Office for National Statistics

Article

Coronavirus and the estimated impact on hospital episodes involving falls and fractures, England: 2013 to 2021

An experimental analysis estimating the impact of coronavirus (COVID-19) on the number of hospital episodes involving falls and fractures associated with new-onset frailty and disability.

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1 . Main points

- The number of hospital episodes involving falls decreased during the national lockdowns but increased above the modelled expected number when lockdown measures were lifted.
- The number of hospital episodes involving fractures were much lower than expected during periods of national lockdown but returned to expected levels when lockdown measures were lifted.
- The number of hospital episodes involving fractures returned to expected levels more slowly for pension- and older-aged patients than for younger age groups, suggesting a lifestyle change or greater hesitance for older age groups to return to daily activities or to present themselves at hospital.
- The post-lockdown increase in the number of falls and fracture episodes was only temporary for patients without frailty but continued for patients with pre-morbid frailty as defined using the Hospital-wide Frailty Index; this suggests older people with frailty may need specific consideration when preparing for future pandemics.
- Decreases in fracture episodes below expected levels were observed between October 2020 and January 2021 in areas where local tiered restrictions were imposed over this period.
- National increases in hospital episodes involving falls came primarily from patients in the South East, the North West, and Yorkshire and The Humber.

2 . Understanding the data

There is a concern that the coronavirus (COVID-19) pandemic, and in particular national lockdowns, will have led to an increase in the prevalence of disability and frailty. This is because of the way the pandemic changed the health and healthcare-seeking behaviors of citizens in England.

Deconditioning is defined as a deterioration in physical performance and is an important sign of new-onset disability and frailty. Age UK survey data based upon self-reported well-being have suggested that older people have experienced physical deconditioning and cognitive decline (such as feeling forgetful and confused) following the social isolation and national lockdown measures imposed during the pandemic.

Frailty and the transition into disability are not routinely recorded in UK health data sources. Indirect proxy measures can be used to establish whether the prevalence of frailty and disability changed during and since the national lockdowns. Falls and fractures are both associated with new-onset disability and frailty and can be used as proxy measures of frailty prevalence at a population level. This means that an increase in falls and fractures could be a sign that there are now more people in England who are at an increased risk of disability, falls, and admission to hospital.

The purpose of this research was to establish whether the number of hospital episodes involving falls and fractures in England during the pandemic varied significantly from the number expected through the modelling of historical data. We then considered what this might tell us about the rate of disability and frailty.

To do this, we used Auto-Regressive Integrated Moving Average (ARIMA) models on Hospital Episode Statistics (HES) fall and fracture episodes data for 1 January 2013 to 23 January 2020. An expected baseline was estimated from this data for the number of episodes in the absence of the pandemic, with 95% confidence intervals. These baselines were compared with the observed number of episodes throughout the pandemic period (24 January 2020 to 31 December 2021) and were stratified by age, sex and region.

We also considered whether geographical differences in social restrictions during the pandemic, such as tiered local lockdowns, showed any correlation with fall and fractures as signs of new-onset disability and frailty.

3 . Fall and fracture episodes

Overall, the number of fall episodes were generally lower than expected during periods of national lockdown, but rapidly increased and exceeded projected levels when national lockdown measures were lifted (Figure 1).

Figure 1: The number of fall episodes decreased during national lockdowns, but exceeded expected levels as lockdown measures were lifted

Total number of fall episodes, and expected baseline episodes based on historical data modelling with 95% confidence intervals, England, February 2020 to January 2022

Notes:

1. Pale grey shaded areas represent periods of national lockdown from 16 March 2020 to 4 July 2020, 5 November 2020 to 1 December 2020 and 6 January 2021 to 8 March 2021. Dark grey shaded areas represent periods of local tiered lockdown from 14 September 2020 to 4 November 2020 and 2 December 2020 to 5 January 2021.

2. A single episode could be recorded as both a fall and a fracture, therefore the separate number of fall and fracture episodes cannot be summed to create a total number of fall and fracture episodes.

