**NHS Digital**

**Indicator Supporting Documentation**

**IAP00385 Summary Hospital-level Mortality Indicator (SHMI)**

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| FIELD | CONTENTS |
| IAP Code | IAP00385 |
| Title | Summary Hospital-level Mortality Indicator (SHMI) |
| Published by | NHS Digital |
| Reporting period | Quarterly |
| Geographical Coverage | England |
| Reporting level(s) | NHS Trust |
| Based on data from | Hospital Episode Statistics (HES), ONS deaths registration data |
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| Rating | Fit for use with caveats |
| Assurance date | 19/12/2014 |
| Review date | 19/06/2015 |
| Indicator set | Clinical Indicators |
| Brief Description | The SHMI is the ratio between the actual number of patients who die following hospitalisation at a trust and the number that would be expected to die on the basis of average England figures, given the characteristics of the patients treated there.  It covers all deaths reported of patients who were admitted to non-specialist acute trusts in England and either die while in hospital or within 30 days of discharge. |
| Purpose | The purpose of SHMI is to have a transparent and open measure that is developed to provide a more complete picture of hospital mortality with the inclusion of ALL in-hospital deaths as well as deaths up to 30 days after discharge, which is currently not available in any other summary mortality indicators. This is consistent with the view that hospitals should be interested in what happens to their patients in the period immediately following discharge.  The SHMI is publicly available with the methodology designed to a degree of rigour and openness that will be subject to continuous review and improvement underpinned by a standards-based approach as defined by the Indicator Assurance Process.  The publication of the SHMI is also accompanied by guidelines which help inform appropriate use and interpretation of the indicator and is based on bandings indicating whether a trust is ‘higher than expected’, ‘lower than expected’ or ‘as expected’. |
| Definition | The SHMI is the ratio between the actual number of patients who die following hospitalisation at a trust and the number that would be expected to die on the basis of average England figures, given the characteristics of the patients treated there.  It covers all deaths reported of patients who were admitted to non-specialist acute trusts in England and either die while in hospital or within 30 days of discharge.  The expected number of deaths is calculated from statistical models derived to estimate the risk of mortality based on the characteristics of the patients (including the condition the patient is in hospital for, other underlying conditions the patient suffers from, age, gender, method of admission to hospital, and year of discharge. |
| Data Source | * Hospital Episode Statistics (HES), provider spells level * HES-ONS linked mortality data   A combination of finalised and provisional HES data is used to ensure that the indicator is as timely as possible. |
| Numerator | Observed*p* = the observed number of deaths occurring either in hospital or within 30 days (inclusive) of discharge for each provider *p*. |
| Denominator | Expected*p* = The expected number of deaths occurring either in hospital or within 30 days (inclusive) of discharge for each provider *p*. This is obtained by summing all of the estimated risks for all finished provider spells for provider *p*. |
| Calculation | The calculation of the estimated risk for each provider spell is carried out using logistic regression models.  For each provider *p* the SHMI is defined as  *SHMIp* = |
| Interpretation Guidelines | A combination of finalised and provisional HES data is used to ensure that the indicator is as timely as possible.  HES data are linked with ONS deaths registrations data to enable the capturing of deaths which occur outside of hospital. This is an established data linkage which is routinely carried out by the HSCIC. Full details of the methodology used to carry out the linkage are available on the HSCIC website: <http://www.hscic.gov.uk/article/2677/Linked-HES-ONS-mortality-data>  On rare occasions patients may appear to have activity in HES after the date of death in the HES-ONS linked dataset. This is called ‘subsequent activity’ and is a data quality issue related to either a patient being incorrectly coded in the HES dataset (e.g. an outpatient appointment recorded as attended after date of death) or incorrectly submitted patient identifiers resulting in incorrect linkage between HES and ONS deaths registrations data. |
| Caveats | It is recommended that the indicator is reviewed within six months to determine whether progress has been made with the sponsorship of the indicator and to re-assess the purpose of the indicator in light of this. |

Application Form

Indicator Assurance Service

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| **Title:** | **Summary Hospital-level Mortality Indicator (SHMI)** |
| **Set or domain:** | **SHMI** |
| ***IAS Ref code:*** | ***IAP00385*** |

Version History

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| --- | --- | --- | --- |
| Version | Date | Changed By | Change |
| V1 | 11/07/14 | Simone Chung | Revised application using new form |
| V2 | 22/08/14 | Emily Jackson | Form updated ahead of MRG meeting 05/09/2014 |
| V3 | 27/11/14 | Simone Chung | Form updated ahead of being discussed at MRG 4/12/14 |
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# Application Form

**Introduction /Overview**

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| **1.1 Title** | Summary Hospital-level Mortality Indicator (SHMI). Deaths associated with hospitalisation. |
| **1.2 Set or domain** | N/A |
| **1.3 Topic area** | Mortality indicator, hospital care |
| **1.4 Definition** | The SHMI is the ratio between the actual number of patients who die following hospitalisation at a trust and the number that would be expected to die on the basis of average England figures, given the characteristics of the patients treated there.  It covers all deaths reported of patients who were admitted to non-specialist acute trusts in England and either die while in hospital or within 30 days of discharge.  The expected number of deaths is calculated from statistical models derived to estimate the risk of mortality based on the characteristics of the patients (including the condition the patient is in hospital for, other underlying conditions the patient suffers from, age, gender, method of admission to hospital, and year of discharge. |
| **1.5 Indicator owner & contact details** | Health and Social Care Information Centre  We welcome comments and queries on the methodology detailed by this specification. Please email them to enquiries@hscic.gov.uk (quoting ‘SHMI’ in the subject of your email). |
| **1.6 Publication status** | Currently in publication |

**Rationale**

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| **2.1 Sponsor** |  |
| **2.2 Purpose** | There have historically been several mortality measures used across the NHS. These measures had different specifications, that weren’t publicly available, and led to confusion across the service.  The purpose of SHMI is to have a transparent and open measure that is developed to provide a more complete picture of hospital mortality with the inclusion of ALL in-hospital deaths as well as deaths up to 30 days after discharge, which is currently not available in any other summary mortality indicators. This is consistent with the view that hospitals should be interested in what happens to their patients in the period immediately following discharge.  The SHMI is publicly available with the methodology designed to a degree of rigour and openness that will be subject to continuous review and improvement underpinned by a standards-based approach as defined by the HSCIC Indicator Assurance Process.  The publication of the SHMI is also accompanied by guidelines which help inform appropriate use and interpretation of the indicator and is based on bandings indicating whether a trust is ‘higher than expected’, ‘lower than expected’ or ‘as expected’.  The SHMI can be used locally by individual hospital trusts to assess and investigate their mortality related outcomes compared to the national baseline. Regulators (for example, the Care Quality Commission) and commissioning organisations can also use the SHMI to investigate outcomes for trusts under their jurisdiction.  SHMI values cannot immediately be interpreted as indicating good or bad performance and instead should be viewed as a ‘smoke alarm’ which requires further investigation. As such, the bandings for the SHMI are designed to give an indication of whether a trust’s mortality related outcomes are significantly different from the national baseline. For example, the SHMI (along with the Hospital Standardised Mortality Ratio) was used as a starting point to identify trusts for further investigation by the Keogh Mortality Review in 2013. |
| **2.3 Endorsement** | Following the recommendations from the National Review of the Hospital Standardised Mortality Ratio (HSMR), the Department of Health commissioned the HSCIC to produce and publish the SHMI. The design of the methodology used was developed under the auspices of a national steering group, established by Sir Bruce Keogh, NHS Medical Director and chaired by Ian Dalton, Chief Executive of the NHS Northeast. Membership of the group included a wide range of the leading experts on mortality as well as representatives of key stakeholders comprising clinical, academic, commercial and different interests across the NHS.  The SHMI Technical Working Group support and contribute to the continuing technical work associated with the development and construction of the SHMI. Meetings are chaired by the HSCIC and are held on a quarterly basis. Members of the group include representatives from the Department of Health, Care Quality Commission, HSCIC, Professional Association of Clinical Coders, Public Health England, King's Fund, University Hospitals Birmingham, Dr Foster Intelligence, Dr Foster Unit at Imperial College London, CHKS and Nuffield Trust.  *Link to the SHMI Technical Working Group proceedings on the HSCIC website:* [*http://www.hscic.gov.uk/shmi-tg*](http://www.hscic.gov.uk/shmi-tg)  Known issues are detailed in the SHMI issues log and kept under review.  *Link to the SHMI Methodology Specification Issues Log on the HSCIC website:* [*http://www.hscic.gov.uk/SHMI*](http://www.hscic.gov.uk/SHMI) |
| **2.4 Evidence base** | The design of the methodology used in the calculation of the SHMI was developed under the auspices of a national steering group, established by Sir Bruce Keogh, NHS Medical Director and chaired by Ian Dalton, Chief Executive of the NHS Northeast. Membership of the group included a wide range of the leading experts on mortality as well as representatives of key stakeholders comprising clinical, academic, commercial and different interests across the NHS.  As part of the review, the Department of Health also commissioned independent statistical modelling work, which was carried out by the School of Health and Related Research (ScHARR) at the University of Sheffield and the methodology used is based on their recommendations.  The modelling work requested from ScHARR was to have three objectives i) to undertake a sensitivity analysis of the impact of or interaction between key variables, ii) to illustrate the characteristics and behaviour of the SHMI using historic data iii) to ensure the SMHI is fully replicable by different teams using a common method and data source.  Further details of the work undertaken by ScHARR and a high level summary can be found in the report ‘An evaluation of the Summary Hospital Mortality Index’ under Sections 1 and 2. A copy of the report is available on the HSCIC website under Why are we producing the SHMI? at <http://www.hscic.gov.uk/SHMI>. |
| **2.5 Policy base (or NICE quality standard), related national incentives or critical business question** | Organisations have been using different approaches for monitoring mortality, mostly using variations of tools such as the Hospital Standardised Mortality Ratio (HSMR) and the Risk Adjusted Mortality Indicator (RAMI). However, the different versions of mortality indicators and other assessments of the quality of care can produce different results, and this has inevitably resulted in some confusion across the NHS and the public at large.  A national steering group, established by Sir Bruce Keogh, NHS Medical Director and chaired by Ian Dalton, Chief Executive of the NHS Northeast was asked to look at agreeing a single methodology for a mortality indicator for adoption across the NHS in England. Membership of the group included a wide range of the leading experts on mortality as well as representatives of key stakeholders comprising clinical, academic, commercial and different interests across the NHS. They proposed to adopt a new measure, the SHMI, as outlined in their final report:  [*http://webarchive.nationalarchives.gov.uk/+/www.dh.gov.uk/en/Healthcare/Qualityandproductivity/Makingqualityhappen/NationalQualityBoard/DH\_102954*](http://webarchive.nationalarchives.gov.uk/+/www.dh.gov.uk/en/Healthcare/Qualityandproductivity/Makingqualityhappen/NationalQualityBoard/DH_102954) |
| **2.6 Set or domain rationale, if appropriate** | N/A |

