NCA National Office of Clinical Audit

NAHM National Audit of Hospital Mortality

NATIONAL AUDIT OF HOSPITAL MORTALITY

ANNUAL REPORT 2019

PREPARED BY THE NAHM REPORT WRITING GROUP WITH ASSISTANCE FROM THE NAHM GOVERNANCE COMMITTEE

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NATIONAL OFFICE OF CLINICAL AUDIT (NOCA)

The National Office of Clinical Audit (NOCA) was established in 2012 to create sustainable clinical audit programmes at national level. NOCA is funded by the Health Service Executive National Quality Improvement (QI) Team and operationally supported by the Royal College of Surgeons in Ireland.

Clinical audit is a clinically led quality improvement process that seeks to improve patient care and outcomes through systematic review of care against explicit criteria, and by acting to improve care when standards are not met (Department of Health and Children, 2008).

NOCA supports hospitals to learn from their audit cycles.

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The NAHM Governance Committee wishes to acknowledge the Health Service Executive (HSE) National Clinical Care Programmes for their guidance and support in the preparation of this fifth National Audit of Hospital Mortality Annual Report. In particular, we wish to thank the following:

Prof. Joseph Harbison and Ms Joan McCormack, Irish National Audit of Stroke

Dr Desmond Murphy, National Clinical Lead in Respiratory Medicine

Dr Brian Creedon, National Clinical Programme for Palliative Care

Prof. Ken McDonald and Ms Regina Black, National Heart Programme

The Health Intelligence Unit (HIU), Strategic Planning and Transformation, HSE, has developed the National Quality Assurance Improvement System (NQAIS) suite of tools in partnership with OpenApp, the National Clinical Programmes and other stakeholders. We would like to thank the HIU for its support in the development of the NQAIS NAHM web-based tool, which focuses on in-hospital mortality patterns. The HIU provides valuable advice to NOCA and the NAHM Governance Committee.

We would like to extend our gratitude to the HSE National QI Team. The National QI Team works in partnership with patients, families and all who work in the health system to innovate and improve the quality and safety of our care, and considers national clinical audit a key improvement activity. The HSE National QI Team funds NOCA and provides valuable advice to NOCA and the NAHM Governance Committee.

Finally, we would like to thank both the Healthcare Pricing Office (HPO), which manages the Hospital In-Patient Enquiry (HIPE) scheme, and the clinical coders working in both the HSE HIPE offices and in the HPO who code the medical records and prepare the data upon which this report is based. The HPO provides HIPE data to the HIU in the HSE for the generation of mortality patterns in the NQAIS NAHM web-based tool. The HPO also provides valuable advice to NOCA and the NAHM Governance Committee.

ACKNOWLEDGING SIGNIFICANT CONTRIBUTIONS FROM THE FOLLOWING:

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DESIGNED BY SWERVE

NCA National Office of Clinical Audit

National Audit of Hospital Mortality

ANNUAL REPORT 2019

National Office of Clinical Audit

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12th November 2020

Dear Ms Egan,

I wish to acknowledge receipt of the National Audit of Hospital Mortality Annual Report 2019.

On behalf of the NOCA Governance Board, I wish to congratulate you, Audit Manager Deirdre Burke and your governance committee on an excellent report which gives assurance to patients that mortality is being carefully monitored in Irish hospitals.

Please accept this as formal endorsement from the NOCA Governance Board of the National Audit of Hospital Mortality 2019.

Yours sincerely,

Dr Brian Creedon
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GLOSSARY

ACRONYM	FULL TERM
ADST	Analysis and Display Scientific Team
AMI	acute myocardial infarction (heart attack)
CCI	Charlson Comorbidity Index
CCS	Clinical Classifications Software
COPD	chronic obstructive pulmonary disease
CUH	Cork University Hospital
CuSum	cumulative summary control chart
HIPE	Hospital In-Patient Enquiry scheme
HIQA	Health Information and Quality Authority
HIU	Health Intelligence Unit, Strategic Planning and Transformation, HSE
HPO	Healthcare Pricing Office
HPSIR	Hospital Patient Safety Indicator Report
HSE	Health Service Executive
ICD-10-AM/ ACHI/ACS	International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification/Australian Classification of Health Interventions/Australian Coding Standards
IHFD	Irish Hip Fracture Database
INAS	Irish National Audit of Stroke
NAHM	National Audit of Hospital Mortality. A structured review and evaluation of care as part of the clinical audit cycle.
NHQRS	National Healthcare Quality Reporting System
NOCA	National Office of Clinical Audit
NQAIS	National Quality Assurance Improvement System. A suite of audit and performance-monitoring tools developed by the Health Intelligence Unit, Strategic Planning and Transformation, HSE.
NQAIS NAHM	National Quality Assurance Improvement System, National Audit of Hospital Mortality web-based tool
NSTEMI	non-ST-elevation myocardial infarction
OECD	Organisation for Economic Co-operation and Development
PPCI	primary percutaneous coronary intervention

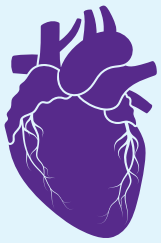
ACRONYM	FULL TERM
principal diagnosis	The diagnosis which was established after investigation and found to be responsible for the episode of admitted patient care, as represented by an ICD-10-AM/ACHI/ACS code.
SMR	standardised mortality ratio
S/SWHG	South/South West Hospital Group
STEMI	ST-elevation myocardial infarction

EXECUTIVE SUMMARY

This is the fifth *National Audit of Hospital Mortality Annual Report*. Data in this report are from the closed Hospital In-Patient Enquiry (HIPE) scheme file for 2019 on the National Quality Assurance Improvement System, National Audit of Hospital Mortality (NQAIS NAHM) web-based tool. HIPE data are extracted from 44 public acute hospitals and used in the tool. The report focuses on data for six key diagnoses identified for public reporting based on inclusion criteria set by the NAHM Governance Committee: acute myocardial infarction (AMI), heart failure, ischaemic stroke, haemorrhagic stroke, chronic obstructive pulmonary disease (COPD), and pneumonia. Hospitals can view their in-hospital mortality data for all diagnoses via the NQAIS NAHM web-based tool throughout the year.

The purpose of this report is to provide an analysis of in-hospital mortality to stakeholders, patients, the public and the wider healthcare system, and to communicate the recommendations made on the basis of the findings. This report should reassure readers that there is a process in place to monitor mortality data, and any outliers are acted upon and the learnings shared. A summary of statistical outlier reviews conducted during 2019 is included in this report. This main report is supported by a summary report, which is presented in a clear visual format, and also by the *National Audit of Hospital Mortality Supporting Appendix 2019*, both of which are available to download from the National Office of Clinical Audit (NOCA) website (https://www.noca.ie/publications/publications-listing/P0/category/3).

KEY FINDINGS



ACUTE MYOCARDIAL INFARCTION

In-hospital mortality for AMI has decreased significantly (35%) over the past 10 years, from 72 deaths per 1,000 admissions in 2010 to 47 deaths per 1,000 admissions in 2019.

HEART FAILURE

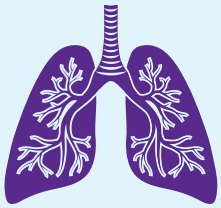
In-hospital mortality for heart failure has decreased significantly (23%) over the past 10 years, from 88 deaths per 1,000 admissions in 2010 to 68 deaths per 1,000 admissions in 2019.

ISCHAEMIC STROKE

In-hospital mortality for ischaemic stroke decreased significantly (38%) between 2009 and 2018, from 123 deaths per 1,000 admissions in 2009 to 76 deaths per 1,000 admissions in 2018. However, this has risen slightly in 2019, when 80 deaths per 1,000 admissions were recorded.

HAEMORRHAGIC STROKE

In-hospital mortality for haemorrhagic stroke has decreased by 9% over the past 10 years, from 264 deaths per 1,000 admissions in 2010 to 241 deaths per 1,000 admissions in 2019. This is not a statistically significant decrease.



CHRONIC OBSTRUCTIVE PULMONARY DISEASE

In-hospital mortality for COPD increased by 12% between 2010 and 2019, from 33 deaths per 1,000 admissions in 2010 to 37 deaths per 1,000 admissions in 2019. This is not a statistically significant increase.

PNEUMONIA

In-hospital mortality for pneumonia has decreased significantly (27%) over the past 10 years, from 142 deaths per 1,000 admissions in 2010 to 103 deaths per 1,000 admissions in 2019.

OUTLIERS

Statistical outliers occurred in four individual diagnoses during 2019, and the relevant hospitals have conducted reviews of their data. One example of where a hospital has been proactive in its approach to being an outlier in NAHM is also included in the statistical outliers section. There were no issues of concern raised in the reviews.

KEY RECOMMENDATION

The National Audit of Hospital Mortality recommends that NOCA should develop more structured guidance on statistical outlier reviews, and it also recommends that this should be completed during the second quarter of 2021.

INTRODUCTION

This is the fifth *National Audit of Hospital Mortality Annual Report* from the National Office of Clinical Audit (NOCA). The report presents mortality data for 2019 from 33 of the 44 publicly funded hospitals participating in the National Audit of Hospitality Mortality (NAHM). These data relate to acute cases admitted to hospital, where the principal reason for admission, established at time of discharge, is one of the following six key diagnoses:

- acute myocardial infarction (AMI)
- heart failure
- ischaemic stroke
- haemorrhagic stroke
- chronic obstructive pulmonary disease (COPD)
- pneumonia.

The NAHM Governance Committee set criteria for the selection of diagnoses to be included in the report, and some of the diagnoses with the highest burden on the healthcare system in Ireland are included. There are also inclusion criteria applied to hospitals, with only those hospitals meeting the criteria for these six key diagnoses being publicly reported – *see National Audit of Hospital Mortality Supporting Appendix 2019* on the NOCA website for more information on inclusion criteria at https://www.noca.ie/publications/publications-listing/P0/category/3. Patients and the public should be reassured that while not all hospitals' data are published in this report, hospitals can view their in-hospital mortality data for all diagnoses (high and low volume) via the National Quality Assurance Improvement System (NQAIS) NAHM web-based tool throughout the year.

This report provides information on in-hospital mortality for people who use our health service, work in our health service, and those who develop health policies which aim to improve the quality of our health service. Mr Alan Egan, NAHM Public and Patient Interest Representative, commented: "Our healthcare system is a stressed system and this is something that is likely to continue, because of increased demands and constrained resources. When media report on our healthcare system, the focus is usually on the bad stories. When the NAHM statistics over the past 10-year period are analysed, we see that solid, steady improvements are continuously being made. This is a tribute to all the workers within our healthcare system."

The COVID-19 pandemic has impacted somewhat on the content of this report, as work on implementing some of the recommendations in the 2018 report has been delayed; for example, the development of guidance on how palliative care treatment should be recorded has been postponed until 2021.

Dr Deirdre Mulholland, Director of Public Health, Health Service Executive East commented: "We are currently in unprecedented times, with the whole of the Irish health system and society responding to the COVID-19 pandemic. This is challenging for all of us, particularly as there is no clarity on whether or when there will be an effective vaccine and/or treatment. However, it is important that health services continue to work with NOCA to provide the data and information required for this report. This report includes information from 44 publicly funded hospitals and reflects the health services' commitment to continue to learn and improve their services based on quality information and audit. It will be important and informative that the 2020 annual report reflects the impact of COVID-19 on our health services and provides information that the system can use in improving services and in planning for the future." Dr Mulholland went on to say: "It is important to recognise the commitment of the health services not

only to the audit process and to the development of this report, but also to continuing to learn and improve their services during a time of huge challenge and demands."

Finally, NOCA would like to extend its sincere gratitude and appreciation to all those whose hard work has enabled this report to be published on time, despite the challenges presented during 2020.

NAHM AIMS

Our aims are to:

- understand and improve the quality of hospital-based mortality data
- promote reflection on the quality of overall patient care
- identify areas for improvement.

WHAT IS NQAIS NAHM?

The NQAIS NAHM web-based tool extracts Hospital In-Patient Enquiry (HIPE) scheme data from 44 participating publicly funded acute hospitals. These data are uploaded to the NQAIS NAHM web-based tool, developed by the Health Intelligence Unit (HIU), Strategic Planning and Transformation in the Health Service Executive (HSE) and the software developer OpenApp, with support from Professor Simon Jones (Professor in Population Health, New York University). The tool allows individual hospitals (Table 1) to access their mortality data at hospital, diagnostic group, and individual diagnosis level throughout the year and to review their mortality patterns in detail.

NQAIS NAHM calculates a standardised mortality ratio (SMR) for each diagnosis group based on the principal diagnosis (the primary reason a patient required hospital admission) as coded in the HIPE system. An SMR is the observed number of deaths divided by the expected number of deaths in a hospital for a particular diagnosis and time period, adjusted for patient characteristics which are known to impact on inpatient mortality, as follows:

- age
- gender
- pre-existing conditions (Charlson Comorbidity Index (CCI))
- in-hospital palliative care treatment
- source of admission (e.g. home, nursing home)
- type of admission (e.g. elective, emergency)
- previous emergency admissions in last 12 months to the same hospital
- medical card (proxy for deprivation).

SMRs are an indicator of quality in hospitals and are an appropriate way of looking at mortality data. Variation between the expected value and a result that is unlikely to have arisen from random variation provides a signal to hospitals that the number of deaths in their hospital is above what was expected and that this should be reviewed. A review of patient profile, case mix and healthcare provision should be performed, and, where appropriate, areas for improvement identified.

The NAHM Governance Committee defines an outlier as occurring where an SMR for an individual diagnosis is higher than expected, appearing outside the 99.8% confidence intervals, combined with high breach of 99.8% control limits in the cumulative summary control chart (CuSum). An outlier is considered a *statistical* outlier if this high SMR and CuSum breach occur in two consecutive quarterly releases of data in NQAIS NAHM.

When a statistical outlier is identified, NOCA engages with the accountable user in the hospital in line with NOCA's *Monitoring and Escalation Policy* (NOCA, 2017), requesting a review to be carried out to investigate the possible reasons for the difference from expected. Accountable users vary from hospital to hospital, but some examples include the Hospital Manager/CEO, Clinical Risk Manager, Quality Manager, Clinical Director, Business Manager, HIPE Manager, etc.

NQAIS NAHM can give assurance that the risk model works well on hospitals with large volumes of cases for any given diagnosis. SMRs are calculated for all 44 participating hospitals and on all diagnoses in the NQAIS NAHM tool. However there are limitations to the model when it comes to hospitals with lower volumes of cases per diagnosis. Despite this, all hospitals are able to see their data via the web-based tool, and they can also see if they have an outlier. If this outlier becomes a statistical outlier then the accountable user in the hospital will be contacted by NOCA.

HOW DATA ARE PRESENTED IN THIS REPORT

This is a condensed report which contains clinical information and data quality chapters that featured in previous reports, and is available to download from the NOCA website (www.noca.ie). Data for each of the six diagnoses are presented in a standardised format to enable the reader to review the report in sections if they so wish.

More information is available for download from the NOCA website (www.noca.ie/publications/publications-listing/P0/category/3), including the *National Audit of Hospital Mortality Supporting Appendix 2019* (which provides information on methodology, inclusion criteria, and definitions of International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification/ Australian Classification of Health Interventions/Australian Coding Standards (ICD-10-AM/ACHI/ACS) codes used in this report), and also a summary report using visual statistics and plain language.

An SMR is presented for each of the diagnoses in a funnel plot. The interpretation of this funnel plot is explained in Appendix 1. Crude mortality trends over the past 10 years, infographics showing the percentages of deaths per age group, and CCI scores are presented for each of the six key diagnoses.

HIPE data are based on cases which may include multiple admissions for the same patient. For this reason, in this report we refer to cases rather than patients.

WHAT THIS REPORT CAN AND CANNOT DO

This report publishes mortality data for participating Irish acute hospitals for six key diagnoses. NAHM has always advocated for transparency and continues to publish hospital-identifiable information from NQAIS NAHM.

In response to commentary on last year's report, we would again like to emphasise that the aim of this report is not to produce a league table or to compare outcomes between hospitals for cases admitted with the six key diagnoses listed above. This report cannot be used to compare hospitals with each other. The reason for this is multifactorial – no two hospitals will have the same patient profile, and many cases will be transferred to specialist centres for management and/or intervention. Some cases with complex diagnoses may be deemed not suitable for intervention and remain at the admitting hospital. Also, as is evident from the analysis in some diagnoses, data for a number of years need to be combined in order to get meaningful results. Some of the 44 participating hospitals do not have sufficient numbers of cases presenting with certain diagnoses to have their data used to provide meaningful analysis. In 2016, the Healthcare Pricing Office (HPO) commissioned an independent audit of hospital inpatient coding which found variability between hospitals' coding practices, which could in turn result in differences in SMRs (Pavilion Health Australia, 2016).

This report looks at the mortality rates of cases where the main reason for admission was one of the six key diagnoses, but it is important to emphasise that this may not be the actual cause of death for each case; for example, a patient may be admitted with a stroke, but the ultimate cause of death may be pneumonia.

The Department of Health published mortality data in the National Healthcare Quality Reporting System (NHQRS) 2019 for diagnoses of AMI, haemorrhagic stroke and ischaemic stroke. The basis of this methodology is the Organisation for Economic Co-operation and Development's (OECD) direct standardised death rate. This method allows for comparison between Ireland and other countries. The methodology used for NQAIS NAHM differs from that used for the NHQRS, as NQAIS NAHM uses an indirect SMR that adjusts for patient characteristics which are known to impact on inpatient mortality. This allows hospitals to compare their observed death rate against the death rate that would be expected in that hospital if other variables affecting mortality could be taken into consideration. Due to the differences in methodology, it is not possible to compare in-hospital mortality indicators in this report against those presented by the Department of Health in the NHQRS report.

