data Warehouse (CDW) that contains test results from Electronic Communication of Surveillance in Scotland (ECOSS) and Rapid Admission Preliminary Inpatient Data (RAPID) or local admission data.
2. The data used has not been adjusted for differing patient populations nor size of NHS board.
3. Data include any reinfection episodes from samples taken during an inpatient stay in hospital.

Figure 2: Proportion of Hospital onset COVID-19 cases by onset status and NHS board: specimen dates up to 18 September 2022.^{1,2,3}



1. Source of data are Corporate Data Warehouse (CDW) that contains test results from Electronic Communication of Surveillance in Scotland (ECOSS) and Rapid Admission Preliminary Inpatient Data (RAPID) or local admission data.
2. The data used has not been adjusted for different patient groups and size of NHS board.
3. Data include any reinfection episodes from samples taken during an inpatient stay in hospital.

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Further information

Further Information can be found on the [PHS website](#).

The next release of this publication will be 19 October 2022.

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Appendices

Appendix 1 – Revisions to the surveillance

Description of Revision	First report revision applied	Rationale for revision
Change from ECOSS to Corporate Data Warehouse (CDW) database	18/08/2021 (2021 Week 29 report)	<p>On the 28th July 2021, the COVID-19 reporting processes were updated by Public Health Scotland, which has resulted in some changes to the cumulative positive cases reported. From the report published on 18th August 2021, data have been generated using this new methodology, resulting in changes to the overall number of cases reported. Non-Scottish residents who first tested positive for COVID-19 within a Scottish hospital were excluded with this new methodology.</p> <p>Please see the Public Health Scotland website for more information.</p>
Re-inclusion of non-Scottish cases defined as a hospital onset case	06/10/2021 (2021 Week 36 report)	<p>After update in methodology to report cases by Public Health Scotland, non-Scottish residents were excluded from this report, for publication between 18th August 2021 and 29th September 2021.</p> <p>As of 6th October 2021, any COVID-19 cases from non-Scottish residents defined as a hospital onset case have been reinstated, and will continue to be reported. These cases are reported under the NHS board where the first COVID-19 sample was taken. ARHAI report these additional cases to accurately reflect the burden of infection and extent of nosocomial transmission of COVID-19 in Scottish hospitals.</p>
Inclusion of private laboratory data in Public Health Scotland COVID-19 dataset	15/12/2021 (2021 Week 46 report)	<p>The case inclusion methodology has been updated by Public Health Scotland. New data feeds from private labs are now included in the overall PHS COVID -19 dataset used for COVID-19 hospital onset reporting. This has resulted in the addition of 711 cases between week ending 3rd October 2021 and week ending 14th November 2021.</p>

Description of Revision	First report revision applied	Rationale for revision
Change in case definition to include Lateral Flow Device (LFD) positive results	02/02/2022 (2022 Week 1 report)	<p>Public Health Scotland has updated the Scottish COVID-19 national case definition to reflect the revised testing strategy from 5th January 2022. The new definition is valid for cases from 5th January 2022 onwards, whereby either a person's first LFD or PCR positive test is accepted. LFD positive cases followed by a negative PCR result within 48 hours are excluded. This change in definitions primarily affects the number of cases reported as community onset, and will have a minimal impact on hospital onset COVID-19.</p> <p>Please see the Public Health Scotland website for more information.</p>
Inclusion of reinfections data	04/05/2022 (2022 Week 14 report)	<p>On the 1st of March 2022, Public Health Scotland updated the Scottish COVID-19 national case definition to include reinfections of COVID-19.</p> <p>Previously COVID-19 cases were based on an individual's first positive test result only. The new definition includes both first infections and possible reinfections. Possible reinfections are defined as individuals who test positive, by PCR (polymerase chain reaction) or LFD (lateral flow device), 90 days or more after their last positive test. Note that as per the change in definitions to include LFD tests as above, positive tests after 90 days from an LFD before the 5th January 2022 are not included as a reinfection.</p> <p>All reinfection data from the beginning of the pandemic are now included in the report. From week 7 report (week ending 16/03/2022) to week 13 report (week ending 03/04/2022) only reinfections from 29th November 2021 were validated and included in the report, with reinfections prior to these classified as community onset. From week 14 (week ending 10/04/2022) the remaining reinfections from the beginning of the pandemic until 28th November were validated.</p> <p>Please see the Public Health Scotland website for more information.</p>

Description of Revision	First report revision applied	Rationale for revision
Exclusion of community onset cases	01/06/2022 (2022 Week 18 report)	<p>On the 1st of May 2022, the Scottish Government Test and Protect Transition Plan changed testing strategies, with the cessation of almost all population-based testing for SARS-CoV-2.</p> <p>Following this change, the reporting of community onset cases in this report has been discontinued. The proportion of each hospital onset status is now presented as a proportion of all hospital onset cases (non-hospital onset, indeterminate hospital onset, probable hospital onset and definite hospital onset).</p> <p>NHS Golden Jubilee was excluded from all proportion data until the 2022 Week 17 report (week ending 01/05/2022), as there were no “community onset” cases assigned to that board. From the week 18 report (week ending 08/05/2022) NHS Golden Jubilee is included in all proportions.</p> <p>For more information on changes in testing, please see the Scottish Government website, https://www.gov.scot/publications/test-protect-transition-plan/</p>

Appendix 2 – Publication metadata

Publication title

Hospital onset COVID-19 cases in Scotland

Description

This release provides information on hospital onset COVID-19 cases, there is a need for consistent reporting using standardised case definitions.

