

National Integrated Health Service Information (NIHSI) version 2.0

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Identifying and definitional attributes

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Data quality

Data quality statement summary:

Summary

- The National Integrated Health Services Information (NIHSI) is a major enduring national linked health data asset for health research and analysis.
- The NIHSI version (v) 2.0 brings together state/territory (NSW, Vic, Qld, SA, Tas and ACT) hospitals data including admitted patient care services, emergency department services and outpatient services with Commonwealth administrative data sets including the Medical Benefits Schedule (MBS), Pharmaceutical Benefits Scheme (PBS), Repatriation Pharmaceutical Benefits Scheme (RPBS), Residential Aged Care and the National Death Index (NDI).
- The NIHSI v 2.0 contains data from 2010–11 until 2019–20 financial years and was released in December 2022.
- Data linkage for the NIHSI was undertaken using probabilistic linkage by combining records from one data set with records from another data set, based on similarities in characteristics (e.g., first, and last names(s); day, month, and year of birth; and sex). The Medicare Consumer Directory (MCD) and NDI were first linked to create the Australian Institute of Health and Welfare (AIHW) linkage spine which was used to create the NIHSI.
- The NIHSI can be used to inform health service planning, for monitoring and evaluation purposes and policy development.
- The NIHSI v 2.0 can only be used for purposes approved by the AIHW Ethics Committee. The NIHSI is not to be used for administrative and/or compliance purposes and cannot be used for sub-national performance indicator reporting. A comprehensive description of what the NIHSI can and can't be used for is available from the [National Integrated Health Services Information - Australian Institute of Health and Welfare \(aihw.gov.au\)](#)
- Participation in and contribution to the NIHSI by jurisdictions is voluntary. The NIHSI v 2.0 does not include hospitals data from Western Australia and the Northern Territory. The AIHW will continue to liaise with Western Australia and the Northern Territory to enable their hospitals data to be included in the NIHSI in the future.
- State and territory health departments share data with AIHW for the curation of several hospital data National Minimum Data Sets (NMDS). The core elements of these data sets are agreed by the National Health Data and Information Standards Committee (NHDISC) for mandatory collection and reporting at a national level undertaken by AIHW.
- Since 2018, and under the guidance and approval of the state and territory health data custodians, the AIHW has re-purposed these NMDS to curate the linked NIHSI analytical asset.
- The hospital data included in the NIHSI draws on the hospital data NMDS from the:
 - National Public Hospital Establishments Database (NPHEd),
 - National Hospital Morbidity Database (NHMD) (otherwise referred to as Admitted patient care data),
 - National Non-Admitted Patient Emergency Department Care Database (NNAPEDCD), and
 - National Non-Admitted Patient (episode-level) Database (NNAP(e)D).
- The scope of admitted patient private hospitals records is incomplete and varies across participating states and territories. Only Queensland provided the complete private hospitals identifiers. The AIHW will continue to work with jurisdictions to provide more complete private hospitals data.

- The MBS data collection contains information on services that qualify for a benefit under the *Health Insurance Act 1973* and for which a claim has been processed. The MBS data in NIHSI v 2.0 include a unit record level data for all MBS services between 1 July 2010 and 30 June 2020 that have been claimed and processed by Services Australia.
- The PBS and RPBS are national government-funded schemes designed to subsidise the cost of pharmaceutical medicines. Within NIHSI, PBS and RPBS data are combined and are referred collectively as PBS data. The data in NIHSI v 2.0 include a unit record level data extract for all PBS/RPBS prescriptions supplied between 1 July 2010 and 30 June 2020.
- Data for NDI are obtained from the registrars of Births, Deaths and Marriages in each state and territory. Deaths from 1 July 2010 to 31 December 2020 are included in the NIHSI v 2.0.
- The aged care data is drawn from the National Aged Care Data Clearinghouse (NACDC) which captures data on aged care programs operating under the *Aged Care Act 1997*. Data include information on people receiving aged care, assessments (of care needs), episodes of care, as well as aged care services and providers. The aged care data in the NIHSI v 2.0 include details of active episodes of permanent and respite residential aged care within the period 1 July 2010 and 30 June 2020.
- The NIHSI v 2.0 can be accessed by Commonwealth and state/territory health departments, health portfolio agencies and the AIHW for approved projects. The NIHSI v 2.0 can be accessed by named analysts on approved projects from these organisations.
- The NIHSI is a health service-based linked analytical asset. It includes records of health services provided to people who are usual residents of Australia. It may capture some people who live in Australia but who are not eligible for Medicare (e.g., international students, visitors to Australia from countries with reciprocal healthcare agreements). As such, both under coverage and over coverage of different groups within the Australian resident population need to be considered in the analysis and interpretation of data from the NIHSI.
- Analysts must not attempt to link other collections or any other available data set to the NIHSI v 2.0.

