# Justification for new HES denominators methodology

## Purpose:

SSNAP uses HES data from previous years to calculate a denominator for each routinely admitting team to set “expected” numbers of future admissions per year. SSNAP wishes to check and validate the number of records each team has submitted to the audit in previous years against the contemporaneous HES for that time period, and to set expected figures for the upcoming year. Comparing the number of SSNAP admissions to the expected figure for each team is an important validation for SSNAP, and acts as a measure of case ascertainment for England.

Previously, SSNAP have calculated team-level denominators based on the number of HES records with a primary diagnosis of stroke (I61, I63, I64) and with an episode order number of 1. However, due to differences in the way HES and SSNAP record information about each admission, it is felt that this methodology likely over-estimates the number of stroke admissions, as it risks double-counting a single admission for stroke if a patient is transferred between providers.

The updated methodology therefore seeks to reduce the double counting of stroke admissions due to transfers both within and between Trusts, and to improve the assignment of each stroke admission to the hospital that treats the patient first. The updated methodology therefore first identifies “continuous inpatient stays” (CIPs) where one of the HES records in the CIP has a primary diagnosis of stroke, before assigning that CIP to the first hospital treating the patient during that inpatient stay. This ensures as close a match as possible between the interpretation of each SSNAP admission, and each HES CIP, and between the SSNAP team who starts the SSNAP record (the first team to admit the patient to hospital for stroke), and the first hospital recorded in HES treating the patient for a stroke continuous inpatient stay.

## Method:

### Data requested from NHS Digital:

SSNAP sends a download of patient identifiers to NHS Digital for linkage. NHS Digital returns to SSNAP a file containing **all** HES records (whether stroke or otherwise) for that financial year for:

* Any patient identified in the SSNAP dataset
* Any patient identified in HES as having at least one HES record with an ICD code of I61, I63 or I64.

For 2014-15, a HES file containing 638,209 records, relating to 155,776 patients was returned from NHS Digital.

### Flow:

* 638,209 records, relating to 155,776 patients
  + Of these, 5 records had no dates[[1]](#footnote-1) recorded so were dropped, leaving 638,204 records for 155,775 patients. Of these, 83,592 patients had a record with a primary diagnosis of stroke
    - 91,473 records duplicated the HES\_id, admission\_date and discharge\_date, and had no stroke diagnosis in any of the diagnosis fields. These records were therefore dropped.
    - 27,836 records duplicated the HES\_id, admission\_date and discharge\_date, and had a less primary stroke diagnosis than other records with the same information for the same patient. These records were therefore dropped.
    - Following the above deductions, 518,895 HES records for 152,011 patients remain, 83,592 of these patients have a record with a primary diagnosis of stroke.

However, some of these 83,592 patients may have had more than 1 admission in the year for stroke, where the admissions were separate with the patient leaving hospital care between admissions. We therefore sought to identify continuous inpatient stays (CIPs).

We investigated the difference in the number of CIPs if no gap between HES records was allowed, and if a gap of 1-2 days was allowed.

* Of these 518,895 records:
  + 349,396 CIPs with no gap between HES records were identified, of which 87,159 had a primary diagnosis of stroke
  + 310,053 CIPs with less than 3 days between HES records were identified, of which 86,284 had a primary diagnosis of stroke

This is a difference of **875 CIPs** with a primary diagnosis of stroke, depending on the allowable gap between HES records for the same patient.

NHS Digital provides a methodology for linking HES episodes to create CIPs: <http://content.digital.nhs.uk/media/11859/Provider-Spells-Methodology/pdf/Spells_Methodology.pdf>. SSNAP have sought to replicate this method, however, the NHS Digital method does **not** join together two provider spells where the discharge destination of the first spell is 19 and the admission source of the next spell is 51 and the admission method of the next spell is 21, where the difference between the discharge date of the first provider spell and the admission date of the next provider spell is between 0 and 2 days inclusive. However, this relies upon the discharge destination, admission source and admission method fields in the HES data to be accurately completed. In order to assess whether these fields are accurately recorded in the HES data and therefore the best methodology for calculating CIPs, SSNAP compared the readmission information in HES to that in SSNAP.

***Comparison of readmission information in HES and SSNAP:***

*In the SSNAP dataset, less than 200 patients per year were readmitted to hospital for stroke either the day after being discharged from hospital for a previous admission for stroke, or the day after that.*

*If CIPs with a gap of 1-2 days between records are only treated as separate stroke admissions where there is no evidence of transfer[[2]](#footnote-2) in the sameday CIPs being joined together to create a 3day CIP, there would be only 435 extra admissions. This would mean there were 440 instances of patients being discharged from hospital and then readmitted to hospital for stroke either the day after, or the day after that.*

*Although 440 is higher than 200, since it is in the right order of magnitude, CIPs with a gap of 1-2 days but without evidence of transfer were therefore counted as separate admissions.*

The comparative exercise demonstrated that the right order of magnitude of patient readmissions were counted when using an approximation of the NHS Digital methodology without the exclusion criteria based on the combination where discharge destination of the first spell is 19 and the admission source of the next spell is 51 and the admission method of the next spell is 21. We therefore decided to drop this exclusion from the SSNAP methodology for calculation of CIPs for stroke.