Theme

Infections in Scotland

Topic

COVID-19

Format

Word document

Data source(s)

COVID-19 Cases:

- Case data source: Source of data are Corporate Data Warehouse (CDW) that contains test results from Electronic Communication of Surveillance in Scotland (ECOSS).
- Admissions Data Source: Rapid Admission Preliminary Inpatient Data (RAPID) or Local Patient Admissions Systems.

Date that data are acquired

27 September 2022

Release date

12 October 2022

Frequency

Weekly

Timeframe of data and timeliness

Timeframe of this publication was decided by first positive sample in Scotland (i.e. March 2020)

The latest iteration of data is 18 September 2022; therefore, the data are 3 or 4 weeks in arrears.

Continuity of data

Weekly updates

Revisions statement

These data are not subject to planned major revisions. However, ARHAI Scotland aims to continually improve the interpretation of the data and therefore analysis methods are regularly reviewed and may be updated in the future.

Revisions relevant to this publication

Data are continually validated by both NHS boards and within the ECOSS laboratory database and within CDW. The databases are live and data may change due to possible changes in specimen dates, personal demographics or amendments to COVID-19 test results. Any changes to hospital onset cases, which are validated by NHS boards, are tracked by ARHAI Scotland.

Revisions relevant to this publication for hospital onset COVID-19 cases up to 11 September 2022 include:

NHS Board	Hospital Onset Category	Change	Reason for Change
NHS LO	Non-Hospital onset	-1	Data correction for week ending 11/09/2022

Concepts and definitions

A COVID-19 case is defined as an individual who has tested positive for COVID-19 by SARS-CoV-2 RT-PCR (PCR), or, from 5th January 2022 onwards by PCR, Lateral Flow Device (LFD) or other point of care rapid test. LFD positive cases that are followed by a negative PCR result within 48 hours are excluded.

First positive test and reinfections for each individual are counted. Episodes of infection are described as:

- First positive test recorded for case since March 2020
- Possible reinfections defined as individuals who test positive 90 days or more after their last positive test.

The transmission of COVID-19 is thought to occur mainly through respiratory droplets and through contact with contaminated surfaces. [Further information on the epidemiology of COVID-19 in healthcare settings can be found on the Public Health Scotland website](#). As sustained community transmission has occurred as the pandemic has progressed, it has become more challenging to identify true cases of hospital transmission.

A system for monitoring COVID-19 is critical to tracking nosocomial transmission in healthcare settings to inform infection prevention and control measures. In response to the Scottish Government's request to ascertain and validate the hospital-onset status of all COVID-19 cases in Scotland, ARHAI Scotland are working with NHS boards to establish a minimum viable dataset to fulfil this request.

The agreed nosocomial case definition for the UK is based on the number of days since admission to an NHS health board to the date of specimen sampling for a positive SARS-CoV-2 RT-PCR test. Time since admission to specimen sampling is categorised as:

- non-hospital onset (first positive specimen of new infection or reinfections (90 days or more after their last positive test) on day 1 or 2 of admission to NHS board)
- indeterminate (first positive specimen of new infection or reinfections (90 days or more after their last positive test) on days 3 to 7 of admission to NHS board)
- probable (first positive specimen of new infection or reinfections (90 days or more after their last positive test) on days 8 to 14 of admission to NHS board)

- definite hospital onset (first positive specimen date of new infection or reinfections (90 days or more after their last positive test) was 15 or more days after admission to NHS board)

Any remaining COVID-19 cases where the first positive specimen of a new infection or a reinfection (90 days or more after their last positive test) are taken in the community are classed as community onset. Community onset cases are not currently in scope for inclusion in this report.

These definitions are necessary due to the maximum incubation period of 14 days. See table below:

Day of sampling post admission	Nosocomial categorisation
Before admission	Community onset COVID-19
Day 1 of admission/on admission to NHS board	Non-hospital onset COVID-19
Day 2 of admission	Non-hospital onset COVID-19
Day 3 of admission	Indeterminate hospital onset COVID-19
Day 4 of admission	Indeterminate hospital onset COVID-19
Day 5 of admission	Indeterminate hospital onset COVID-19
Day 6 of admission	Indeterminate hospital onset COVID-19
Day 7 of admission	Indeterminate hospital onset COVID-19
Day 8 of admission	Probable hospital onset COVID-19
Day 9 of admission	Probable hospital onset COVID-19
Day 10 of admission	Probable hospital onset COVID-19
Day 11 of admission	Probable hospital onset COVID-19
Day 12 of admission	Probable hospital onset COVID-19
Day 13 of admission	Probable hospital onset COVID-19
Day 14 of admission	Probable hospital onset COVID-19
Day 15 of admission and onwards to discharge	Definite hospital onset COVID-19
Post discharge	Community onset COVID-19

The hospital onset cases in this report represent cases presenting in hospital and do not include COVID-19 associated with hospital care that present on readmission to hospital or post-discharge.