NAHM IN ACUTE HOSPITALS

NOTE: Dublin hospitals have been displayed collectively by hospital group

SAOLTA UNIVERSITY HEALTH CARE GROUP

- LETTERKENNY UNIVERSITY HOSPITAL
- SLIGO UNIVERSITY HOSPITAL
- ROSCOMMON UNIVERSITY HOSPITAL
- PORTIUNCULA UNIVERSITY HOSPITAL
- MAYO UNIVERSITY HOSPITAL
- GALWAY UNIVERSITY HOSPITALS

RCSI HOSPITALS

IRELAND EAST HOSPITAL GROUP

DUBLIN MIDLANDS HOSPITAL GROUP

UL HOSPITALS GROUP

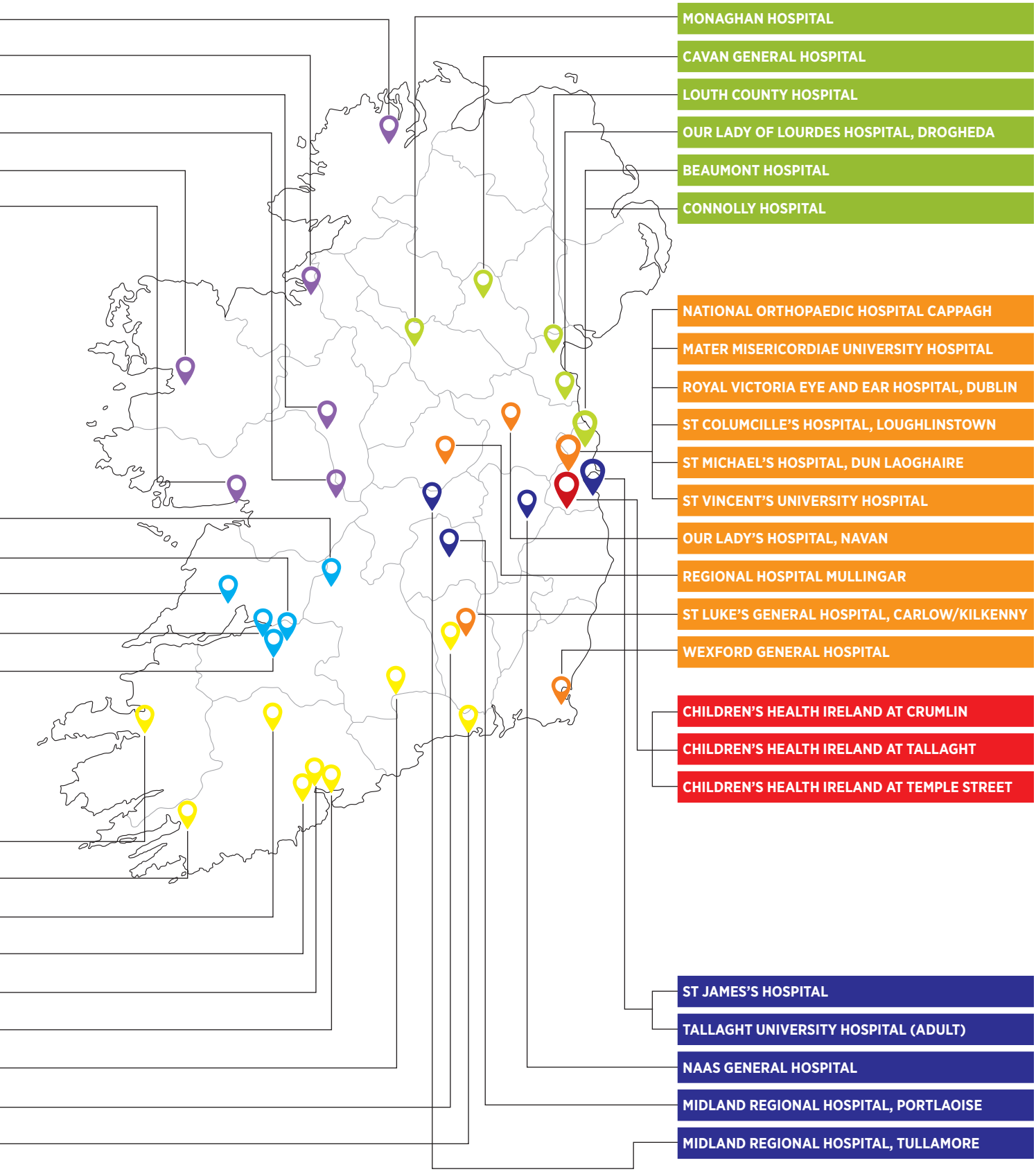
- NENAGH HOSPITAL
- UNIVERSITY HOSPITAL LIMERICK
- ENNIS HOSPITAL
- ST JOHN'S HOSPITAL, LIMERICK
- CROOM ORTHOPAEDIC HOSPITAL

CHILDREN'S HEALTH IRELAND

SOUTH/SOUTH WEST HOSPITAL GROUP

- UNIVERSITY HOSPITAL KERRY
- BANTRY GENERAL HOSPITAL
- MALLOW GENERAL HOSPITAL
- CORK UNIVERSITY HOSPITAL
- MERCY UNIVERSITY HOSPITAL, CORK
- SOUTH INFIRMARY VICTORIA UNIVERSITY HOSPITAL
- SOUTH TIPPERARY GENERAL HOSPITAL
- KILCREENE REGIONAL ORTHOPAEDIC HOSPITAL
- UNIVERSITY HOSPITAL WATERFORD

TABLE 1: HOSPITALS PARTICIPATING IN NAHM


MONAGHAN HOSPITAL
CAVAN GENERAL HOSPITAL
LOUTH COUNTY HOSPITAL
OUR LADY OF LOURDES HOSPITAL, DROGHEDA
BEAUMONT HOSPITAL
CONNOLLY HOSPITAL
NATIONAL ORTHOPAEDIC HOSPITAL CAPPAGH
MATER MISERICORDIAE UNIVERSITY HOSPITAL
ROYAL VICTORIA EYE AND EAR HOSPITAL, DUBLIN
ST COLUMCILLE'S HOSPITAL, LOUGHLINSTOWN
ST MICHAEL'S HOSPITAL, DUN LAOGHAIRE
ST VINCENT'S UNIVERSITY HOSPITAL
OUR LADY'S HOSPITAL, NAVAN
REGIONAL HOSPITAL MULLINGAR
ST LUKE'S GENERAL HOSPITAL, CARLOW/KILKENNY
WEXFORD GENERAL HOSPITAL
CHILDREN'S HEALTH IRELAND AT CRUMLIN
CHILDREN'S HEALTH IRELAND AT TALLAGHT
CHILDREN'S HEALTH IRELAND AT TEMPLE STREET
ST JAMES'S HOSPITAL
TALLAGHT UNIVERSITY HOSPITAL (ADULT)
NAAS GENERAL HOSPITAL
MIDLAND REGIONAL HOSPITAL, PORTLAOISE
MIDLAND REGIONAL HOSPITAL, TULLAMORE

We have had very good engagement from hospitals, with 67 users availing of refresher training on the new enhanced NQAIS NAHM system. See audit update on page 64 for more information.

COMMENT FROM NAHM USER REPRESENTATIVE

NQAIS NAHM data and the SMR is one of our hospital quality metrics. Over the last three years, we have used the information from the NQAIS NAHM data as part of our assurance process to the Board of the hospital. NQAIS NAHM data provide us with a standardised measurement that compares our hospital mortality rates with the overall national average rate. The ratio provides a starting point to assess our mortality rates and identify areas for potential improvement. The data are presented at our Quality & Patient Safety Committee and are then passed on to the Board of the hospital.

We actively interrogate the data for any statistical outliers. A finding of a statistical outlier within the dataset does not necessarily indicate a problem, but rather highlights that there is a difference between the expected value for the diagnosis and the actual result for the hospital, and that this result was unlikely to have arisen from random variation. We use this flag to prompt the need for further investigation on a specific area. We subsequently carry out a healthcare record review on that specific area to explore the care provided, and whether it was in accordance with good practice and accurately clinically documented.

The dataset is a broad but valuable marker for identifying opportunities for improving patient care. Like all hospitals, we are still on the learning curve for maximising the use of these data. Our process for reviewing and interpreting the information is still evolving and the work involved is insightful and valued.

Ms Ruth Buckley
Quality Manager, QPS Directorate
Mater Misericordiae University Hospital

DATA QUALITY

Data for NQAIS NAHM are extracted from routinely collected administrative data from the patient medical record. These data are collected by the HIPE scheme, which is managed by the HPO on behalf of the HSE. HIPE clinical coders extract, code and enter the data from the patient medical record (including discharge summary) into the standardised HIPE portal. The HPO supports the use of HIPE in hospitals. A patient discharge summary should be completed for every in-hospital discharge, including where death has occurred. HIPE clinical coders and clinicians should collaborate to ensure that the information contained in the patient medical record is as accurate as possible. A coded medical record is produced for each discharged case. The HPO sends encrypted and secure exports of the HIPE national file to the HIU on a monthly basis for upload to NQAIS tools. Data are refreshed on NQAIS NAHM quarterly throughout the year and monthly in quarter one, as the HIPE national file is approaching closure.

NAHM DATA QUALITY STATEMENT

The purpose of the data quality statement (Table 2) is to highlight the assessment of the quality of NQAIS NAHM data during 2019, using internationally agreed dimensions of data quality as laid out in the Health Information and Quality Authority's (HIQA's) *Guidance on a data quality framework for health and social care* (HIQA, 2018). The statement should assure patients and service users that the accuracy and reliability of NAHM data are continually assessed by NQAIS NAHM users. One of the objectives of NAHM is to understand and improve the quality of hospital-based mortality data. The data quality statement identifies strengths and areas for improvement. For example, the change to the new summary page will help NQAIS NAHM users to identify when they are a statistical outlier for the completion of the Hospital Patient Safety Indicator Report (HPSIR). The changes to Clinical Classifications Software (CCS) groups (internationally recognised diagnosis groupings which allow for statistical analysis) within the NQAIS NAHM tool will benefit users, as the data are now more in line with information available from other sources. These changes show the evolution of NAHM to facilitate users' requirements. Version one of the data dictionary is not yet available for users; this is identified as a limitation and will be addressed in 2020 when it is completed.

TABLE 2: OVERVIEW OF THE QUALITY OF NQAIS NAHM DATA IN 2019

Dimensions of data quality in 2019	Definition (HIQA, 2018)	Assessment of dimension (NQAIS NAHM)
Relevance 	**Relevant data meet the current and potential future needs of users.**	Relevance of NAHM data is based on releases of data to the NQAIS NAHM tool and the value of the data to local hospitals and other stakeholders. Each participating hospital has the functionality to access and use its own data to support quality improvement initiatives and service development. Hospitals received updates of data on the web-based tool in January, February, March, May, September and December 2019. All users were informed by email as the releases of data occurred and when the next release was due. All planned release dates were met. An Information ("i") button in the NQAIS NAHM web-based tool indicates the date when the data were released to the tool and made available for users. The date of data covered in the rolling 12-month period is the default display. Older updates of data are available to view using the look back function available on the "period" button. Hospital Groups received a report specific to their group in January, May, July and November 2019. The HSE Business Information Unit received metadata information in January 2019. Hospital staff use NAHM information to complete the HPSIR, which has collected and published data from all hospitals since August 2019. Feedback was received that there was not complete alignment between the ICD-10-AM/ACHI/ACS diagnostic codes used in the CCS group "fracture neck of femur" in NQAIS NAHM and the codes used in the Irish Hip Fracture Database (IHFD). NHAM updated the "fracture neck of femur" CCS group in mid-2020. This improvement to NQAIS NAHM will mean that the NAHM CCS group and the IHFD data will be based on the same ICD-10-AM/ACHI/ACS codes. This will mean that hospitals with a high SMR in the "fracture neck of femur" CCS group in NAHM can look at their IHFD data to see if they have similar results. Data from both databases should be broadly the same, with a few exceptions, as some patients will have their hip fracture classed as a secondary diagnosis (NAHM uses the principal diagnosis only). Feedback can be given via the comments section of the NQAIS NAHM web-based tool and is highlighted at all monthly training sessions. Some user feedback during 2019 resulted in the enhancement of the new summary page to make it easier for users to identify when they were a statistical outlier in NQAIS NAHM. This is especially useful for those completing the HPSIR reports. This change demonstrates how NQAIS NAHM has had to be adaptable in order to ensure that the data remain valuable to local users in the course of their day-to-day work, and how the tool has evolved to meet users' information requirements. There were no research data requests received for NAHM data during 2019. Any data requests for research and service evaluation will be assessed in line with the NOCA Research Data Access Policy.

Dimensions of data quality in 2019	Definition (HIQA, 2018)	Assessment of dimension (NQAIS NAHM)
Accuracy and reliability 	**The accuracy of data refers to how closely the data correctly describe what they were designed to measure. Reliability refers to whether those data consistently measure, over time, the reality of the metrics that they were designed to represent.**	Accurate data capture is imperative not only for patient care, but also for NAHM, as the data collected are used in the NQAIS NAHM risk calculations. All NAHM user training undertaken in 2019 highlighted the need for accurate documentation and discharge summaries for all cases, both alive and deceased. Inconsistency in the inclusion of the phrasing "for palliation" or "palliative Care" continues to have an impact on accuracy in this field. This is particularly evident in the Cork University Hospital review on page 30, which highlighted that its SMR would have been within the normal range if the hospital's palliative care activity was all documented in the way required by the Irish Coding Standards so that its HIPE office could then also code the activity as "palliative care". All data used were extracted directly from HIPE; therefore, data validation was carried out both at hospital level and by the HPO. NOCA carried out further validation of HIPE data before every release of data to the NQAIS NAHM tool in January, February, March, May, September and December 2019. There were no issues of concern raised from these validations. The HPO monitors, validates and anonymises the data before sending them to the HIU HSE, where the statistical modelling is applied in line with agreed dates and timelines. This process turns HIPE data into NQAIS NAHM information. A final validation process is carried out by NOCA before data are released to the web-based tool for hospitals to view. This processing timeline takes approximately 6 weeks, and all targets were met throughout 2019. HIPE coverage figures were not made available to users by NOCA; rather, they were communicated directly to hospitals by the HPO. HIPE coverage figures are included in Hospital Group reports for 2019. As all data were extracted from HIPE and all fields used were mandatory, there were no invalid/missing values. The 2019 report was based on data from the closed 2019 HIPE data file(HIPE_2019_ASOF_0420_V17_CLOSE_ENC_EPI_DOB_HI_TODEC.fil).

Dimensions of data quality in 2019	Definition (HIQA, 2018)	Assessment of dimension (NQAIS NAHM)
Timeliness and punctuality 	**Timely data are collected within a reasonable agreed time period after the activity that they measure. Punctuality refers to whether data are delivered on the dates promised, advertised or announced.**	Timeliness of data in NAHM relates to the timeliness and punctuality of reports from NQAIS NAHM to hospital users. Hospitals received updates of data on the web-based tool in line with planned release dates for 2019. Hospital Groups received a report specific to their group quarterly during 2019. All data updates to the NQAIS NAHM web-based tool were released as planned in 2019. A schedule of data updates for 2019/2020 was published in the *National Audit of Hospital Mortality Annual Report 2018* (NOCA, 2019), which is publicly available on the NOCA website. All participating hospitals code their patients' charts within 30 days of discharge, as per instruction from the HPO (HPO, 2017). The HIPE Coverage Report for January to December 2019 data (April 2020, closed file) shows that 99.52% of discharges on the patient administration system were coded and exported to the national HIPE file. There is collaboration between NOCA, hospitals, the HPO, the HIU HSE, and the software developer in order to ensure that NQAIS NAHM can produce timely, accurate data for local hospitals to use for quality assurance and improvement purposes.
Coherence and comparability 	**Coherent and comparable data are consistent over time and across providers and can be easily combined with other sources.**	In 2019, NQAIS NAHM was based on the 8th Edition of the Australian Coding Standards ICD-10-AM/ACHI/ACS. All ICD codes are matched to CCS groups, which allows for statistical analysis. CCS groupings are used internationally in all mortality models. In April 2019, the "acute bronchitis" CCS group in NAHM was renamed as "lower respiratory infection (other)". The change was made because more than 90% of diagnoses captured in the "acute bronchitis" CCS group were actually unspecified lower respiratory infections, not acute bronchitis as the name might have suggested. The ICD-10-AM/ACHI/ACS codes contained in this CCS group remain the same. This does not affect historical comparison of the CCS group in NAHM. Version one of the NQAIS NAHM data dictionary was being developed during 2019 in line with HIQA standards. When this is complete it will be made available to NAHM data users. NQAIS NAHM uses data from HIPE, which ensures consistency in data collection. Data definitions are sourced from the HPO's HIPE data dictionary, which is available at http://www.hpo.ie/hipe/hipe_data_dictionary/HIPE_Data_Dictionary_2020_V12.0.pdf. Any changes to NQAIS NAHM data or their collection will be communicated to hospitals' HIPE offices. NQAIS NAHM is not comparable to international models due to differences in the risk model, i.e. ages, day cases, 30-day mortality figures, etc. Therefore, international or regional benchmarking is not possible.

Dimensions of data quality in 2019	Definition (HIQA, 2018)	Assessment of dimension (NQAIS NAHM)
Accessibility and clarity 	**Data are easily obtainable and clearly presented in a way that can be understood.**	The NAHM team has published five annual reports focusing on six key diagnoses which have a high burden of illness and meet specified inclusion criteria. Hospitals can view in-hospital mortality data for these six diagnoses, as well as all other diagnoses, throughout the year via the NQAIS NAHM web-based tool. Hospitals can view data in different formats, including the new Explorer and Crosstab functions, in the new enhanced tool. "All diagnoses" or "individual diagnosis" reports are available to download. Data from some of the functions can be downloaded into Excel for further investigation. A summary report in clear language with graphics is also produced annually and is available for download from the NOCA website, increasing the accessibility of this information to the general public (https://www.noca.ie/publications/publications-listing/P0/category/3). NQAIS NAHM users within each hospital/Hospital Group are trained on interpretation of the outputs of the NQAIS NAHM web-based tool. In September 2019, the new enhanced NQAIS NAHM tool was launched. This launch was communicated to all users and refresher training was offered. Following the launch of the new enhancements, 67 users were trained or took a refresher course on the NQAIS NAHM web-based tool. Training continues to be available monthly. There are now 276 registered users with access to the NQAIS NAHM tool. Registered users cover a broad range of positions, including hospital managers/CEOs, quality and risk managers, clinical directors, consultants, nurses, HIPE coders, business managers, etc.

DATA RELEASES TO THE NQAIS NAHM WEB-BASED TOOL

All scheduled data releases to NQAIS NAHM were met during 2019. The COVID-19 pandemic resulted in the HIPE national data file closing 4 weeks later than in recent years, on 30 April 2020. This was due to the HIPE resources in hospitals being focused on COVID-19 coding during the month of March 2020.

The schedule of data releases in 2020 as published in the *National Audit of Hospital Mortality Annual Report 2018* (NOCA, 2019) was met in early 2020; however, the release of data was paused to allow work to be carried out to assess the impact of the COVID-19 pandemic on the NQAIS NAHM risk methodology. An update on data releases will be included in the 2020 annual report. Table 3 shows the scheduled release dates for data in 2021.

TABLE 3: SCHEDULED DATES FOR THE RELEASE OF DATA TO THE NQAIS NAHM WEB-BASED TOOL IN 2021

Release of data to NQAIS NAHM	Data periods included in the NQAIS NAHM data release	Comments Type of release
January 2021	November 2019 to October 2020	Monthly update
February 2021	December 2019 to November 2020	Monthly update
March 2021	January 2020 to December 2020	Quarterly
June 2021	April 2020 to March 2021	Closed HIPE file/ quarterly
September 2021	July 2020 to June 2021	Quarterly
December 2021	October 2020 to September 2021	Quarterly

PALLIATIVE CARE

Palliative care is an approach to treatment for people suffering from a life-threatening illness. Treatment can be required at any stage during a patient's illness, or towards the end of their life. The aim is to provide relief from suffering for the patient and for their family by actively managing pain and other symptoms and providing psychological, social and spiritual support. Palliative care may be delivered by various specially trained staff as part of the healthcare team in a hospital, not solely by a palliative care consultant. There continue to be challenges with the wide definition of palliative care. Many people still think of palliative care as care provided at the very last stage of life, but the scope has broadened to include care at earlier stages of illness, and it can be delivered at the same time as interventional treatment. Cases with palliative care coded in HIPE potentially have a greater risk of in-hospital death than those that do not.

In Ireland, during 2019, the 8th Edition of the International Classification of Diseases was used for coding patients' charts (Elsworthy *et al.*, 2013). The guidance to clinical coders in the 8th Edition of the International Classification of Diseases states that the palliative care code should be assigned when there is documentation that the patient has been seen by or attended to by a palliative care specialist or palliative care team (HPO, 2019).

Figure 1 and Figure 2 show that there continues to be inconsistency in the application of palliative care coding across Irish acute hospitals. Dr Brian Creedon, Clinical Lead for the National Clinical Programme for Palliative Care, commented: "The use of the palliative care code in Ireland remains nebulous and can simply indicate treatment is 'palliative' or with 'palliative intent', which defines almost all chronic disease management."