**Data**

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| **3.1 Data source** | Hospital Episode Statistics (HES), provider spells level [1]  HES-ONS linked mortality data [2]  A combination of finalised and provisional HES data is used to ensure that the indicator is as timely as possible. |
| **3.2 Justification of source and others considered** | HES data are collected through administrative systems in secondary care; there is no respondent burden. As the data are submitted by trusts to the Secondary Uses Service (SUS) for the purposes of payment, the coverage is almost complete.  HES data does not allow the identification of deaths which occur outside of hospital. Linking HES data to ONS death registrations data creates a richer dataset which means that deaths occurring outside of hospital within 30 days of discharge can be captured in the SHMI. This is an established data linkage which is routinely carried out by the HSCIC. |
| **3.3 Data availability** | The dataset used for the SHMI publication is 6 months in arrears for the provisional HES dataset and 4 months in arrears for the HES-ONS mortality dataset.  Requests for access to the record level data which are used in the calculation of the SHMI should be directed to the HSCIC’s Data Access Request Service. Restrictions on access to the ONS deaths registrations data means that the indicator cannot be widely replicated.  *Link to the Data Access Request Service on the HSCIC website:* [*http://www.hscic.gov.uk/dars*](http://www.hscic.gov.uk/dars) |
| **3.4 Data quality** | The data used to produce the SHMI are generated from data the trusts submit to SUS. At pre-arranged dates during the year on a monthly basis, a data extract is taken from the SUS data warehouse and this is used to create the HES extract.  Prior to the HES data being made available to users, a number of cleaning rules and validations are applied. Data quality notes are published alongside the data which highlight any specific known issues with the data e.g. issues with fields for a specific provider, coverage issues, mapping issues and links to these data quality notes are provided as part of the SHMI background quality report. Further information on HES data quality and data cleaning rules is available on the HSCIC website: [*http://www.hscic.gov.uk/article/1825/The-processing-cycle-and-HES-data-quality*](http://www.hscic.gov.uk/article/1825/The-processing-cycle-and-HES-data-quality).  A combination of finalised and provisional HES data is used in the calculation of the SHMI to ensure that the indicator is as timely as possible. The relative proportions of finalised and provisional data that are used are dependent on the publication timetable and vary between quarterly releases. Data quality for finalised data is expected to be better than that for provisional data, as providers are given the opportunity to revise and update their submissions for the year.  Clinical coding can vary between trusts. For example, there is considerable variation in the way that palliative care coding guidelines are interpreted and applied by different trusts. Similarly, some trusts have reported that their SHMI value may be impacted by the under-coding of secondary diagnoses in their data, resulting in a lower Charlson Comorbidity Index.  It has come to our attention that there may be several trusts who are unable to record still births with a discharge method of ‘Baby was still born’ on their patient administration system (PAS) and are instead coding these records with a discharge method of ‘Died’. This means that such records will be included in the calculation of the SHMI where they should have been excluded. The impact on the overall SHMI value for affected trusts is small. |
| **3.5 If data quality is considered low, is an aim of the indicator to drive up data quality?** | N/A  *If yes, please outline the data quality improvement plan below:* |
| **3.6 Quality assurance** | Prior to the HES data being made available to users, a number of cleaning rules and validations are applied. Data quality notes are published alongside the data which highlight any specific known issues with the data e.g. issues with fields for a specific provider, coverage issues, mapping issues. Further information on HES data quality and data cleaning rules is available on the HSCIC website: [*http://www.hscic.gov.uk/article/1825/The-processing-cycle-and-HES-data-quality*](http://www.hscic.gov.uk/article/1825/The-processing-cycle-and-HES-data-quality)  Following the generation of the SHMI, the total number of finished provider spells for each provider is compared to the number for the previous publication as a basic data quality check. This check is designed to identify any potential coverage issues for particular providers (e.g. due to data submission errors) and any anomalies are followed up with the HSCIC’s HES Data Quality team. Where issues are identified, appropriate caveats are included on the publication.  Trusts are provided with pre-release access to their own SHMI values around 10 days prior to publication through the Clinical Indicator Previewer for the purposes of quality assurance. Trusts are able to raise queries on the values, and where issues are identified appropriate caveats are included on the publication. |
| **3.7 Data linkage** | HES data are linked with ONS deaths registrations data to enable the capturing of deaths which occur outside of hospital. This is an established data linkage which is routinely carried out by the HSCIC. Full details of the methodology used to carry out the linkage are available on the HSCIC website: [*http://www.hscic.gov.uk/article/2677/Linked-HES-ONS-mortality-data*](http://www.hscic.gov.uk/article/2677/Linked-HES-ONS-mortality-data)  The following rules are used to link the date of death in the HES-ONS linked dataset to the last provider spell for that patient in the SHMI dataset:  All discharge episodes from the filtered HES provider spells dataset (see data filters section) are identified for joining using the field P\_SPELL\_LAST\_EPISODE = ‘Y’.  The HES-ONS linked mortality dataset is joined to the HES provider spells dataset for each patient using the following rules:   * Where a HESID has only one provider spell:   + the HES-ONS linked mortality dataset is joined to the HES provider spells dataset using the HESID to HESID\_MAPPED fields * Where a HESID has more than one provider spell:   + the HES-ONS linked mortality dataset is joined to the HES provider spells dataset using the HESID to HESID\_MAPPED fields and the provider spell with the latest (maximum) P\_SPELL\_DISDATE * Where a HESID has more than one provider spell and where multiple provider spells have the same latest (maximum) discharge date:   + the HES-ONS linked mortality dataset is joined to the HES provider spells dataset using the HESID to HESID\_MAPPED fields and the provider spell number with the highest (maximum) P\_SPELL\_NUMBER |
| **3.8 Quality of data linkage** | This is an established data linkage which is routinely carried out by the HSCIC.  On rare occasions patients may appear to have activity in HES after the date of death in the HES-ONS linked dataset. This is called ‘subsequent activity’ and is a data quality issue related to either a patient being incorrectly coded in the HES dataset (e.g. an outpatient appointment recorded as attended after date of death) or incorrectly submitted patient identifiers resulting in incorrect linkage between HES and ONS deaths registrations data.  Analysis on the SHMI dataset for the period January 2011 – December 2013 shows that approximately 0.16% of records are flagged with subsequent activity. Around 0.05% of in hospital deaths in the dataset are not processed as an event of death, because there is a later record in the dataset which the death record is linked to. This problem is not specific to any particular trust or diagnosis group and so the overall impact on SHMI values at trust level is negligible. The HES development team are continuing to review this and to refine the data linkage methodology which will further reduce the impact.  This was discussed at the July 2014 meeting of the SHMI Technical Working Group, where the group agreed that no further action was required due to the negligible impact of subsequent activity on the SHMI. |
| **3.9 Data fields** | The data fields required for the calculation of the SHMI and accompanying contextual indicators are as follows:  **HES provider spells dataset:**  • HESID\_MAPPED Individual patient identifier  • P\_SPELL\_NUMBER Identifies unique provider spells  • P\_SPELL\_START\_AGE Age of the patient at the start of the spell  • CLASSPAT Patient classification  • SEX Sex of patient  • P\_SPELL\_ADMIMETH Method of admission to hospital  • P\_SPELL\_ADMIDATE Admission date to hospital  • DIAG\_1 Primary diagnosis code  • DIAG\_2 – DIAG\_20 Secondary diagnosis codes  • P\_SPELL\_DISMETH Discharge method for provider spell  • P\_SPELL\_DISDATE Discharge date for provider spell  • PROCODET\_MAPPED Provider code for spell mapped to current providers  • P\_SPELL\_FIRST\_EPISODE Identifies the first episode in a provider spell  • P\_SPELL\_LAST\_EPISODE Identifies the last episode in a provider spell  • P\_SPELL\_EPIORDER Identifies the order of episodes with each spell  • TRETSPEF The specialty in which the consultant was working during the period of care  • IMD04RK The Index of Multiple Deprivation (IMD) overall rank  **HES-ONS linked mortality dataset:**  • HESID Individual patient identifier  • DOD HES-ONS linked date of death |
| **3.10 Data filters** | The following filters are applied to the HES provider spells dataset prior to linking to the HES-ONS linked mortality dataset:  Select providers prior to linking date of death:  Field Name: **PROCODET\_MAPPED**  Condition:  a. OR b. defined as follows:   1. Begins with ‘R’ except any of the provider codes listed in Appendix C.1 - Specialist Hospitals AND Appendix C.2 – Mental Health Trusts and Community Hospitals 2. Includes ‘5QT’   Select time period prior to linking date of death:  Field Name: **P\_SPELL\_DISDATE**  Condition:  The 36 month period specified in the SHMI publications timetable [3] + 30 days  The following data filters are applied to the first episode of the spell, identified by P\_SPELL\_FIRST\_EPISODE = ‘Y’ of the HES provider spells dataset after linking to the HES-ONS linked mortality dataset:  Select time period:  Field Name: **P\_SPELL\_DISDATE**  Condition:  For creating the risk model: the 36 month period specified in the SHMI publications timetable [3] is used. For scoring the indicator: the 12 month period specified in the SHMI publications timetable [3] is used. For the contextual indicators: the same dataset as for scoring the SHMI  Remove still births from the dataset:  Field Name: **P\_SPELL\_DISMETH**  Condition: NOT equal to 5  Remove day cases, regular day attenders and regular night attenders from the dataset  Field Name: **CLASSPAT**  Condition: NOT equal to 2, 3 or 4  Remove activity for provider 5QT where the admission date is on or after 1st April 2012  Field Name: **PROCODET\_MAPPED, P\_SPELL\_ADMIDATE**  Condition: PROCODET\_MAPPED = ‘5QT’ AND P\_SPELL\_ADMIDATE >= ‘01-Apr-2012’ |
| **3.11 Justifications of exclusions & how these adhere to standard definitions** | Specialist trusts, mental health trusts, community trusts and independent sector providers are excluded from the SHMI because there are important differences in the case-mix of patients treated there compared to non-specialist acute trusts and the SHMI has not been designed for these types of trusts.  A rolling one year dataset is used to score the SHMI. A three year dataset is used in the construction of the statistical models to aid in model convergence. As mortality outcomes tend to improve over time, a risk adjustment variable for the year of discharge is included in the statistical models. An additional 30 days at the end of the three year period are selected prior to linking spells to date of deaths from the HES-ONS mortality data to ensure that mortality events occurring in the 30 day post discharge period are assigned to the correct provider spell.  Stillbirths are removed from the dataset due to inconsistencies in coding between trusts (some trusts include them within SUS whereas others do not). Also, ONS include still births in their birth registrations dataset and not in death registrations. Therefore, they are not recorded in the HES-ONS mortality dataset from the ONS data. HES death data added to the linked HES-ONS mortality dataset uses only DISMETH = ‘4’ (Died). Stillbirths in HES are identified using the criteria of DISMETH = ‘5’ (Baby was stillborn). Stillbirths are therefore not recorded in the HES-ONS mortality dataset.  Day cases, regular day attenders and regular night attenders are excluded from the calculation as they are a low risk group of patients and considered outside the scope of the SHMI.  Prior to 1st April 2012, all activity for Isle of Wight was identified by the organisation code ‘5QT – Isle of Wight NHS Primary Care Trust’. From 1st April 2012, a new code ‘R1F – Isle of Wight NHS Trust’ was created following the transfer of provision of services from Isle of Wight NHS Primary Care Trust to Isle of Wight NHS Trust. Therefore, activity with a provider code of 5QT and an admission date on or after 1st April 2012 is excluded from the dataset. Activity with a provider code of 5QT and an admission date prior to 1st April 2012 is included. |
| **3.12 Data processing** | Definition of event:  For this indicator the event is defined as a death that occurred either in-hospital or within 30 days (inclusive) of being discharged from hospital:  Condition:  Both a. AND b. are true. Defined as follows:  a. DOD – P\_SPELL\_DISDATE < 31  b. P\_SPELL\_ADMIDATE ≤ DOD  Rationale:  Condition b. prevents events being assigned where a patient is recorded as dead before their spell in hospital begins.  Note: It is possible for condition a. to return a negative number. Possible causes for this are: the patient may have died late at night and the hospital were unable to record the discharge until the next day, or, the patient may have died on a previous day but was not released until tests were performed on a subsequent day.  Two new variables *Died* and *Survived* are created. An event has occurred when Died = 1.  1 and *Survived* = 0 IF condition met;  *Died* =  0 and *Survived* = 1 otherwise.  Pre Data Processing:  Field Name: **DIAG\_1**  Condition: For each provider spell, DIAG\_1 is based on the primary diagnosis of the first episode. However, if the primary diagnosis of the first episode of the provider spell is an R code (chapter XVIII in the ICD-10 classification - Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified), DIAG\_1 will then be based on the primary diagnosis from the second episode. If the primary diagnosis from the second episode is also an R code, DIAG\_1 is then reverted to be based on the primary diagnosis from the first episode. P\_SPELL\_EPIORDER is used to identify the episode order.  Field Name: **P\_SPELL\_CHARLSON**  Condition: Where the second episode of the provider spell is used to derive the primary diagnosis, the secondary diagnosis fields from the second episode are used to calculate the Charlson Comorbidity Index. Otherwise, the secondary diagnosis fields from the first episode of the provider spell are used. Details of the calculation of P\_SPELL\_CHARLSON are provided in Appendix D: Charlson Comorbidity Index Calculation.  Field Name: **P\_SPELL\_ADMIMETH**  Formulae: If P\_SPELL\_ADMIMETH is <NULL> then SET P\_SPELL\_ADMIMETH = 99  Rationale: This condition sets all missing methods of admission to not known.  Field Name: **SEX**  Formulae: If SEX is <NULL> then SET SEX = 9  Rationale: This condition sets all missing sexes of patients to not specified.  Field Name: **P\_SPELL\_DISDATE**  Formulae: 1 for the 1st most recent 12-month period in the dataset  YEAR\_INDEX = 2 for the 2nd most recent 12-month period in the dataset  3 for the 3rd most recent 12-month period in the dataset  Rationale: This condition assigns an index to the 3 year dataset according to a 12-month period. New field name YEAR\_INDEX.  Field Name: **PROCODET\_MAPPED**  Formulae: If PROCODET\_MAPPED = ‘5QT’ then SET PROCODET\_MAPPED = ‘R1F’  Rationale: This condition maps activity for ‘5QT – Isle of Wight NHS Primary Care Trust’ to ‘R1F – Isle of Wight NHS Trust’.  Note: Prior to 1st April 2012, all activity for Isle of Wight was identified by the organisation code ‘5QT – Isle of Wight NHS Primary Care Trust’. From 1st April 2012, a new code ‘R1F – Isle of Wight NHS Trust’ was created following the transfer of provision of services from Isle of Wight NHS Primary Care Trust to Isle of Wight NHS Trust.  Data Processing:   * **P\_SPELL\_START\_AGE**  Category numbers for this field are listed in Appendix B.1 – Age. New field name STARTAGE. * **P\_SPELL\_ADMIMETH**  Category numbers for this field are listed in Appendix B.3 – Admission Method. New field name ADMIMETH. * **SEX**  Category numbers for this field are listed in Appendix B.4 – Sex. New field name GENDER. * **DIAG\_1**  Diagnoses in this field are recorded using ICD-10 codes [4]. These are assigned to CCS categories using the amended AHRQ CCS ICD-10 lookup table supplied by the Dr Foster Unit at Imperial College London [5]. These CCS categories are then grouped into diagnosis groups as detailed in Appendix A: CCS Diagnosis Groupings. New field name DIAG\_GROUP. * **P\_SPELL\_CHARLSON**  Category numbers for this field are listed in Appendix B.2 – Charlson Comorbidity Index. New field name CHARLSON\_INDEX. |

