UK Health Security Agency

Technical summary

UK Health Security Agency data series on deaths in people with COVID-19

Contents

1. Summary

The main findings are as follows:

1. Monitoring the number of deaths in people with coronavirus (COVID-19) is a vital part of tracking the pandemic. The UK Health Security Agency (UKHSA) has developed a data series that collates reports from multiple sources to give a daily number of deaths in people with a positive SARS CoV-2 test detected by a polymerase chain-reaction (PCR) test or rapid lateral flow test in England, regardless of where they died.

2. There are 2 definitions of a death in a person with COVID-19 in England, one broader measure and one measure reflecting current trends:

   1) A death in a person with a positive SARS-CoV-2 test and either died within 60 days of the first specimen date of the most recent episode of infection **or** died more than 60 days after the first specimen date of the most recent episode of infection, only if COVID-19 is mentioned on the death certificate.
   2) A death in a person with a positive SARS-CoV-2 test **and** died within (equal to or less than) 28 days of the first positive specimen date of the most recent episode of infection.

3. UKHSA combines data from 4 different sources on a daily basis:
   i. Deaths occurring in hospitals among individuals tested positive for COVID-19 , notified to NHS England by NHS trusts.
   ii. Deaths notified to local Health Protection Teams in the course of outbreak management.
   iii. Death reports from NHS electronic hospital records which can be linked to a positive SARS-CoV-2 test including:
      i. Laboratory-confirmed positive PCR tests, reported by testing laboratories. Reports include tests from both Pillar 1 and Pillar 2.
      ii. Lateral flow device tests, assisted testing or self-reported tests by members of the public.
   iv. Office for National Statistics (ONS) death registrations which can be linked to a positive SARS-CoV-2 test as above.

4. The UKHSA data series includes deaths in anyone with a positive SARS-CoV-2 test, including those who die outside of hospital settings.

5. Death data is checked for errors and a semi-automated program is run to match records and ensure as far as possible a person who died is not counted twice across different reporting systems.

6. On 29 April 2020, Public Health England (now UKHSA) commenced daily reporting of deaths in people with COVID-19. On August 12, 2020 the definition used by the PHE data series was revised to report 2 measures:

    1) Deaths within 60 days or if the death occurred after 60 days, COVID-19 is listed on the death registration.
    2) Deaths in laboratory-confirmed positive individuals where the death occurred within 28 days.

Both measures are published daily on the GOV.UK dashboard and weekly in the PHE surveillance report.

7. From 1 February 2022, UKHSA began reporting deaths following COVID-19 re-infections. From this point, reported deaths in people with COVID-19 are considered from the first positive specimen date of the most recent episode of infection, rather than an individual's first ever positive specimen date.

8. The UKHSA data series is not designed to provide definitive information on the causal role of COVID-19 in relation to individual deaths. The weekly publication of deaths statistical bulletin from the Office of National Statistics (ONS) includes all deaths where COVID-19 is recorded on the death certificate, regardless of whether a laboratory result is available or not.

2. Background

Monitoring the number of deaths among individuals with COVID-19 is a vital part of tracking the pandemic. It is critical to ensure death data is as accurate, comprehensive and timely as possible.

UKHSA has developed a methodology that links data from 4 sources to provide a comprehensive daily count of deaths among people with COVID-19 infection in England. The purpose of this reporting is to fulfil a need to rapidly report numbers of deaths each day, balancing the need for:

- understanding the overall burden and societal impact of COVID-19 and characterising clinical outcomes and demographics of those infected
- real-time surveillance of immediate trends in mortality and underlying transmission

3. Aims

This paper explains the process for reporting deaths with COVID-19 and describes the advantages and limitations of the reporting method. It provides an explanation of how to interpret the UKHSA COVID-19 death data series and sets out answers to frequently asked questions.

4. Outline of UKHSA data series

4.1 Definition of COVID-19 related deaths

There are 2 measures of a death in a person with COVID-19 in England, one measure to reflect current trends and one comprehensive measure that incorporates death certificate data:

1. A death in a person with a positive SARS-CoV-2 test **and** died within (equal to or less than) 28 days of the first positive specimen date of the most recent infection.

2. A death in a person with a positive SARS-CoV-2 test and either died within 60 days of the first specimen date of the most recent infection **or** died more than 60 days after the first specimen date of the most recent infection, only if COVID-19 is mentioned on the death certificate.

A separate episode of COVID-19 infection is considered where a positive SARS-CoV-2 test results occurs more than 90 days after a previous positive result.

The UKHSA data series does not include deaths where COVID-19 is mentioned on the death certificate but a positive SARS-CoV-2 test was not reported. All deaths with a positive specimen (including at post-mortem) are counted regardless of the cause of death, and then restricted based on the time frames listed above.