3. If a patient is transferred between consultants or health care providers during their hospitalisation, this may be recorded as more than one hospital episode. Therefore, it is possible that a single fall or fracture could be counted more than once in this analysis.

Download the data

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The largest observed reduction in the number of fall episodes compared with expected levels was in April 2020, shortly after the first national lockdown was implemented. This could be because of people following the rules of the first national lockdown and therefore avoiding activities which may have increased their risk of hospitalisation and exposure to the virus.

These patterns are to be expected because of the reduced exposure to activities that may risk falls or fractures during lockdown periods. People may have also been more likely to engage in risk-taking behaviours immediately after the lockdown restrictions were lifted, and contact sports were re-introduced. People may also have been more likely to present at hospital after lockdown restrictions were lifted when their perceived risk of infection may have been lower.

Similar patterns were observed for national fracture episodes. However, the number of fracture episodes did not exceed expected levels, with the exception of September 2020 (Figure 2).

Figure 2: Fracture episodes dropped below expected levels during national lockdowns, but returned to expected levels when measures were lifted

Total number of fracture episodes, and expected baseline episodes based on historical data modelling with 95% confidence intervals, England, February 2020 to January 2022

Notes:

1. Pale grey shaded areas represent periods of national lockdown from 16 March 2020 to 4 July 2020, 5 November 2020 to 1 December 2020 and 6 January 2021 to 8 March 2021. Dark grey shaded areas represent periods of local tiered lockdown from 14 September 2020 to 4 November 2020 and 2 December 2020 to 5 January 2021.

2. A single episode could be recorded as both a fall and a fracture, therefore the separate number of fall and fracture episodes cannot be summed to create a total number of fall and fracture episodes.

3. If a patient is transferred between consultants or health care providers during their hospitalisation, this may be recorded as more than one hospital episode. Therefore, it is possible that a single fall or fracture could be counted more than once in this analysis.

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And yet, in the months following the lifting of the third national lockdown, both fall and fracture episodes fell below expected levels for a sustained period. This could indicate a lifestyle change, or an aversion to attending hospital following injury because of fear of exposure to coronavirus (COVID-19).

There were no notable differences in the patterns observed for males and females.

4 . Frail fall and fracture episodes

Fall and fracture episode records that also included International Classification of Diseases and Related Health Problems 2010 (ICD-10) codes from the Hospital Frailty Score Index were used as a proxy for frailty and disability prevalence in the population. When looking specifically at fall and fracture episodes with these frailty markers, a different pattern was observed.

The number of frail fall and fracture episodes consistently exceeded expected levels throughout the observation period, with the exception of February 2021. Levels peaked in May 2020 during the first national lockdown, and immediately following the second and third national lockdowns (Figure 3).

This may indicate an increase in vulnerability of frail individuals to falls and fractures because of the social isolation, immobility, cognitive decline and physical deconditioning that may have been experienced during these public health interventions.

Figure 3: Frail fall and fracture episodes consistently exceeded expected levels throughout the coronavirus (COVID-19) pandemic, increasing upon the lifting of national lockdowns

Total number of fall and fracture episodes with a frailty marker, and expected baseline episodes based on historical data modelling with 95% confidence intervals, England, February 2020 to January 2022

Notes:

1. Pale grey shaded areas represent periods of national lockdown from 16 March 2020 to 4 July 2020, 5 November 2020 to 1 December 2020 and 6 January 2021 to 8 March 2021. Dark grey shaded areas represent periods of local tiered lockdown from 14 September 2020 to 4 November 2020 and 2 December 2020 to 5 January 2021.

2. A single episode could be recorded as both a fall and a fracture, therefore the separate number of fall and fracture episodes cannot be summed to create a total number of fall and fracture episodes.

3. If a patient is transferred between consultants or health care providers during their hospitalisation, this may be recorded as more than one hospital episode. Therefore, it is possible that a single fall or fracture could be counted more than once in this analysis.