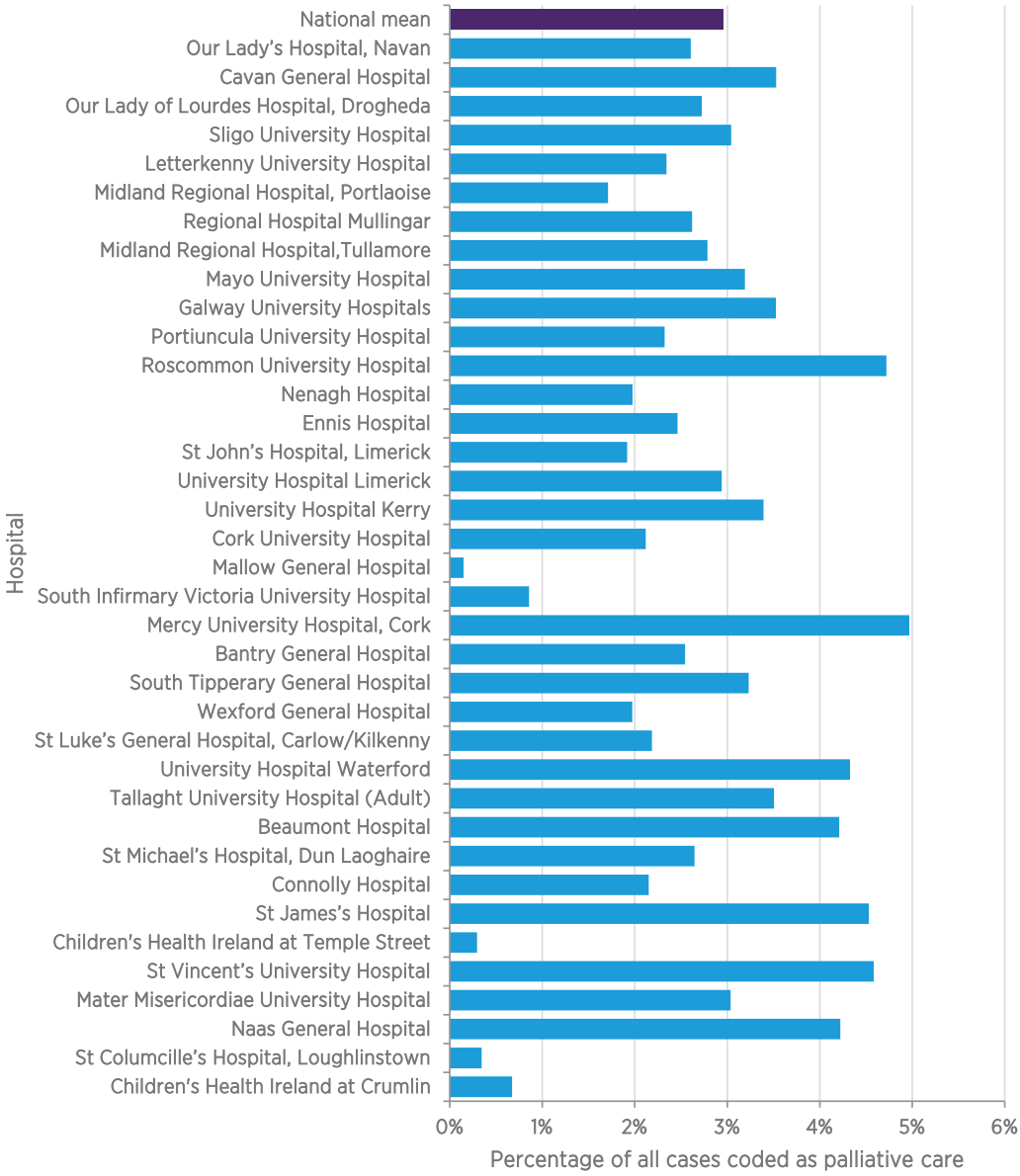


FIGURE 1: APPLICATION OF PALLIATIVE CARE CODE AS A PERCENTAGE OF ALL CASES, 2019*

* Note: National Orthopaedic Hospital Cappagh, Royal Victoria Eye and Ear Hospital, Dublin, Louth County Hospital, Monaghan Hospital, Croom Orthopaedic Hospital, Kilcreene Regional Orthopaedic Hospital and Children's Health Ireland at Tallaght have been excluded due to small numbers.

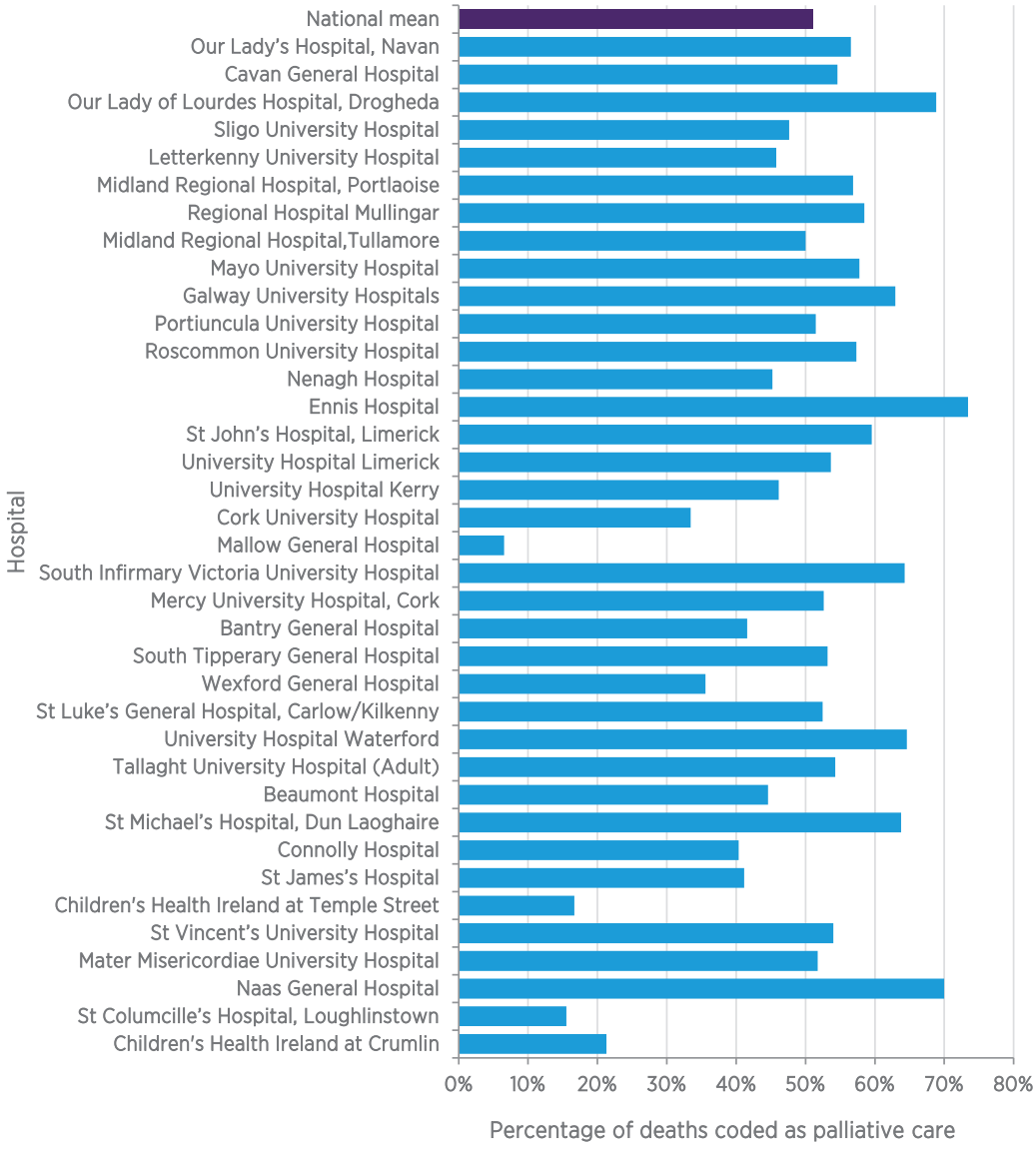


FIGURE 2: APPLICATION OF PALLIATIVE CARE CODE AS A PERCENTAGE OF DEATHS, 2019*

* Note: National Orthopaedic Hospital Cappagh, Royal Victoria Eye and Ear Hospital, Dublin, Louth County Hospital, Monaghan Hospital, Croom Orthopaedic Hospital, Kilcreene Regional Orthopaedic Hospital and Children's Health Ireland at Tallaght have been excluded due to small numbers.

The introduction of the 10th Edition of the classification used in HIPE, the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification/Australian Classification of Health Interventions/Australian Coding Standards (Australian Consortium for Classification Development, 2017) has changed the way that the palliative care code can be applied from January 2020 onwards. The new coding standard in the 10th Edition (HPO, 2020) states that the palliative care code can only be applied as an additional diagnosis when there is documented evidence that the patient has been provided with palliative care treatment.

Previous NAHM annual reports have discussed the inconsistences in documentation of wording related to palliative care in healthcare records, and therefore the knock-on impact on NAHM. Anecdotally, the NAHM Audit Manager has been informed that the phrases "palliative care" or "for palliation" are not always documented in the patients records, despite the treatment being provided. The challenge is to achieve accurate and consistent wording for palliative care treatment in patient records, not only for data quality, but also due to the impact this has on the NQAIS NAHM risk model.

The *National Audit of Hospital Mortality Annual Report 2018* recommended that there should be collaboration between the National Clinical Programme for Palliative Care and the HPO in order to provide guidance on wording which will be accepted to show evidence of palliative care treatment for a patient (NOCA, 2019). This change in approach to applying the palliative care code is required in line with the new 10th Edition guidelines and provides an opportunity for new advice to be issued to clinicians and HIPE coders. If the correct wording is not documented, the hospital's HIPE office cannot code the activity and there will be even more inconsistency in the rates of the palliative care code being applied nationally. The capture of accurate documented wording in patient medical records in relation to the provision of palliative care treatment is essential for producing accurate and reliable SMRs in NQAIS NAHM.

Collaboration between the HPO and the National Clinical Programme for Palliative Care was scheduled to begin with a workshop in March 2020. Unfortunately, due to the growing impact of COVID-19 at the time, this had to be postponed.

Figure 3 shows an increase over time in the application of the palliative care code both for all admissions and for patients who had died. The year-on-year rise in the application of this code may be due to the awareness raised about the palliative care code by NOCA, in partnership with the HPO and NQAIS NAHM, or it may simply reflect an increase in the number of cases receiving palliative care treatment.

	ALL ADMISSIONS	ALL DEATHS
		
2015	2.4%	40.6%
2016	2.6%	45.7%
2017	2.8%	47.8%
2018	2.8%	48.4%
2019	2.9%	51.2%

FIGURE 3: NATIONAL RATE OF APPLICATION OF THE PALLIATIVE CARE CODE FOR ALL ADMISSIONS AND FOR ALL DEATHS, 2015–2019

The percentage of cases (both alive and dead) with a palliative care code applied in 2019 is shown in Figure 4. This is broken down into the six key diagnoses included in this report. Figure 4 shows the percentage of cases that had a palliative care code recorded for each of the six diagnoses, and also shows the percentage of deaths that had palliative care recorded as an additional diagnosis in HIPE in 2019. Between 2% and 12% of all cases had palliative care recorded, while between 29% and 55% of those who died in hospital with one of these six diagnoses had palliative care recorded prior to their death. Dr Brian Creedon commented that a potential explanation for why AMI and haemorrhagic stroke have the lowest percentages of deaths with a palliative care code (29% and 36%, respectively) may be that deaths from these diagnoses are usually sudden.

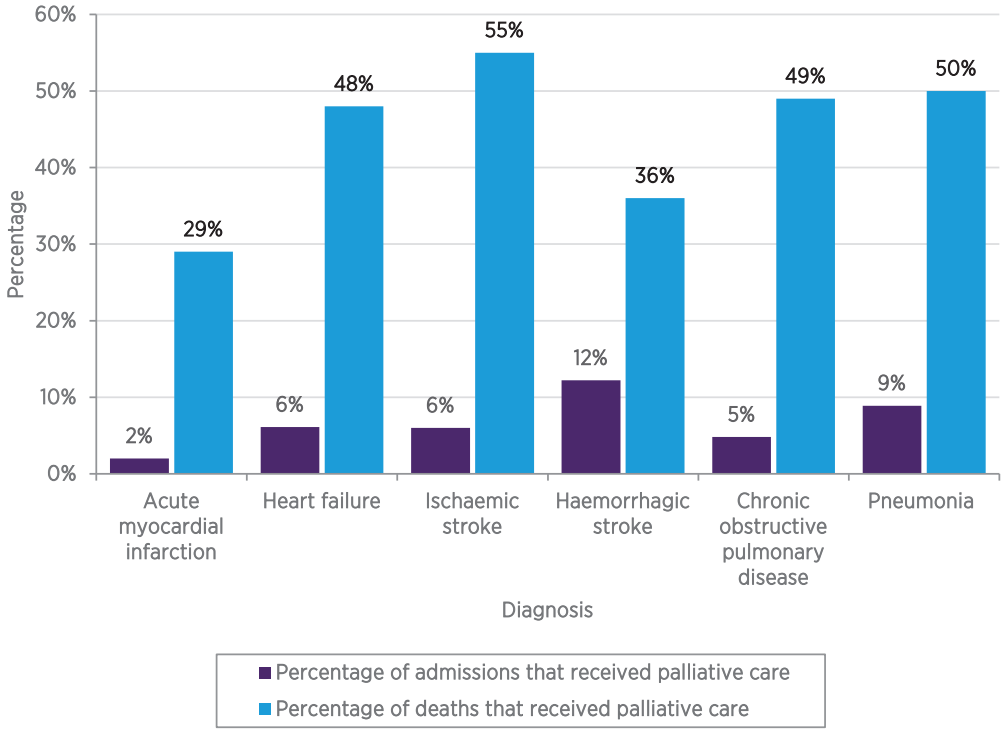


FIGURE 4: PERCENTAGE OF CASES AND DEATHS WITH THE PALLIATIVE CARE CODE APPLIED, BY DIAGNOSIS, 2019

STATISTICAL OUTLIERS

The NAHM Governance Committee defines an outlier as occurring where an SMR for an individual diagnosis is higher than expected, appearing outside the 99.8% confidence intervals, and also when the related CuSum breaches its 99.8% control limits. An outlier is considered a *statistical* outlier if this high SMR and CuSum breach occur in two consecutive quarterly releases of data in NQAIS NAHM.

A finding of a statistical outlier does not indicate that a hospital is providing poor quality of care, but rather that there is a difference between the expected value and the result that is unlikely to have arisen from random variation alone. Further investigation may be warranted, and this should trigger analysis and review in the hospital.

In the *National Audit of Hospital Mortality Annual Report 2018* (NOCA, 2019), Cork University Hospital (CUH) was identified as an outlier in pneumonia. A preliminary review was carried out during 2019 and was finalised in 2020. A summary of the review is below. During 2019, the SMR for pneumonia in CUH reverted to within expected ranges.

Update on Cork University Hospital outlier for pneumonia in 2018

In 2018, CUH had a statistical outlier for pneumonia. As detailed in the 2018 annual report, published in December 2019, a preliminary review on a random sample of pneumonia cases was undertaken by the hospital. A further review supported by the Quality and Patient Safety Office in the South/South West Hospital Group (S/SWHG) was undertaken in 2019, and further support from NOCA was requested for comparative analysis.

In December 2019, NOCA presented an analysis of the CUH pneumonia data compared with 11 other hospitals which had similar numbers of pneumonia cases in 2018. This analysis showed that CUH had the lowest proportion of cases with the principal diagnosis of pneumonia or recorded for any pneumonia, the lowest mean CCI score for deceased pneumonia cases, and the lowest number of palliative care-coded pneumonia cases among the 11 hospitals analysed. It also had a higher-than-average proportion of deaths for cases with pneumonia among the 11 hospitals analysed.

NOCA also conducted an analysis to see what the SMR would be if the risk model was adjusted to assign the 2018 average percentage of palliative care across pneumonia for CUH. This resulted in a change in the SMR from high (red) to above average (yellow) and eliminated the CuSum signal in August 2018, thus showing that if the national average rate of palliative care provision for pneumonia cases was applied to pneumonia in CUH for 2018, there would not be a statistical outlier.

Gerard O'Callaghan
Chief Executive Officer
Cork University Hospital

Continuous improvement work identified by Cork University Hospital

Ideally, CUH would have liked to have had the opportunity to retrospectively correct the coding for the pneumonia data in 2018. In relation to the pneumonia 2018 review above and also the two respiratory categories included in the reviews of statistical outliers in 2019 data below, they identify a need for some continuous improvement work to be undertaken at both local and national level, including:

- Liaison by NOCA with the National Clinical Programme for Palliative Care, programmes for respiratory care and with the HPO in relation to palliative care coding in order to agree terminology which can be accepted in place of the words “palliative care” or “palliation” being documented in medical records.
- Liaison by NOCA with programmes for respiratory care, as it is difficult for services to look at the processes of care since there is no guideline/standard defined for unspecified pneumonia.
- NOCA to develop guidance and a template for outlier review and a review report, using a co-design approach with relevant stakeholders.
- The CUH Executive Lead for NAHM has engaged with the Clinical Leads in Respiratory care in CUH to ensure ongoing clinical oversight of the data activity.
- Engagement by CUH with the HIPE office, as there is variation in the application of the palliative care code between hospitals, which is evident from the analysis undertaken by NOCA. A review and work with the CUH coders in relation to this are ongoing.
- Coding and correct application of palliative care is primarily dependent on clinicians recording this activity in the patient record, and there is an acknowledged requirement to improve documentation once the agreed terminology is in place with the care programmes.
- Due to a number of statistical outlier signals in respiratory medicine and the needs of patients for non-invasive ventilation in response to the COVID-19 pandemic, CUH is undertaking a review of how this service is currently delivered against best practice in areas such as clinical governance of the service; policies, procedures, protocols and guidelines supporting the service; training; and quality assurance processes.

MONITORING AND ESCALATION OF STATISTICAL OUTLIERS IN 2019 DATA

There were a number of statistical outliers in NAHM during 2019, some of which were in a diagnosis outside of the six key diagnoses published in this report. As a result of the pressure of COVID-19 on hospital resources, NAHM advised hospitals to only undertake a data quality review of 2019 statistical outliers if they were in a position to do so. Monitoring and escalation of 2020 data in NQAIS NAHM has been paused until the impact of COVID-19 on the NQAIS NAHM model is investigated and more clearly understood.

CUH had statistical outliers in aneurysm, lower respiratory infection (other), and COPD during 2019. CUH engaged with NOCA during 2019 and 2020 regarding these outliers, and a summary of their reviews is provided below.

Update on outliers at Cork University Hospital in NAHM, 2019

CUH, in collaboration with the S/SWHG, has undertaken reviews of the data relating to statistical outliers for 2018 and 2019 pertaining to the following diagnoses:

- aneurysm
- lower respiratory infection (other)
- COPD.

ANEURYSM

Context for review: The CUH CuSum for aneurysm signaled above average (yellow) at the end of November 2017 and then high (red) in August 2018. It has remained high (red) since then, and therefore meets the definition for a statistical outlier as defined by the NAHM Governance Committee.

Outcome of review: This review was conducted on data extracted from NQAIS NAHM relating to cases discharged from CUH with a principal diagnosis of aneurysm for the period July 2018 to June 2019 (n=83), the most contemporaneous data available at the time. The findings of this review have been shared and discussed with the clinical leads for both vascular and cardiothoracic services in CUH.

Admission type: Forty-nine percent of admissions with a principal diagnosis of aneurysm during this period were elective (39 first-time admissions and 2 readmissions), and 51% were emergency admissions (n=42). As all of the elective admissions were discharged alive, the emergency admissions who died (n=11) formed the basis of the review. Of note, more than half of the cases where death occurred were admitted under the cardiothoracic services with a diagnosis of dissection/rupture, and the remaining cases were admitted under a number of other specialties. CUH is a regional specialist centre for the S/SWHG and greater Munster area, which results in the frequent transfer of cases from other hospitals in the Hospital Group for specialist services, of which aneurysm is one. Of the 11 deceased cases in CUH with a principal diagnosis of aneurysm during this 12-month period to end of June 2019, 6 were direct admissions to CUH and 5 were transferred in.

Age: The 11 deceased cases were all emergency admissions with an age range of 38–94 years and an average age of 64 years.

Palliative care*:* Ninety-one percent of deceased cases were coded for palliative care.

Conclusion: There were 11 deaths in this group of cases during the 12 months to end of June 2019. It is important to note that this group represents a small number of cases with diverse underlying anatomical pathology. As a result of different diagnoses within this grouping, these 11 deceased cases were admitted under a variety of different specialties with different clinical pathways. It is therefore not possible to undertake further meaningful analysis or comparisons.

LOWER RESPIRATORY INFECTION (OTHER)

Context for review: The CUH CuSum for lower respiratory infection (other) signaled above average (yellow) in January 2019 and rose to high (red) status in February 2019, where it remained throughout 2019.

Outcome of review: This review was conducted on data extracted from NQAIS NAHM relating to cases discharged from CUH with a principal diagnosis of lower respiratory infection (other) for the period January to December 2019 (n=868; 28 deaths).

Palliative care*:* Only 9 (32%) of the 28 deceased cases were coded as having been on a palliative care pathway.

Age*:* The average age was 73 years, and the median age was 78 years. Twenty-one cases were aged over 65 years, and 7 were aged over 90 years.

CCI score*:* Of the 28 deceased cases, 8 were considered high risk for mortality based on the NQAIS NAHM risk model. Six of these cases also had a CCI score over 5, indicating a high level of comorbidities, thus increasing risk due to overall complexity.