**Construction**

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| **4.1 Numerator** | *Observedp* = the observed number of deaths occurring either in hospital or within 30 days (inclusive) of discharge for each provider *p*. |
| **4.2 Denominator** | *Expectedp* = The expected number of deaths occurring either in hospital or within 30 days (inclusive) of discharge for each provider *p*. This is obtained by summing all of the estimated risks for all finished provider spells for provider *p*. The calculation of the estimated risk for each provider spell is carried out using logistic regression models and further details are provided in the ‘Risk adjustment variables and methodology’ section below. |
| **4.3 Computation** | For each provider *p* the SHMI is defined as *SHMIp* = |
| **4.4 Risk adjustment or standardisation type** | Logistic Regression Model |
| **4.5 Justification of risk adjustment type** | A logistic regression model is used to calculate the expected number of events because the outcome variable is a binary variable (died or survived). |
| **4.6 Risk adjustment variables and methodology** | A full main effects only logistic regression model with a logit link function is derived for each of the 140 SHMI diagnosis groups *d* (identified by the variable DIAG\_GROUP).  The independent case-mix variables used in the construction of the models are:  • STARTAGE Age group at start of spell  • CHARLSON\_INDEX Charlson Comorbidity Index group  • ADMIMETH Admission method group  • GENDER Gender group  • YEAR\_INDEX Year index  Each distinct combination of values for these variables defines a distinct case-mix *j*.  The 1st category is used as the reference category for the CHARLSON\_INDEX and YEAR\_INDEX variables. The category with the highest number of records across the three year dataset for each diagnosis group is used as the reference category for the STARTAGE, ADMIMETH and GENDER variables.  Records which have a missing or unknown value for the STARTAGE, ADMIMETH or GENDER variables are re-categorised to belong to the corresponding reference category for that variable and diagnosis group.  The SAS Enterprise Guide model-fitting options *RIDGING=ABSOLUTE* and *NOCHECK* are used to ensure that all of the 140 statistical models converge:   * the *NOCHECK* option suppresses checking for infinite parameters * the *RIDGING=ABSOLUTE* option adjusts the ridging technique used by SAS to improve the log-likelihood function.   The response variable for each logistic regression model is where:   * *Eventsdj* = the number of observed eventsfor diagnosis group *d* and case-mix *j* over all providers *p* * *Trialsdj* = the number of finished provider spells for diagnosis group *d* and case-mix *j* over all providers *p*   The risk of an event is calculated for every case-mix combination *j* in all diagnosis groups *d* as  *Riskdj* = where *logoddsdj* =  with intercept and case-mix estimates , …, for case-mix variables *x1*, …, *xj* with diagnosis group *d*. |
| **4.7 Justification of risk adjustment variables** | The statistical models used to estimate the expected number of deaths for the SHMI are built on fewer risk adjustment variables than the variables proposed by the Steering Group for the National Review of the Hospital Standardised Mortality Ratio (HSMR) in their report. Using more risk adjustment variables may improve the predictive power of the models.  However, the proposed risk adjustment variables were highly correlated and using only age, Charlson comorbidity index, admission method and gender provided a simple and stable model which was recommended by the School of Health and Related Research (ScHARR) at the University of Sheffield in their final report.  *Link to the reports: ‘An evaluation of the Summary Hospital Mortality Index’ and ‘National review of the hospital standardised mortality ratio’:* [*http://www.hscic.gov.uk/SHMI*](http://www.hscic.gov.uk/SHMI)  Some proposed risk adjustment variables are not of sufficient data quality to be included in the final model. For example, the SHMI methodology does not include an adjustment for patients who are recorded as receiving palliative care. This is because there is considerable variation between trusts in the coding of palliative care. Details of further analysis on this issue can be referenced in the Palliative Care Coding Report which is available to download from [*http://www.hscic.gov.uk/SHMI*](http://www.hscic.gov.uk/SHMI)*.*  The SHMI methodology does not make any adjustment for deprivation. This is because adjusting for deprivation might create the impression that a higher death rate for those who are more deprived is acceptable and has the potential to remove from the SHMI some of the differences that it is designed to measure. The HSCIC has carried out some further analysis on the impact of deprivation on the SHMI and this is available to download from [*http://www.hscic.gov.uk/SHMI*](http://www.hscic.gov.uk/SHMI)*.* |
| **4.8 Confidence interval / control limit use** | Control Limits |
| **4.9 Confidence interval / control limit methodology** | The control limits for the SHMI value are 95% control limits from a random effects model [6] [7] applying a 10% trim for over-dispersion.  The standardised Pearson residual Z is derived assuming that  the standard error (SE) of loge *SHMI* = .  Trimming is based on the standardised Pearson residual Z for each provider *p* excluding the top and bottom 10% of the scores from the calculation of the upper and lower limits, defined as Z*p* = X loge *SHMIp*  The upper and lower control limits, *OD\_ULp* and *OD\_LLp* for each provider *p* are defined as  where:  z0.025; Standard score for lower limit of 2SD prediction interval  zα =  z0.975; Standard score for the upper limit of 2SD prediction interval  τ2 = over-dispersion parameter defined as  with:  *N*\* = remaining number of providers after trimming;  = remaining number of expected events after trimming;  = over-dispersion factor defined as with  = remaining standardised Pearson residual after trimming. |
| **4.10 Justification of confidence interval/control limit use and methodology** | Over-dispersion is the presence of greater variability in a data set that would be expected based on a given statistical model. This is a common feature in analysis of applied data where populations are heterogeneous.  The level of over-dispersion can be characterised by the over-dispersion factor, denoted by φ.  As described in Spiegelhalter (2005), if there is no over-dispersion, φN has an approximately distribution, meaning that φ is statistically significant if φ>1+2, where N is the number of units.  For the SHMI publication released in July 2014 covering discharges in the period January 2013 – December 2013, N=141 and φ=6.44, i.e. it is statistically significant.  Ignoring this over-dispersion could lead to a large number of trusts being inappropriately classified having a ‘higher than expected’ SHMI value.  Therefore, the methodology described in Spiegelhalter (2005) is used to adjust the SHMI control limits for the presence of over-dispersion.  It is possible that the level of over-dispersion in the SHMI data will reduce as further improvements are made to the methodology (e.g. by the addition of further risk adjustment variables) and this will continue to be reviewed.  However, it is likely that some level of over-dispersion will remain because of variations between trusts which are not reflected in the HES data and are unrelated to quality of care (e.g. differences in coding practices).  The table below is a summary of an analysis based on the SHMI publication in July 2014 covering discharges in the reporting period January 2013 to December 2013. The top two rows are the breakdown of trusts by banding based on control limits adjusted for over-dispersion. The second row (highlighted) is the one defined in the current methodology (V1.16). The bottom two rows are the breakdown of trusts by banding based on control limits not adjusted for over-dispersion (exact Poisson control limits).  Referring to the table above, a large number of trusts will be classified as higher or lower than expected when based on control limits not adjusted for over-dispersion i.e. between 44% and 61% of all England non-specialist acute trusts. This contradicts the purpose of the SHMI reporting based on the bandings, as a high proportion of trusts outside the control limits makes the indicator counter intuitive which in turn makes it difficult for users to interpret the SHMI thus rendering it not fit for purpose.  With reference to the discussion paper, the arguments for and against adjustments for over-dispersion were discussed and summarised with a proposed way forward, which was to adjust for over-dispersion. Referring to the table above, there will be no trusts categorised as ‘higher than expected’ based on the 99.8% control limits adjusted for over-dispersion for the related publication. Analysis of other publications will return either one trust or no trust categorised as ‘higher than expected’. This was why 95% control limits adjusted for over-dispersion are currently used instead of the 99.8% control limits adjusted for over-dispersion.  Spiegelhalter D. (2005). Funnel plots for comparing institutional performance.  *Statistics in Medicine*. 24:1185-1202. |

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| Definition of control limits | Number of trusts with a banding of: higher than expected | Number of trusts with a banding of: lower than expected | Number of trusts with a banding of: as expected |
| 99.8% control limits adjusted for over-dispersion | 0 | 11 | 130 |
| ***95% control limits adjusted for over-dispersion*** | ***7*** | ***16*** | ***118*** |
| 99.8% exact Poisson control limits | 33 | 29 | 79 |
| 95% exact Poisson control limits | 51 | 35 | 55 |