The updated methodology therefore counts HES records as a single continuous inpatient stay for:

* patients with a gap of 1-2 days if there is sufficient evidence of transfer[[3]](#footnote-3) in their HES records,
* patients with no gap between HES records

Overall, this gives **86,719** CIPs with a primary diagnosis of stroke.

***Justification for using only CIPs with a primary diagnosis of stroke:***

*Of the 86,719 CIPs with a primary diagnosis of stroke, the majority linked, based on the patient’s NHS number, with at least one SSNAP record. However, for CIPs with a 2nd diagnosis of stroke, only a minority linked with a SSNAP record (and that may have been for a different admission). It is therefore reasonable to conclude that HES records with a primary diagnosis of stroke are the best comparator to SSNAP admissions.*

***External validation:***

*Deriving this new method was undertaken in collaboration with Public Health England (PHE). The method for determining the denominators was run on PHE’s HES data which additionally contains HES records for non-stroke patients. Using PHE’s data gave 86,285 CIPs with a primary diagnosis of stroke, which compares very favourably with the 86,710 CIPs with a primary diagnosis of stroke in SSNAP’s HES data.*

### Determining trust-level and team-level expected figures:

Each of the 86,719 CIPs were assigned to the first provider within the CIP (i.e. the provider with the earliest admission date for the CIP). Of these 86,719 CIPs, 805 were assigned to 81 trusts with <55 stroke admissions. These 81 trusts are primarily Partnership and Community trusts. Admissions to such trusts are outside the inclusion criteria for SSNAP. When admissions to such trusts are excluded, the total number of CIPs for England in 2014-15 from the HES data is **85,914** admissions for 142 trusts.

These expected figures can be updated over time if teams submit evidence of changes in their number of admissions in clinical coding as recorded from their IT department’s clinical coding data for the relevant time period.

#### Single stroke hospital per Trust

The HES data contains both hospital and Trust code. SSNAP sets expected figures at team level, which normally matches the hospital code. For the majority of Trusts, there is only one stroke hospital within the Trust, and all HES records will be assigned to that hospital when setting the expected number in SSNAP.

#### Multiple stroke hospitals per Trust

However, for a minority of Trusts, there are 2 or 3 hospitals treating stroke with the Trust. In these cases, the number of HES records assigned to each hospital code within the Trust will be cross-referenced with the number submitted by each SSNAP team. Where the sum of the submitted records for all hospitals within the Trust is not similar to the Trust’s HES number, SSNAP will ensure that the expected numbers for the hospitals within a Trust add up to the overall number in HES for the Trust using the available information. For example, there are 3 stroke hospitals within the Heart of England NHS Foundation Trust; Birmingham Heartlands Hospital, Good Hope General Hospital and Solihull Hospital. Each of these 3 hospitals has submitted records to SSNAP, and each of the 3 hospitals has a separate NHS code within the HES data.

In a handful of Trusts, 2 SSNAP teams have submitted records separately as the Trusts runs two separate stroke services based in different locations, but the HES return has been made under a single hospital code. For these Trusts, the HES denominator will be shared between the 2 SSNAP teams whilst maintaining the proportion of patients admitted to each hospital within the Trust from the SSNAP data.

Where a hospital within a Trust with more than 1 stroke hospital supplies evidence that their expected number derived from HES does not match their internal coding, SSNAP will seek to reassign the difference to the other hospitals within the Trust in order to maintain the overall denominator, or will require evidence from all hospitals within the Trust to reduce the Trust’s overall denominator.

#### Missing hospital code in HES data

However, the degree to which the hospital code is completed within the HES data varies between Trusts. For example, there are a few Trusts that submitted part (but not all) of their HES records under incomplete hospital codes. For these Trusts, SSNAP will investigate the number of stroke admitting hospitals within that Trust and where there is only one hospital, SSNAP will assign the total Trust figure to that hospital.

#### Trusts not routinely admitting strokes in SSNAP

Where the information on the Trusts in HES does not neatly align with the routinely admitting trusts in SSNAP or where Trusts do not match any SSNAP participating acute service, SSNAP will contact these Trusts to open discussions regarding the reasons for the discrepancy between the numbers recorded as direct admissions in SSNAP and the denominators using the new HES methodology.

### Determining CCG-level population based expected figures:

In addition to splitting the HES data by the hospital the patient was first admitted to, it is also possible to split the data based on the geographic area the patient resides in. The geographic area is the Clinical Commissioning Group (CCG) area, based on the CCG of residence recorded in the HES data. The number of stroke admissions per CCG in the HES data can then be compared with the number of patients per CCG in the SSNAP data, based on the patient’s postcode of residence as recorded by the inpatient team treating the patient.