Admission source*:* Twenty-two (79%) of the deceased cases were admissions from home. The remaining six were emergency transfers from other acute hospitals or from nursing homes or other long-stay accommodation.

Conclusion: Twenty-eight patients with a principal diagnosis of lower respiratory infection (other) died during 2019. Only 32% of these were assigned a palliative care code. The low percentage of palliative care coding at CUH in comparison to the national average has contributed to the outlier.

COPD

Context for review: The CUH CuSum for COPD signaled above average (yellow) in September 2018 and rose to high (red) in February 2019, before slowly dropping back into the above average (yellow) range later in 2019. The SMR during this period was also high, at 174.9.

Outcome of review: This review was conducted on data extracted from NQAIS NAHM relating to cases discharged from CUH with a principal diagnosis of COPD for the period January to December 2019 (n=678; 39 deaths).

Palliative care*:* Only 14 (36%) of the 39 deceased cases were coded as having been on a palliative care pathway. Eight (21%) of the 39 deceased cases were admitted to the intensive care unit.

Age*:* The average age was 71 years, and median age was 72 years.

CCI score: Of the 39 deceased cases, 14 were considered high risk for mortality based on the NQAIS NAHM risk model.

Admission source and type: All 39 deceased cases were emergency admissions.

Conclusion: In relation to the CUH reviews of two respiratory categories (lower respiratory infection (other) and COPD), it should be noted that the comments under **Continuous improvement work identified by CUH** on page 31 are applicable for the COPD conclusion.

Gerard O'Callaghan
Chief Executive Officer
Cork University Hospital

Mater Misericordiae University Hospital had statistical outliers for cases with a principal diagnosis of "fluids and electrolytes" during 2019. A summary of its review is provided below.

Mater Misericordiae University Hospital
Fluids and electrolytes statistical outlier, 2019

Fourteen cases were reviewed by the Executive Clinical Director, Prof. Brendan Kinsley, using a standardised mortality screening tool developed by the Mater Misericordiae University Hospital. One case is a coroner's inquest, so it was not included in the analysis.

KEY FINDINGS

Thirteen cases with a principal diagnosis of fluids and electrolytes reflected severe illness in other organ systems (cardiac failure, renal failure, hepatic failure and end-stage cancer) on admission to hospital rather than a primary electrolyte disturbance. In all cases, the initial management plan was the immediate correction of the fluid and electrolyte levels for stabilisation.

In the majority of cases, the electrolyte disturbance had been corrected and the mortality rate reflected the comorbidities within the cohort. Many of these patients had long histories of ill health and were nearing the end of life. At times, the clinical documentation of fluids and electrolytes as the principal diagnosis in the context of the patients' existing cardiac conditions impacted this outlier. Five cases had multiple comorbidities where the reordering of a secondary diagnosis to the principal diagnosis was a consideration. There was sufficient documentary evidence from the principal clinician at the time of care to enable the reordering of diagnoses in one of the cases.

The flagging of this outlier within NQAIS NAHM was a useful prompt to review this diagnosis group. It provided us with the opportunity to examine the interpretation of our mortality outcomes for cases with a fluids and electrolytes diagnosis. We note the need to continue educating our staff on improving clinical documentation in order to enable accurate sequencing of the principal diagnosis of fluids and electrolytes along with other comorbidities.

Conclusion

In summary, no concerns were noted regarding the care and management of these patients. The sequencing of the principal diagnosis was a contributory factor to the outlier. In this instance, the NQAIS NAHM tool did not accurately reflect the complexity of comorbidities in this patient group.

Prof. Brendan Kinsley
Executive Clinical Director (tenure completed 30 June 2020)
Mater Misericordiae University Hospital

Figure 24 on page 59 presents a funnel plot showing hospitals' SMRs for COPD in 2019. There are four hospitals outside the control lines on the plot, indicating that they are outside the expected range. Three of these hospitals – CUH, Tallaght University Hospital and Beaumont Hospital – are outside the upper control limits, and St John's Hospital is outside the lower control limits. With the exception of CUH, this is the first occurrence where the SMR is outside control limits, therefore these hospitals were not statistical outliers for monitoring and escalation at year end 2019 as defined by the NAHM Governance Committee. CUH is a statistical outlier, as it was outside the 99.8% control limits for two consecutive quarterly periods, and a review of its summary report is included above.

St James's Hospital had an above-average SMR for AMI during 2019, and as the year end approached, it became high (red). If the SMR remained high in the next quarterly data refresh, St James's Hospital would have been a statistical outlier and would have been required to submit a report in line with NOCA's *Monitoring and Escalation Policy* (NOCA, 2017). However, St James's Hospital did not wait until it was a statistical outlier, and reviewed its data without being requested to by NOCA. St James's Hospital has shared its commentary below, describing the actions it took. This is a very good example of a hospital being proactive and checking the data when they are outside of expected ranges in order to make sure everything is correct. The corrections identified moved St James's Hospital's SMR for AMI to within expected ranges by year end 2019.

St James's Hospital's review of its AMI data for 2019

The process used in St James's Hospital to monitor and assure its HIPE data and NAHM reports resulted in a red signal (high) for AMI being confirmed as a data artefact rather than as an indicator of adverse clinical outcomes. The red signal for data from May 2019 appeared in a report in early 2020, but had not been present in earlier reports. A yellow signal (above average) for AMI from August 2019 also prompted a quality assurance review by St James's Hospital's cardiology service. The hospital's clinical coding function undertakes an internal programme of audits prior to the close of the national HIPE file in March each year. As part of this process, a scheduled periodic review of all cases with a principal diagnosis of AMI in 2019 was conducted in January 2020. This analysis resulted in the principal diagnosis for three AMI cases, transferred from other hospitals, being changed to "atherosclerotic heart". AMI was instead coded in these cases as a secondary diagnosis. The red signal (high) was not sustained in the NAHM data following these corrections.

St James's Hospital's quality assurance process involves consistent monitoring of NAHM signals, with any red or a new yellow signal prompting the hospital's Quality and Safety Improvement Directorate to notify the clinical director and clinical lead for the diagnostic groups involved. The consultants responsible for the care of each patient whose HIPE record contributed to the signal are also contacted. Consultants are asked to review each patient's healthcare record to provide assurance that the patient received appropriate care or to inform the hospital's Director of Quality and Safety Improvement if they had any concerns regarding the safety or quality of care the patient received. Any safety concerns raised would then be managed through the hospital's safety learning review procedures based on the HSE's Incident Management Framework, 2018.

Consultants are also requested to review the coding of the principal diagnosis (i.e. the clinical cause for the patient's admission) and additional diagnoses. Alternatively, these case reviews may be conducted through a specialty clinical outcomes review meeting (i.e. a mortality and morbidity meeting), with the assurance provided by the specialty team lead. St James's Hospital's HIPE coding team is also asked by the hospital's Clinical Audit Manager to review the coding of all cases contributing to signals of concern. NAHM reports and assurances received are overseen by the hospital's Clinical Audit Oversight Committee and are reported to the Hospital Executive Management Group and to the Quality, Safety and Risk Committee of the Hospital Board.

Jinish Rajan
Quality Manager, Clinical Audit

Una Geary
Clinical Lead, Quality and Safety Improvement

STATISTICAL OUTLIERS REVIEW GUIDANCE

Since 2015, in line with NOCA's *Monitoring and Escalation Policy* (NOCA, 2017), NAHM has been engaging with hospitals that have unconfirmed statistical outliers. Guidance has been provided in the form of suggested headings for a review, record review report forms (appendices in the policy), and support calls between the NAHM Audit Manager and the nominated person in the hospital. NOCA has received feedback confirming that more structured guidance is required. NOCA undertook to carry out a body of work to develop guidance documentation for all unconfirmed statistical outliers in NOCA, not just in NAHM, and for how to conduct a data quality review. The work will involve collaboration with relevant stakeholders to ensure that there is clear guidance on what is expected at each step in the process; it will also include providing definitions as well as outlining the roles and responsibilities of those involved in the review, including NOCA and the audit governance committees.

This guidance will benefit all users of NQAIS NAHM, particularly when a statistical outlier occurs. The review reports will be more structured and learnings shared through annual reports will be more consistent in their content.

This work was due to be carried out during spring 2020, but due to workload priorities related to the COVID-19 pandemic, the work had to be postponed. NAHM recommends that NOCA completes this work during Q2 2021.

CARDIOVASCULAR DIAGNOSES

BACKGROUND

Cardiovascular disease is the number one cause of death globally, causing approximately 17.9 million deaths each year. Of these deaths, 85% are due to heart attack or stroke (World Health Organization, 2020). Cardiovascular diseases are a group of disorders affecting the heart and blood vessels. These conditions include coronary heart disease (myocardial infarction or heart attack), cerebrovascular disease (ischaemic and haemorrhagic stroke), heart failure, and rheumatic heart disease. Professor Ken McDonald, National Clinical Lead for the National Heart Programme, commented: "Accepting the statistical limitations outlined, it is encouraging to see the reduction in in-hospital mortality for AMI and heart failure."

The NQAIS NAHM web-based tool includes data for all cases with a cardiovascular principal diagnosis, not solely those diagnoses presented in this report. Each hospital can access its data locally and conduct reviews as required.

For the purposes of public reporting, the NAHM Governance Committee applied inclusion criteria to the framework for the NAHM report. The following cardiovascular diagnoses meet the reporting criteria:

- AMI
- heart failure
- ischaemic stroke
- haemorrhagic stroke.

ACUTE MYOCARDIAL INFARCTION

BACKGROUND

The medical term for a heart attack is acute myocardial infarction (AMI). A heart attack is a life-threatening medical emergency in which the supply of blood to the heart is suddenly blocked, usually by a blood clot. The lack of blood or blockage to the heart can seriously damage the heart muscles (Irish Heart Foundation, 2020).

There are two types of heart attack which are diagnosed by a trace of the heart rhythm known as an electrocardiogram (ECG):

- ST-elevation myocardial infarction (STEMI)
- non-ST-elevation myocardial infarction (NSTEMI).

For the purposes of this report, both subtypes are grouped together under the diagnosis of AMI.

A STEMI is a major heart attack caused by a blockage in the arteries supplying blood to the heart muscle. Urgent treatment is required. The HSE's HeartBeat Portal records data on STEMI patients brought directly, or referred from surrounding general hospitals, to designated primary percutaneous coronary intervention (PPCI) centres for treatment. These are centres equipped with an emergency catheter laboratory and staffed by healthcare professionals who are able to perform PPCI. Treatment consists of insertion of a wire into the artery to open it using a balloon to allow the blood to flow to the heart muscle again. If a STEMI patient cannot be transferred to a PPCI centre within 90 minutes for treatment, then they are transferred to the nearest emergency department to receive thrombolysis, which is a clot-busting drug (HSE, 2020d).

NSTEMI heart attacks usually cause less damage to the heart muscle. The majority of cases are sent for an early investigation of the arteries in the heart (called an angiography), which is carried out in a hospital equipped with a catheter laboratory. Low-risk NSTEMI heart attacks can be treated medically using prescription drugs.

During 2019, 6,149 cases with a principal diagnosis of AMI were discharged from the 44 hospitals included in NQAIS NAHM.

AMI in NQAIS NAHM is based on ICD-10-AM/ACHI/ACS codes I21, I210, I211, I212, I213, I214, I219, I22, I220, I221, I228, and I229, and is fully defined in the online appendices which can be found at https://www.noca.ie/publications/publications-listing/P0/category/3/0.

FINDINGS

NQAIS NAHM calculates a CCI score for each case, which indicates the significance of the pre-existing conditions on admission and their associated 1 year mortality risk (Figure 5). The scores are grouped as less than 1, between 1 and 5, and greater than 5. The majority of cases had a CCI score of less than 1 (64%), meaning that these cases presenting with AMI as their principal diagnosis had a low risk of mortality. Figure 6 shows that 85% of deceased AMI cases were over 65 years old.

	<1 NO SIGNIFICANT PRE-EXISTING COMORBIDITIES	1-5 MODERATE COMORBIDITIES	>5 SEVERE COMORBIDITIES
ACUTE MYOCARDIAL INFARCTION	64%	15%	21%

FIGURE 5: CHARLSON COMORBIDITY INDEX SCORES FOR CASES WITH A PRINCIPAL DIAGNOSIS OF ACUTE MYOCARDIAL INFARCTION, 2019

	0-34	35-64	65+
ACUTE MYOCARDIAL INFARCTION	0%	15%	85%

FIGURE 6: DECEASED CASES WITH A PRINCIPAL DIAGNOSIS OF ACUTE MYOCARDIAL INFARCTION, BY AGE GROUP, 2019

Figure 7 presents the crude in-hospital mortality rate for AMI from 2010 to 2019, with a 95% confidence interval (CI). These data have not been adjusted for differences in age profile or comorbidities over time, but they provide background information on hospital presentations for this time period. There has been a significant reduction (35%) in in-hospital mortality for AMI over the past 10 years, from 72 deaths per 1,000 admissions in 2010 to 47 deaths per 1,000 admissions in 2019.

When performing a statistical analysis, small sample sizes may provide erratic results; for this reason, only hospitals with 100 or more admissions are included for analysis in order to ensure statistical reliability. Of the 44 participating hospitals, only 21 met this criterion in 2019. The number of cases with a principal diagnosis of AMI admitted to these hospitals in 2019 ranged from 105 to 714.

The number of hospitals which met the inclusion criterion may appear to be a relatively small sample of our participating hospitals (N=44); however, the hospitals included each had more than 100 admissions, and their combined admissions accounted for 91% of cases admitted with a principal diagnosis of AMI in 2019.

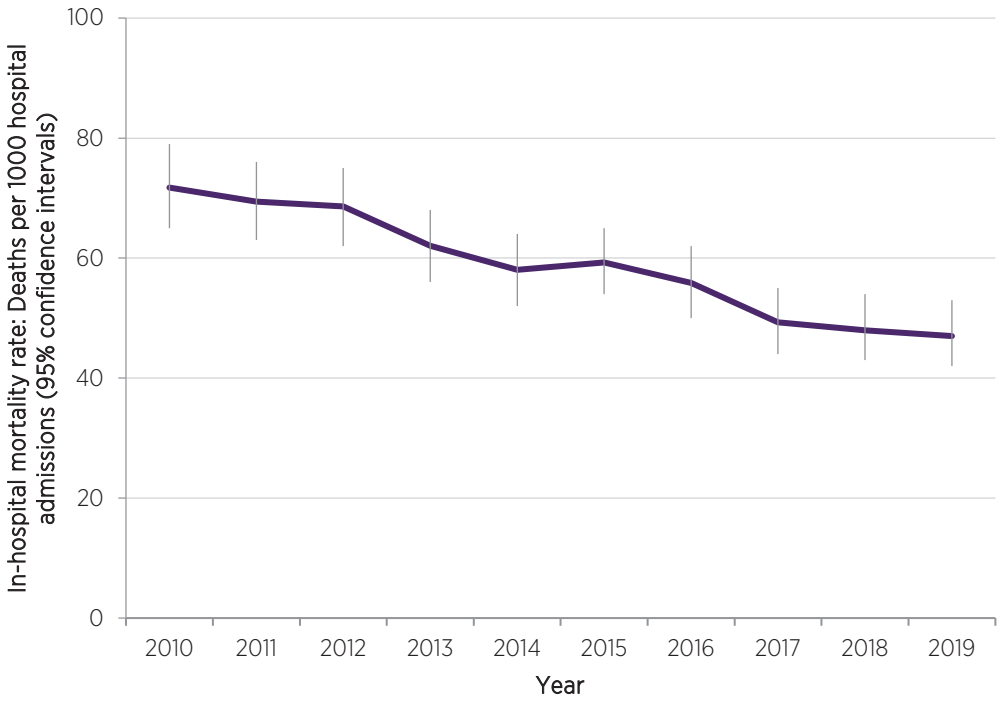


FIGURE 7: NATIONAL IN-HOSPITAL MORTALITY FOLLOWING ADMISSION WITH PRINCIPAL DIAGNOSIS OF ACUTE MYOCARDIAL INFARCTION, 2010–2019

Figure 8 presents the SMRs for these hospitals in a funnel plot, with 99.8% control limits. These limits represent the upper and lower limits of expected variation. Each individual hospital's control limits are calculated based on that hospital's patient details. If an SMR appears outside the 99.8% control limits, it is very unlikely that this is due to chance (1 in 500 likelihood to be due to chance alone), and further investigation is warranted. All hospitals had an SMR within the control limits of 99.8% for AMI, indicating that all hospitals' SMRs were within the expected range for 2019. Twenty-three hospitals are not included in this analysis, as they did not meet the inclusion criterion relating to a defined number of admissions and expected events.

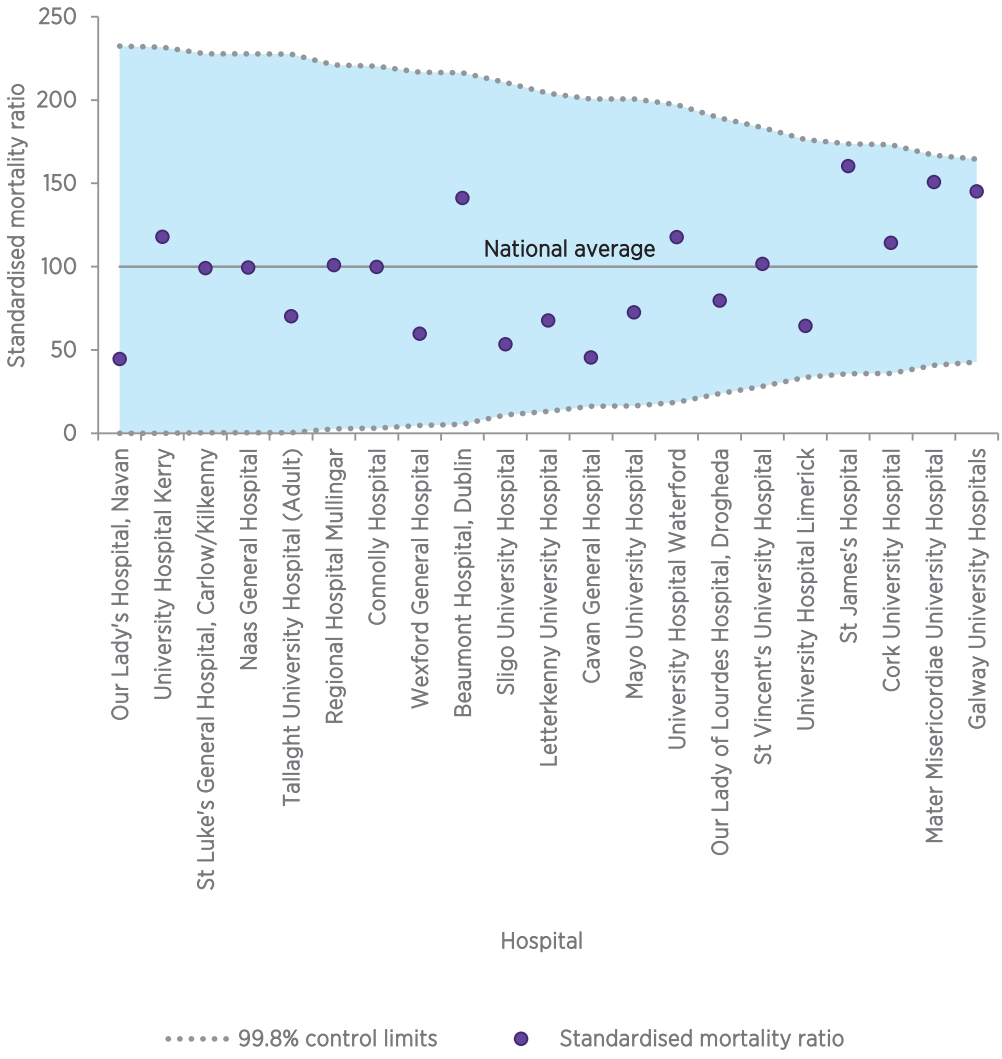


FIGURE 8: NATIONAL IN-HOSPITAL STANDARDISED MORTALITY RATIO FOLLOWING ADMISSION WITH PRINCIPAL DIAGNOSIS OF ACUTE MYOCARDIAL INFARCTION, 2019

HEART FAILURE

BACKGROUND

Heart failure is a medical condition where the heart does not work as efficiently as it should. This means that due to the heart's reduced ability to pump, your blood cannot deliver enough oxygen and nourishment to your body to allow it to work normally. This can cause various symptoms such as muscle fatigue, shortness of breath, and leg swelling.