**Interpretation**

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| **5.1 Contextual information provided alongside indicator** | The following contextual indicators are published alongside the SHMI:   * Percentage of provider spells with palliative care coding * Percentage of deaths with palliative care coding * Deaths within thirty days for elective admissions * Deaths within thirty days for non-elective admissions * Deaths split by those occurring in hospital and those occurring outside hospital within 30 days of discharge * Provider spells split by deprivation quintile * Deaths split by deprivation quintile   All the SHMI contextual indicators are based on the same spell level data as the SHMI and report at the same level i.e. for all non-specialist acute NHS trusts. |
| **5.2 Justification of contextual information** | To support the interpretation of the SHMI, various contextual indicators are published alongside it. These contextual indicators are selected and released in order of priority from the list defined by the Steering Group for the National Review of the Hospital Standardised Mortality Ratio, with new indicators recommended by the SHMI Technical Working Group.  The SHMI methodology does not make any adjustment for patients who are recorded as receiving palliative care. This is because there is considerable variation between trusts in the coding of palliative care. Following feedback, as an interim solution for the above and pending the adoption and use of new coding guidelines, two contextual indicators relating to palliative care coding are published alongside the SHMI:   * Percentage of provider spells with palliative care coding * Percentage of deaths with palliative care coding   More detailed analysis on this issue can be found in the Palliative Care Coding Report, which is available to download from [*http://www.hscic.gov.uk/SHMI*](http://www.hscic.gov.uk/SHMI)  The SHMI methodology does not make any adjustment for deprivation. This is because adjusting for deprivation might create the impression that a higher death rate for those who are more deprived is acceptable and has the potential to remove from the SHMI some of the differences that it is designed to measure. The HSCIC has carried out some further analysis on the impact of deprivation on the SHMI and this is available to download from [*http://www.hscic.gov.uk/SHMI*](http://www.hscic.gov.uk/SHMI)  Two contextual indicators on deprivation are published alongside the SHMI:   * Provider spells split by deprivation quintile * Deaths split by deprivation quintile   Additionally, three further contextual indicators are published alongside the SHMI to support its interpretation and to aid trusts with quality assurance.   * Deaths within thirty days for elective admissions * Deaths within thirty days for non-elective admissions * Deaths split by those occurring in hospital and those occurring outside hospital within 30 days of discharge |
| **5.3 Calculation and data source of contextual information** | **Percentage of provider spells with palliative care coding**  Using the same spell level data as the SHMI, this indicator presents crude percentage rates of finished provider spells that are coded with palliative care at either diagnosis or treatment specialty level.  Three variants of this contextual indicator are calculated (see numerator definitions below).  Spells that have palliative care coded at diagnosis level are identified as those spells where any diagnosis field (DIAG\_1-DIAG\_20 inclusive) contains the code Z515 for any episode in the spell.  Spells that have palliative care coded at treatment specialty level are identified as those spells where the treatment specialty field (TRETSPEF) has the value 315 (palliative care).  Denominator definition: Count of finished provider spells in the SHMI dataset.  Numerator definition (variant 1): Count of finished provider spells in the SHMI dataset where palliative care is coded at diagnosis level for any episode in the spell.  Numerator definition (variant 2): Count of finished provider spells in the SHMI dataset where palliative care is coded at treatment speciality level for any episode in the spell.  Numerator definition (variant 3): Count of finished provider spells in the SHMI dataset where palliative care is coded at either treatment or speciality level for any episode in the spell.  **Percentage of deaths with palliative care coding**  Using the same spell level data as the SHMI, this indicator presents crude percentage rates of deaths reported in the SHMI that are coded with palliative care at either diagnosis or treatment specialty level.  Three variants of this contextual indicator are calculated (see numerator definitions below).  Spells that have palliative care coded at diagnosis level are identified as those spells where any diagnosis field (DIAG\_1-DIAG\_20 inclusive) contains the code Z515 for any episode in the spell.  Spells that have palliative care coded at treatment specialty level are identified as those spells where the treatment specialty field (TRETSPEF) has the value 315 (palliative care).  Denominator definition: Count of observed deaths in the SHMI dataset.  Numerator definition (variant 1): Count of observed deaths in the SHMI dataset where palliative care is coded at diagnosis level for any episode in the spell.  Numerator definition (variant 2): Count of observed deaths in the SHMI dataset where palliative care is coded at treatment speciality level for any episode in the spell.  Numerator definition (variant 3): Count of observed deaths in the SHMI dataset where palliative care is coded at either treatment or speciality level for any episode in the spell.  **Deaths within 30 days for elective admissions**  Using the same spell level data as the SHMI, this indicator presents crude percentage rates of elective admissions where a death occurs either in-hospital or within 30 days (inclusive) of being discharged from hospital.  Spells with an elective admission method are defined as those where P\_SPELL\_ADMIMETH is equal to any of 11, 12, 13.  Denominator definition: Count of all finished provider spells in the SHMI dataset with an elective admission method.  Numerator definition: Count of all finished provider spells in the SHMI dataset with an elective admission method where the patient dies either in-hospital or within 30 days (inclusive) of discharge.  **Deaths within 30 days for non-elective admissions**  Using the same spell level data as the SHMI, this indicator presents crude percentage rates of non-elective admissions (including those where the admission method is unknown) where a death occurs either in-hospital or within 30 days (inclusive) of being discharged from hospital.  Spells with a non-elective admission method are defined as those where P\_SPELL\_ADMIMETH is equal to any of 21, 22, 23, 24, 25, 2A, 2B, 2C, 2D, 28, 31, 32, 81, 82, 83, 84, 89, 98, 99.  Denominator definition: Count of all finished provider spells in the SHMI dataset with a non-elective admission method.  Numerator definition: Count of all finished provider spells in the SHMI dataset with a non-elective admission method where the patient dies either in-hospital or within 30 days (inclusive) of discharge.  **Deaths split by those occurring in hospital and those occurring outside hospital within 30 days of discharge**  Using the same spell level data as the SHMI, this indicator presents crude percentage rates of deaths reported in the SHMI which occur in hospital and deaths which occur outside hospital within 30 days of discharge.  Denominator definition: Count of observed deaths in the SHMI dataset.  Numerator definition (variant 1): Count of observed deaths in the SHMI dataset where P\_SPELL\_DISMETH=4.  Numerator definition (variant 2): Count of observed deaths in the SHMI dataset where P\_SPELL\_DISMETH NOT equal to 4.  **Provider spells split by deprivation quintile**  Using the same spell level data as the SHMI, the indicator presents crude percentage rates of finished provider spells reported in the SHMI which fall under each deprivation quintile.  The deprivation quintile is defined using the IMD Overall Ranking field in the Hospital Episode Statistics (HES) dataset. Each of the 32,482 Super Output Areas (SOAs) in England has been assigned a rank. The SOA with a rank of 1 is the most deprived and the SOA with a rank of 32,482 is the least deprived.  Spells are assigned to a deprivation quintile as follows:   * If the IMD Overall Ranking is between 1 and 6496 (inclusive) then the record is assigned to deprivation quintile 1 * If the IMD Overall Ranking is between 6497 and 12993 (inclusive) then the record is assigned to deprivation quintile 2 * If the IMD Overall Ranking is between 12994 and 19489 (inclusive) then the record is assigned to deprivation quintile 3 * If the IMD Overall Ranking is between 19490 and 25986 (inclusive) then the record is assigned to deprivation quintile 4 * If the IMD Overall Ranking is between 25987 and 32482 (inclusive) then the record is assigned to deprivation quintile 5 * If the IMD Overall Ranking is NULL then the spell is assigned a NULL value   Denominator definition: Count of finished provider spells in the SHMI dataset.  Numerator definition (variant 1): Count of finished provider spells in the SHMI dataset which fall under deprivation quintile 1.  Numerator definition (variant 2): Count of finished provider spells in the SHMI dataset which fall under deprivation quintile 2.  Numerator definition (variant 3): Count of finished provider spells in the SHMI dataset which fall under deprivation quintile 3.  Numerator definition (variant 4): Count of finished provider spells in the SHMI dataset which fall under deprivation quintile 4.  Numerator definition (variant 5): Count of finished provider spells in the SHMI dataset which fall under deprivation quintile 5.  Numerator definition (variant 6): Count of finished provider spells in the SHMI dataset which fall under the NULL deprivation quintile.  **Deaths split by deprivation quintile**  Using the same spell level data as the SHMI, the indicator presents crude percentage rates of deaths reported in the SHMI which fall under each deprivation quintile.  The deprivation quintile is defined using the IMD Overall Ranking field in the Hospital Episode Statistics (HES) dataset. Each of the 32,482 Super Output Areas (SOAs) in England has been assigned a rank. The SOA with a rank of 1 is the most deprived and the SOA with a rank of 32,482 is the least deprived.  Deaths are assigned to a deprivation quintile as follows:   * If the IMD Overall Ranking is between 1 and 6496 (inclusive) then the record is assigned to deprivation quintile 1 * If the IMD Overall Ranking is between 6497 and 12993 (inclusive) then the record is assigned to deprivation quintile 2 * If the IMD Overall Ranking is between 12994 and 19489 (inclusive) then the record is assigned to deprivation quintile 3 * If the IMD Overall Ranking is between 19490 and 25986 (inclusive) then the record is assigned to deprivation quintile 4 * If the IMD Overall Ranking is between 25987 and 32482 (inclusive) then the record is assigned to deprivation quintile 5 * If the IMD Overall Ranking is NULL then the spell is assigned a NULL value   Denominator definition: Count of observed deaths in the SHMI dataset.  Numerator definition (variant 1): Count of observed deaths in the SHMI dataset which fall under deprivation quintile 1.  Numerator definition (variant 2): Count of observed deaths in the SHMI dataset which fall under deprivation quintile 2.  Numerator definition (variant 3): Count of observed deaths in the SHMI dataset which fall under deprivation quintile 3.  Numerator definition (variant 4): Count of observed deaths in the SHMI dataset which fall under deprivation quintile 4.  Numerator definition (variant 5): Count of observed deaths in the SHMI dataset which fall under deprivation quintile 5.  Numerator definition (variant 6): Count of observed deaths in the SHMI dataset which fall under the NULL deprivation quintile. |
| **5.4 Use of bandings, benchmarks or targets** | To help users of the data understand the SHMI values, trusts have been categorised into one of three bandings.  For any given number of expected deaths, a range of observed deaths can be considered to be ‘as expected’. If the observed number of deaths falls outside of this range, the trust in question will be considered to have a higher or lower SHMI than expected. The range, the extremes of which are called control limits, are calculated according to the methodology specified above.   * Trusts whose SHMI value falls above the upper control limit are categorised as ‘higher than expected’ * Trusts whose SHMI value falls between the upper and lower control limits are categorised as ‘as expected’ * Trusts whose SHMI value falls below the lower control limit are categorised as ‘lower than expected’   The SHMI is recalibrated and rebased quarterly, at every publication. This means that the England average figures which drive the expected figures are updated at every quarter. Any improvements or otherwise to a SHMI value for a trust compared to the previous publication will be relative to the England average for the publication period. Therefore, if the overall England average has improved and the performance of a trust has also improved around the same scale, their SHMI value would show little, if any, change. |
| **5.5 Justification of bandings, benchmarks or targets used** | There is evidence of over-dispersion in the dataset and so the calculation of the control limits includes an adjustment for this [7].  95% control limits have been chosen rather than 99.8% control limits because the SHMI is intended to be used as a ‘smoke alarm’ to trigger further investigation. Therefore, a higher risk of false positives (type 1 error) is considered acceptable. If 99.8% control limits from a random effects model applying a 10% trim for over-dispersion are used then a very small number of trusts (i.e. zero or one for each publication) have a SHMI value which is categorised as ‘higher than expected’. |
| **5.6 Banding, benchmark or target methodology, if appropriate** | Upper and lower control limits are calculated for each provider *p* based on the target, *Expected*, according to the methodology set out in the Section on ‘Confidence interval / control limit methodology’ above. The bandings are then assigned as follows:  1 if *SHMIp* is greater than *OD\_ULp*;  *OD\_BANDINGp* = 2 if *SHMIp* is between *OD\_LLp* and *OD\_ULp* inclusive  3 if *SHMIp* is less than *OD\_LLp* |
| **5.7 Evidence of variability** | Variability in the SHMI is illustrated by the funnel plot shown below, where the control limits are shown by the two dotted lines and the circles represent individual trusts. For the reporting period January 2013 – December 2013:   * 7 trusts had a ‘higher than expected’ SHMI value * 15 trusts had a ‘lower than expected’ SHMI value * 119 trusts had an ‘as expected’ SHMI value   Funnel plot showing variability in the SHMI |
| **5.8 Interpretation guidelines** | A ‘higher than expected’ SHMI value should not immediately be interpreted as indicating good or bad performance and instead should be viewed as a ‘smoke alarm’ which warrants a follow-up. It is recommended that such follow-ups use a structure such as the pyramid of investigation for special cause variation [8] to further investigate the SHMI (see diagram below).  Picture showing pyramid of investigation for special cause investigation. From the bottom of the pyramid to top: Data, patient case-mix, structure or resource, process of care and then individual  More likely explanations are listed towards the bottom of the pyramid, and so it is suggested that these are investigated first. The SHMI requires careful interpretation and should be used in conjunction with other indicators and information from other sources (patient feedback, staff surveys and other such material) that together form a holistic view of trust outcomes.  In May 2013 the HSCIC launched a service to provide trusts with an extract of the record-level data which are used to calculate their SHMI value. As part of this service, the HSCIC are also providing trusts with Variable Life-Adjusted Display (VLAD) charts for some of the individual diagnosis groups which make up the SHMI. VLAD charts are a type of statistical process control chart which make a visual comparison between an expected outcome and its associated observed outcome. This information is intended to assist trusts in understanding their SHMI in more detail.  The SHMI is recalibrated and rebased at every publication. This means that the England average figures which drive the expected figures are updated at every quarter. Any improvements or otherwise to a SHMI value for a trust compared to the previous publication will be relative to the England average for the publication period. Therefore, if the overall England average has improved and the performance of a trust has also improved around the same scale, their SHMI value would show little, if any, change.  The indicator can be used to compare a trust’s mortality related outcomes to the national baseline. However, it should not be used to directly compare mortality related outcomes between trusts. |
| **5.9 Limitations and potential bias** | The SHMI Methodology Specification Issues Log is available online at: <http://www.hscic.gov.uk/SHMI>.  **Interpretation**  The SHMI is not a direct measure of quality of care, nor does it provide any information on ‘avoidable’ mortality. In particular, a ‘higher than expected’ SHMI value should not immediately be interpreted as indicating good or bad performance and instead should be viewed as a ‘smoke alarm’ which warrants a follow-up. Behaviours other than the standard of care can affect a trust’s SHMI value e.g. differences in clinical coding.  **Exclusions**  Specialist trusts, mental health trusts, community trusts and independent sector providers are excluded from the SHMI because there are important differences in the case-mix of patients treated there compared to non-specialist acute trusts and the SHMI has not been designed for these types of trust. However, all inpatient activity (including mental health, community and specialist activity) is included for non-specialist acute trusts as the data currently available doesn’t allow straightforward identification of acute and community activity. The HSCIC is investigating ways in which community activity for integrated trusts can be identified in the underlying dataset and will continue to review this issue with the SHMI Technical Working Group.  **Palliative care coding**  A small number of non-specialist acute trusts have hospices within their organisation. The transfer of patients into these hospices from other non-specialist acute trusts is likely to have an effect on the value of the SHMI for trusts with hospices within their organisation. Also, there are a small number of non-specialist acute trusts who provide specialist palliative care inpatient services within designated wards. This arrangement will potentially have an effect on the value of the SHMI as well.  The SHMI methodology does not make any adjustment for patients who are recorded as receiving palliative care. This is because there is considerable variation between trusts in the coding of palliative care. Following feedback, as an interim solution for the above and pending the adoption and use of new coding guidelines, two contextual indicators relating to palliative care coding are published alongside the SHMI.  **Model convergence**  All 140 logistic regression models converge when the SAS model fitting options RIDGING=ABSOLUTE and NOCHECK are used. However, there are a small number of diagnosis groups where convergence warning messages are generated when the options RIDGING=ABSOLUTE and NOCHECK are not used.  The HSCIC recognises that not everyone will have access to the same statistical software and model fitting options and therefore could experience model convergence difficulties. The HSCIC has recently carried out some changes to the methodology to reduce the number of diagnosis groups affected by this issue to around 6 and these groups will be the focus of future work to ensure that the SHMI methodology is fully replicable.  **Model fit**  The success of the case-mix adjustment in predicting the outcome is evaluated using the c statistic for each statistical model. Models are typically considered to be reasonable if the c statistic is 0.7 or higher. There are some diagnosis groups where it is difficult to improve the c statistic, for example groups where the patients are all babies, because there is little variation in case-mix between patients. However, for some of the other diagnosis groups there is more scope for improvement. The HSCIC is investigating ways of improving model fit e.g. by including CCS subgroup as a variable in the model and the addition of interaction terms.  Currently, the Charlson co-morbidity index score is included in the model as a categorical variable with only three categories: 0, 1-5 and >5, which is a limited categorisation. The HSCIC is currently carrying out investigations into the adoption of the Elixhauser Index as the measure of comorbidity in the SHMI calculation, as it covers a wider number of chronic and long-term conditions compared to the Charlson index. As part of this work, the HSCIC will consider whether this should be included as a categorical or continuous variable in the SHMI models.  **Coding**  The SHMI only uses primary and secondary diagnosis codes from the first episode in the spell (or the second episode if the primary diagnosis in the first episode is an R code (sign or symptom)). Examination at local level shows that trusts do not always record existing comorbidities in the first episode (especially when the first episode is in a short stay admissions unit). Similarly, some diagnoses are also recorded later in the stay which can result in attribution to the wrong SHMI diagnosis group. However, the aim is to identify comorbidities which are present on admission, rather than complications which occur during the spell.  **Other**  Trusts are increasingly developing different approaches to providing care which are being introduced at different speeds e.g. some trusts do not record ambulatory care cases as admissions resulting in a significantly reduced number of provider spells. These changes impact differentially on their SHMI values and causes difficulties when making comparisons at an aggregated level and interpreting differences in the indicator.  The SHMI includes all deaths which occur either in hospital or within 30 days of discharge, which is likely to cause bias because of variation in length of stay by hospital due to their differing discharge policies. It has been suggested that changing the definition of the event to include only deaths occurring within 30 days of admission would result in a more robust measure and the HSCIC is currently reviewing this with the SHMI Technical Working Group. |
| **5.10 Presentation of indicator** | The SHMI is published on a quarterly basis with the first publication in October 2011. The statistical models used to derive the values are recalibrated on a quarterly basis in line with the publication.  The quarterly publication of the SHMI on the HSCIC Indicator Portal includes:   * SHMI data at trust level (including number of finished provider spells, number of observed deaths, number of expected deaths, SHMI value and SHMI banding) * SHMI model parameter statistics * SHMI model fit statistics * SHMI contextual indicators at trust level * Machine readable format definitions * Indicator methodology specifications   *Link to the SHMI publication on the HSCIC Indicator Portal:* [*http://indicators.ic.nhs.uk/webview/*](http://indicators.ic.nhs.uk/webview/)  A more detailed report, including key facts, details of how to interpret the SHMI and its banding, analysis for trusts identified as repeat outliers and information on data quality, is available from the HSCIC’s publication repository. A glossary containing definitions of the terminology used in the report is also provided.  *Link to the SHMI report on the HSCIC publication repository:* [*http://www.hscic.gov.uk/pubs/shmijan13dec13*](http://www.hscic.gov.uk/pubs/shmijan13dec13)  The following supporting information is available on the HSCIC SHMI webpage:   * SHMI publication timetable * SHMI frequently asked questions document * HES SHMI data guidance, which provides details of the HES extracts that are used in the publication of the SHMI along with a timetable for correcting incorrect data in SUS, HES and SHMI * Full details of the methodology used in the calculation of the SHMI, including the methodology used to link HES data to ONS deaths registrations data, the methodology used to create the provider spells from HES episode level data, SHMI methodology specification document and SHMI contextual indicator specification documents |