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The number of frail fall and fracture episodes also remained higher than expected in the 10 months following the final national lockdown. This suggests that this increased vulnerability of frail individuals to falls and fractures could be long lasting.

5 . Fall and fracture episodes by age

The large decrease in the number of fall episodes in April 2020 was observed across all age groups, except for those aged 18 years and under. This decrease was most notable for those aged 80 years and over. The same pattern was seen for fracture episodes, for which a less marked decrease was also observed for those aged 18 years and under.

After April 2020, the number of fall episodes increased and exceeded expected levels the most rapidly for working-age patients (Figure 4). A similar pattern was observed for fracture episodes returning to expected levels (Figure 5). This coincides with the phased return to work programme that occurred before the lockdown measures were lifted. This would have predominantly affected people of working age, increasing their exposure to work-related risks.

Figure 4: Fall episodes increased most rapidly for working-age patients after April 2020, during the phased return to work programmes

Total number of fall episodes and expected baseline episodes based on historical data modelling with 95% confidence intervals, by age, England, February 2020 to January 2022

Notes:

1. Pale grey shaded areas represent periods of national lockdown from 16 March 2020 to 4 July 2020, 5 November 2020 to 1 December 2020 and 6 January 2021 to 8 March 2021. Dark grey shaded areas represent periods of local tiered lockdown from 14 September 2020 to 4 November 2020 and 2 December 2020 to 5 January 2021.

2. A single episode could be recorded as both a fall and a fracture, therefore the separate number of fall and fracture episodes cannot be summed to create a total number of fall and fracture episodes.

3. If a patient is transferred between consultants or health care providers during their hospitalisation, this may be recorded as more than one hospital episode. Therefore, it is possible that a single fall or fracture could be counted more than once in this analysis.

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The number of fall episodes for pension-age and older-age patients also increased rapidly after April 2020 and following the lifting of subsequent national lockdowns (Figure 4). This may suggest increased vulnerability in these groups after periods of increased isolation and decreased mobility.

In contrast, fracture episodes for pension-age and older-age patients increased to expected levels at a much slower rate than the younger age groups. The number of episodes generally remained lower than expected for those aged 80 years and older (Figure 5). This could indicate a lifestyle change for those in the older age groups or a hesitance to return to day-to-day activities. This could suggest that there was a desire to avoid hospitalisation, where there was likely a perceived risk of coronavirus (COVID-19) infection.

Figure 5: Fracture episodes in pension-age and older-age patients increased to expected levels after April 2020 at a much slower rate than for younger age groups

Total number of fracture episodes and expected baseline episodes based on historical data modelling with 95% confidence intervals, by age, England, February 2020 to January 2022

Notes:

1. Pale grey shaded areas represent periods of national lockdown from 16 March 2020 to 4 July 2020, 5 November 2020 to 1 December 2020 and 6 January 2021 to 8 March 2021. Dark grey shaded areas represent periods of local tiered lockdown from 14 September 2020 to 4 November 2020 and 2 December 2020 to 5 January 2021.

2. A single episode could be recorded as both a fall and a fracture, therefore the separate number of fall and fracture episodes cannot be summed to create a total number of fall and fracture episodes.

3. If a patient is transferred between consultants or health care providers during their hospitalisation, this may be recorded as more than one hospital episode. Therefore, it is possible that a single fall or fracture could be counted more than once in this analysis.

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The number of fall and fracture episodes for those aged 18 years and under generally followed expected levels throughout the observation period. This is with the exception of a drop in fracture episodes during the first lockdown period (April 2020).

6 . Frail fall and fracture episodes by age

Frailty markers were designed for use in older demographics, and so patterns for frail fall and fracture episodes came primarily from older-age patients (aged 80 years and over).

The number of frail fall and fracture episodes were higher than expected for working-age, pension-age and older-age patients for the majority of the coronavirus (COVID-19) pandemic. Episodes only dropped below expected levels near the onset of the first national lockdown and during the third period of national lockdown (Figure 6).