The number of heart failure cases continues to rise due to three major factors:
- the ageing population
- improved survival post-myocardial infarction
- continuing difficulty preventing and managing cardiometabolic diseases (obesity, hypertension, type 2 diabetes) in the general population.

Heart failure is a major chronic disease not only in Ireland but worldwide. It is estimated that up to 2% of the adult population in developed countries has heart failure, with the prevalence rising to >10% among those aged over 70 years. Because it is primarily a condition of older adults, mortality and morbidity remain high with heart failure, despite advances in diagnosis and therapy. Heart failure is reported to account for 5% of all emergency medical admissions, of which 80% are patients aged over 65 years. Research in Ireland shows similar findings, and heart failure represents a major public health burden (HSE, 2020e).

The most up-to-date economic evidence available, from the National Heart Failure Clinical Care Programme's *Heart Failure Model of Care* (HSE, 2012), highlights that heart failure is a major drain on healthcare spending, accounting for an estimated 2–4% of the total healthcare budget, based on data from the United Kingdom and the United States of America.

A growing body of data from national and international sources shows that integrated management programmes for heart failure, encompassing primary care and hospital services, can produce significant reductions in the need for hospitalisation and achieve better quality of life and outcomes for patients. Shared care with multidisciplinary-based approaches is indicated as achieving the most effective heart failure care outcomes (HSE, 2020e).

In 2019, 6,697 cases with a principal diagnosis of heart failure were discharged from the 44 hospitals included in NQAIS NAHM. Ninety-seven percent of these cases were emergency admissions.

Heart failure in NQAIS NAHM is based on ICD-10-AM/ACHI/ACS codes I50, I500, I501, and I509, and is fully defined in the online appendices which can be found at https://www.noca.ie/publications/publications-listing/P0/category/3/0.

FINDINGS

NQAIS NAHM calculates a CCI score for each case, which indicates the significance of the pre-existing conditions on admission and their associated 1 year mortality risk (Figure 9). The scores are grouped as less than 1, between 1 and 5, and greater than 5. Half of heart failure cases had a CCI score of less than 1 in 2019, meaning that these cases presenting with heart failure as their principal diagnosis were in the group with the lowest risk of mortality in the following 12 months. Figure 10 shows that 95% of deceased heart failure cases were over 65 years old.

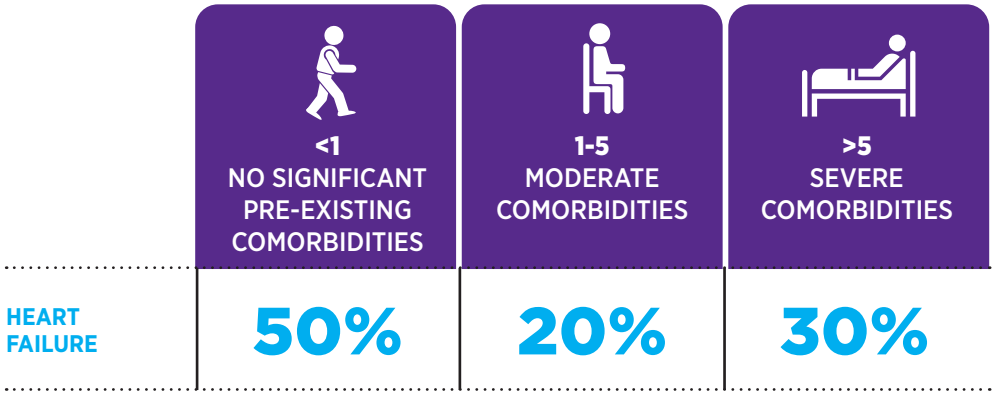


FIGURE 9: CHARLSON COMORBIDITY INDEX SCORES FOR CASES WITH A PRINCIPAL DIAGNOSIS OF HEART FAILURE, 2019

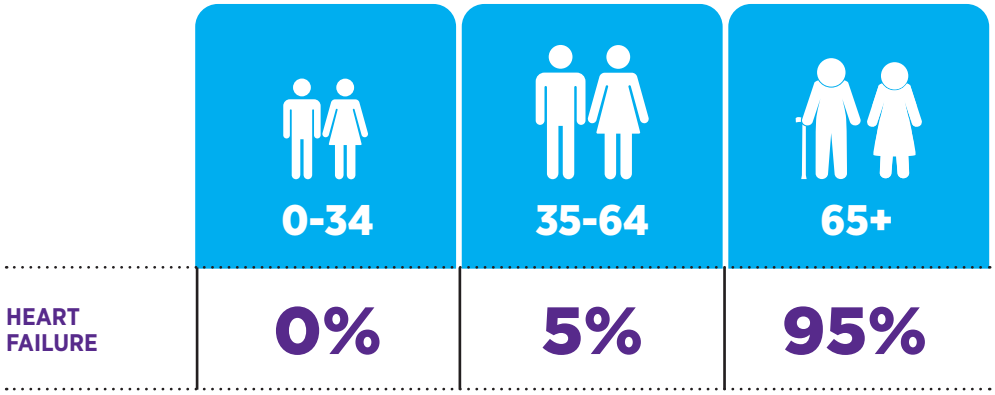


FIGURE 10: DECEASED CASES WITH A PRINCIPAL DIAGNOSIS OF HEART FAILURE, BY AGE GROUP, 2019

A crude in-hospital mortality rate from 2010 to 2019 for heart failure is presented in Figure 11, with a 95% CI. These data have not been adjusted for differences in age profile or comorbidities over time, but they provide background information on hospital presentations for this time period. There has been a significant reduction (23%) in in-hospital mortality for heart failure over the past 10 years, from 88 deaths per 1,000 admissions in 2010 to 68 deaths per 1,000 admissions in 2019.

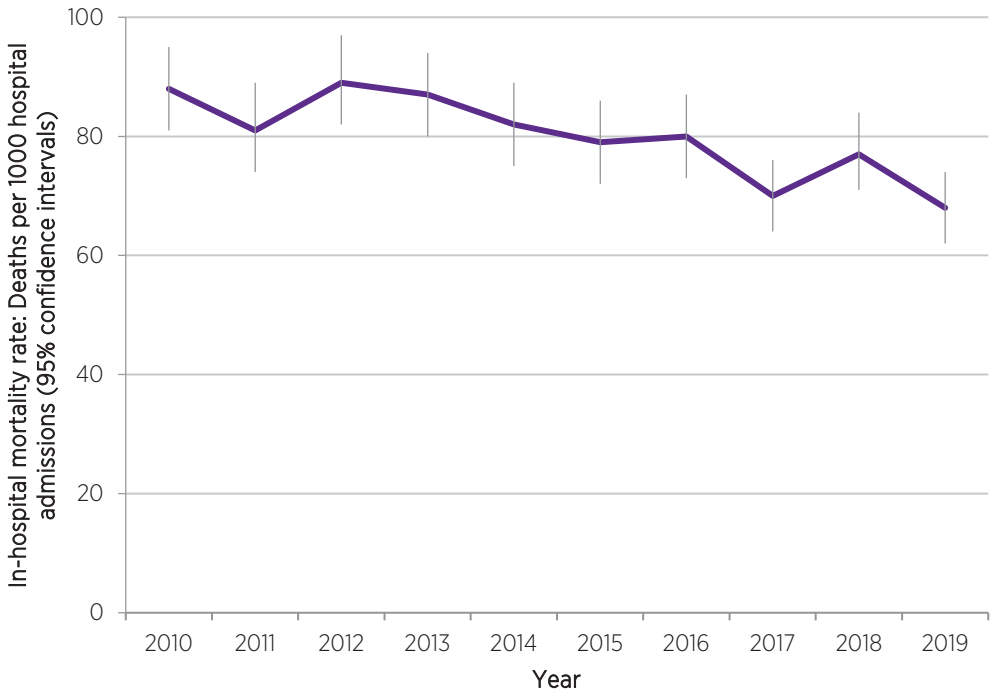


FIGURE 11: NATIONAL IN-HOSPITAL MORTALITY FOLLOWING ADMISSION WITH PRINCIPAL DIAGNOSIS OF HEART FAILURE, 2010–2019

When performing a statistical analysis, small sample sizes may provide erratic results; for this reason, only hospitals with 100 or more admissions are included for analysis in order to ensure statistical reliability. Of the 44 participating hospitals, only 31 met this criterion for heart failure in 2019. The number of cases with a principal diagnosis of heart failure admitted to these hospitals in 2019 ranged from 106 to 363.

The number of hospitals which met the inclusion criterion may appear to be a relatively small sample of our participating hospitals (N=44); however, the hospitals included each had more than 100 admissions, and their combined admissions accounted for 96% of cases admitted with a principal diagnosis of heart failure in 2019.

Figure 12 presents the SMRs for these hospitals in a funnel plot, with 99.8% control limits. These limits represent the upper and lower limits of expected variation. Each individual hospital's control limits are calculated based on that hospital's patient details. If an SMR appears outside the 99.8% control limits, it is very unlikely that this is due to chance (1 in 500 likelihood to be due to chance alone), and further investigation is warranted. All hospitals had an SMR within the control limits of 99.8% for heart failure, indicating that all hospitals' SMRs were within the expected range for 2019. Thirteen hospitals are not included in this analysis, as they did not meet the inclusion criterion relating to a defined number of admissions and expected events.

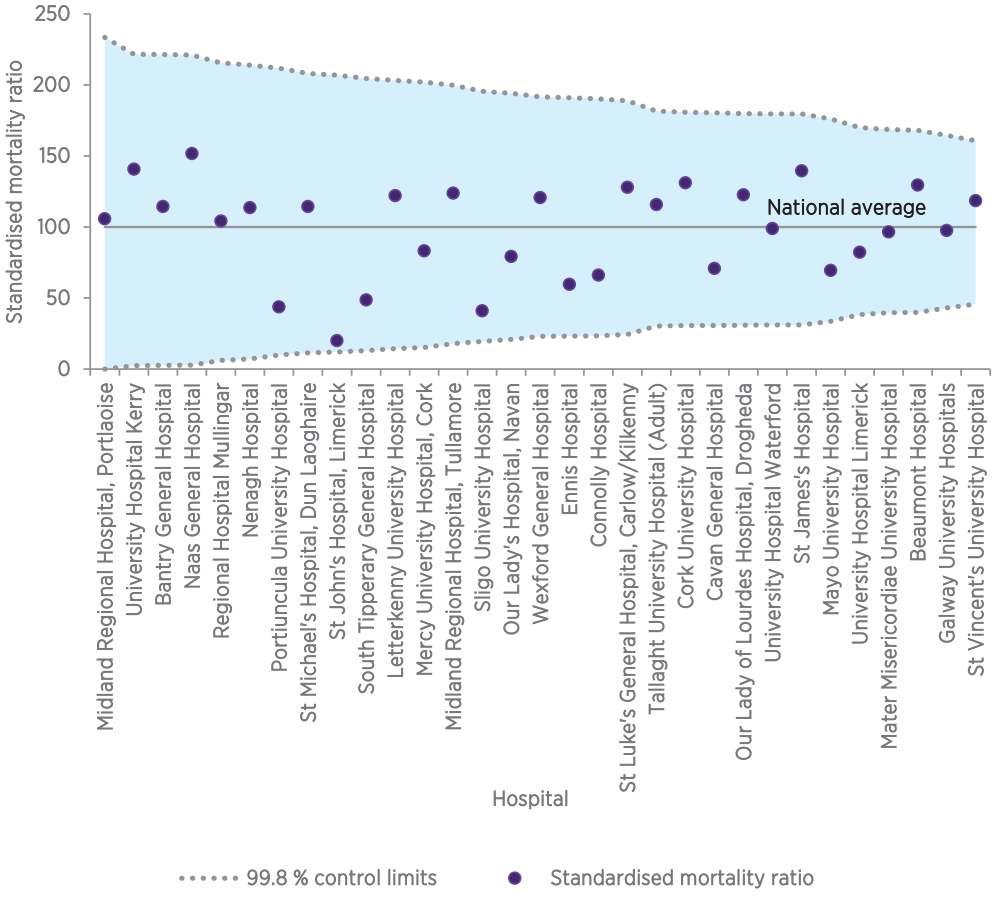


FIGURE 12: NATIONAL IN-HOSPITAL STANDARDISED MORTALITY RATIO FOLLOWING ADMISSION WITH PRINCIPAL DIAGNOSIS OF HEART FAILURE, 2019

STROKE

BACKGROUND

Stroke can be a serious, life-threatening medical condition. There are two main types:

1) **Ischaemic**, where the blood supply to the brain is stopped due to a blood clot; this accounts for approximately 85% of all strokes.
2) **Haemorrhagic**, where a weakened blood vessel supplying the brain ruptures, causing bleeding into or around the brain; this accounts for the remaining 15% of strokes (King's College London for the Stroke Alliance for Europe (SAFE), 2017).

Like all organs, the brain needs oxygen and nutrients provided by the blood in order to function properly. If the supply of blood becomes interrupted or cut off, brain cells begin to die rapidly. When the affected brain cells die, the motor, visual or cognitive function (e.g. speech) controlled by these cells stops working. Depending on the location and size of the affected area, a stroke can lead to very significant brain injury and disability, and possibly even death. Stroke affects 17 million people worldwide each year; it is the second leading cause of death and the leading cause of long-term adult disability (SAFE, 2020). In Ireland, HIPE recorded a total of 6,447 cases of stroke in acute hospitals with an acute stroke as their principal diagnosis (ICD-10-AM/ACHI/ACS codes I60, I61, I63 and I64) nationally in 2019 (HPO, 2020). There were 4,817 cases captured on the National Stroke Register in 2018 from 18 of the 27 hospitals in Ireland with stroke units (National Stroke Programme, 2019).

The reduction in mortality and in the predicted increase of stroke admissions is multifactorial. Primary care interventions, including detection and management of hypertension and atrial fibrillation, are key drivers of this trend. National policies such as Healthy Ireland have increased public awareness of cardiovascular risk factors and general healthier living practices (e.g. exercise and smoking cessation), which may also be impacting the trend. In addition, time-dependent acute treatments for ischaemic stroke, such as thrombolysis and thrombectomy, have improved greatly in recent years. This has been achieved as the result of a National Acute Stroke Collaborative programme run by the Royal College of Physicians of Ireland, which has reduced the door-to-decision time across the acute hospital sector, and by further expansion and development of the National Thrombectomy Service.

There is an ongoing need to increase public awareness of stroke, and the National Clinical Programme for Stroke is working with the Department of Health and the Irish Heart Foundation to reinstate the FAST campaign.

In 2019, the National Stroke Register became the Irish National Audit of Stroke (INAS) under the governance of NOCA.

The figures in this section are reflective of the 27 hospitals in Ireland with stroke units rather than all 44 NAHM participating hospitals.

ISCHAEMIC STROKE

BACKGROUND

Ischaemic strokes – which are the most common type of stroke – occur when blood clots block the flow of blood to the brain. Blood clots typically form in areas where the arteries have been narrowed or blocked by fatty, cholesterol-containing deposits known as plaque (hardening of the arteries or atherosclerosis).

As we get older, our arteries become narrower, but certain risk factors can dangerously accelerate this process. These risk factors include:

- smoking
- high blood pressure
- obesity
- high cholesterol levels (often caused by a high-fat diet, but can also result from inherited factors)
- a family history of diabetes or heart disease
- excessive alcohol intake (which can also make obesity and high blood pressure worse, as well as causing heart damage and an irregular heartbeat).

Diabetes is also a risk factor, particularly if it is poorly controlled, as excess glucose in the blood can damage the arteries. Another possible cause of ischaemic stroke is an irregular heartbeat (atrial fibrillation), which can cause blood clots that become lodged in the brain.

Since the establishment of the National Clinical Programme for Stroke (NCPS) in 2010 and the introduction of standardised care pathways and new forms of treatment in the form of thrombolysis (clot-busting drugs) and, more recently, acute thrombectomy, we have seen improved survival rates for patients presenting with stroke. In 2018, 384 of the 4,533 cases with ischaemic stroke were referred for mechanical thrombectomy (National Thrombectomy Service, 2020, Table 1). The INAS reports that in 2019, 11% of ischaemic stroke cases were treated with thrombolysis (NOCA, 2020).

In 2019, 4,809 cases with a principal diagnosis of ischaemic stroke were discharged from the 44 hospitals included in NQAIS NAHM.

Ischaemic stroke in NQAIS NAHM is based on ICD-10-AM/ACHI/ACS codes I63, I630, I631, I632, I633, I634, I635, I636, I638, and I639, and is fully defined in the online appendices which can be found at https://www.noca.ie/publications/publications-listing/P0/category/3/0.

FINDINGS

NQAIS NAHM calculates a CCI score for each case, which indicates the significance of the pre-existing conditions on admission and their associated 1 year mortality risk (Figure 13). The scores are grouped as less than 1, between 1 and 5, and greater than 5. Almost one-third of ischaemic stroke cases in 2019 had a CCI score of 6 or higher, meaning that these cases presenting with ischaemic stroke as their principal diagnosis were at high risk of mortality in the following 12 months. Figure 14 shows that 92% of deceased ischaemic stroke cases were over 65 years old.

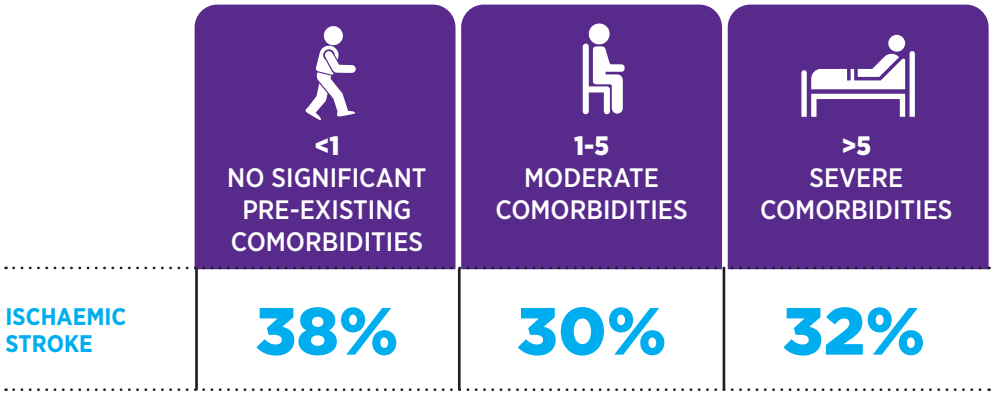


FIGURE 13: CHARLSON COMORBIDITY INDEX SCORES FOR CASES WITH A PRINCIPAL DIAGNOSIS OF ISCHAEMIC STROKE, 2019

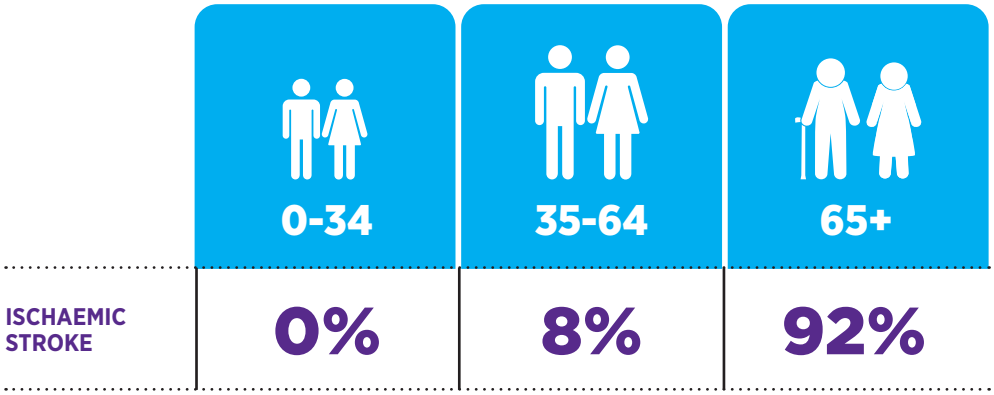


FIGURE 14: DECEASED CASES WITH A PRINCIPAL DIAGNOSIS OF ISCHAEMIC STROKE, BY AGE GROUP, 2019

A crude in-hospital mortality rate from 2010 to 2019 for ischaemic stroke is presented in Figure 15, with a 95% CI. These data have not been adjusted for differences in age profile or comorbidities over time, but they provide background information on hospital presentations for this time period. There was a significant reduction (38%) in in-hospital mortality between 2009 and 2018, from 123 deaths per 1,000 admissions in 2009 to 76 deaths per 1,000 admissions in 2018; however, this rose slightly in 2019, when 80 deaths per 1,000 admissions were recorded. These figures are consistent with INAS data for 2019. Professor Joe Harbison, INAS Clinical Lead, commented: "We are still deficient in number and quality of acute stroke unit beds compared with comparable countries, so there is potential for further improvement in care in that respect."

