

The impact of hospitalisation for sepsis on employee earnings and employment status, England: April 2014 to December 2024

The change in employee earnings and employment after hospitalisation for sepsis, compared with 12 to 24 months before hospitalisation.

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1 . Main points

- Sepsis is a serious consequence of untreated infections that develops suddenly and can lead to life-threatening organ dysfunction and long-term complications, such as post-sepsis syndrome, or death.
- Sepsis survivors experienced a sustained decrease in earnings over five years, compared with the 12 to 24 months before sepsis; this was an average decrease of £198 per month in the first six months, and of £8,124 over five years.
- Sepsis was associated with a persistent decrease in the probability of survivors being in paid employment; they remained 2.5 percentage points less likely to be employed five years after hospitalisation for sepsis, compared with the 12 to 24 months before hospitalisation.
- The relative impact of sepsis on employment and earnings over five years was strongest for individuals aged 25 to 29 years, 40 to 44 years, and those in the Black ethnic group.
- Earnings and probability of employment started to decline before hospitalisation for sepsis, suggesting that some of the observed impacts may be attributable to underlying health conditions that increased the risk of sepsis, rather than to sepsis alone.
- Sepsis was associated with a high risk of death, with 37.8% of individuals dying within five years; when accounting for this increased mortality risk, the average loss of earnings was estimated to be £15,863 over five years.

The datasets used in this analysis have been de-identified in a secure virtual environment before they were combined and analysed. The de-identified linked data will only be used for statistical production and research, in line with the [Code of Practice for Statistics](#). Read more in [Section 5: Data sources and quality](#).

This analysis was produced in collaboration with the UK Health Security Agency to better understand the economic consequences of sepsis for individuals and society.

2 . Results of the analysis

Using linked administrative data, the research measures changes in monthly employee earnings and the likelihood of paid employment following hospital admission for sepsis. The findings will help improve understanding of the longer-term impacts of sepsis and inform decisions about the support needs of people affected by the condition.

In this analysis, we estimate the impact of sepsis on employment and monthly employee earnings for a cohort of working-age sepsis survivors (aged 25 to 60 years at disease onset) in England over a follow-up period of five years, compared with the 12 to 24 month period before sepsis. For more information on our methods, please see [Section 4: Glossary](#) and [Section 5: Data sources and quality](#).

Using NHS Hospital Episode Statistics (HES) data, we identified sepsis survivors as individuals who experienced a hospital admission lasting more than two days, with sepsis listed as a primary diagnosis in their episode records (see [Section 4: Glossary](#) for the distinction between admissions and episodes). In our main analysis, we only included individuals who were still alive a year after their sepsis hospital diagnosis.

We used regression models with individual fixed effects to isolate the impact of a hospital diagnosis of sepsis on labour force participation and monthly employee earnings (for the entire sample and among those in work).

Our main results are shown in Figure 1. Further analysis, including breakdowns by age group, sex, ethnic group, region, and relative level of area deprivation, can be found in our [accompanying dataset](#).

Figure 1: Sepsis leads to sustained declines in monthly employee earnings and employment, both immediately and over the five-year follow-up period

Changes in monthly employee earnings (overall and among those in work) and the probability of being in employment before and after sepsis, adults aged 25 to 60 years, hospitalised with sepsis in England between 1 April 2017 and 31 March 2024, compared with 12 to 24 months before diagnosis

Notes:

1. The study cohort comprised individuals who were hospitalised for more than two days with a primary diagnosis of sepsis, which corresponds to one of the four International Classification of Diseases tenth revision (ICD-10) codes (A410, A415, A419, and R572) between 1 April 2017 and 31 March 2024 in England.
2. Only individuals who survived at least 12 months from the onset of sepsis were included; if an individual died after 12 months, their employment and earnings were included in the analysis up to their date of death.
3. The reference period was defined as 12 to 24 months before the onset of sepsis because reductions in earnings and employment are observed in the 12 months before onset, likely because of the influence of underlying health conditions.
4. Month 0 to 1 corresponds to the month of hospitalisation for sepsis.
5. Estimates are presented alongside 95% confidence intervals.
6. Earnings are gross monthly earnings paid to employees in 2024-equivalent values.
7. Being a paid employee is defined as receiving monthly earnings greater than £0.

Over five years, hospitalisation for sepsis was associated with an average loss of £8,124 in earnings. Reductions in earnings and employment are greatest in the first six months following a sepsis diagnosis. Survivors lose an average of £198 (14.9%) per month during this period, compared with the 12 to 24 months before sepsis hospital admission.