The daily number represents new deaths reported to UKHSA in the 24 hours up to 5pm the previous day. Report date does not equate to date of death as it can take up to 2 weeks for a death to be reported to UKHSA.

4.2 Data sources and processing

UKHSA receives reports of death from 4 sources:

1. Deaths occurring in hospitals among individuals with COVID-19, notified to NHS England by NHS trusts using the COVID-19 Patient Notification System (CPNS).

2. Deaths with a positive SARS-CoV-2 test, notified to UKHSA Health Protection Teams during outbreak management (primarily in non-hospital settings) and recorded in an electronic reporting system.

3. All people with a positive SARS-CoV-2 test reported to the Second Generation Surveillance System (SGSS) (a centralised repository of laboratory results) are submitted on a daily basis to the Demographic Batch Service (DBS) to check NHS electronic patient records for reports of deaths in the previous 24 hours in any setting. Positive tests include:

    a) Laboratory confirmed positive PCR tests, reported by testing laboratories. Reports include tests from both Pillar 1 and Pillar 2.
    b) Lateral flow device tests, assisted testing or self-reported tests by members of the public.

4. Office for National Statistics (ONS) death registrations which can be linked to a positive SARS-CoV-2 test result (as above). These deaths are reported on a 5 to 14 day lag.

4.3 Quality assurance

Quality assurance is undertaken by UKHSA using semi-automated programmes, with manual checking before and after processing. This involves sense checking data in relation to key information (for example age at death, date of birth, hospital admission, death report). Data from each source is cleaned, merged and duplicate reports are removed to avoid deaths being counted twice.

4.4 Data linkage

Death records from the 4 data sources are linked principally on NHS number. Records without NHS numbers are linked on a combination of other patient identifying information (PII) such as first name, surname, date of birth and postcode.

4.5 Advantages of the UKHSA data series

The UKHSA data series has the following advantages:

- broad coverage of deaths in anyone recently diagnosed with COVID-19, including those outside of hospital settings
- capturing deaths among individuals with multiple COVID-19 infections
- more timely reporting of deaths: there is a lag between the date of death and the date it is reported to UKHSA; using multiple overlapping data sources, the delay is reduced by approximately 1 to 2 days
- optimises completeness of hospital reporting by combining information from multiple sources, making it less likely that deaths are missed
- ensures England COVID-19 death reporting is consistent with how deaths are reported in the rest of the UK

4.6 Limitations of the UKHSA data series

The UKHSA data series does not include deaths in people where COVID-19 is suspected but not confirmed by testing (SARS-CoV-2 PCR either negative or not done). Furthermore, the UKHSA data series does not report cause of death, and as such represents deaths in people with COVID-19 and not necessarily caused by COVID-19.

5. Including reinfections to the UKHSA data series

5.1 Background

As the pandemic continues and more variants emerge, it is more likely that people will be reinfected with COVID-19. Prior to 31 January 2022, surveillance figures only reported COVID-19 cases as the date of the first infection, so individuals were only counted once. As such, deaths within 28 days and 60 days were also counted from the date of the first positive specimen date.

From 31 January 2022 UKHSA improved their reporting system to allow counting of multiple infections, with each infection defined by a 90 day 'episode'. An episode is considered a COVID-19 infection where positive SARS-CoV-2 test results occurs within and including 90 days of previous positive result.

From 1 February 2022, the total number deaths in people with COVID-19 were updated to count deaths that occurred following a re-infection, and the definition of a death with COVID-19 was amended to include all deaths within 28 or 60 days of the first positive specimen date of the most recent episode of infection.

Figures 1 and 2 show the change in deaths under the different measures. Figure 1 shows the updated back series of deaths separating out deaths following a first infection and re-infections. Figure 2 shows the number of deaths added as a result of adding re-infections and the proportion of total deaths this represents. It is important to note that the deaths added under the new measures disproportionately affect more recent weeks (since December 2021) and this change does not significantly affect the overall epidemic curve and trends in death.