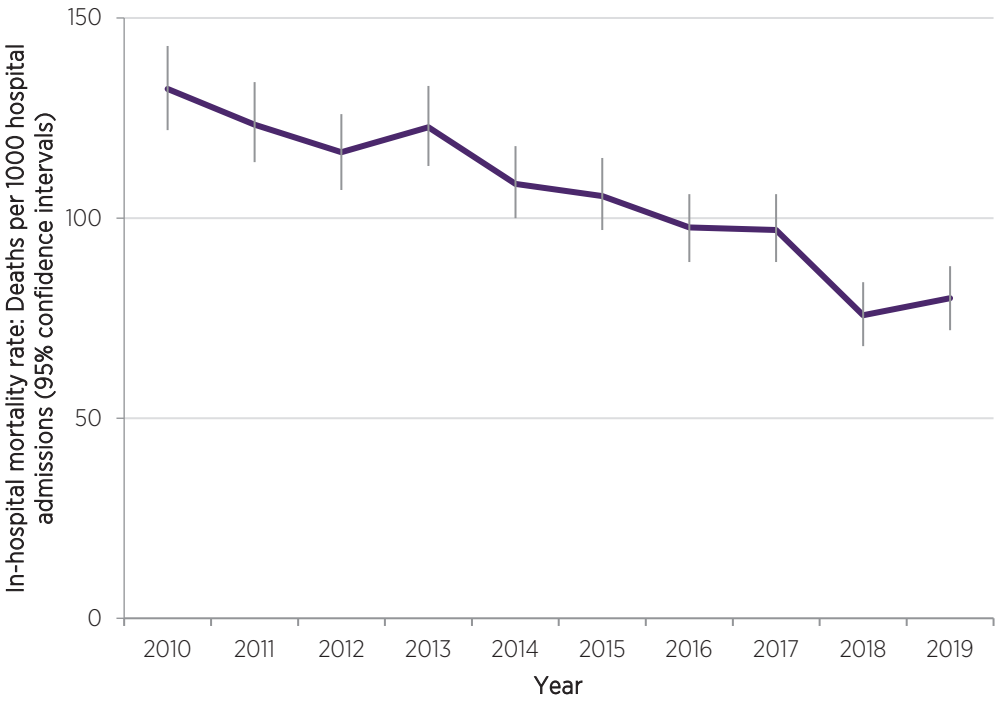


FIGURE 15: NATIONAL IN-HOSPITAL MORTALITY FOLLOWING ADMISSION WITH PRINCIPAL DIAGNOSIS OF ISCHAEMIC STROKE, 2010–2019

When performing a statistical analysis, small sample sizes may provide erratic results; for this reason, only hospitals with 100 or more admissions are included for analysis in order to ensure statistical reliability. Twenty-seven of the participating hospitals admit acute stroke cases, and 17 of these met this inclusion criterion for 2019. The number of cases with a principal diagnosis of ischaemic stroke admitted to these hospitals in 2019 ranged from 103 to 621.

The number of hospitals which met the inclusion criterion may appear to be a relatively small sample of the 27 hospitals admitting acute stroke cases; however, the 17 hospitals included each had more than 100 admissions, and their combined admissions accounted for 82% of cases admitted with a principal diagnosis of ischaemic stroke in 2019.

Figure 16 presents the SMRs for these hospitals in a funnel plot, with 99.8% control limits. These limits represent the upper and lower limits of expected variation. Each individual hospital's control limits are calculated based on that hospital's patient details. If an SMR appears outside the 99.8% control limits, it is very unlikely that this is due to chance (1 in 500 likelihood to be due to chance alone), and further investigation is warranted. The 17 included hospitals had an SMR within the control limits of 99.8% for ischaemic stroke. Ten of the 27 hospitals with stroke units are not included in this analysis, as they did not meet the inclusion criterion relating to a defined number of admissions and expected events.

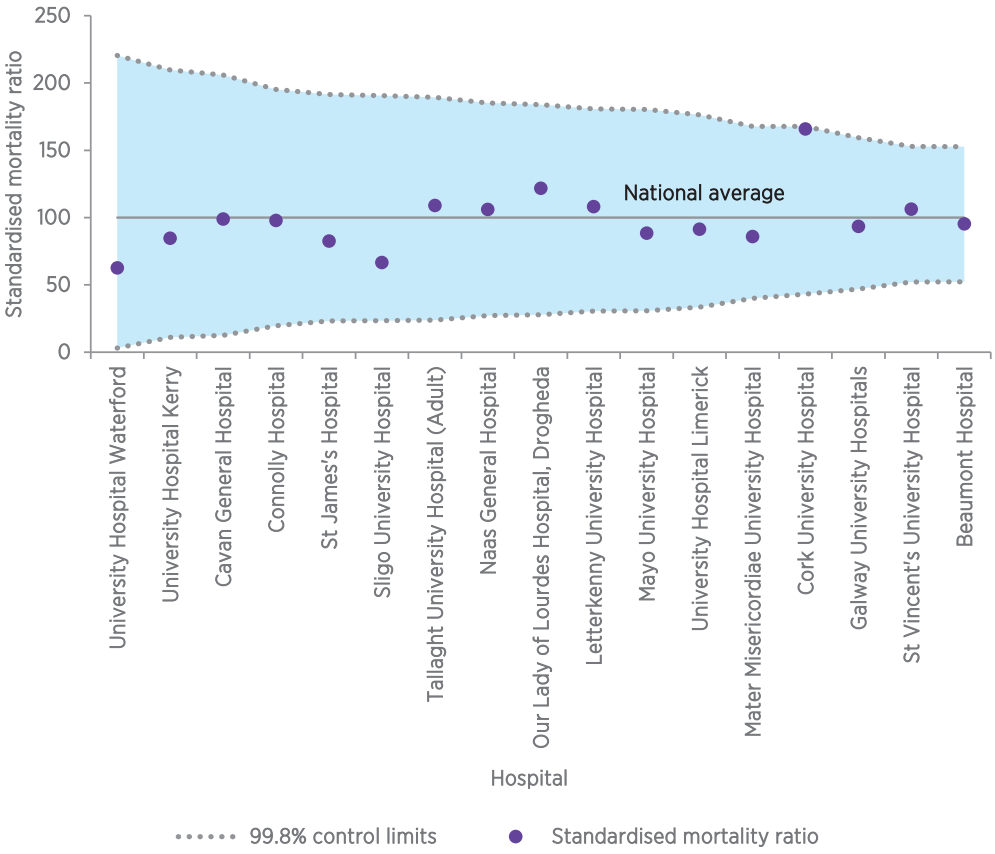


FIGURE 16: NATIONAL IN-HOSPITAL STANDARDISED MORTALITY RATIO FOLLOWING ADMISSION WITH PRINCIPAL DIAGNOSIS OF ISCHAEMIC STROKE, 2019

HAEMORRHAGIC STROKE

BACKGROUND

Haemorrhagic strokes (also known as cerebral haemorrhages or intracranial haemorrhages) usually occur when a blood vessel in the brain bursts and bleeds into the substance of the brain (intracerebral haemorrhage). In about 5% of cases, the bleeding occurs on the surface of the brain (subarachnoid haemorrhage).

The main cause of haemorrhagic stroke is high blood pressure (hypertension), which can weaken the arteries in the brain and make them prone to split or rupture.

The risk factors for high blood pressure include:
- being overweight
- drinking excessive amounts of alcohol
- smoking
- a lack of exercise.

Haemorrhagic stroke occurs less frequently than ischaemic stroke but has a much higher mortality rate, with 241 deaths per 1,000 admissions for haemorrhagic stroke compared with 80 deaths per 1,000 admissions for ischaemic stroke in 2019.

In 2019, 1,462 cases with a principal diagnosis of haemorrhagic stroke were discharged from the 44 hospitals included in NQAIS NAHM.

Haemorrhagic stroke in NQAIS NAHM is based on ICD-10-AM/ACHI/ACS codes I60, I600, I601, I602, I603, I604, I605, I606, I607, I608, I609, I61, I610, I611, I612, I613, I614, I615, I616, I618, and I619, and is fully defined in the online appendices which can be found at https://www.noca.ie/publications/publications-listing/P0/category/3/0.

FINDINGS

NQAIS NAHM calculates a CCI score for each case, which indicates the significance of the pre-existing conditions on admission and their associated 1 year mortality risk (Figure 17). The scores are grouped as less than 1, between 1 and 5, and greater than 5. Although almost half (47%) of haemorrhagic stroke cases had a CCI of less than 1, almost one-third had a CCI of 6 or higher, indicating that these cases had a high risk of mortality in the following 12 months. Figure 18 shows that 78% of deceased haemorrhagic stroke cases were over 65 years old.

	<1 NO SIGNIFICANT PRE-EXISTING COMORBIDITIES	1-5 MODERATE COMORBIDITIES	>5 SEVERE COMORBIDITIES
HAEMORRHAGIC STROKE	47%	21%	32%

FIGURE 17: CHARLSON COMORBIDITY INDEX SCORES FOR CASES WITH A PRINCIPAL DIAGNOSIS OF HAEMORRHAGIC STROKE, 2019

	0-34	35-64	65+
HAEMORRHAGIC STROKE	0%	22%	78%

FIGURE 18: DECEASED CASES WITH A PRINCIPAL DIAGNOSIS OF HAEMORRHAGIC STROKE, BY AGE GROUP, 2019

A crude in-hospital mortality rate from 2010 to 2019 for haemorrhagic stroke is presented in Figure 19, with a 95% CI. These data have not been adjusted for differences in age profile or comorbidities over time, but they provide background information on hospital presentations for this time period. There has been a 9% reduction in in-hospital mortality over the past 10 years, from 264 deaths per 1,000 admissions in 2010 to 241 deaths per 1,000 admissions in 2019.

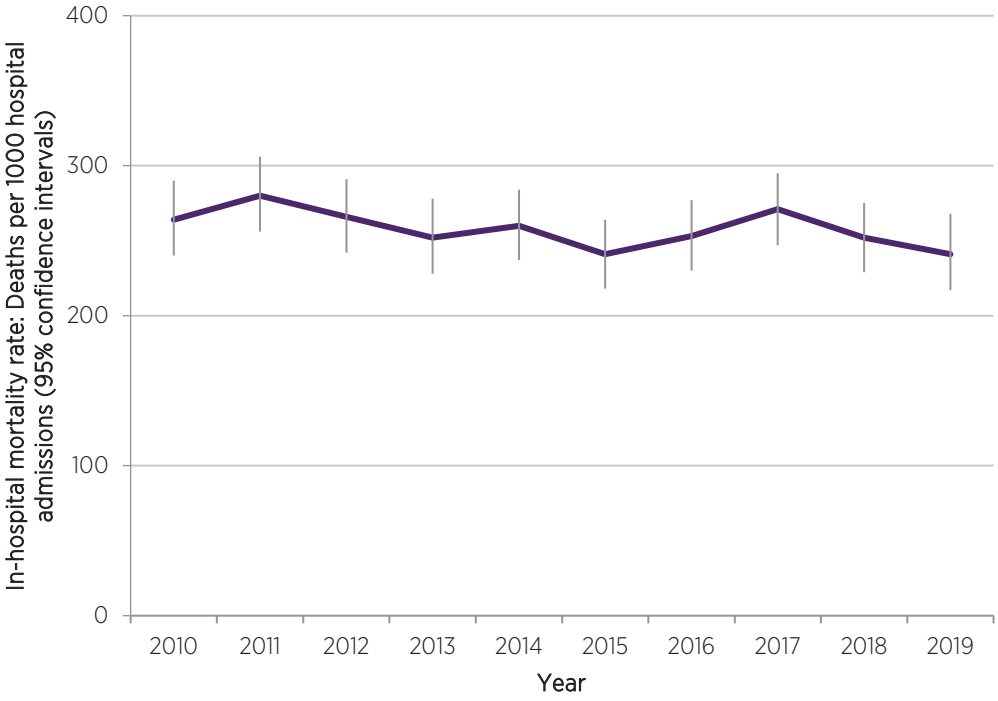


FIGURE 19: NATIONAL IN-HOSPITAL MORTALITY FOLLOWING ADMISSION WITH PRINCIPAL DIAGNOSIS OF HAEMORRHAGIC STROKE, 2010–2019

When performing a statistical analysis, small sample sizes may provide erratic results; for this reason, only hospitals with 100 or more admissions are included for analysis in order to ensure statistical reliability. Due to the low numbers of cases with a principal diagnosis of haemorrhagic stroke, data for the 3-year period from 2017 to 2019 were combined. Twenty-seven of the participating hospitals admit acute stroke cases, and only 12 of these met the inclusion criterion for 2017–2019. The number of cases with a principal diagnosis of haemorrhagic stroke admitted to each of these hospitals between 2017 and 2019 ranged from 102 to 978.

The number of hospitals which met the inclusion criterion may appear to be a relatively small sample of the 27 hospitals admitting acute stroke cases; however, the 12 hospitals included each had more than 100 admissions, and their combined admissions accounted for 74% of cases admitted with a principal diagnosis of haemorrhagic stroke between 2017 and 2019.

The SMRs for these hospitals are presented in a funnel plot, with 99.8% control limits (Figure 20). These limits represent the upper and lower limits of expected variation. Each individual hospital's control limits are calculated based on that hospital's patient details. If an SMR appears outside the 99.8% control limits, it is very unlikely that this is due to chance (1 in 500 likelihood to be due to chance alone), and further investigation is warranted. All hospitals had an SMR within the control limits of 99.8% for haemorrhagic stroke, indicating that all hospitals' SMRs were within the expected range for 2017–2019. Fifteen of the 27 hospitals with stroke units are not included in this analysis, as they did not meet the inclusion criterion relating to a defined number of admissions and expected events.

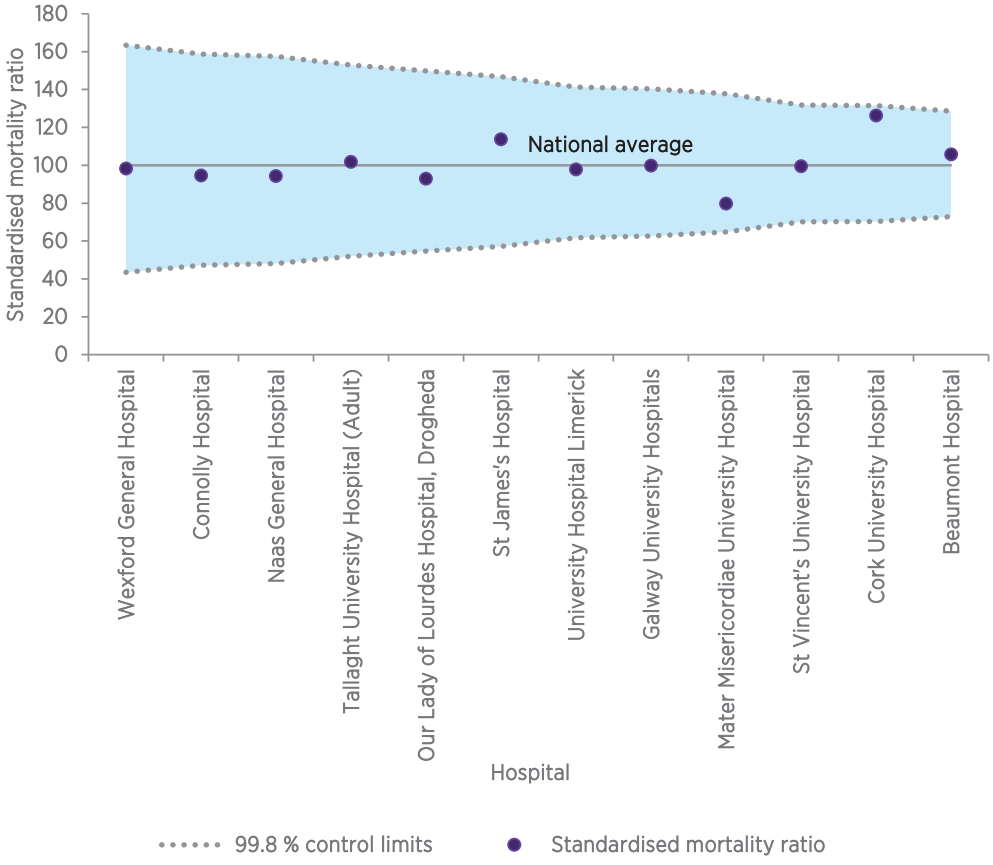


FIGURE 20: NATIONAL IN-HOSPITAL STANDARDISED MORTALITY RATIO FOLLOWING ADMISSION WITH PRINCIPAL DIAGNOSIS OF HAEMORRHAGIC STROKE, 2017–2019

RESPIRATORY DIAGNOSES

Respiratory diseases are diseases of the airways and other structures of the lung.

Respiratory diseases are a major cause of death, accounting for 10% of deaths across Organisation for Economic Co-operation and Development (OECD) countries in 2017.

In 2013, the most recent year for which comparable European Union data are available, rates of mortality from respiratory diseases were 41% higher in Ireland than the European Union average (193.1 versus 137.1 deaths per 100,000 population, respectively). In 2016, there were 3,856 deaths registered in Ireland as being due to respiratory disease (excluding lung cancer). Deaths due to chronic lower respiratory disease (n=1711) and deaths due to pneumonia (n=1049) accounted for 72% of these deaths (HSE, 2020a).

Some of the most common respiratory diseases are COPD, asthma, occupational lung diseases and pulmonary hypertension. Data on these diseases, among others, are available for hospitals to view locally on the NQAIS NAHM web-based tool.

For the purposes of public reporting, the NAHM Governance Committee applied inclusion criteria to the framework for the NAHM report. The following respiratory diagnoses meet the reporting criteria:

- COPD
- pneumonia.

These are two of the most common causes of respiratory hospitalisations in Ireland.

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

BACKGROUND

Chronic obstructive pulmonary disease (COPD) is a disease that causes inflammation of the lungs and obstruction of the airways which is usually progressive and only partially reversible. It may be a life-threatening condition and is one of the most common respiratory diseases in Irish adults. It usually affects people over the age of 35 years.

The disease causes increasing breathlessness, a chronic cough and increasing mucous production. Severe cases can result in frequent intervention at primary care level, hospital admissions, and often premature death. It is a significant cause of morbidity and mortality in Ireland; compared with other European countries, Ireland has one of the highest hospitalisation rates per 100,000 population, and highest age-standardised death rates from COPD (HSE, 2020b).

The most common specific cause of emergency hospital admission among adults in Ireland is COPD (Department of Health, 2019).

It is estimated that more than 500,000 people in Ireland are living with COPD, yet it is estimated that only 200,000 of them have had a formal diagnosis made. It is particularly prevalent in the more vulnerable populations in society, including people from areas with high social deprivation. Tobacco smoking is the most significant risk factor for the development of COPD. The disease is not curable, but it is treatable. The most effective treatment in patients who smoke is to stop smoking. Tobacco smokers have a higher risk of respiratory symptoms, lung function abnormalities and mortality from COPD than non-smokers (non-smokers include those who have ceased smoking in the previous 12 months). Ten percent of cases with COPD are non-smokers, many having ceased smoking for a number of years.

For more than 60% of people with COPD, a comorbidity other than COPD may be listed as the primary cause of their death. Under-recognition and under-diagnosis of COPD affect the accuracy of mortality data. While COPD is frequently the primary cause of death, it may be listed as a contributory cause of death or omitted from that certificate entirely (HSE, 2020a). An Irish audit showed that the in-hospital mortality for those with COPD was 3.3% and the 90-day mortality was 8.3% (Crinion *et al*., 2013).