Figure 6: The increase in frail falls and fractures above expected levels was primarily seen among pension-age and older-age patients

Total number of frail fall and fracture episodes and expected baseline episodes based on historical data modelling with 95% confidence intervals, by age, England, February 2020 to January 2022

Notes:

1. Pale grey shaded areas represent periods of national lockdown from 16 March 2020 to 4 July 2020, 5 November 2020 to 1 December 2020 and 6 January 2021 to 8 March 2021. Dark grey shaded areas represent periods of local tiered lockdown from 14 September 2020 to 4 November 2020 and 2 December 2020 to 5 January 2021.

2. A single episode could be recorded as both a fall and a fracture, therefore the separate number of fall and fracture episodes cannot be summed to create a total number of fall and fracture episodes.

3. If a patient is transferred between consultants or health care providers during their hospitalisation, this may be recorded as more than one hospital episode. Therefore, it is possible that a single fall or fracture could be counted more than once in this analysis.

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The number of frail fall and fracture episodes peaked in May 2020 across these age groups. They also remained higher than expected following the end of the third national lockdown.

The sustained increase in frail fall and fracture episodes following the third national lockdown was most pronounced in pension-age adults. This complements the trends seen for the overall population. It suggests a sustained elevated risk of older, frail individuals incurring a fall or fracture following the prolonged national lockdown periods. Those aged 80 years and over may have chosen to adopt lifestyle changes that also reduced their risk outside of periods of public health intervention.

7 . Regional differences in fall and fracture episodes

Regional differences in the number of episodes could be attributed to disparities in the way different hospitals code admission causes on hospital episode records. Differences could also have been introduced or increased during the coronavirus (COVID-19) pandemic, when there were additional pressures on hospital resources. However, the initial drop in the number of fall and fracture episodes was observed across all regions at the onset of the pandemic, reaching the lowest levels in April 2020.

Fall episodes in the South East, the North West and Yorkshire and The Humber greatly exceeded expected levels during the first national lockdown, and upon the ending of lockdown measures in April 2021. This had a significant effect on the national trend (Figure 7).

This could indicate that people living in these areas were either more vulnerable following periods of isolation and immobility or took more risks when these restrictions were removed.

Figure 7: Increases in fall episodes post-lockdown primarily came from patients in the South East, the North West, and Yorkshire and The Humber

Total number of fall episodes and expected baseline episodes based on historical data modelling with 95% confidence intervals, by region, England, February 2020 to January 2022

Notes:

1. Pale grey shaded areas represent periods of national lockdown from 16 March 2020 to 4 July 2020, 5 November 2020 to 1 December 2020 and 6 January 2021 to 8 March 2021. Dark grey shaded areas represent periods of local tiered lockdown from 14 September 2020 to 4 November 2020 and 2 December 2020 to 5 January 2021.

2. A single episode could be recorded as both a fall and a fracture, therefore the separate number of fall and fracture episodes cannot be summed to create a total number of fall and fracture episodes.

3. Regional differences in the number of episodes could be attributed to disparities in the way different hospitals code admission causes on hospital episode records.

4. If a patient is transferred between consultants or health care providers during their hospitalisation, this may be recorded as more than one hospital episode. Therefore, it is possible that a single fall or fracture could be counted more than once in this analysis.

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The number of fall episodes settled below expected levels in London, the South East, the South West and the North West. This suggests a potential lasting impact of public health interventions on fall episodes in these areas, either through behaving more cautiously, or avoiding seeking medical assistance at hospital.

Between October 2020 and January 2021, the number of fall episodes in the East Midlands, London and the South East dropped below expected levels. This coincided with when local tiered lockdowns were imposed in these areas (Figure 7). A similar pattern was observed in the number of fracture episodes (Figure 8).