Description

The NIHSI v 2.0 is an enduring linked data asset that brings together the following data sets:

Data Collection	States/territories included	Timeframe
National Hospital Morbidity Database (NHMD) – public hospitals	NSW, Vic, Qld, SA, Tas, ACT	2010–11 to 2019–20
NHMD – private hospitals	Qld ACT Vic	2010–11 to 2019–20 2010–11 to 2018–19 2010–11 to 2016–17
National Non-Admitted Patient Emergency Department Care Database (NNAPEDCD)	NSW, Vic, Qld, SA, Tas, ACT	2010–11 to 2019–20
National Non-Admitted Patient (episode-level) Database (NNAP(e)D)	Tas, ACT Vic NSW Qld	2013–14 to 2019–20 2016–17 to 2019–20 2017–18 to 2019–20 2016–17 to 2019–20
National Death Index (NDI),	National (all states/territories)	1 July 2010 to 31 December 2020

Residential Aged Care Services Data from the National Aged Care Data Clearinghouse (NACDC)	National (all states/territories)	2010–11 to 2019–20, episode entry before 30 June 2020 and/or a date of exit after July 2010
Medicare Benefits Schedule (MBS)	National (all states/territories)	1 July 2010 to 30 June 2020
Pharmaceutical Benefits Scheme (PBS) and Repatriation Pharmaceutical Benefits Scheme (RPBS)	National (all states/territories)	1 July 2010 to 30 June 2020

Data on Indigenous status are mainly sourced from the national hospitals data collections. The inclusion of the Voluntary Indigenous Identifier has not yet been agreed. The NIHSI v 2.0 can be accessed through the AIHW Research Only Network (RON) and the Department of Health and Aged Care's Enterprise Data Warehouse (EDW).

Institutional environment: The Australian Institute of Health and Welfare (AIHW) is an independent corporate Commonwealth entity under the [Australian Institute of Health and Welfare Act 1987](#) (AIHW Act), governed by a [management board](#) and accountable to the Australian Parliament through the Health portfolio.

The AIHW is a nationally recognised information management agency. Its purpose is to create authoritative and accessible information and statistics that inform decisions and improve the health and welfare of all Australians.

Compliance with the confidentiality requirements in the AIHW Act, the Privacy Principles in the [Privacy Act 1988](#) (Cth) and AIHW's data governance arrangements ensures that the AIHW is well positioned to release information for public benefit while protecting the identity of individuals and organisations.

For further information see the [AIHW website](#), which includes details about the AIHW's [governance](#) and [role and strategic goals](#).

The NIHSI was approved by the Australian Health Ministers Advisory Council and is owned by the AIHW, the Commonwealth Department of Health and Aged Care, and state and territory health authorities. It is managed under the custodianship of the AIHW, in consultation with representatives from state/territory health departments, and the Commonwealth Department of Health and Aged Care.

Timeliness: The NIHSI v 2.0 data set was released in December 2022 and made available to approved analysts. The NIHSI v 2.0 holds data from 1 July 2010 to 30 June 2020. Therefore, the timing of the data asset release was more than two years after the end of the reference period.

Accessibility:

NIHSI v 2.0 is available for access by Commonwealth and state/territory health departments, health portfolio agencies and the AIHW. The NIHSI v 2.0 can be accessed by named analysts on approved projects from these organisations.

Projects proposed from the above organisations are assessed to be consistent with the AIHW Ethics Committee approval and the governance protocols by the AIHW's Ethics Committee Delegate, and the AIHW Data Custodian to access NIHSI.