Figure 1. Deaths with COVID-19 within 28 days of a positive test by first infection and following a re-infection, 2 March 2020 to 31 January 2022

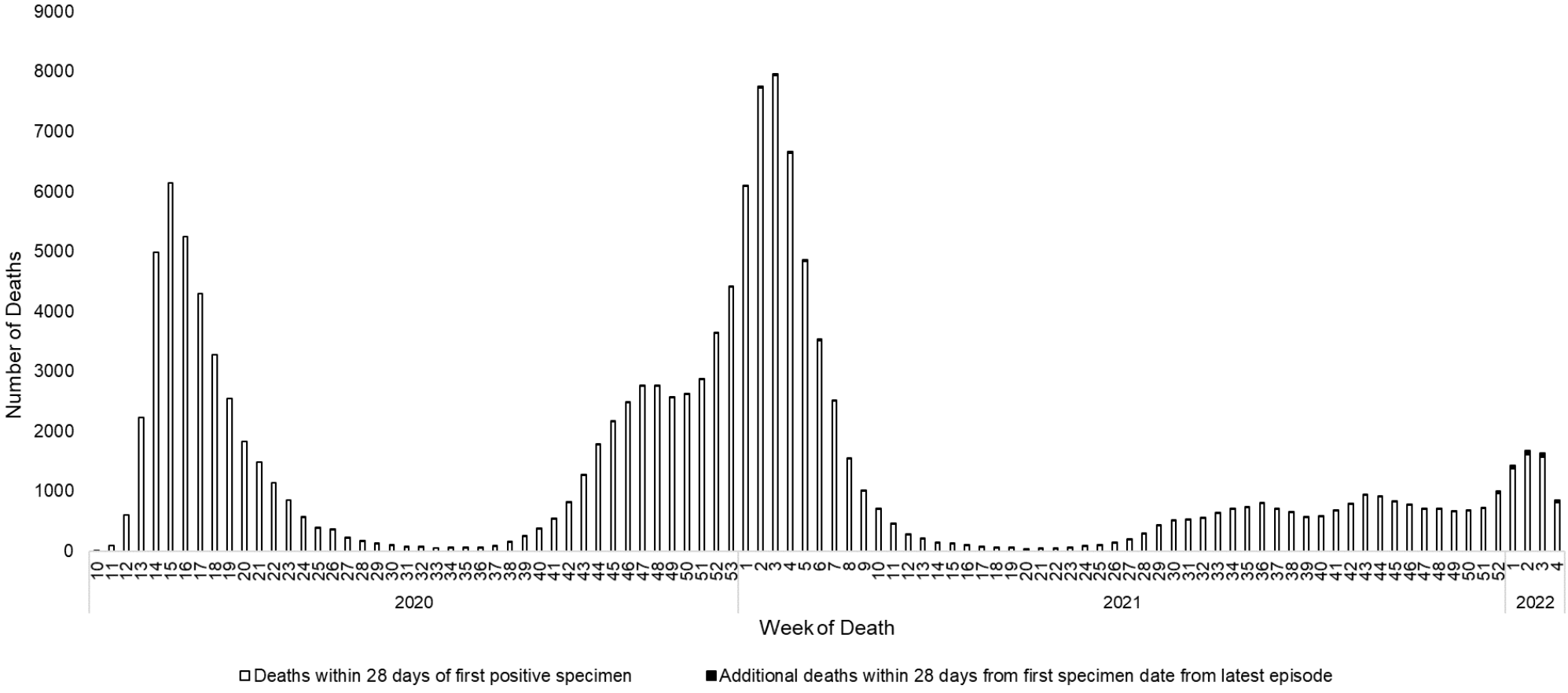
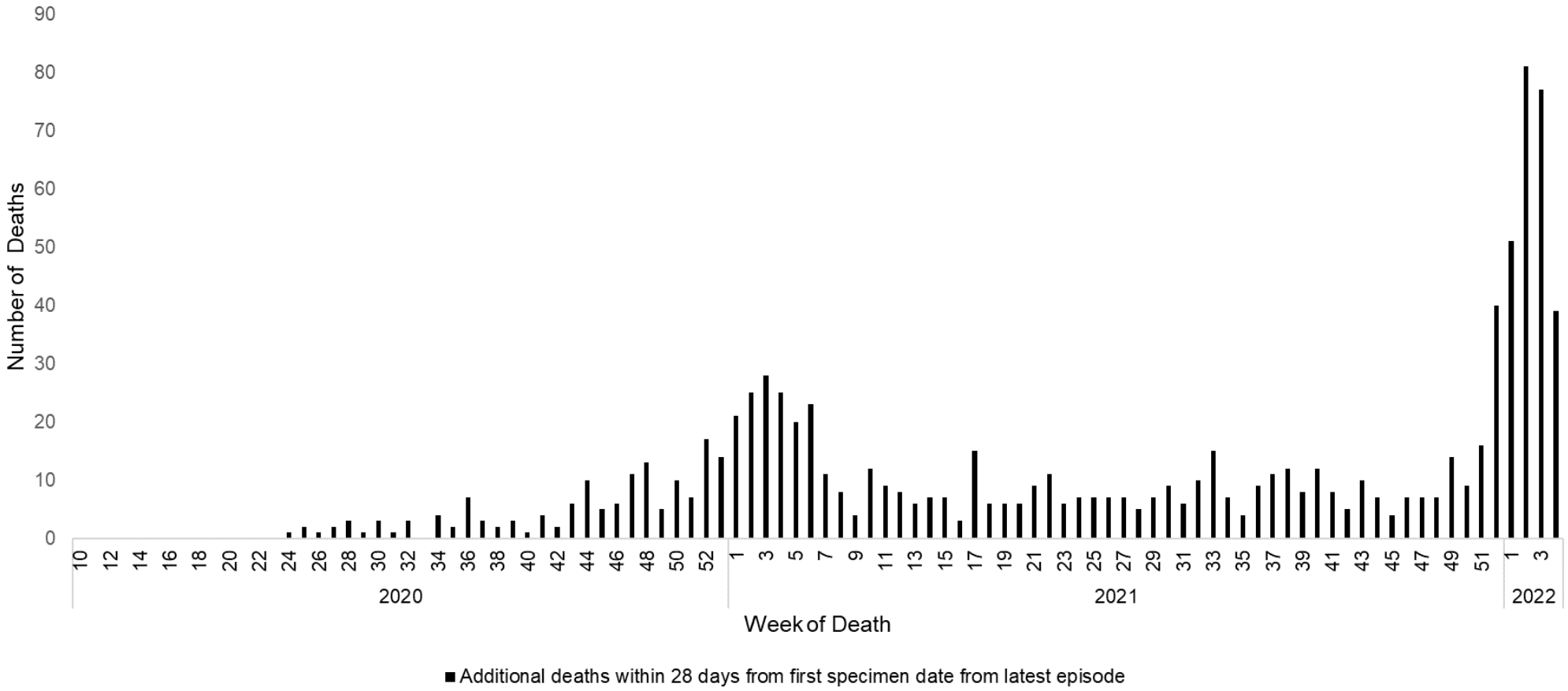