As shown in Figure 1, the negative impact on earnings is caused by both a reduction in earnings among those in work (whether from reduced hours or change to lower-paid employment) and an increase in the probability of not being in employment. These effects persist throughout the follow-up period, with monthly earnings remaining £73 (5.5%) lower, on average, five years after hospitalisation.

Relative to the reference period (12 to 24 months before sepsis), individuals aged 25 to 29 years, 40 to 44 years, and those in the Black ethnic group experienced the largest relative reductions in earnings.

As shown in Figure 1, monthly earnings and employment decreased during the year before sepsis, compared with the 12 to 24 months before sepsis. This reflects, in part, a residual confounding from other serious comorbidities (see [Section 5: Data sources and quality](#)).

Hospital admission data for the three years before sepsis suggest that exposed individuals were less likely to be healthy, had over 10 times more hospital admissions (and 20 times more in the six months pre-sepsis), and were more likely to have serious comorbidities (for example, 24.9% had cancer) than a cohort with a similar age and sex profile. See our [accompanying dataset](#) for further detail.

In addition to the main results, we restricted the sepsis cohort to individuals who had not been hospitalised in the 1 to 12 months before their diagnosis. This was done to demonstrate that the estimated impacts are not caused by underlying health conditions. We continued to find significant impacts on earnings and employment, with £8,360 lost over a five-year period. This restricted sample represents 41.1% of total sepsis survivors identified in HES data during the study period and is, therefore, not representative of sepsis survivors more widely.

Sepsis carries a high risk of death. When extending the analysis to all individuals diagnosed with sepsis during the study period, 37.8% of them died within five years of developing it, compared with 10.5% in the matched comparison group.

We captured the loss of earnings caused by the increased risk of death associated with sepsis by assigning values of zero for employment and earnings to those deceased. Accounting for the effect of the increased risk of death caused by sepsis, we found an average loss of £15,863 over five years (compared with £8,124 when looking at survivors only).

3 . Data on the impact of hospitalisation for sepsis on employee earnings and employment status, England: April 2014 to December 2024

[The impact of sepsis hospitalisation on employee earnings and employment status, England: April 2014 to December 2024](#) Dataset | Released 29 July 2026 The change in employee earnings and employment after hospitalisation for sepsis, compared with 12 to 24 months before hospitalisation.

4 . Glossary

Admissions and episodes

In NHS Hospital Episode Statistics (HES), an admission refers to a continuous period of care in a hospital, beginning when a patient is admitted and ending when they are discharged, transferred or have died. An admission comprises one or more episodes of care, with episodes defined as a period of care under a single consultant.

Comorbidity

The term comorbidity refers to other health conditions that occur alongside a person's primary diagnosis (sepsis, in this analysis) and may affect their overall health.

Fixed effects regression

A fixed effects regression model is a statistical model that can be applied to panel data, where there are multiple measurements per individual.

Within the fixed effects model, an individual's labour market status in any time period is compared with their own previous status. This means that all sources of time-invariant confounding (the effect of factors that do not change over time and that influence both the likelihood of treatment and labour market status) are implicitly controlled for.

Sources of time-varying confounding (such as calendar time and ageing) are accounted for by including them as additional terms in the fixed effects regression model.

International Classification of Diseases tenth edition codes and sepsis codes

The International Classification of Diseases tenth edition (ICD-10) is a standardised coding system for medical diagnoses. A four-digit version of ICD-10 codes is used in HES to describe the nature of care and cause of admission.

Because sepsis symptoms vary substantially between individuals, the diagnosis and coding of sepsis in HES is not robust. Accurate diagnosis of sepsis remains challenging, with instances of both under and overdiagnosis, as clinical guidelines and medical practice continue to evolve. There is no consensus in the literature on what combination of ICD-10 codes best capture sepsis for surveillance purposes.

In this analysis, only four sepsis codes, which are widely validated, have been included:

- A410 (Sepsis due to *Staphylococcus aureus*)
- A415 (Sepsis due to other Gram-negative organisms)
- A419 (Sepsis, unspecified)
- R572 (Septic shock)

The majority of cases are coded against A419 (see our [accompanying dataset](#)).

[Confidence intervals](#) are calculated using clustered standard errors to account for correlation between the measurements for each individual.

Inverse probability weights

The type of inverse probability weights used in this analysis is described in Section 4: Glossary of our [The impact of NHS Talking Therapies on monthly employee pay and employment status, England article](#).