Project proposals are then sent to the NIHSI Advisory Committee for approval. Project proposals will name the analysts undertaking the project. Only named analysts for approved projects can access the NIHSI.

Projects using the NIHSI v 2.0 have access to all data from participating jurisdictions, except for projects that propose to use Queensland hospitals data and can only access that data upon receipt of explicit approval from the Queensland data custodian(s).

The NIHSI can be accessed through secure access environments, namely the AIHW Research Only Network (RON) and in the Department of Health and Aged Care's Enterprise Data Warehouse (EDW). Access to these host environments is managed by the AIHW Data Custodian and in accordance with the governance protocols for NIHSI.

Several published reports are available that have drawn upon data held in the NIHSI. All approved aggregate data released from the secure access environments satisfy output requirements and approval processes. All reports, publications and products are published and accessible from the AIHW website (www.aihw.gov.au/reports-data/nihsi/current-approved-projects).

Interpretability:

Information on the linked data sources for NIHSI v 2.0 is available on the [AIHW website](http://www.aihw.gov.au). Metadata information for each source collection are published in the AIHW's online metadata registry – METEOR, and the National Health Data Dictionary.

METEOR and the National health data dictionary can be accessed on the AIHW website:

- [METEOR home](#)
- [National Health Data Dictionary version 16.2, Summary – Australian Institute of Health and Welfare](#)

The National Death Index (NDI) is maintained by AIHW in the National Mortality Database (NMD). The data quality statements underpinning the AIHW NMD can be found in the Australian Bureau of Statistics (ABS publications):

- [Deaths, Australia \(ABS cat. no. 3302.0\)](#), and
- [Causes of death, Australia \(ABS cat. no. 3303\)](#)

Further information can be found on the AIHW website on the [National Mortality Database](#) and [National Death Index](#).

Public hospital admitted patient episode data in the NIHSI are drawn from the National Hospital Morbidity Database (NHMD). The 2019–20 Admitted Patient Care National Minimum Data Set (NMDS) data items can be found under [METEOR ID 699728](#). Please refer to METEOR for other years.

Non-admitted patient emergency department care are patients registered for care in emergency departments. For further information, see [Non-admitted patient emergency care NMDS 2019–20](#) in METEOR.

Information on [Medicare Benefits Schedule \(MBS\) data collection](#) and [Pharmaceutical Benefits Scheme \(PBS\)](#) can be found on the AIHW website.

Information on the National Aged Care Data Clearinghouse is available from [National Aged Care Data Clearinghouse - Australian Institute of Health and Welfare \(aihw.gov.au\)](http://www.aihw.gov.au)

Relevance:

The NIHSI is a linked person-level national information asset about the services provided by Australia's hospitals, medical and other services through the MBS, PBS, including RPBS, and residential aged care, linked to the National Death Index. The NIHSI v 2.0 holds data between 1 July 2010 and 30 June 2020, and can be used to produce outputs to inform medical research and health policy development, and the planning, monitoring and evaluation of health and aged care service delivery.

NIHSI v 2.0 does not include Western Australia and Northern Territory hospitals data. The AIHW is continuing to negotiate with Western Australia and the Northern Territory to enable their hospitals data to be included in the NIHSI in the future.

Coverage of admitted patient private hospitals and non-admitted patient care data within NIHSI v 2.0 is limited, subject on the availability of identifiers provided by states and territories to the AIHW for its data linkage activities to create the NIHSI. Only Victoria, Queensland and the Australian Capital Territory have private hospitals data included in NIHSI v 2.0. In addition, only Tasmania, Australian Capital Territory, Victoria, Queensland, and New South Wales have non-admitted patient care data in NIHSI v 2.0 (see table in the Quality Statement Summary for details of which years are included). As such, the scope of admitted patient private hospitals and non-admitted patient care records is underrepresented and varies across participating states and territories.

Data on Indigenous status are sourced from the national hospitals data collections to create a derived Indigenous flag that represents an ever-identified Indigenous status. Only records for persons with a linked hospital record will have a derived Indigenous flag reported.