**Risks and Usefulness**

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| **6.1 Similar existing indicators** | There are several tools available to organisations in England to monitor mortality associated with hospitalisation. Two of the main tools which are currently used in addition to the SHMI are:   * Hospital Standardised Mortality Ratio (HSMR) which is developed and published by Doctor Foster Intelligence (DFI) * Risk Adjusted Mortality Indicator (RAMI) which is developed and published by CHKS |
| **6.2 Differences between proposed and existing indicators** | There are some differences between the SHMI and other mortality indicators. For example, the main differences between the SHMI and the HSMR are:   * The HSMR is reported as a standardised ratio with a baseline of 100, while the SHMI has a baseline of 1 * The SHMI includes deaths occurring in hospital and deaths occurring outside of hospital within 30 days of discharge, whereas the HSMR only includes deaths occurring in hospital * The SHMI includes deaths from all Clinical Classifications System (CCS) groups, while the HSMR includes deaths from 56 CCS groups which account for around 80 per cent of in hospital deaths * The case-mix adjustment variables differ between the SHMI and HSMR, for example, the HSMR includes an adjustment for palliative care whereas the SHMI does not. * The final model selection method varies between the SHMI and HSMR   Further details of the methodology used to calculate the HSMR are available from DFI:  *Link to the DFI website:* [*http://drfosterintelligence.co.uk/*](http://drfosterintelligence.co.uk/)  The main differences between the SHMI and the RAMI are:   * The RAMI is reported as a standardised ratio with a baseline of 100, while the SHMI has a baseline of 1 * The SHMI includes deaths occurring in hospital and deaths occurring outside of hospital within 30 days of discharge, whereas the RAMI only includes deaths occurring in hospital * The SHMI includes more activity compared to the RAMI. For example, zero length of stay emergencies and spells containing the palliative care diagnosis code (Z51.5) are excluded from the RAMI * The case-mix adjustment variables differ between the SHMI and the RAMI   Further details of the methodology used to calculate the RAMI are available from CHKS:  *Link to the CHKS website:* [*http://www.chks.co.uk/*](http://www.chks.co.uk/) |
| **6.3 Coherence and comparability** | The statistical models used in the calculation of the SHMI are recalibrated and rebased quarterly, at every publication. This means that the England average figures which drive the expected figures are updated at every quarter. Any improvements or otherwise to a SHMI value for a trust compared to the previous publication will be relative to the England average at the point of publication. Therefore, if the overall England average has improved and the performance of a trust has also improved around the same scale, their SHMI value would show little, if any, change.  The SHMI reports on mortality for all non-specialist acute trusts in England only.   * NHS National Services Scotland publishes Hospital Standardised Mortality Ratios (HSMR) (the methodology used to calculate the Scottish HSMR is not the same as that used by DFI to calculate the English HSMR)   *Link to the Scottish HSMR data:* [*http://www.isdscotland.org/Health-Topics/Quality-Indicators/HSMR/*](http://www.isdscotland.org/Health-Topics/Quality-Indicators/HSMR/)   * The Welsh Government publishes the Risk Adjusted Mortality Indicator (RAMI), which is calculated by CHKS:   *Link to the Welsh RAMI data:* [*http://wales.gov.uk/splash?orig=/topics/health/publications/health/reports/mortality/*](http://wales.gov.uk/splash?orig=/topics/health/publications/health/reports/mortality/)   * The Department of Health, Social Services and Public Safety in Northern Ireland does not currently publish any indicators on mortality associated with hospitalisation |
| **6.4 Undesired behaviours and/or gaming** | The SHMI methodology has been designed to limit the potential for undesired behaviours and gaming. For example, the SHMI only includes adjustments for factors which are beyond the control of the provider e.g. patient diagnosis, age, gender. The SHMI methodology does not make any adjustment for patients who are recorded as receiving palliative care because there is considerable variation between trusts in the coding of palliative care. The inclusion of palliative care as a risk adjustment variable in other mortality indicators has resulted in a large increase in the use of palliative care codes.  Clinical coding can vary between trusts with differences in the way that coding guidelines are interpreted and applied. Some trusts have reported that their SHMI value may be impacted by the under-coding of secondary diagnoses in their data, resulting in a lower Charlson Comorbidity Index. Similarly, SHMI values may be impacted by over-coding by trusts.  The SHMI is based on the HES Admitted Patient Care (APC) dataset. It is possible that some trusts may submit types of activity to the HES Outpatient dataset that other trusts would include in the HES APC dataset (e.g. some trusts do not record ambulatory care cases as admissions resulting in a significantly reduced number of finished provider spells) and this has the potential to impact of the SHMI values for these trusts. |
| **6.5 Improvement actions** | SHMI values cannot immediately be interpreted as indicating good or bad performance and instead should be viewed as a ‘smoke alarm’ which requires further investigation by the trust. Trusts are expected to investigate their SHMI value and take steps to address any areas of concern identified. It is recommended that such investigations use a structure such as the pyramid of investigation for special cause variation [8] (see diagram below).  Picture showing the pyramid of investigation, showing from bottom to top: Data, patient case-mix, structure or resource, process of care, individual  More likely explanations are listed towards the bottom of the pyramid, and so it is suggested that these are investigated first. The SHMI requires careful interpretation and should be used in conjunction with other indicators and information from other sources (patient feedback, staff surveys and other such material) that together form a holistic view of trust outcomes. |
| **6.6 Approach to indicator review** | The SHMI Technical Working Group support and contribute to the continuing technical work associated with the development and construction of the SHMI. Meetings are chaired by the HSCIC and are held on a quarterly basis. Members of the group include representatives from the Department of Health, Care Quality Commission, HSCIC, Professional Association of Clinical Coders, Public Health England, King's Fund, University Hospitals Birmingham, Dr Foster Intelligence, Dr Foster Unit at Imperial College London, CHKS, and Nuffield Trust.  Comments on the SHMI publication can be made through various media:   * By trust medical directors and other authorised users via the Clinical Indicator Previewer * ‘Have your say’ on SHMI HSCIC website * HSCIC general enquiries email [enquiries@hscic.gov.uk](mailto:enquiries@hscic.gov.uk) and/or telephone number 0845 300 6016   The SHMI will be subject to continuous review. An issues log is maintained by the HSCIC in order to document issues raised on the methodology used to calculate the SHMI. These issues feed into the continuous review process for the SHMI.  *Link to the SHMI Methodology Specification Issues log:* [*http://www.hscic.gov.uk/SHMI*](http://www.hscic.gov.uk/SHMI)  The HSCIC has worked with several trusts to help them further understand their SHMI value and the methodology used to calculate the SHMI. We are working to improve the range of information available to trusts and other users in light of this work. We are also investigating developing some case studies to demonstrate how we can help users understand the SHMI in more detail.  Detailed methodology specification documents are available on the HSCIC website. Users are invited to provide feedback and comments. All feedback and comments will be reviewed and, where agreed to be appropriate with the SHMI Technical Working Group, changes made to the methodology.  All other supporting documentation relating to the indicator specification is also published on the SHMI support and guidance page. |
| **6.7 Disclosure control** | The SHMI publication is subject to a standard HSCIC risk assessment prior to issue. Disclosure control is implemented where this is deemed to be necessary in accordance with the protocols associated with the underlying data sources. Further details of the risk assessment are available in the HSCIC’s Small Numbers Procedure.  *Link to the HSCIC’s Small Numbers Procedure* [*http://www.hscic.gov.uk/pubs/calendar*](http://www.hscic.gov.uk/pubs/calendar)  *Link to the HSCIC’s privacy policy:*  *<http://www.hscic.gov.uk/privacy>*  The Code of Practice for Official Statistics is followed regarding security and release of information prior to publication.  *Link to the Code of Practice for Official Statistics:* [*http://www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html*](http://www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html) |
| **6.8 Copyright** | The copyright to the information we are disclosing is held by the Health and Social Care Information Centre (HSCIC). The HSCIC has suspended the application of re-use license fees as a consequence of government policy ('Making Public Data Public'), so you may re-use this information free of charge. Please ensure that the following copyright statement is included within your documents: **'Copyright © 2014 Re-used with the permission of the Health and Social Care Information Centre. All rights reserved.'**  Full details of our terms and conditions can be found at  <http://www.hscic.gov.uk/terms-and-conditions> |

**Additional Information**

|  |  |
| --- | --- |
| **7.1 Previous decision-making documents** |  |
| **7.2 References** | [1] Details of the methodology used to create provider spells can be referenced at <http://www.hscic.gov.uk/SHMI>  [2] Details of the ONS linked Date of Death to HES data can be referenced at <http://www.hscic.gov.uk/SHMI>  [3] Details of the SHMI Publication Calendar can be referenced at <http://www.hscic.gov.uk/SHMI>  [4] Details of the World Health Organisation (WHO) International Classification of Diseases (ICD) can be found at <http://www.who.int/classifications/icd/en/>  [5] The lookup table mapping ICD-10 codes into CCS categories can be referenced at <http://www.hscic.gov.uk/SHMI>  [6] Spiegelhalter D J (2005) Funnel plots for comparing institutional performance. Statistics in Medicine, Apr 24(8): 1185-1202  [7]Spiegelhalter D J (2005) Handling over-dispersion of performance indicators. Quality & Safety in Health Care, Oct 14(5): 347-351  [8] Lilford R, Mohammed M A, Speigelhalter D, Thomson R (2004) Use and misuse of process and outcome data in managing performance of acute medical care: avoiding institutional stigma. Lancet, Apr 363(9415): 1147-54  [9] A definition and details of the diagnosis fields can be referenced at <http://www.hscic.gov.uk/hesdatadictionary>  [10] Any cleaning rules related to the diagnosis fields can be referenced at <http://www.hscic.gov.uk/article/1825/The-processing-cycle-and-HES-data-quality>  [11] The mapping from ICD-10 codes to CCS groups is produced by the Agency for Healthcare Research and Quality (AHRQ) and is can be referenced at <http://www.hscic.gov.uk/SHMI>  [12] List provided by Care Quality Commission (CQC), June 2011  [13] List of all Mental Health trusts available from <http://www.nhs.uk/ServiceDirectories/Pages/MentalHealthTrustListing.aspx>  [14] Details of the Charlson methodology used can be referenced at <http://www.drfosterhealth.co.uk/hospital-guide/methodology/> |