Figure 8: Decreases in fracture episodes were observed in areas where local tiered restrictions were implemented

Total number of fracture episodes and expected baseline episodes based on historical data modelling with 95% confidence intervals, by region, England, February 2020 to January 2022

Notes:

1. Pale grey shaded areas represent periods of national lockdown from 16 March 2020 to 4 July 2020, 5 November 2020 to 1 December 2020 and 6 January 2021 to 8 March 2021. Dark grey shaded areas represent periods of local tiered lockdown from 14 September 2020 to 4 November 2020 and 2 December 2020 to 5 January 2021.

2. A single episode could be recorded as both a fall and a fracture, therefore the separate number of fall and fracture episodes cannot be summed to create a total number of fall and fracture episodes.

3. Regional differences in the number of episodes could be attributed to disparities in the way different hospitals code admission causes on hospital episode records.

4. If a patient is transferred between consultants or health care providers during their hospitalisation, this may be recorded as more than one hospital episode. Therefore, it is possible that a single fall or fracture could be counted more than once in this analysis.

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In contrast to national trends, the number of fracture episodes in the West Midlands and the North East exceeded expected levels in September 2020 and June 2021.

8 . Coronavirus and the estimated impact on hospital episodes involving falls and fractures, England data

Coronavirus and the estimated impact on hospital episodes involving falls and fractures, England Dataset | Released 28 April 2023 Data on experimental analysis estimating the impact of coronavirus (COVID-19) on the number of hospital episodes involving falls and fractures associated with new-onset frailty and disability.

9 . Glossary

Hospital episode

A hospital episode is a time period within a hospitalisation where the patient is in the continuous care of one consultant or health care provider. A patient may be transferred from one consultant to another during their stay, which would result in there being two or more episode records for the hospitalisation.

Expected episodes

Expected episodes are calculated by Auto-Regressive Integrated Moving Average (ARIMA) models using fall and fracture episodes data from Hospital Episode Statistics (HES) from 1 January 2013 to 23 January 2020. These data are then used to estimate an expected baseline for the number of episodes in the absence of the coronavirus (COVID-19) pandemic, with 95% confidence intervals.

Pandemic period

For the purposes of this research, the pandemic period was defined as 24 January 2020 to 31 December 2021.

National lockdown

National lockdowns are defined as periods of time when lockdown measures were implemented across the whole of England, instructing people to stay at home and restricting them from meeting others.

Frail falls and fractures

Fall and fracture episodes that also included International Classification of Diseases and Related Health Problems 2010 (ICD-10) codes from the Hospital Frailty Score Index, used as a proxy for frailty and disability prevalence in the population.

Working age

Patients aged 19 years to 64 years.

Pension age

Patients aged 65 years to 79 years.

Older age

Patients aged 80 years and older.

Local tiered lockdown

Periods of time when lockdown measures were implemented in specific parts of the country, instructing people to stay at home and restricting them from meeting others.

10 . Data sources and quality

This research looked at hospital episodes taken from NHS England's Hospital Episode Statistics (HES) Admitted Patient Care (APC) database. It focuses on episodes where specific International Classification of Diseases and Related Health Problems 2010 (ICD-10) codes relating to fractures, falls and frailty were present in primary or secondary diagnosis fields.

Auto-Regressive Integrated Moving Average (ARIMA) models were used to establish whether the number of hospital episodes in England involving falls and fractures varied significantly from their forecasted trajectory over the course of the coronavirus (COVID-19) pandemic. We then considered what this might tell us about the incidence of disability and frailty. The models were optimised individually for national, age-stratified, sex-stratified and region-stratified projections.

Read more about the data sources, quality and methods used in our Estimating the impact of coronavirus (COVID-19) on hospital episodes involving falls and fractures, England methodology.

11 . Related links

Coronavirus and the estimated impact on hospital episodes involving fall and fractures – sources and methods, England
Methodology | Released 28 April 2023
The sources and methods used to estimate the impact of coronavirus (COVID-19) on hospital episodes involving falls and fractures associated with new-onset frailty and disability.

12 . Cite this article

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