Data on a person's usual residence varies across data collections included in the NIHSI, with the minimum geography available at the postcode level and either Statistical Area Level 2 (based on the ABS Australian Statistical Geography Standard (ASGS) Edition 2) or Statistical Local Area (based on the ABS Australian Standard Geography Classification) for earlier years of data. Geographical information about the hospital is reported based on state of service and not the state of the patient's usual residence. Therefore, it may be difficult to identify accurate cross-border service provision when analysing patient pathways with the levels of geography information available in NIHSI.

Accuracy:

Data included in the NIHSI v 2.0 are sourced from administrative data collections designed for various purposes. As such, the AIHW has limited capacity to validate data quality. The data collection and cleaning processes varies across these collections, and the quality of the NIHSI v 2.0 will be subject to the quality of the data held in these source collections.

To assist in interpreting hospitals data, more detailed information about the data sources, data quality, analysis methods, and the definitions and classifications used are available from [About the data - Australian Institute of Health and Welfare](#).

A data quality statement for the NDI is available from [National Death Index \(NDI\), Data Quality Statement](#).

Data quality information for the [AIHW National Aged Care Data Clearinghouse](#) and [Aged Care Funding Instrument](#) can be found in METEOR.

Data on [MBS](#) and [PBS/RPBS](#) that may be useful to users can be found in METEOR.

Linkage quality

The quality of linkage depends on the coverage of identifiers available for each collection, and consistency with information held in the integrating spine (i.e., Medicare Consumer Directory (MCD) and National Death Index (NDI) were first linked to create the NIHSI linkage spine). This means that NIHSI v 2.0 is based on data that is linked to MCD and NDI based information. People who are not eligible for Medicare are not included in the spine. Some admitted patients may not be enrolled in or are not eligible for Medicare but will still be included in the National Hospital Morbidity Database (NHMD) such as international students or some overseas visitors who were admitted to public hospitals. For example, overseas visitors from New Zealand, Ireland, the United Kingdom, the Netherlands, Sweden, Finland, Norway, Italy, Malta, Belgium and Slovenia may receive public hospital

care because Australia has Reciprocal Health Care Agreements with these countries. Over coverage in these cases may occur due to a lack of information or when the individuals leave Australia and are no longer considered as usual residents. This may mean that individuals may continue to be counted in the analysis after these individuals are no longer residents in Australia unless methods are applied to adjust for this over coverage. As such, under coverage or over coverage of different groups within the Australian resident population need to be considered in the analysis and interpretation of NIHSI data.

As the NIHSI v 2.0 spine is made up of MCD and NDI records, we expect 100% linkage rates for MBS, PBS, and NDI records in NIHSI v 2.0. The table below shows percentage of linked and unlinked records in NIHSI v 2.0

Person Project Numbers (PPNs) that are linked to the Spine	Unlinked	Linked
MBS data	0.00%	100.00%
PBS data	0.00%	100.00%
National Death Index (NDI) data	0.00%	100.00%
Residential Aged Care (RAC) data	0.28%	99.72%
Admitted Patient Care (APC) data	4.95%	95.05%
Emergency Patient Care (EPC) data	6.16%	93.84%
Non-Admitted Patient Care (NAP) data	10.27%	89.73%

Hospitals data linkage results by state

NIHSI v 2.0 hospitals data were created by combining the NIHSI 1.0 data with the latest available 2019–20 hospitals data supplied to AIHW. The data were linked using a probabilistic linkage method. This is a method of linking using non-unique identifiers (e.g., name, date of birth, address) to establish weights which represent the likelihood that two records belong to the same person. These weights are used to inform matches and non-matches and include clerical review for a selected 'grey area' in between based on cut-off weights. These cut-off weights are selected based on the results of sample-based clerical reviews. For this project, high cut-off weights were chosen to ensure that estimated Positive Predictive Value (PPV) chosen as the linkage accuracy indicator is 98% or above. The PPV is calculated as percentage of the number of true positive links to the sum of true positive and false positive links.