# Appendices

### Appendix A: CCS Diagnosis Groupings [9] [10] [11]

|  |  |  |
| --- | --- | --- |
| **Category No.** | **CCS Category(s)** | **CCS Label(s)** |
|  | 1 | Tuberculosis |
|  | 2, 249 | Septicaemia (except in labour), Shock |
|  | 3 | Bacterial infection; unspecified site |
|  | 4 | Mycoses |
|  | 5 | HIV infection |
|  | 6, 7, 8, 9, 10 | Hepatitis, Viral infection, Other infections; including parasitic, Sexually transmitted infections (not HIV or hepatitis), Immunizations and screening for infectious disease |
|  | 11 | Cancer of head and neck |
|  | 12 | Cancer of oesophagus |
|  | 13 | Cancer of stomach |
|  | 14 | Cancer of colon |
|  | 15 | Cancer of rectum and anus |
|  | 16 | Cancer of liver and intrahepatic bile duct |
|  | 17 | Cancer of pancreas |
|  | 18 | Cancer of other GI organs; peritoneum |
|  | 19 | Cancer of bronchus; lung |
|  | 20 | Cancer; other respiratory and intrathoracic |
|  | 22, 23 | Melanomas of skin, Other non-epithelial cancer of skin |
|  | 24 | Cancer of breast |
|  | 25 | Cancer of uterus |
|  | 26, 28 | Cancer of cervix, Cancer of other female genital organs |
|  | 27 | Cancer of ovary |
|  | 29, 30, 31 | Cancer of prostate, Cancer of testis, Cancer of other male genital organs |
|  | 32 | Cancer of bladder |
|  | 33, 34 | Cancer of kidney and renal pelvis, Cancer of other urinary organs |
|  | 35 | Cancer of brain and nervous system |
|  | 37, 38 | Hodgkin's disease, Non-Hodgkin's lymphoma |
|  | 39 | Leukemias |
|  | 40 | Multiple myeloma |
|  | 41, 45 | Cancer; other and unspecified primary, Maintenance chemotherapy; radiotherapy |
|  | 42 | Secondary malignancies |
|  | 21, 36, 43 | Cancer of bone and connective tissue, Cancer of thyroid, Malignant neoplasm without specification of site |
|  | 44, 167 | Neoplasms of unspecified nature or uncertain behavior, Nonmalignant breast conditions |
|  | 46, 47 | Benign neoplasm of uterus, Other and unspecified benign neoplasm |
|  | 49 | Diabetes mellitus without complication |
|  | 50 | Diabetes mellitus with complications |
|  | 48, 51 | Thyroid disorders, Other endocrine disorders |
|  | 55 | Fluid and electrolyte disorders |
|  | 52, 53, 58 | Nutritional deficiencies, Disorders of lipid metabolism, Other nutritional; endocrine; and metabolic disorders |
|  | 59, 60 | Deficiency and other anemia, Acute posthemorrhagic anemia |
|  | 63 | Diseases of white blood cells |
|  | 57, 61, 62, 64 | Immunity disorders, Sickle cell anemia, Coagulation and hemorrhagic disorders, Other hematologic conditions |
|  | 65, 68 | Mental retardation, Senility and organic mental disorders |
|  | 66, 67, 69, 72 | Alcohol-related mental disorders, Substance-related mental disorders, Affective disorders, Anxiety; somatoform; dissociative; and personality disorders |
|  | 71 | Other psychoses |
|  | 70, 73, 74, 75 | Schizophrenia and related disorders, Preadult disorders, Other mental conditions, Personal history of mental disorder |
|  | 76, 77, 78 | Meningitis (except that caused by tuberculosis or sexually transmitted disease), Encephalitis (except that caused by tuberculosis or sexually transmitted disease), Other CNS infection and poliomyelitis |
|  | 79 | Parkinson's disease |
|  | 80, 81 | Multiple sclerosis, Other hereditary and degenerative nervous system conditions |
|  | 82, 113 | Paralysis, Late effects of cerebrovascular disease |
|  | 83 | Epilepsy; convulsions |
|  | 85 | Coma; stupor; and brain damage |
|  | 84, 86, 87, 88, 89, 90, 91, 92, 93, 94 | Headache; including migraine, Cataract, Retinal detachments; defects; vascular occlusion; and retinopathy, Glaucoma, Blindness and vision defects, Inflammation; infection of eye (except that caused by tuberculosis or sexually transmitted disease), Other eye disorders, Otitis media and related conditions, Conditions associated with dizziness or vertigo, Other ear and sense organ disorders |
|  | 95 | Other nervous system disorders |
|  | 96 | Heart valve disorders |
|  | 97 | Peri-; endo-; and myocarditis; cardiomyopathy (except that caused by tuberculosis or sexually transmitted disease) |
|  | 98, 99 | Essential hypertension, Hypertension with complications and secondary hypertension |
|  | 100 | Acute myocardial infarction |
|  | 101 | Coronary atherosclerosis and other heart disease |
|  | 102 | Nonspecific chest pain |
|  | 103 | Pulmonary heart disease |
|  | 104 | Other and ill-defined heart disease |
|  | 105 | Conduction disorders |
|  | 106 | Cardiac dysrhythmias |
|  | 107 | Cardiac arrest and ventricular fibrillation |
|  | 108 | Congestive heart failure; nonhypertensive |
|  | 109 | Acute cerebrovascular disease |
|  | 110, 111, 112 | Occlusion or stenosis of precerebral arteries, Other and ill-defined cerebrovascular disease, Transient cerebral ischemia |
|  | 114 | Peripheral and visceral atherosclerosis |
|  | 115 | Aortic; peripheral; and visceral artery aneurysms |
|  | 116 | Aortic and peripheral arterial embolism or thrombosis |
|  | 117 | Other circulatory disease |
|  | 118, 119, 120, 121 | Phlebitis; thrombophlebitis and thromboembolism, Varicose veins of lower extremity, Hemorrhoids, Other disease of veins and lymphatics |
|  | 122 | Pneumonia (except that caused by tuberculosis or sexually transmitted disease) |
|  | 125 | Acute bronchitis |
|  | 127 | Chronic obstructive pulmonary disease and bronchiectasis |
|  | 128 | Asthma |
|  | 129 | Aspiration pneumonitis; food/vomitus |
|  | 130 | Pleurisy; pneumothorax; pulmonary collapse |
|  | 131 | Respiratory failure; insufficiency; arrest (adult) |
|  | 132 | Lung disease due to external agents |
|  | 56, 133 | Cystic fibrosis, Other lower respiratory disease |
|  | 123, 124, 126, 134, 136, 137 | Influenza, Acute and chronic tonsillitis, Other upper respiratory infections, Other upper respiratory disease, Disorders of teeth and jaw, Diseases of mouth; excluding dental |
|  | 135 | Intestinal infection |
|  | 138 | Esophageal disorders |
|  | 139 | Gastroduodenal ulcer (except hemorrhage) |
|  | 140, 141 | Gastritis & duodenitis, Other disorders of stomach and duodenum |
|  | 143 | Abdominal hernia |
|  | 144 | Regional enteritis and ulcerative colitis |
|  | 145 | Intestinal obstruction without hernia |
|  | 146, 147 | Diverticulosis & diverticulitis, Anal and rectal conditions |
|  | 142, 148 | Appendicitis and other appendiceal conditions, Peritonitis and intestinal abscess |
|  | 149 | Biliary tract disease |
|  | 150 | Liver disease; alcohol-related |
|  | 151 | Other liver diseases |
|  | 152 | Pancreatic disorders (not diabetes) |
|  | 153 | Gastrointestinal hemorrhage |
|  | 154 | Noninfectious gastroenteritis |
|  | 155 | Other gastrointestinal disorders |
|  | 157 | Acute and unspecified renal failure |
|  | 156, 158 | Nephritis; nephrosis; renal sclerosis, Chronic renal failure |
|  | 159 | Urinary tract infections |
|  | 160, 161, 162 | Calculus of urinary tract, Other diseases of kidneys and ureters, Other diseases of bladder and urethra |
|  | 163 | Genitourinary symptoms and ill-defined conditions |
|  | 164, 165, 166 | Hyperplasia of prostate, Inflammatory conditions of male genital organs, Other male genital disorders |
|  | 168, 169, 170, 171, 172, 173, 175 | Inflammatory diseases of female pelvic organs, Endometriosis, Prolapse of female genital organs, Menstrual disorders, Ovarian cyst, Menopausal disorders, Other female genital disorders |
|  | 174, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 218 | Female infertility, Contraceptive & procreative management, Spontaneous abortion, Induced abortion, Prostabortion complications, Ectopic pregnancy, Other complications of pregnancy, Hemorrhage during pregnancy; abruption placenta; placenta previa, Hypertension complicating pregnancy; childbirth; or the puerperium, Early or threatened labor, Prolonged pregnancy, Diabetes or abnormal glucose tolerance complicating pregnancy; childbirth; or the puerperium, Malposition; malpresentation, Fetopelvic disproportion; obstruction, Previous C-section, Fetal distress and abnormal forces of labour, Polyhydramnios and other problems of amniotic cavity, Umbilical cord complication, OB-related trauma to perineum and vulva, Forceps delivery, Other complications of birth; puerperium affecting management of mother, Normal pregnancy and/or delivery, Livebirths |
|  | 197 | Skin and subcutaneous tissue infections |
|  | 198, 199, 200 | Other inflammatory condition of skin, Chronic ulcer of skin, Other skin disorders |
|  | 201 | Infective arthritis and osteomyelitis (except that caused by tuberculosis or sexually transmitted disease) |
|  | 204 | Other non-traumatic joint disorders |
|  | 205, 206 | Spondylosis; intervertebral disc disorders; other back problems, Osteoporosis |
|  | 207 | Pathological fracture |
|  | 211 | Other connective tissue disease |
|  | 54, 202, 203, 208, 209, 210, 212 | Gout and other crystal arthropathies, Rheumatoid arthritis and related disease, Osteoarthritis, Acquired foot deformities, Other acquired deformities, Systemic lupus erythematosus and connective tissue disorders, Other bone disease and musculoskeletal deformities |
|  | 213 | Cardiac & circulatory congenital anomalies |
|  | 214, 215, 216, 217 | Digestive congenital anomalies, Genitourinary congenital anomalies, Nervous system congenital anomalies, Other congenital anomalies |
|  | 219 | Short gestation; low birth weight; and fetal growth retardation |
|  | 220, 221, 222, 223 | Intrauterine hypoxia and birth asphyxia, Respiratory distress syndrome, Hemolytic jaundice and perinatal jaundice, Birth trauma |
|  | 224 | Other perinatal conditions |
|  | 226 | Fracture of neck of femur (hip) |
|  | 229 | Fracture of upper limb |
|  | 230 | Fracture of lower limb |
|  | 225, 227, 228, 231, 232 | Joint disorders and dislocations; trauma-related, Spinal cord injury, Skull and face fractures, Other fractures, Sprains and strains |
|  | 233 | Intracranial injury |
|  | 234 | Crushing injury or internal injury |
|  | 235 | Open wounds of head; neck; and trunk |
|  | 236 | Open wounds of extremities |
|  | 237 | Complication of device; implant; or graft |
|  | 238 | Complication of surgical procedures or medical care |
|  | 239 | Superficial injury; contusion |
|  | 240 | Burns |
|  | 241, 242, 243 | Poisoning by psychotropic agents, Poisoning by other medications and drugs, Poisoning by nonmedicinal substances |
|  | 244 | Other injuries & conditions due to external causes |
|  | 245 | Syncope |
|  | 246 | Fever of unknown origin |
|  | 247, 248 | Lymphadenitis, Gangrene |
|  | 250 | Nausea and vomiting |
|  | 251 | Abdominal pain |
|  | 252 | Malaise and fatigue |
|  | 253, 254, 255, 256, 257, 258, 259, 260 | Allergic reactions, Rehabilitation care; fitting of prostheses; and adjustment of devices, Administrative/social admission, Medical examination/evaluation, Other aftercare, Other screening for suspected conditions (not mental disorders or infectious disease), Residual codes; unclassified, E Codes: All (external causes of injury and poisoning) |

### Appendix B: Category Levels

### Appendix B.1 – Age

|  |  |
| --- | --- |
| **Category No.** | **Values** |
|  | 7000 – 7012 |
|  | 1 – 4 |
|  | 5 – 9 |
|  | 10 – 14 |
|  | 15 – 19 |
|  | 20 – 24 |
|  | 25 – 29 |
|  | 30 – 34 |
|  | 35 – 39 |
|  | 40 – 44 |
|  | 45 – 49 |
|  | 50 – 54 |
|  | 55 – 59 |
|  | 60 – 64 |
|  | 65 – 69 |
|  | 70 – 74 |
|  | 75 – 79 |
|  | 80 – 84 |
|  | 85 – 89 |
|  | 90 – 120 |
|  | Missing |

## 

### Appendix B.2 – Charlson Comorbidity Index

|  |  |
| --- | --- |
| **Category No.** | **Values** |
| 1 | 0 |
| 2 | 1 – 5 |
| 3 | > 5 |

### Appendix B.3 – Admission Method

|  |  |  |
| --- | --- | --- |
| **Category No.** | **Category Description** | **Values** |
|  | Elective | 11, 12, 13 |
|  | Unknown | 99 |
|  | Acute | 21, 22, 23, 24, 25, 2A, 2B, 2C, 2D, 28, 31, 32, 81, 82, 83, 84, 89, 98 |

Note: The release of version 6.2 of the Commissioning Data Sets (CDS) introduced an updated set of admission method codes to be used from 1st April 2013 onwards. Admission method code 25 was introduced as part of this update and admission method code 28 was replaced with codes 2A, 2B, 2C, 2D. Historic data with admission method code 28 will continue to be categorised as ‘Acute’ admissions.