## Summary:

The new methodology improves the ability to compare SSNAP figures with HES submissions and reduces the risk of double-counting where a patient is transferred between providers. The number of continuous inpatient stays for stroke in England in 2015-16 is **85,914** admissions.

The new method was derived in collaboration with PHE, and externally validated against PHE’s HES data. Very similar national figures were derived from both sets of HES data.

The new methodology also improves the assignation of continuous inpatient stays to the relevant provider, and SSNAP will collaborate with Trusts to understand and minimise the mismatches between HES and SSNAP data that remain.

## Recommendations:

* Continue to use HES as a comparator using the new methodology described above, whilst understanding the limitations of this approach and seeking further evidence from providers where necessary
* Contact teams with their updated expected figures using the template in Appendix 1
* Be reassured that figures for England and per CCG are robust, and use the new England figure as the estimate of the number of stroke admissions in England.

## Further work:

1. A similar methodology will be applied to data from Wales (Patient Episode Database for Wales; PEDW) to derive updated expected figures for Welsh health boards.
2. Trusts and Welsh health boards will be contacted using the template in Appendix 1. Trusts and health boards will be given the opportunity to provide evidence if the number does not match local coding data. SSNAP will assess the reasons given for any such mismatch and adjust the expected figures or methodology where necessary.
3. Due to information governance requirements in Northern Ireland SSNAP are unable to undertake patient-level linkage with the equivalent national administrative datasets, therefore this method cannot be used to triangulate the expected numbers for the SSNAP data. Instead, information from previous acute organisational audits, and communication with the Trusts is used to set appropriate expected numbers for each of the hospitals in Northern Ireland. In future, these figures will be cross referenced against nationally reported statistics from the Department of Health in Northern Ireland.

## Appendix 1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
| 2016-17: |  |  |  |  |  |
| There is a mismatch between your expected number and your HES submissions, and between your SSNAP submission and your HES number in 2016-17. | | | | | |
|  |  |  |  |  |  |
| Your current expected number is: 1300 | | |  |  |  |
| **We therefore propose to increase your expected number to 1700 for 2018-19.** | | | | | |
| We may need to revise your case ascertainment for previous years in light of this new information. | | | | |  |
|  |  |  |  |  |  |
|  |  | Your trust | Hospital A | Hospital B |  |
| 2016-17 |  |  |  |  |  |
|  | SSNAP submission | 1200 | 550 | 650 |  |
|  | Expected figure | 1300 | 550 | 750 |  |
|  | HES figure | 1700 | 800 | 900 |  |
|  |  |  |  |  |  |
| In this year: | |  |  |  |  |
|  | Your expected number was similar to your SSNAP submission | | | | |
|  | Your HES number was higher than your SSNAP submission | | | |  |
|  | Your expected number was lower than your HES number | | | |  |
|  |  |  |  |  |  |
| Over time: | |  |  |  |  |
|  | Over time, your SSNAP submissions have increased slightly | | | |  |
|  | Over time, your expected number has increased slightly | | | |  |
|  | Over time, your HES number has increased | | |  |  |
|  |  |  |  |  |  |
|  |  | Your trust | Hospital A | Hospital B |  |
| 2015-16 |  |  |  |  |  |
|  | SSNAP submission | 1200 | 550 | 650 |  |
|  | Expected figure | 1300 | 550 | 750 |  |
|  | HES figure | 1300 | 550 | 750 |  |
|  |  |  |  |  |  |
| In this year: | |  |  |  |  |
|  | Your expected number was similar to your SSNAP submission | | | | |
|  | Your HES number was similar to your SSNAP submission | | | |  |
|  | Your expected number was similar to your HES number | | | |  |
|  |  | Your trust | Hospital A | Hospital B |  |
| 2014-15 |  |  |  |  |  |
|  | SSNAP submission | 1100 | 500 | 600 |  |
|  | Expected figure | 1200 | 550 | 650 |  |
|  | HES figure | 1300 | 550 | 750 |  |
|  |  |  |  |  |  |
| In this year: | |  |  |  |  |
|  | Your expected number was similar to your SSNAP submission | | | | |
|  | Your HES number was higher than your SSNAP submission | | | |  |
|  | Your expected number was similar to your HES number | | | |  |

1. The method primarily utilises the HES admission and discharge dates, but where missing or inconsistent, it utilises epistart and epiend dates, as well as speldur. [↑](#footnote-ref-1)
2. As defined by a disdest of 49, 50, 51, 52, 53, 84, or an admisorc of 49, 50, 51, 52, 53, 87, or an admimeth of 2B or 81. [↑](#footnote-ref-2)
3. As defined by a disdest of 49, 50, 51, 52, 53, 84, or an admisorc of 49, 50, 51, 52, 53, 87, or an admimeth of 2B or 81. [↑](#footnote-ref-3)