Clinical guidelines for COPD are currently in development by the National Clinical Programme for COPD.

In 2019, 16,184 cases with a principal diagnosis of COPD were discharged from the 44 hospitals included in NQAIS NAHM.

COPD in NQAIS NAHM is based on ICD-10-AM/ACHI/ACS codes J40, J41, J410, J411, J418, J42, J43, J430, J431, J432, J438, J439, J44, J440, J441, J448, J449, and J47, and is fully defined in the online appendices which can be found at https://www.noca.ie/publications/publications-listing/P0/category/3/0.

FINDINGS

NQAIS NAHM calculates a CCI score for each case, which indicates the significance of the pre-existing conditions on admission and their associated 1 year mortality risk (Figure 21). The scores are grouped as less than 1, between 1 and 5, and greater than 5. The majority (65%) of COPD cases in 2019 had a CCI score of less than 1, meaning that these cases presenting with COPD as their principal diagnosis were in the low-risk group for mortality in the next 12 months. Figure 22 shows that 90% of deceased COPD cases were over 65 years old.

	<1 NO SIGNIFICANT PRE-EXISTING COMORBIDITIES	1-5 MODERATE COMORBIDITIES	>5 SEVERE COMORBIDITIES
CHRONIC OBSTRUCTIVE PULMONARY DISEASE	65%	13%	22%

FIGURE 21: CHARLSON COMORBIDITY INDEX SCORES FOR CASES WITH A PRINCIPAL DIAGNOSIS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE, 2019

	0-34	35-64	65+
CHRONIC OBSTRUCTIVE PULMONARY DISEASE	0%	10%	90%

FIGURE 22: DECEASED CASES WITH A PRINCIPAL DIAGNOSIS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE, BY AGE GROUP, 2019

A crude in-hospital mortality rate from 2010 to 2019 for COPD is presented in Figure 23, with a 95% CI. These data have not been adjusted for differences in age profile or comorbidities over time, but they provide background information on hospital presentations for this time period. There was an increase (12%) in in-hospital mortality for COPD between 2010 and 2019, from 33 deaths per 1,000 admissions in 2010 to 37 deaths per 1,000 admissions in 2019. Dr Desmond Murphy, National Clinical Lead in Respiratory Medicine, says that "the outcomes for COPD may appear to have deteriorated due to the implementation of admission avoidance and COPD outreach programmes for patients who would previously have had shorter admissions and better outcomes. This measure may therefore paradoxically have increased the mean outcome values for admitted patients. This will warrant further dissection of the figures."

The COPD crude mortality rate has remained the same in 2018 and 2019, with 37 in-hospital deaths per 1,000 admissions recorded in both years. The number of cases admitted with COPD as a principal diagnosis has increased over the past 10 years, from 10,996 in 2010 to 16,184 in 2019.

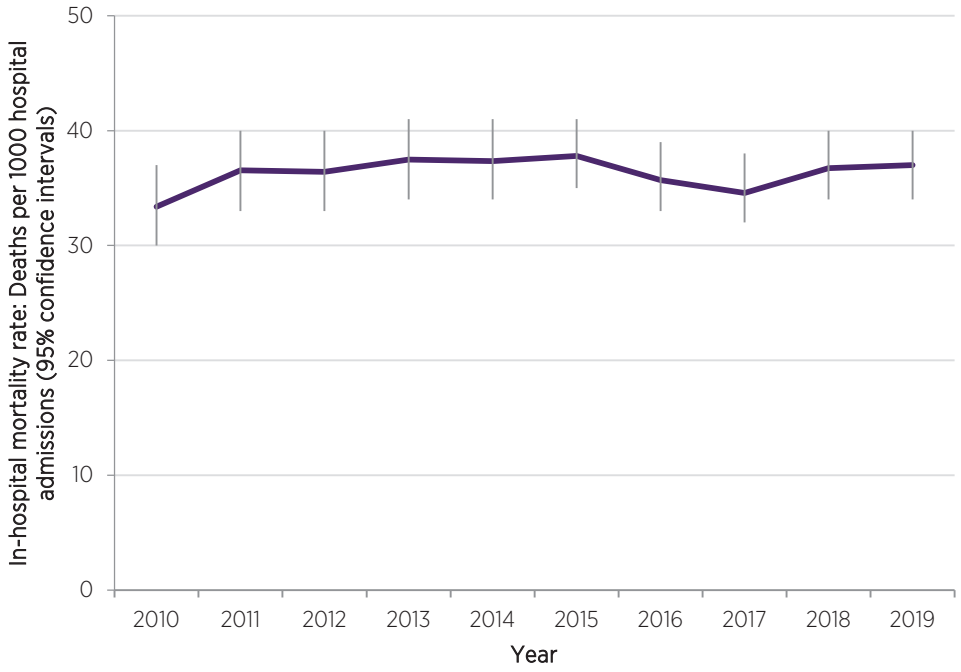


FIGURE 23: NATIONAL IN-HOSPITAL MORTALITY FOLLOWING ADMISSION WITH PRINCIPAL DIAGNOSIS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE, 2010–2019

When performing a statistical analysis, small sample sizes may provide erratic results; for this reason, only hospitals with 100 or more admissions are included for analysis in order to ensure statistical reliability. Of the 44 participating hospitals, only 31 met this criterion for COPD in 2019. The number of cases with a principal diagnosis of COPD admitted to these hospitals in 2019 ranged from 183 to 963.

The number of hospitals which met the inclusion criterion may appear to be a relatively small sample of our participating hospitals (N=44); however, the hospitals included each had more than 100 admissions, and their combined admissions accounted for 97% of cases admitted with a principal diagnosis of COPD in 2019.

Figure 24 presents the SMRs for these hospitals in a funnel plot, with 99.8% control limits. These limits represent the upper and lower limits of expected variation. Each individual hospital's control limits are calculated based on that hospital's patient details. If an SMR appears outside the 99.8% control limits, it is very unlikely that this is due to chance (1 in 500 likelihood to be due to chance alone), and further investigation is warranted. Twenty-seven hospitals had an SMR within the control limits of 99.8% for COPD, indicating that these hospitals' SMRs were within the expected range for 2019. Thirteen hospitals are not included in this analysis, as they did not meet the inclusion criterion relating to a defined number of admissions and expected events.

Three hospitals' SMRs (Tallaght University Hospital, Beaumont Hospital and Cork University Hospital) were outside the upper control limits and one hospital's SMR (St John's Hospital Limerick) was outside the lower control limits in December 2019. For three of these hospitals, this is the first occurrence where the SMR was outside the respective upper or lower 99.8% control limits, and therefore they were not statistical outliers for monitoring and escalation at year end 2019 as defined by the NAHM Governance Committee. Cork University Hospital was outside the upper 99.8% control limits for two consecutive quarterly data periods and was therefore a statistical outlier. A summary of the outlier review is included in the Statistical outliers section on page 33.

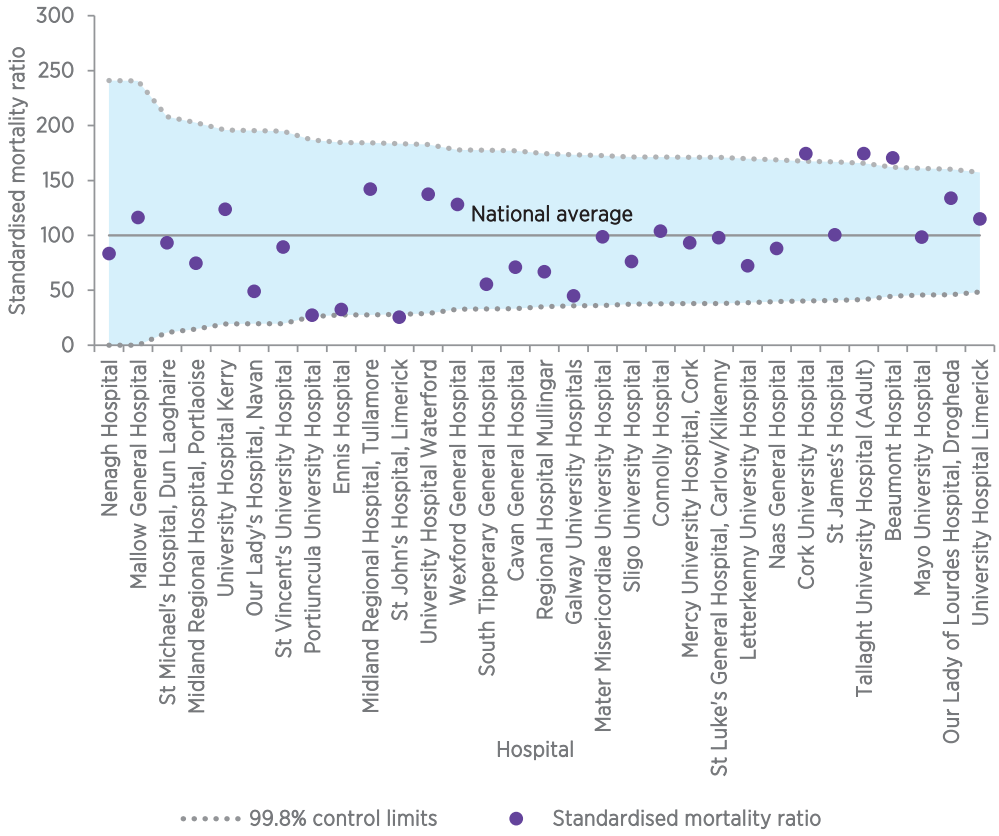


FIGURE 24: NATIONAL IN-HOSPITAL STANDARDISED MORTALITY RATIO FOLLOWING ADMISSION WITH PRINCIPAL DIAGNOSIS OF CHRONIC OBSTRUCTIVE PULMNARY DISEASE, 2019

PNEUMONIA

BACKGROUND

Pneumonia is an acute inflammatory condition (swelling) of the tissue in one or both lungs. There are clusters of tiny air sacs at the end of the breathing tubes in the lungs, which will fill with air when lungs are healthy. If an individual has pneumonia, these tiny sacs become inflamed and fill up with fluid, which makes breathing painful and limits oxygen intake.

Common symptoms of pneumonia include: a cough, which may either be dry or produce thick yellow, green, brown or blood-stained mucus (phlegm); difficulty breathing – your breathing may be rapid and shallow, and you may feel breathless, even when resting; and a fever.

Pneumonia normally affects around 8 in 1,000 adults each year (HSE, 2020c). It is more widespread in autumn and winter. Pneumonia can affect people of any age. It is more common – and can be more serious – in certain groups of people, such as the very young, the very elderly, those with certain other health conditions or those with a weakened immune system. Pneumonia is usually the result of a bacterial infection. However, different types of bacteria and viruses can also cause pneumonia. For example, coronavirus (COVID-19) causes respiratory tract infections in humans, the most common being viral pneumonia.

For at-risk groups, pneumonia can be severe and may require hospital treatment. This is because it can lead to serious complications which in some cases can be fatal.

Possible complications of pneumonia include:

- pleurisy, where the thin linings between the lungs and ribcage (pleura) become inflamed, which can lead to respiratory failure
- a lung abscess, a rare complication that is mostly seen in people with a serious pre-existing illness or a history of severe alcohol misuse
- blood poisoning (septicaemia), which is also a rare but serious complication.

In 2019, 14,066 cases with a principal diagnosis of pneumomia were discharged from the 44 hospitals included in NQAIS NAHM.

Pneumonia in NQAIS NAHM is based on ICD-10-AM/ACHI/ACS codes A202, A212, A221, A310, A420, A430, A481, A78, B012, B052, B250, B583, B59, B671, J12, J120, J121, J122, J123, J128, J129, J13, J14, J15, J150, J151, J152, J153, J154, J155, J156, J157, J158, J159, J16, J160, J168, J17, J170, J171, J172, J173, J178, J18, J180, J181, J182, J188, J189, J85, J850, and J851, and is fully defined in the online appendices which can be found at https://www.noca.ie/publications/publications-listing/P0/category/3/0.

FINDINGS

NQAIS NAHM calculates a CCI score for each case, which indicates the significance of the pre-existing conditions on admission and their associated 1 year mortality risk (Figure 25). The scores are grouped as less than 1, between 1 and 5, and greater than 5. Forty-five percent of pneumonia cases in 2019 had a CCI score of less than 1; however, more than one-third (36%) had a CCI score of 6 or more, indicating that these cases were at high risk of mortality in the following 12 months. Figure 26 shows that 91% of deceased pneumonia cases were over 65 years old.

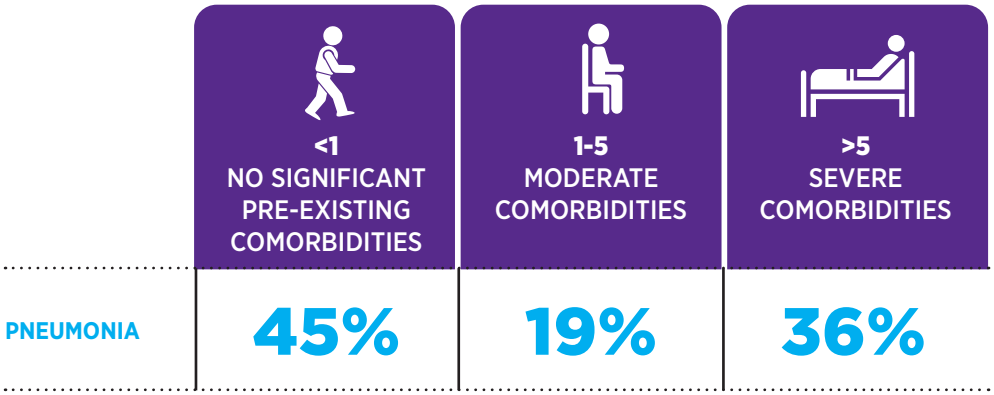


FIGURE 25: CHARLSON COMORBIDITY INDEX SCORES FOR CASES WITH A PRINCIPAL DIAGNOSIS OF PNEUMONIA, 2019

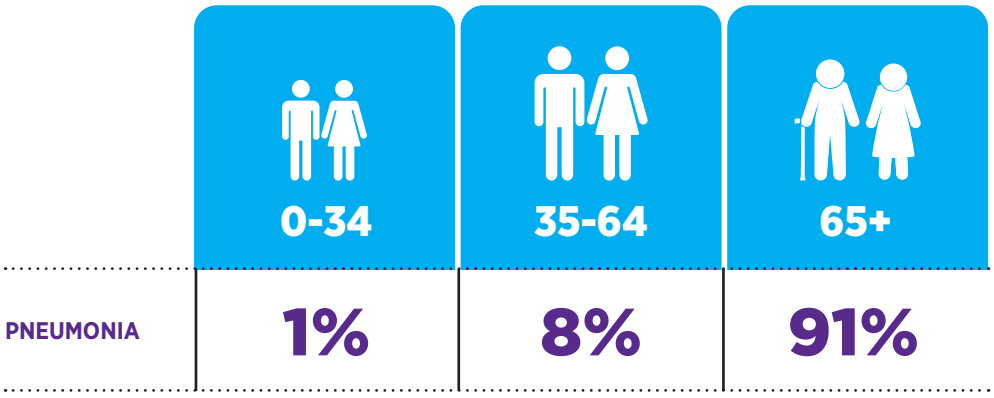


FIGURE 26: DECEASED CASES WITH A PRINCIPAL DIAGNOSIS OF PNEUMONIA, BY AGE GROUP, 2019

A crude in-hospital mortality rate from 2010 to 2019 for pneumonia is presented in Figure 27, with a 95% CI. These data have not been adjusted for differences in age profile or comorbidities over time, but they provide background information on hospital presentations for this time period. There has been a significant reduction (27%) in in-hospital mortality for pneumonia over the past 10 years, from 142 deaths per 1,000 admissions in 2010 to 103 deaths per 1,000 admissions in 2019. Dr Desmond Murphy, National Clinical Lead in Respiratory Medicine, commented: "This continued downward trend could be in part due to the better recognition and response to patient deterioration following the introduction in 2013 in all acute hospitals of the National Early Warning Score (NEWS) and improved recognition and treatment around sepsis, or it could also be due to the differences in respiratory coding with pneumonia and COPD offsetting each other."

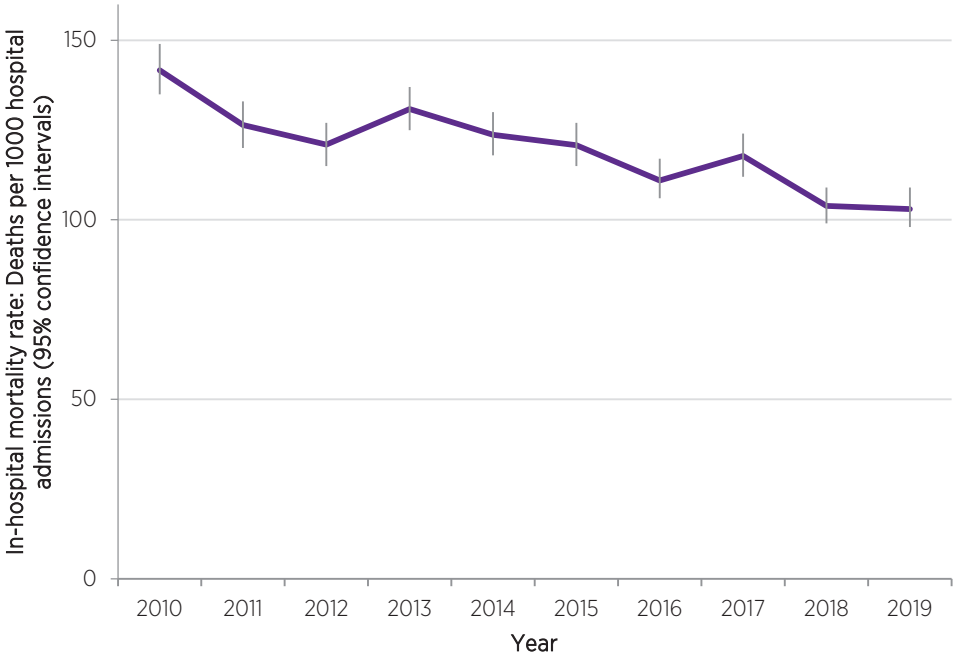


FIGURE 27: NATIONAL IN-HOSPITAL MORTALITY FOLLOWING ADMISSION WITH PRINCIPAL DIAGNOSIS OF PNEUMONIA, 2010–2019

When performing a statistical analysis, small sample sizes may provide erratic results; for this reason, only hospitals with 100 or more admissions are included for analysis in order to ensure statistical reliability. Of the 44 participating hospitals, only 32 met this criterion for pneumonia in 2019. The number of cases with a principal diagnosis of pneumonia admitted to these hospitals in 2019 ranged from 109 to 1,097.

The number of hospitals which met the inclusion criterion may appear to be a relatively small sample of our participating hospitals (N=44); however, the hospitals included each had more than 100 admissions, and their combined admissions accounted for 98% of cases admitted with a principal diagnosis of pneumonia in 2019.

Figure 28 presents the SMRs for these hospitals in a funnel plot, with 99.8% control limits. These limits represent the upper and lower limits of expected variation. Each individual hospital's control limits are calculated based on that hospital's patient details. If an SMR appears outside the 99.8% control limits, it is very unlikely that this is due to chance (1 in 500 likelihood to be due to chance alone), and further investigation is warranted. Thirty-two hospitals had an SMR within the control limits of 99.8% for pneumonia in 2019. Twelve hospitals are not included in this analysis, as they did not meet the inclusion criterion relating to a defined number of admissions and expected events.