### Appendix B.4 – Sex

|  |  |  |
| --- | --- | --- |
| **Category No.** | **Category Description** | **Values** |
|  | Male | 1 |
|  | Female | 2 |
|  | Unknown | 0, 9 |

### Appendix C: Exclusion List

### Appendix C.1 – UK Specialist Hospitals [12]

|  |  |  |
| --- | --- | --- |
| **No.** | **Name** | **Provider Code** |
|  | Royal National Orthopaedic Hospital NHS Trust | RAN |
|  | Nuffield Orthopaedic Centre NHS Trust | RBF |
|  | The Robert Jones and Agnes Hunt Orthopaedic Hospital NHS Foundation Trust | RL1 |
|  | The Royal Orthopaedic Hospital NHS Foundation Trust | RRJ |
|  | Royal Brompton and Harefield NHS Foundation Trust | RT3 |
|  | Papworth Hospital NHS Foundation Trust | RGM |
|  | Liverpool Heart and Chest NHS Foundation Trust | RBQ |
|  | Sheffield Children's NHS Foundation Trust | RCU |
|  | Birmingham Children's Hospital NHS Foundation Trust | RQ3 |
|  | Alder Hey Children's NHS Foundation Trust | RBS |
|  | Great Ormond Street Hospital for Children NHS Foundation Trust | RP4 |
|  | The Clatterbridge Cancer Centre NHS Foundation Trust | REN |
|  | The Christie NHS Foundation Trust | RBV |
|  | The Royal Marsden NHS Foundation Trust | RPY |
|  | The Walton Centre NHS Foundation Trust | RET |
|  | Liverpool Women's NHS Foundation Trust | REP |
|  | Birmingham Women's NHS Foundation Trust | RLU |
|  | Queen Victoria Hospital NHS Foundation Trust | RPC |
|  | Royal National Hospital for Rheumatic Diseases NHS Foundation Trust | RBB |
|  | Moorfields Eye Hospital NHS Foundation Trust | RP6 |

### Appendix C.2 – Mental Health Trusts [13] and Community Hospitals

|  |  |  |
| --- | --- | --- |
| **No.** | **Name** | **Provider Code** |
|  | North East London NHS Foundation Trust | RAT |
|  | Dorset Healthcare University NHS Foundation Trust | RDY |
|  | Leeds and York Partnership NHS Foundation Trust | RGD |
|  | Somerset Partnership NHS Foundation Trust | RH5 |
|  | Nottinghamshire Healthcare NHS Trust | RHA |
|  | Oxfordshire Learning Disability NHS Trust | RHX |
|  | Cornwall Partnership NHS Foundation Trust | RJ8 |
|  | Calderstones Partnership NHS Foundation Trust | RJX |
|  | West London Mental Health NHS Trust | RKL |
|  | North Staffordshire Combined Healthcare NHS Trust | RLY |
|  | Norfolk and Suffolk NHS Foundation Trust | RMY |
|  | Tavistock and Portman NHS Foundation Trust | RNK |
|  | Cumbria Partnership NHS Foundation Trust | RNN |
|  | Oxford Health NHS Foundation Trust | RNU |
|  | Northamptonshire Healthcare NHS Foundation Trust | RP1 |
|  | Lincolnshire Partnership NHS Foundation Trust | RP7 |
|  | Oxleas NHS Foundation Trust | RPG |
|  | South West London and St George's Mental Health NHS Trust | RQY |
|  | North Essex Partnership NHS Foundation Trust | RRD |
|  | South Staffordshire and Shropshire Healthcare NHS Foundation Trust | RRE |
|  | Barnet, Enfield and Haringey Mental Health NHS Trust | RRP |
|  | Cambridgeshire and Peterborough NHS Foundation Trust | RT1 |
|  | Pennine Care NHS Foundation Trust | RT2 |
|  | Leicestershire Partnership NHS Trust | RT5 |
|  | Suffolk Mental Health Partnership NHS Trust | RT6 |
|  | 2gether NHS Foundation Trust | RTQ |
|  | 5 Boroughs Partnership NHS Foundation Trust | RTV |
|  | Central and North West London NHS Foundation Trust | RV3 |
|  | South London and Maudsley NHS Foundation Trust | RV5 |
|  | Humber NHS Foundation Trust | RV9 |
|  | Avon and Wiltshire Mental Health Partnership NHS Trust | RVN |
|  | Southern Health NHS Foundation Trust | RW1 |
|  | Mersey Care NHS Trust | RW4 |
|  | Lancashire Care NHS Foundation Trust | RW5 |
|  | East London NHS Foundation Trust | RWK |
|  | South Essex Partnership University NHS Foundation Trust | RWN |
|  | Worcestershire Mental Health Partnership NHS Trust | RWQ |
|  | Hertfordshire Partnership NHS Foundation Trust | RWR |
|  | Devon Partnership NHS Trust | RWV |
|  | Berkshire Healthcare NHS Foundation Trust | RWX |
|  | Sussex Partnership NHS Foundation Trust | RX2 |
|  | Tees, Esk and Wear Valleys NHS Foundation Trust | RX3 |
|  | Northumberland, Tyne and Wear NHS Foundation Trust | RX4 |
|  | Cheshire and Wirral Partnership NHS Foundation Trust | RXA |
|  | Rotherham, Doncaster and South Humber NHS Foundation Trust | RXE |
|  | South West Yorkshire Partnership NHS Foundation Trust | RXG |
|  | Derbyshire Healthcare NHS Foundation Trust | RXM |
|  | Birmingham and Solihull Mental Health NHS Foundation Trust | RXT |
|  | Greater Manchester West Mental Health NHS Foundation Trust | RXV |
|  | Surrey and Borders Partnership NHS Foundation Trust | RXX |
|  | Kent and Medway NHS And Social Care Partnership Trust | RXY |
|  | Coventry and Warwickshire Partnership NHS Trust | RYG |
|  | Dudley and Walsall Mental Health Partnership NHS Trust | RYK |
|  | Cambridgeshire Community Services NHS Trust | RYV |
|  | Sussex Community NHS Trust | RDR |
|  | Norfolk Community Health and Care NHS Trust | RY3 |
|  | Birmingham Community Healthcare NHS Trust | RYW |
|  | Solent NHS Trust | R1C |
|  | Liverpool Community Health NHS Trust | RY1 |
|  | Hertfordshire Community NHS Trust | RY4 |
|  | Lincolnshire Community Health Services NHS Trust | RY5 |
|  | Derbyshire Community Health Services NHS Trust | RY8 |
|  | Kent Community Health NHS Trust | RYY |
|  | Worcestershire Health and Care NHS Trust | R1A |
|  | Shropshire Community Health NHS Trust | R1D |
|  | Staffordshire and Stoke on Trent Partnership NHS Trust | R1E |
|  | Bridgewater Community Healthcare NHS Trust | RY2 |
|  | Leeds Community Healthcare NHS Trust | RY6 |
|  | Wirral Community NHS Trust | RY7 |
|  | Hounslow and Richmond Community Healthcare NHS Trust | RY9 |
|  | Central London Community Healthcare NHS Trust | RYX |
|  | Torbay and Southern Devon Health and Care NHS Trust | R1G |
|  | Gloucestershire Care Services NHS Trust | R1J |

## 

### Appendix D: Charlson Comorbidity Index Calculation

|  |
| --- |
| Introduction |
| The Charlson Index was developed in 1987 based on 1-year mortality data from internal medicine patients admitted to a single New York Hospital and was initially validated within a cohort of breast cancer patients. The original index encompasses 17 medical conditions weighted 1–6 with total scores ranging from 0–37.  A revision to the Charlson Index was presented by Dr. Foster Intelligence (DFI) in their HSMR Methodology documentation [14] indicating the weights should be updated (e.g. HIV had the highest weight in the original index but its mortality has fallen greatly, particularly in hospitalised patients) and calibrated using English data due to differences in coding practice and hospital patient population characteristics.  A table containing the old and new weights of the Charlson Comorbidity Index can be referenced in Appendix D.1: Charlson Comorbidity Index conditions, ICD-10 codes, new and old weights. |

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| Overview |
| The methodology detailed below is based on the recommendation presented by ScHARR as part of their commission by the Department of Health (DH) to finalise the SHMI model with reference to the methodology provided by DFI.  The derivation of the Charlson Comorbidity Index to be used for the calculation of the SHMI will be based on all the Hospital Episode Statistics (HES) secondary diagnosis fields (DIAG\_2 to DIAG\_20 inclusive) with no upper cap to the value. The lowest value for the Charlson Comorbidity Index will be 0. i.e. if the calculated Charlson Comorbidity Index value is less than 0, it will be assigned a value of 0.  If the primary diagnosis of the first episode in the spell starts with R (chapter XVIII in the ICD-10 classification - Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified) the index is calculated using the second episode. If the primary diagnosis in the second episode also starts with R then the first episode is used regardless of R code.  Additionally, if cancer and metastatic cancer are both present then the score for cancer is ignored. |

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| Methodology |
| This specification is based on information provided by the Dr Foster Unit at Imperial College London that described the methodology they use to score the Charlson Index.  The Charlson Comorbidity Index for each provider spell is calculated as the sum of the weights for each of the conditions (see table below) in all secondary diagnosis fields (DIAG\_2 –DIAG\_20).  Where the second episode of the provider spell is used to derive the primary diagnosis, the secondary diagnosis fields from the second episode are used to calculate the Charlson Comorbidity Index. Otherwise, the secondary diagnosis fields from the first episode of the provider spell are used.  For every Charlson Comorbidity Index condition *i*, if any secondary diagnosis fields (DIAG\_2 – DIAG\_20 inclusive) contains any of the ICD-10 codes for condition *i*  then *weighti* = *Newweight*  else *weighti* = 0  The Charlson Comorbidity Index is calculated as CCI =  There is an additional rule to remove the weight for cancer if both cancer and metastatic cancer are present.  If any secondary diagnosis fields (DIAG\_2 – DIAG\_20 inclusive) contains any of the ICD-10 codes for condition 15  then  If any secondary diagnosis fields (DIAG\_2 – DIAG\_20 inclusive) contains any of the ICD-10 codes for condition 11, set *CCI* = *CCI* – 8.  The following rule sets any negative values for the Charlson Comorbidity Index to be equal to zero.  If *CCI* < 0 then set *CCI* = 0. |

### Appendix D.1: Charlson Comorbidity Index conditions, ICD-10 codes, new and old weights

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| **Condition** | **Condition Name** | **ICD-10 codes** | **New weight** | **Old weight** |
|  | Acute myocardial infarction | I21, I22, I23, I252, I258 | 5 | 1 |
|  | Cerebral vascular accident | G450, G451, G452, G454, G458, G459, G46, I60-I69 | 11 | 1 |
|  | Congestive heart failure | I50 | 13 | 1 |
|  | Connective tissue disorder | M05, M060, M063, M069, M32, M332, M34, M353 | 4 | 1 |
|  | Dementia | F00, F01, F02, F03, F051 | 14 | 1 |
|  | Diabetes | E101, E105, E106, E108, E109, E111, E115, E116, E118, E119, E131, E136, E138, E139, E141, E145, E146, E148, E149 | 3 | 1 |
|  | Liver disease | K702, K703, K717, K73, K74 | 8 | 1 |
|  | Peptic ulcer | K25, K26, K27, K28 | 9 | 1 |
|  | Peripheral vascular disease | I71, I739, I790, R02, Z958, Z959 | 6 | 1 |
|  | Pulmonary disease | J40-J47, J60-J67 | 4 | 1 |
|  | Cancer | C00-C76, C81-C97 | 8 | 2 |
|  | Diabetes complications | E102, E103, E104, E107, E112, E113, E114, E117, E132, E133, E134, E137, E142, E143, E144, E147 | -1 | 2 |
|  | Paraplegia | G041, G81, G820, G821, G822 | 1 | 2 |
|  | Renal disease | I12, I13, N01, N03, N052-N056, N072-N074, N18, N19, N25 | 10 | 2 |
|  | Metastatic cancer | C77, C78, C79, C80 | 14 | 3 |
|  | Severe liver disease | K721, K729, K766, K767 | 18 | 3 |
|  | HIV | B20, B21, B22, B23, B24, O987 | 2 | 6 |

Indicator Assurance

**Appraisal Summary**

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| Ref | IAP00385 |
| Title | **Summary Hospital-level Mortality Indicator (SHMI). Deaths associated with hospitalisation** |
| Set / Framework | SHMI |