Matching

Matching is used in causal inference studies to compare the outcomes of a group of individuals exposed to a specific event (in this case, the onset of sepsis) to a group of individuals with similar characteristics who have not been exposed.

Matching can be used to improve the robustness of estimates by balancing covariates between the groups in studies where exposure to an event or treatment cannot be randomised.

In this study, we used exact matching to define the unexposed group (using [stratified sampling](#)) based on five-year age band, sex, and health status as measured by their main comorbidity in the last 12 months, as recorded in HES (see [Section 5: Data sources and quality](#)).

Relative reduction

The relative reduction is the proportion of the modelled loss in average monthly earnings compared with the average monthly earnings during the reference period.

Sepsis

The term sepsis refers to a spectrum of illnesses caused by an untreated infection when the body becomes dysregulated. The condition develops suddenly and quickly, and can lead to life-threatening organ dysfunction. The most severe form of sepsis is septic shock, characterised by dangerously low blood pressure and organ failure, and carries a high risk of mortality. For more information on sepsis and its incidence and impact in the UK, see the House of Commons Library's [Sepsis Awareness research briefing](#), published on 4 October 2024.

5 . Data sources and quality

Linked datasets

We used an extension of the Public Health Data Asset (PHDA) to include data on employee earnings and employment status. Our de-identified, linked dataset includes data from:

- the 2011 Census
- Hospital Episode Statistics (HES) Admitted Patient Care (APC) records (from 1 April 2009 to 31 March 2024)
- Office for National Statistics (ONS) death registrations (registered between 1 January 2009 and 31 December 2024)
- Pay As You Earn (PAYE) Real Time Information (RTI) records from HM Revenue and Customs (HMRC) (from 1 April 2014 to 31 December 2024)

Datasets were linked using NHS numbers and encrypted National Insurance numbers, using the [ONS Demographic Index \(PDF, 549KB\)](#). All data were de-identified before analysis. More details of the linkage processes are provided in Section 5 of our [The impact of NHS Talking Therapies on monthly employee pay and employment status, England: April 2014 to December 2022 bulletin](#).

PAYE earnings data were processed in line with our monthly earnings and employment estimates from our [Pay As You Earn Real Time Information \(PAYE RTI\) methodology](#) and our [Explaining income and earnings methodology](#) to derive monthly earnings, with multiple records per individual aggregated within each month.

Negative monthly employee earnings values were set to zero and values above the 99.9% centile were capped. Monthly employee earnings were deflated to 2024 prices using our [Consumer Price Index including owner occupier's housing costs \(CPIH\) dataset](#). We defined being a paid employee as receiving more than £0 in earnings in a month.

Inclusion criteria and exposure groups

Individuals were included if they were hospitalised between 1 April 2017 and 31 March 2024 with a primary diagnosis of sepsis in HES. The International Classification of Diseases tenth edition (ICD-10) codes A410, A415, A419 and R572 were used to identify sepsis diagnosis.

Where there were multiple qualifying records for an individual, the earliest was taken. Individuals were excluded if they had a prior primary or secondary diagnosis of sepsis in HES between 1 April 2009 and 31 March 2017. To reduce the inclusion of cases in which sepsis was initially suspected but subsequently ruled out, only admissions lasting more than two days were included.

Sociodemographic information was linked to these individuals from the 2011 Census. The sample was restricted to individuals who were:

- counted in the 2011 Census
- resident in England, as recorded in HES, if available, and the 2011 Census if not
- aged 25 to 60 years on the date of sepsis diagnosis
- linked to NHS and HMRC information

We created a sample of unexposed individuals, comprising individuals counted in the 2011 Census, who did not have a primary or secondary diagnosis of sepsis in their hospital records between 1 April 2009 and 31 March 2024.

These individuals were sampled using stratified sampling (see [definition](#)) by five-year age band and sex to match the age-sex distribution of the sepsis cohort. They were also matched on their main comorbidity in the 12 months before sepsis (the most frequently condition listed as a primary diagnosis in their hospital records).

This matching helped to create a sample of unexposed individuals with main comorbidities that are comparable to the exposed sepsis sample. Sociodemographic information of both the sepsis and comparator group (as well as standardised differences) are provided in our [accompanying dataset](#).

The purpose of this sample was to more accurately adjust for time-varying confounders, which would be partially collinear with the within-individual treatment effect in the exposed cohort. To further account for different trends between individuals who were hospitalised and those who were not, we used inverse probability weights to improve comparability. For definitions of terms used in this bulletin, please see [Section 4: Glossary](#).