Percentage Linked

The total number of records in the data set (cohort) were linked to the spine. This means for example, if we linked 85 records out of 100 records provided, the percentage of linkage rate is 85 per cent. The linkage results below reflect more about the linkage process that was undertaken using the latest available 2019–20 hospital data (referred to as a change file in the table). The table below provides the NIHSI v 2.0 linkage rates of the full data extract in the NIHSI data asset by combining NIHSI v 1.0 data with NIHSI 2019–20 change file data (see columns below).

		NIHSI v 1.0 linkage rates		
Data Set	Pre-linked(a)	Number of Records	Number of linked Records	% linked of all Records(c)
New South Wales hospitals	No	19,582,714	18,694,925	95.47%
Victorian hospitals	Yes(b)	5,730,207	4,971,205	86.75%
Queensland hospitals	Yes	5,239,718	5,048,964	96.36%

South Australian hospitals	Yes	1,325,445	1,268,243	95.68%
ACT hospitals	Yes	547,352	522,860	95.53%
Tasmanian hospitals	Yes	502,538	488,758	97.26%

		Change file only linkage rates 2019–20 data supply		
Data Set	Pre-linked(a)	Number of Records	Number of linked Records	% linked of all Records(c)
New South Wales hospitals	No	5,111,320	4,956,787	96.98%
Victorian hospitals	Yes(b)	2,025,980	1,989,313	98.19%
Queensland hospitals	Yes	1,821,793	1,635,274	89.76%
South Australian hospitals	Yes	385,796	378,483	98.10%
ACT hospitals	Yes	225,763	213,278	94.47%
Tasmanian hospitals	Yes	172,023	162,127	94.25%

		NIHSI V 2.0 linkage rates V1.0 +change file		
Data Set	Pre-linked(a)	Number of Records	Number of linked records	% linked of all Records(c)
New South Wales hospitals	No	24,694,034	2,3651,712	95.78%
Victorian hospitals	Yes(b)	7,756,187	6,960,518	89.74%
Queensland hospitals	Yes	7,061,511	6,684,238	94.66%
South Australian hospitals	Yes	1,711,241	1,646,726	96.23%
ACT hospitals	Yes	773,115	736,138	95.22%
Tasmanian hospitals	Yes	674,561	650,885	96.49%

a. Pre-linked data are the identifiers provided by the jurisdictional linkage nodes at person level. The linkage nodes pre-link the episodes, so the individuals with multiple admissions or ED presentations appear only once in the identifiers

provided to AIHW. These individuals are represented as multiple records in non-pre-linked extracts, and there is no indication that these records belong to the same individuals. AIHW Data Integration Services Centre (DISC) determines this as part of the probabilistic linkage process. Therefore, the number of records in NSW reflects the number of episodes, but number of records in Qld extract reflects the number of individuals.

b. Only Admitted Patients and ED presentations from Victoria were pre-linked. Non-admitted 2016–19 patients' identifiers were supplied separately and were not pre-linked. A significant proportion of these records (661,543) did not have names, only 44.4% of records in this group were linked.

c. Percentage of all individuals or of all individuals with the identifiers in that data set that were linked to the National Map.

The AIHW conducted a program of testing and validation to ensure the integrity and quality of NIHSI v. 2.0. These checks included:

- completeness of records by identifying missing values or duplicates.
- alignment of broad aggregates between the linked data set and the source data sets.
- comparability of outputs against published sources of information.

Coherence:

Data held in the NIHSI v 2.0 are based on data held in the relevant AIHW national data collections. Differences in scope and methodologies used to create the NIHSI v 2.0 should be considered when comparing outputs with other sources.

Demographic data, such as usual residence and/or Indigenous status, held in the NIHSI v 2.0 may vary across source data collections. Work is underway to understand the differences in the reporting of demographics within the Asset to be able to advise analysts.

Source and reference attributes

Submitting organisation: Australian Institute of Health and Welfare

Origin: Australian Institute of Health and Welfare

Relational attributes

Related metadata references: Supersedes [National Integrated Health Service Information Analysis Asset \(NIHSI AA\) version 1.0](#)

[AIHW Data Quality Statements](#), Superseded 21/03/2024

See also [COVID-19 Register: Quality Statement](#)

[AIHW Data Quality Statements](#), Standard 07/03/2024