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| **Definition** | The SHMI is the ratio between the actual number of patients who die following hospitalisation at a trust and the number that would be expected to die on the basis of average England figures, given the characteristics of the patients treated there.  It covers all deaths reported of patients who were admitted to non-specialist acute trusts in England and either die while in hospital or within 30 days of discharge.  The expected number of deaths is calculated from statistical models derived to estimate the risk of mortality based on the characteristics of the patients (including the condition the patient is in hospital for, other underlying conditions the patient suffers from, age, gender, method of admission to hospital, and year of discharge. |
| **Purpose** | The purpose of SHMI is to have a transparent and open measure that is developed to provide a more complete picture of hospital mortality with the inclusion of ALL in-hospital deaths as well as deaths up to 30 days after discharge, which is currently not available in any other summary mortality indicators. This is consistent with the view that hospitals should be interested in what happens to their patients in the period immediately following discharge. |

**Assurance Details:**

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| **Reviewing Body** | **HSCIC Indicator Assurance Service** |
| **Application Date** | 01/08/2014 (resubmission) |

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| **Peer Review** |
| Reviewers: |
| *No peer review undertaken at present, although comments from the SHMI Technical Working Group and the current SHMI issues log were taken into consideration at the Methodology Review Group.* |

**Methodological Review**

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| Review Group | HSCIC Methodology Review Group (MRG) |
| Discussion Dates | 05/09/2014, 04/12/2014 |
| Minutes Available | **Yes** |
| Appraisers: | **Julie Stroud (chair) HSCIC Head of Population Health and Social Care**  **Stephanie Birtles NICE Senior Technical Analyst**  **Chris Dew HSCIC Programme Manager, Clinical Indicators**  **Paul Fryers PHE Deputy Director, East Midlands Knowledge and Intelligence Team**  **Jonathan Hope HSCIC Section Head, Statistical Response Unit**  **Paul Iggulden HSCIC Interim Head of Clinical Analysis, Research & Development**  **John Sharp HSCIC Head of Data Quality**  **Alyson Whitmarsh HSCIC Programme Manager, Clinical Audit** |

Conflicts of interest: *It is noted for the record that Chris Dew is a current member of the SHMI Technical Working Group, and that Alyson Whitmarsh has previously attended the group. Julie Stroud is due to take over the chair of the Technical Working Group in the capacity of HSCIC Head of Profession for Statistics in the near future but a present has had no involvement with SHMI.*

**Indicator Governance Board**

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| Discussion Dates | 19/12/14 |
| Minutes Available | **Yes** |

**Summary of Assurance Discussions**

**Methodology Review:**

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| Statement of Recommendation | Based on the application presented to the Methodology Review Group, and the subsequent evidence provided in response to the recommendations made, MRG have indicated that they are satisfied with the detail provided.  The application is put forward for discussion by IGB with the following caveats:   * MRG have assessed the application on the basis that there is a general consensus regarding methodology derived through the Technical Working Group with regards to construct. * The lack of identification of a named sponsor for SHMI means that the purpose of the indicator is not fully fixed. In turn this limits the extent to which the methodology can be assessed against the purpose. As such further work is required to identify the appropriate sponsor which in turn will enable the purpose to be refined and made more clear. * The lack of a named sponsor has implications for the governance of the indicator. If SHMI is meant to reflect a “system wide consensus” then there needs to be evidence of governance, for instance in where the Technical Working Group reports to. This relates to the issue of the need to identify a sponsor or owner. * That the high level analysis undertaken into producing SHMI at Local Authority level should sit on file as part of the Technical Working Group log, but is not necessary for inclusion in the Indicator Library. MRG recommend that the sponsor or Technical Working Group may wish to identify the subject for further investigation. * MRG recognise the conclusions of the paper provided examining the potential to include independent sector providers within SHMI, these being; there is much lower activity at independent sector providers compared to non-specialist acute trusts; more than 90% of activity at independent sector providers are from elective admissions and more than 80% of activity at non-specialist acute trusts are from non-elective admissions; The data quality of activity submitted by independent sector providers is also a concern and; almost 90% of them will unreliable due to insufficient data and therefore would not be published. * However, the Group did not reach a consensus as to whether those organisations that could be included should be included and as such determined that the inclusion of independent sector relates to the purpose of the indicator. It is for the sponsor to identify whether the independent sector is in scope, and such a decision would need careful consideration regarding the impact on the indicator.   Details of the recommendations, actions and responses are set out in the appraisal log below. Acknowledging the caveats identified, MRG put forward the indicator for discussion by the Indicator Governance Board. |

**Indicator Governance Board:**

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| Review Period Set | 6 months |
| Rationale | It is recommended that the indicator is reviewed within six months to determine whether progress has been made with the sponsorship of the indicator and to re-assess the purpose of the indicator in light of this. |

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| **Level of Assurance**  [determined at meeting] | Assured as eligible for inclusion in the Library of Quality Assured indicators |
| **Basis of Decision** | It was agreed the indicator be assured for 6 months, with a recommendation that if there is a failure to identify a sponsor then the indicator should not be considered as appropriate to include in the Library of Quality Assured Indicators. |
| Sign-off Date | 19/12/14 |

Appraisal Log

**Criterion: CLARITY**

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| **No** | **Issue or recommendation** | **Raised By/Date** | **Action Status\* Assigned** | **Response / Action taken (if appropriate)** | **Response date** | **Resolved** | **Checked by / Date** |
| 1a | The sponsor of the measure needs to be clearly identified and their endorsement of the indicator recorded. | MRG  05/09/14 | **Required** | The issue of identifying a named “owner” for the SHMI remains open. Colleagues within the Department of Health have been approached regarding this issue although no response has been received to date. In addition, the matter has been raised with the Head of HSCIC Sponsorship, again with no resolution to date. | 07/11/14 |  |  |

**Criterion: RATIONALE**

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| **No** | **Issue or recommendation** | **Raised By/Date** | **Action Status\* Assigned** | **Response / Action taken (if appropriate)** | **Response date** | **Resolved** | **Checked by / Date** |
|  | **Update**: Rationale should include that the SHMI is a system wide consensus (as opposed to agreement) on the methodology of calculating deaths associated with admission to hospital. | MRG  04/12/14 | Recommended |  |  |  |  |
| 2b | MRG were keen that the paperwork should reflect how the SHMI was built and what was taken into consideration, including the work carried out by School of Health and Related Research (ScHARR), University of Sheffield. | MRG  05/09/14 | Recommended | Application form (2.4) updated with details of work undertaken by ScHARR. | 07/11/14 |  | MRG 04/12/14 |
| 2c | Section 2.3 of the application form (Endorsement) that refers to the SHMI Technical Working Group needs to be strengthened to make clear that the points made within the application form are supported by the group as a consensus opinion. | MRG  04/12/14 | Recommended |  |  |  |  |

**Criterion: DATA**

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| **No** | **Issue or recommendation** | **Raised By/Date** | **Action Status\* Assigned** | **Response / Action taken (if appropriate)** | **Response date** | **Resolved** | **Checked by / Date** |
| 3a | MRG noted the issue regarding data availability for non-NHS and non-researchers which affects the reproducibility of the indicator. They were informed that the HSCIC is currently working to resolve this, however the data release is the responsibility of ONS. | MRG  05/09/14 | No action required | N/A | - | N/A | - |
| 3b | John Sharp (Head of Data Quality, HSCIC) agreed to work with the SHMI team at the HSCIC to ensure the information they provide regarding data quality is as detailed and accessible as MRG require. He requested the SHMI team arrange a suitable time to discuss this with him. | MRG  05/09/14 | **Required** | Advice taken from John Sharp (Head of Data Quality, HSCIC) and required actions implemented:  Application form (3.4) updated to quantify the level of data quality of the data sources used in the development of the SHMI.  Application form (4.7) updated with a description of specific limitations due to data quality issues. | 07/11/14 |  | John Sharp / MRG  04/12/14 |

**Criterion: CONSTRUCTION**

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| **No** | **Issue or recommendation** | **Raised By/Date** | **Action Status\* Assigned** | **Response / Action taken (if appropriate)** | **Response date** | **Resolved** | **Checked by / Date** |
| 4a | MRG were made aware during the meeting that confidence intervals were calculated for the indicator, however the paperwork did not reflect this. They recommended this be updated in section 4.8 and 4.9 of the application form. | MRG  05/09/14 | **Required** | Confidence intervals are not calculated for the indicator. Only control limits are calculated for the SHMI. | 07/11/14 |  | MRG 04/12/14 |
| 4b | MRG ask for more information to be provided regarding the decision to control for over-dispersion.  From the information provided to MRG at the meeting of the 05/09, group members questioned the benefit of controlling as the result seemed to be fewer trusts in the "greater than expected" and "lower than expected" bandings. However, the group were made aware that there was additional information available to justify their decision and that once they had a clearer purpose for the indicator, this may highlight why it is necessary. MRG recommended to investigate the implications of removing the over-dispersion control. | MRG  05/09/14 | **Required** | A discussion paper written by Andy Sutherland (former HSCIC Head of Profession for Statistics) in his capacity as chair of the SHMI Technical Working Group was provided as part of the meeting papers presented to MRG at the meeting of 4/12/14 (MRG Paper 2).  Details of investigation have been provided in section 4.10 of the updated application form | 07/11/14 |  |  |
|  | **Update:** MRG recommended that the final paragraph in section 4.10 needs strengthening and repositioned at the beginning of the box. Much of the other content could be removed, given that reference is made to the TWG decision. | MRG  05/09/14 | **Required** |  |  |  |  |
| 4c | MRG supports the development work to see whether the Elixhauser Comorbidity Index is more suitable than the Charlson Comorbidity Index, however stated that this change would have to be evidence based and with a clear rationale for change. | MRG  05/09/14 | None | N/A |  | N/A |  |
| 4d | MRG raised a concern that an increasing number of patients are being treated in the independent sector, therefore they queried why all NHS-funded care wasn't included in the SHMI. They felt that this inclusion would be useful for commissioners of health services. | MRG  05/09/14 | Recommended | Details of investigation were provided as part of the meeting papers presented to MRG at the meeting of 4/12/14 (MRG Paper 1: Independent sector Analysis.). | 07/11/14 |  | MRG 04/12/14 |
|  | Update: MRG recognised the conclusions of the paper provided examining the potential to include independent sector providers within SHMI, however did not reach a consensus as to whether those organisations that potentially could be included should be. As the inclusion of independent sector relates to the purpose of the indicator, it is for the sponsor to identify whether the independent sector is in scope, with any decision needing careful consideration regarding the impact on the indicator. | MRG 04/12/14 | Recommended |  |  |  |  |
| 4e | With regards to measuring 30 days post admission rather than 30 days post discharge (as identified on the Technical Working Group issues log), the group felt that this change would have to be returned to MRG if implemented as it would be a fundamental change in the definition of an event. | MRG  05/09/14 | None | N/A |  | N/A |  |

**Criterion: INTERPRETATION**

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| **No** | **Issue or recommendation** | **Raised By/Date** | **Action Status\* Assigned** | **Response / Action taken (if appropriate)** | **Response date** | **Resolved** | **Checked by / Date** |
| 5a | MRG highlighted that although the paperwork was clear in how to interpret a trust's SHMI value, it was less clear as to how a trust should interpret the results over time. | MRG  05/09/14 | Recommended | Application form (5.4) has been updated with details of how a trust should interpret the results over time. | 07/11/14 |  | MRG 04/12/14 |
| 5b | As supporting information, it may be useful to calculate the SHMI on a resident population basis (CCG or residence or LA of residence) as well as on a trust patient basis, as comparison between figures for an area and those for its local and specialist trusts may be revealing. | MRG  05/09/14 | Recommended | The developer has undertaken a piece of work to recalculate the SHMI at LA of residence. This was provided to MRG as a map for reference.  Details of investigation were provided as part of the meeting papers presented to MRG at the meeting of 4/12/14 (MRG Paper 3) | 07/11/14 |  | MRG 04/12/14 |

**Criterion: RISKS AND USEFULNESS**

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| **No** | **Issue or recommendation** | **Raised By/Date** | **Action Status\* Assigned** | **Response / Action taken (if appropriate)** | **Response date** | **Resolved** | **Checked by / Date** |
| 6a | MRG noted that the SHMI is under constant review by the SHMI Technical Working Group (TWG) and noted their commitment to the ongoing development of SHMI.  However, members of MRG raised concerns that the working group has not reached a consensus regarding the SHMI methodology and sought clarification as to whether the role of the TWG is for the governance of the indicator or as an advisory body. This relates to the issues raised regarding the sponsor of the indicator and clarity of purpose. | MRG  05/09/14 | Recommended | The SHMI Technical Working Group (TWG) is regarded as an expert peer review panel for the ongoing development of the SHMI. Therefore, their role in the development of the methodology of the SHMI is as an advisory body.  The Terms of Reference is currently being worked on in conjunction with the new chair of the SHMI TWG. | 07/11/14 |  | MRG 04/12/14 |

\*The description of the states given to each recommendation are as follows:

**Action required**: The group concerned is of the opinion that the indicator is not ready to go into the library of Quality Assured Indicators, based on the point raised.

**Action recommended:** The group concerned recommend action is undertaken in the particular area in order to increase the quality and rating of the indicator, however, do not feel this would prevent its inclusion in the Library of Quality Assured Indicators.

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