Admission to health board was agreed as the appropriate point to start counting the duration of hospital stay to first positive specimen date within a new infection or reinfection

episode, rather than the date of admission to a single hospital, since patients can be transferred between hospitals which would lead to restarting the clock to 'day 1' each time and therefore underestimating the number of nosocomial infections.

Any discharges and re-admissions within the same health board which occur within the same calendar day will be classed as a continuous stay; the clock will not be restarted in these instances, only when a readmission occurs on the second day or more after any discharge.

For hospital onset COVID-19 cases the NHS board reported is where the first positive sample within a new infection or reinfection episode was taken, established either using Rapid Admission Preliminary Inpatient Data (RAPID) data and validated by the boards, or using individual NHS board's internal admissions systems. Since the definition of hospital-onset COVID-19 was determined using date of admission to NHS board, the board assigned may not represent the board of attribution of hospital-onset COVID-19 infection (Table above). These data also include non-Scottish residents who have been hospital in-patients at the time of their COVID-19 episode date, assigned to the NHS board of positive test as above.

Minimum data required to be validated:

- CHI number (or for non-Scottish residents, patient forename, surname and date of birth)
- Date of positive SARS-CoV-2 RT-PCR test within new infection or reinfection episode.
- Date of admission to health board when patient tested positive for COVID-19
- NHS board where first positive test of new infections or reinfection episode undertaken

Relevance and key uses of the statistics

Surveillance data are essential for monitoring trends and assisting in outbreak investigations and to understand the extent of ongoing transmission within the hospital setting. ARHAI Scotland offers support to NHS boards across Scotland to aid their local COVID-19 prevention strategies.

Accuracy

It is acknowledged that patients can be transferred between NHS health boards and if transferred into a different health board during the same hospital stay, then the clock is restarted to 'day 1' which could lead to an underestimation of cases. However, the decision to restrict start date to admission to a single NHS health board represents the requirement to report at the health board-level. Any discharges and re-admissions which occur within the same calendar day and within the same NHS board will be overlooked - the clock will not be restarted in these instances, only when a readmission occurs on the second or more day after any discharge.

COVID-19 cases identified after discharge from hospital but within 14 days may be associated with the hospital. These cases, including those identified on readmission to hospital, are not included as hospital onset. This may result in under-reporting of COVID-19 cases associated with hospital care.

Completeness

Surveillance data are collected using the ARHAI Scotland system that allows data collectors in NHS boards to validate ECOSS records as well as identifying additional cases that may not be included in the ECOSS or CDW systems. This therefore means that completeness for hospital onset cases under current definitions is near to 100%.

Comparability

The agreed nosocomial case definition for the UK has been adopted to allow comparison across the four nations. However, geographical differences and healthcare delivery, for example NHS board versus NHS Trust have to be considered.

Accessibility

It is the policy of ARHAI Scotland to make its web sites and products accessible according to [published guidelines](#).

Link to this report open data platform can be found here:

<https://www.opendata.nhs.scot/dataset/hospital-onset-covid-19-cases-in-scotland>

Coherence and clarity

Previous published reports can be found at:

<https://www.publichealthscotland.scot/publications/show-all-releases?id=20584>

Value type and unit of measurement

At National level, the number and proportion of COVID-19 cases which can be classed as definite hospital onset, probable hospital onset, indeterminate hospital onset and non-hospital onset, and broken down by week using the date of first positive COVID-19 sample of new infections or reinfections. The number and proportion of reinfections included in each category is also given.

At NHS board level, the cumulative number and proportion of COVID-19 cases which can be classed as definite hospital onset, probable hospital onset, indeterminate hospital onset, and non-hospital onset, using the date of first positive COVID-19 sample within new infections or reinfection episodes.

Due to rounding the percentages do not always add up to 100%.

Disclosure

The PHS protocol on [Statistical Disclosure Control Protocol](#) is followed.

Official Statistics designation

Management Information

UK Statistics Authority Assessment

Not assessed

Last published

05 October 2022

Next published

19 October 2022

Date of first publication

01 July 2020

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Date form completed

12 October 2022

Appendix 3 – Early access details

Pre-Release Access

Under terms of the "Pre-Release Access to Official Statistics (Scotland) Order 2008", ARHAI Scotland is obliged to publish information on those receiving Pre-Release Access ("Pre-Release Access" refers to statistics in their final form prior to publication). The standard maximum Pre-Release Access is five working days. Shown below are details of those receiving standard Pre-Release Access.

Standard Pre-Release Access:

- Scottish Government Health Department
- NHS board Chief Executives
- NHS board Communication leads