Figure 2. Deaths with COVID-19 within 28 days of a positive test following a re-infection, 2 March 2020 to 31 January 2022



6. How the UKHSA data series compares to the ONS death registrations

The UKHSA data series is used to count daily deaths in people with a positive SARS-CoV-2 test in England. ONS provides a weekly count of all deaths in England and Wales where COVID-19 is recorded on the death certificate (including deaths where COVID-19 was suspected based on symptoms and/or linked to an outbreak, and not limited to laboratory confirmed cases). These are reported on an 11-day lag due to registration delay. This lag can be higher over holiday periods. ONS death registrations which can be linked to positive SARS-CoV-2 tests are included in the UKHSA data series, but ONS death registrations without laboratory confirmation are not.

7. Frequently asked questions

1. Where the mortality data comes from and who is included

This data is collected and combined from data sources: NHS hospitals and healthcare settings, local Health Protection Teams and automated COVID-19 test repository systems. It means we can include deaths in anyone with a positive SARS-CoV-2 test which occur in any setting, including hospitals and care homes. Combining multiple sources means it is less likely to underestimate deaths. Data is checked to ensure deaths are not counted twice. This data series only includes people with a positive SARS-CoV-2 test. It does not include deaths in people who had suspected COVID-19 and were not tested and those who had a negative SARS-CoV-2 test.

2. Implications of the change to episode-level reporting of SARS-CoV-2 cases

The number of deaths counted within both definitions (28 days and 60 days) has increased as a result of the change in case definition. The time between date of positive specimen and date of death for individuals who have died following 2 or more episodes of COVID-19 since the start of the pandemic would have previously been calculated using the earliest specimen date of their first COVID-19 infection. For these individuals the time between date of positive specimen and date of death is now calculated by using the earliest specimen date of their most recent episode of COVID-19 infection. This give a truer reflection of the number of death among individuals with COVID-19, within a given time period following COVID-19 infection.

In practical terms, this has involved reallocation of a number of people who died with COVID-19 to fall within the set time period following diagnosis. This means a number of deaths previous reported under the 60 day definition have been re-classified to within the 28 day definition. Likewise, a number of deaths that were not previously reported under either defition have been reclassified to fall within the 28 and/or 60 day definition.

The total fatalities will have updated retrospectively to reflect this change. It is important to note that this does not significantly affect the trends in deaths (Figures 1 and 2). The way deaths were counted was based on the best available evidence at each stage of the epidemic. A change to counting episodes could only be implemented once enough data was available to inform this change and to analyse the time between positive test results in individuals with multiple positive tests. The implementation of this change has resulted in a reduction in the underestimation of deaths.

About the UK Health Security Agency

The UK Health Security Agency is an executive agency, sponsored by the Department of Health and Social Care.

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