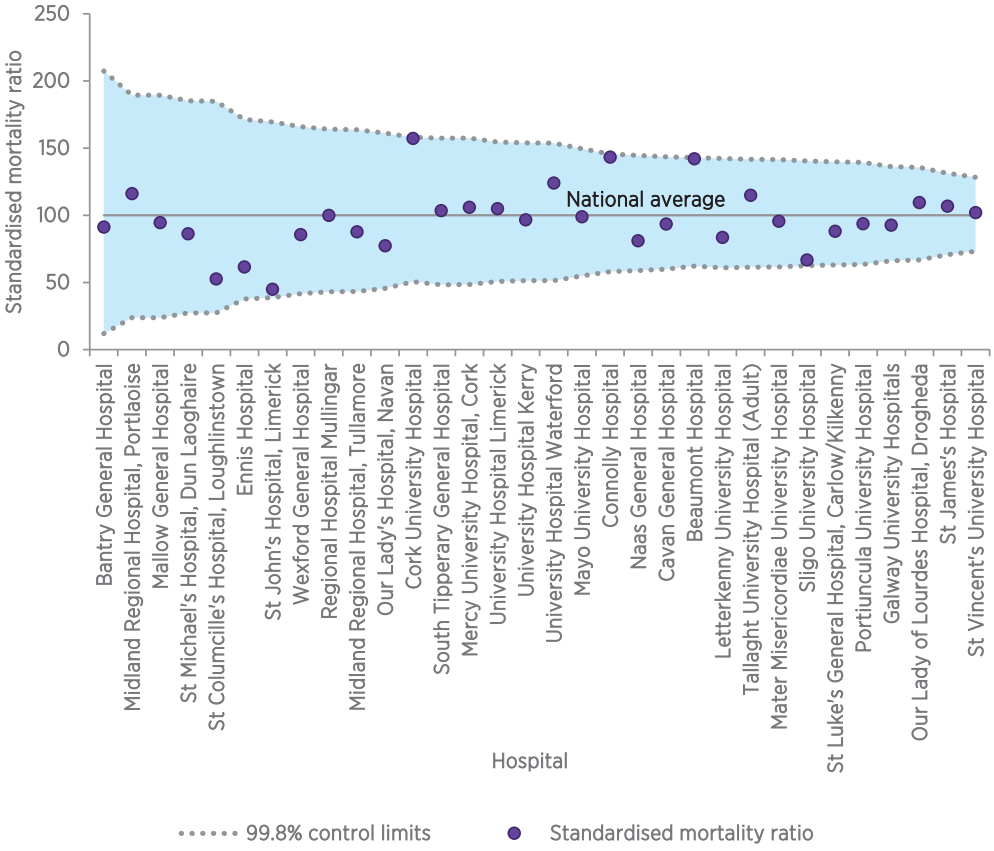


FIGURE 28: NATIONAL IN-HOSPITAL STANDARDISED MORTALITY RATIO FOLLOWING ADMISSION WITH PRINCIPAL DIAGNOSIS OF PNEUMONIA, 2019

AUDIT UPDATE

EVALUATION OF ENHANCED NQAIS NAHM WEB-BASED TOOL AND TRAINING

Background

One of the objectives of NAHM is to understand and improve the quality of hospital-based mortality data. The NQAIS NAHM web-based tool was enhanced in 2019 to allow easier interpretation of NAHM data for users and to increase the tool's functionality. The changes bring NAHM and other NQAIS tools more in line with each other, therefore making it easier for users across all functionalities available in the NQAIS system. Training on the new enhanced tool took place during 2019. Monthly training for new users has continued throughout 2020.

Objective of study

The first dimension of the Health Information and Quality Authority's (HIQA's) *Guidance on a data quality framework for health and social care* is "Relevance – relevant data meet the current and potential future needs of users" (HIQA 2018). The NAHM Governance Committee approved a proposal to gather users' feedback in order to assess the usefulness of the new enhanced features and the effectiveness of the training provided.

Method

All registered users of the NQAIS NAHM web-based tool were invited to take part in a short SurveyMonkey survey during July and August 2020. Users represent hospitals and Hospital Groups. Data confidentiality was maintained, as no personal data (i.e. names of respondents) were gathered. NOCA staff conducted analysis of responses using Excel.

There are 276 registered users of the NQAIS NAHM web-based tool, and an invitation was sent to all users to participate in the survey. Seventy-three responses were received, which is a response rate of 26%. At the time of writing, a total of 67 users have been trained on the new enhanced system.

Analysis of data

Forty-four respondents (61%) had accessed the NQAIS NAHM web-based tool since it was enhanced in September 2019. Respondents were asked to rate the usefulness of the new enhancements on a scale of 1 to 5, with 1 being not useful at all and 5 being very useful. Figure 29 shows that 60% of respondents found the wider range of HIPE fields on the record selection very useful, and that 63% found the plots selection very useful. The Bookmark enhancement got a low rating, with 54% of respondents giving it a score of 2 or 3 for somewhat useful. This feedback will be considered by the NAHM Analysis and Display Scientific Team (ADST) for future enhancements.

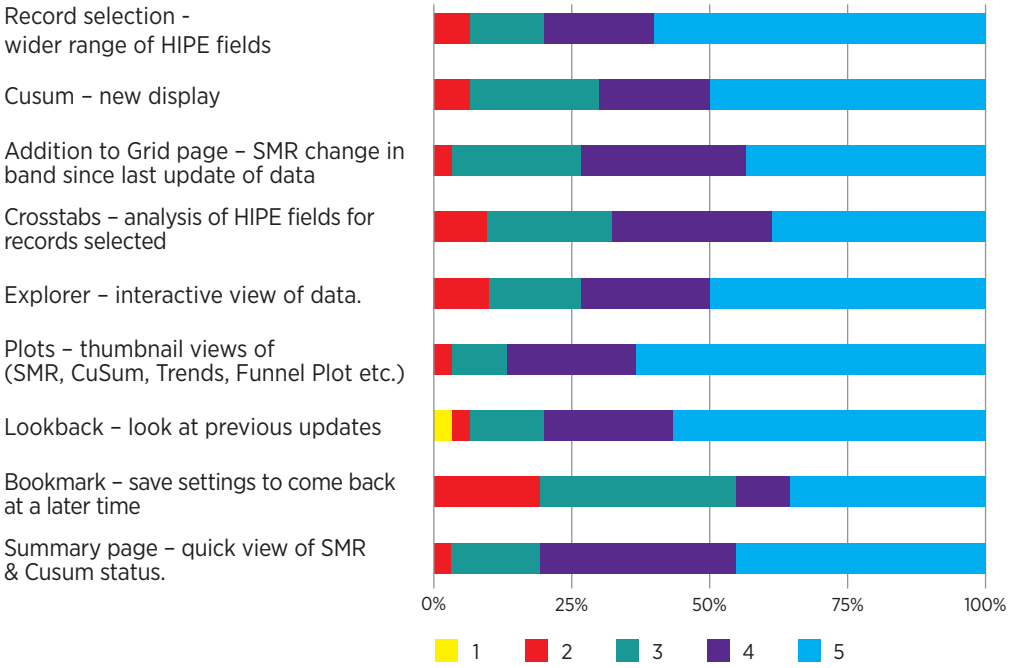


FIGURE 29: USEFULNESS OF ENHANCED FEATURES IN NQAIS NAHM

Thirty-two users responded to say that they had attended training for the new enhanced tool, which represents 44% of the survey respondents and 48% of the total number of users trained on the new system. Thirty-nine percent of these respondents attended by video link and 61% attended in person. Of those who attended by video link, 15% felt that their training suffered by not being face to face. Figure 30 shows that effectiveness of training scored highly, with the majority of respondents giving a score of 4 or 5.

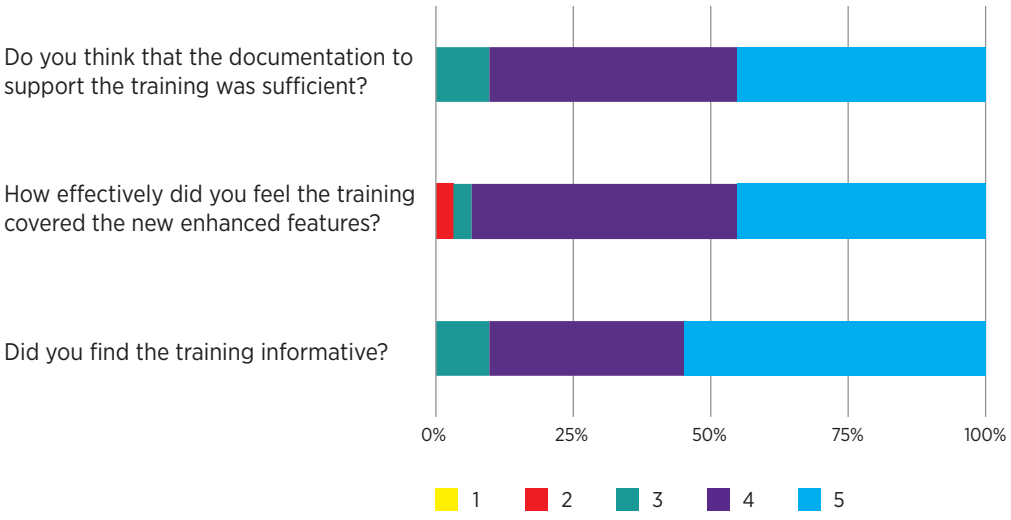


FIGURE 30: EFFECTIVENESS OF TRAINING

A range of short how-to videos has been created covering the basic functions and actions in NQAIS NAHM. These videos are available to download from the "Publications" section on the NOCA website. Survey respondents were asked if they had accessed the videos, and if they had, how effective they found them. Figure 31 shows responses to the accessibility and effectiveness of NAHM how-to training videos. Fifteen percent of respondents accessed these videos, with all rating the videos as somewhat useful or very useful.

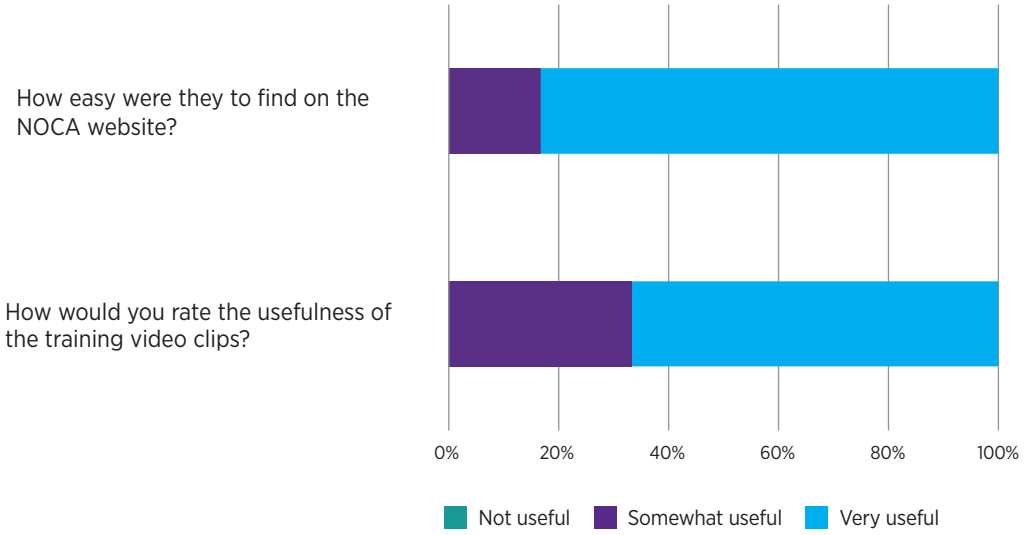


FIGURE 31: ACCESSIBILITY AND EFFECTIVENESS OF NAHM HOW-TO TRAINING VIDEOS

The results of this survey suggest that there may only be a small number of people actively using the NQAIS NAHM web-based tool on a regular basis. However, the responses also show that for those who are using the tool, the new enhancements have generally been useful.

The *National Audit of Hospital Mortality Annual Report 2018* (NOCA, 2019) recommended that hospitals should nominate one accountable person at an executive level to monitor and respond to the NQAIS NAHM web-based tool. This was communicated to the Hospital Group CEOs by Mr Liam Woods, National Director Acute Operations, in January 2020. A list of the nominated persons was compiled by Acute Operations and sent to NOCA. It is hoped that this request has raised awareness of the importance and usefulness of NAHM within individual hospitals. NAHM continues to advocate for clinical directors and consultants to be trained on NQAIS NAHM so that they can access data relative to their own specialty in the web-based tool.

Feedback via the comments section of the web-based tool is always encouraged, and the NAHM Audit Manager is available to support users at all times. The NAHM ADST will consider all feedback in order to ensure that NAHM continues to apply international best practice in terms of clinical, epidemiological, and software developments.

LOW VOLUME OF CASES IN NQAIS NAHM

There are limitations to the NQAIS NAHM model when it comes to hospitals with lower volumes of cases per diagnosis. The risk model is more robust when dealing with larger volumes of cases, but is less so with smaller volumes. SMRs are calculated for all 44 participating hospitals and all diagnoses in the NQAIS NAHM tool. All hospitals are able to see their data via the web-based tool, and they can also see if they have an outlier. If this outlier becomes a statistical outlier then the hospital (this includes hospitals with both small and large volumes of cases per diagnosis) will be contacted, in line with NOCA's *Monitoring and Escalation Policy*, and asked to conduct a review of the data. Hospitals, especially where there is a lower volume of cases for a diagnosis, should NOT look at their SMRs in isolation; other factors should be considered, such as patient experience, safety incident reports, and local hospital audits.

In 2021, NAHM will analyse data pertaining to low-volume hospitals, focusing particularly on mortality in relation to the six key diagnoses included in this report.

KEY RECOMMENDATIONS

KEY RECOMMENDATION
The National Audit of Hospital Mortality recommends that NOCA should develop more structured guidance on statistical outlier reviews, and it also recommends that this should be completed during the second quarter of 2021.
This recommendation will benefit all users of the NQAIS NAHM web-based tool. The statistical outlier review process will be clearer for hospitals to follow and will ensure that all content and headings are covered in the reports issued. All roles and responsibilities for the process, including those within NOCA and the NAHM Governance Committee, will be defined.
NOCA undertakes to have this work completed during Q2 2021.

UPDATE ON RECOMMENDATIONS FROM THE *NATIONAL AUDIT OF HOSPITAL MORTALITY ANNUAL REPORT 2018*

TABLE 4: UPDATE ON RECOMMENDATIONS FROM THE NATIONAL AUDIT OF HOSPITAL MORTALITY ANNUAL REPORT 2018

Recommendation	Key	Summary progress update	Accountable for implementation	Status
Hospitals should nominate one accountable person at an executive level to monitor and respond to the NQAIS NAHM web-based tool.	HSE Acute Operations	National Director of Acute Operations, HSE, wrote to Hospital Group CEOs in January 2020. A list of accountable persons was sent to NOCA.	Hospital Groups	Closed
Guidance developed between the Healthcare Pricing Office (HPO) and the National Clinical Programme for Palliative Care on how to define when code Z51.5 palliative care is applied, following the change to the 10th Edition of ICD-10-AM/ACHI/ACS in January 2020, should be shared with all clinicians in order to ensure consistency in documentation and application of the palliative care code.	NOCA, HPO, National Clinical Programme for Palliative Care	Workshop was cancelled due to the impact of COVID-19 on resources required. New date awaited.	HPO, National Clinical Programme for Palliative Care	On hold
NAHM will provide input to NOCA's programme of paediatric audits, when established, in order to ensure that NAHM is linked to existing paediatric mortality data.	NOCA	NOCA's programme of paediatric audits is not established to date.	NOCA	On hold
The NQAIS NAHM ADST should amend the "fracture neck of femur" Clinical Classifications Software (CCS) group in NQAIS NAHM to reflect the same codes as those used by the IHFD, which will allow triangulation with the IHFD audit.	NAHM ADST	CCS group amended and applied to NQAIS NAHM in September 2020.	NOCA	Closed
The NQAIS NAHM ADST should monitor international mortality tools for any changes to risk modelling in paediatric mortality. It should also explore developing the NQAIS NAHM web-based tool to support an extract of paediatric data to assist hospitals in their interpretation.	NAHM ADST	Monitoring of international mortality tools will be an ongoing task. The NQAIS NAHM tool was enhanced in September 2020 to allow hospitals to extract paediatric data via the Records tab, Explorer tool and Crosstabs functions.	NOCA	Closed

CONCLUSION

This report shows that there has been a continuing decrease in crude mortality trends for AMI, haemorrhagic stroke, pneumonia and heart failure over the past 10 years. However, ischaemic stroke and COPD have seen an increase in mortality rates in 2019 compared with 2018.

Hospitals and Hospital Groups continue to engage with NOCA around statistical outliers, and we thank them for their time and commitment to sharing their learnings in this report.

The global COVID-19 pandemic has impacted on this fifth *National Audit of Hospital Mortality Annual Report*. Although data for 2019 continued to be collated and coded in the local HIPE offices, closure of the HIPE national file for 2019 was delayed by 1 month. The bigger impact, however, was on work which was planned to be carried out during the first half of 2020. As the virus continues to impact our society and businesses, NAHM is planning to release data to the NQAIS NAHM web-based tool in late 2020 with the inclusion of a flag to identify COVID-19 cases. The data for the *National Audit of Hospital Mortality Annual Report 2020* will be more significantly impacted, and NAHM will continue to make efforts to ensure that meaningful data are produced in the NQAIS NAHM tool for 2020.

NAHM has worked with stakeholders throughout the year, taking on board responses to issues as they arose. Work is planned for 2021 to analyse those hospitals which have been excluded from this public report due to the inclusion criteria for diagnoses.

NAHM wishes to acknowledge the challenges faced by all contributors in writing this report; it could not have been written without the efforts of all staff in hospitals and HIPE offices nationwide. Thanks in particular go to members of the NAHM Report Writing Group, who have given up their time and shared their knowledge in the writing of this report.

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APPENDIX 1: SMR FUNNEL PLOT

Standardised mortality ratio funnel plot

For this report, standardised mortality ratio (SMR) funnel plots are scatterplots of individual hospitals' SMRs. The upper and lower borders of the funnel are represented by the 99.8% control limits. These borders represent the upper and lower limits of what is referred to as 'expected variation'. The control limits are affected by the number of cases with a particular principal diagnosis in hospitals. Hospitals with smaller numbers of cases have wider control limits and appear to the left of the SMR funnel plot, while hospitals with larger numbers of cases have narrower control limits and appear to the right of the funnel plot.

An SMR is expected to appear within the 99.8% control limits 998 times out of 1000. Statistically, 1 in 500 observations can be expected to appear outside these control limits by chance alone. In other words, if an SMR appears outside these limits, it is very unlikely that this is due to chance. These observations represent variation worthy of further review.

Funnel plots make it very easy to identify these observations worthy of further review. A hospital's SMR should only be compared with its own control limits. There is no basis for ranking institutions into 'league tables' (Spiegalhalter, 2005), therefore it is not valid to directly compare SMRs between hospitals.

SAMPLE NATIONAL FUNNEL PLOT

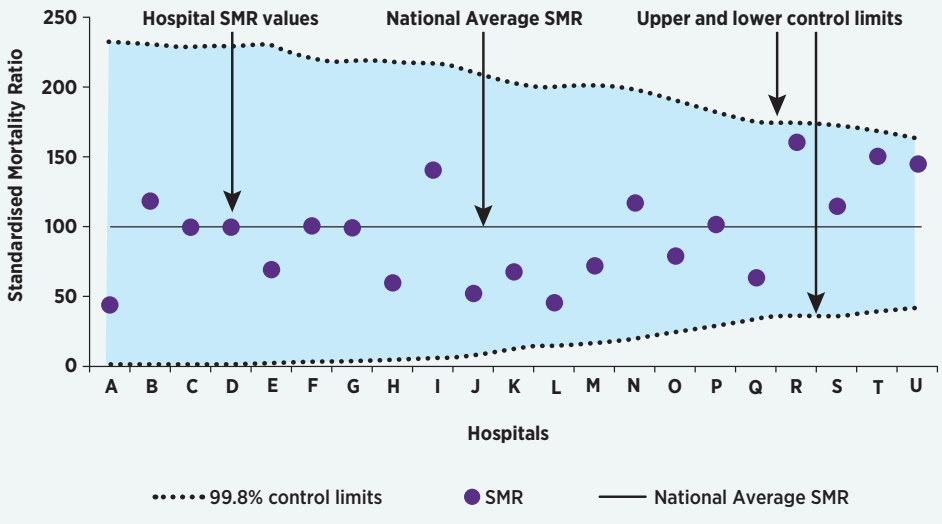

FIGURE A1.1: INFORMATION ON INTERPRETATION OF FUNNEL PLOTS

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NOTES

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