In our main analysis, the exposed group was restricted to 33,136 individuals, who were matched to unexposed individuals, and survived for at least 12 months following their sepsis diagnosis.

In additional analyses, the exposed group included:

- 13,609 individuals who had not been hospitalised in the 1 to 12 months before their sepsis diagnosis
- 43,928 individuals, including those who died within 12 months of their sepsis diagnosis

Follow-up

Individuals were followed up for a minimum of one year and a maximum of five years before and after the onset of sepsis, between 1 April 2014 and 31 December 2024. Follow-up time was censored at the earliest of either death or the end of the study period (31 December 2024). Pre-sepsis follow-up was censored when individuals were under 21 years of age.

To account for earnings and employment lost due to death, we conducted a separate sensitivity analysis (see our [accompanying dataset](#)) including all individuals meeting the sepsis diagnosis criteria (no longer filtering out individuals who died before 12 months after diagnosis). In addition, average monthly earnings and employment were calculated without removing individuals at the date of death. Instead, we recorded their earnings and employment status as zero from the time of death onwards.

Quality

The PHDA is a population-level dataset for England. Of the 50,585,645 individuals with a non-imputed record in the 2011 Census and resident in England at the time of the 2011 Census, 94.4% (47,729,962) could be linked to both NHS and HMRC information.

The PAYE data cover employees only. Therefore, self-employed people are recorded as receiving zero earnings and categorised as not a paid employee for the purposes of this analysis (approximately 13% of working people are self-employed rather than employees, as recorded in our [Labour Force Survey dataset](#)). People who are employed but not currently receiving pay (for example, on maternity leave and not receiving maternity pay) are also categorised as not a paid employee.

We did not have reliable data on hours worked. Therefore, we were unable to distinguish changes in hours worked from hourly pay changes. We were also not able to distinguish sick pay from regular pay. For this reason, we could not investigate the effects of hospitalisation for sepsis on long-term sickness absence.

The estimated impact of sepsis on employment and earnings was likely to include some effects from residual confounding factors because of comorbidities. This is because individuals who developed sepsis commonly had serious comorbidities and experienced a decline in health pre-sepsis as a result of their conditions (as shown by the analysis of their hospital records pre-sepsis in our [accompanying dataset](#)).

To reduce the extent to which the estimates captured the effects of comorbidities rather than sepsis itself, we applied the following adjustments:

- matching the exposed and unexposed group based on main comorbidity 12 months pre-sepsis (as noted in their hospital records), in addition to matching on five-year age group and sex
- including a variable in the inverse probability weights to capture the number of times an individual had been admitted in the 1 to 6 months pre-sepsis (to help control for severity)

Despite these adjustments, we observed a statistically significant pre-trend in the main analysis. The data available from HES are not sufficiently detailed to capture the full extent of the health issues experienced in the sepsis cohort.

Although evidence of a pre-trend suggests that some residual confounding may remain, it does not invalidate the findings. For example, when restricting the exposed cohort to individuals who had not been hospitalised in the 1 to 12 months before sepsis, impacts on employment and earnings remained statistically significant.

6 . Related links

[Sepsis awareness](#)

Research briefing | Released 4 October 2024

House of Commons Library briefing providing background information about sepsis, its health impacts on society, the literature in the UK, and epidemiological information (including relating to hospitalisation).

[Sepsis recovery and post sepsis syndrome](#)

Webpage | Static

The UK Sepsis Trust's page summarising information about post-sepsis and other long-term impairments for sepsis survivors. It provides guidance for those returning to work, as well as contact information for carers and survivors requiring support.

[Impact of health conditions requiring hospitalisation on earnings, employment and benefits receipt, England: April 2014 to December 2022](#)

Article | Released 25 June 2025

The change in earnings, probability of being a paid employee and probability of benefits receipt attributable to having a major condition requiring hospital admission, compared with a reference period before the hospital admission.

[Using the power of linked data to understand factors preventing people from working](#)

Blog | Released 5 December 2023

Emma Rourke explains how linked, population-level data can improve our understanding of the interplay between health and work, with the goal of improving the wellbeing of individuals and the economy.

[Labour market overview, UK: July 2026](#)

Bulletin | Released 21 July 2026

Estimates of employment, unemployment, economic inactivity and other employment-related statistics for the UK.

[Rising ill-health and economic inactivity because of long-term sickness, UK: 2019 to 2023](#)

Article | Released 26 July 2023

Experimental statistics estimating the different health conditions of the working-age population and those economically inactive because of long-term sickness.

7 . Cite this statistical bulletin

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