

2 Hospital inpatients

2.1 Summary

This methodology estimates acute hospital inpatient costs by disease category, age and sex by apportioning the total inpatient expenditure to individual episodes of hospitalisation, with an adjustment for resource intensity of treatment for the specific episode (using diagnosis related groups (DRGs)). Medical costs for private, compensable and other non-public patients in public and private hospitals are estimated for age-sex-disease groups using a set of private medical weights for DRGs and age-sex-specific information from the Health Insurance Commission on in-hospital private medical charges for various categories of service.

Public psychiatric hospital data for New South Wales and Victoria are used to allocate public psychiatric hospital inpatient costs to disease, age and sex.

Box 2.1: Key assumptions and limitations

- *The proportion of total public acute hospital expenditure that relates to inpatients is given by the inpatient fractions estimated for each State and Territory by the National Health Ministers' Benchmarking Working Group.*
- *The cost of inlier days for a hospital episode is proportional to the DRG weight for that episode, using AN-DRG-1 or AN-DRG-2 national cost weights for public hospitals, repatriation hospitals and private hospitals.*
- *The average medical cost component included in AN-DRG cost weights relates entirely to public patients.*
- *Half of the average pathology and imaging costs per DRG relate entirely to public patients, the other half relate to all patients.*
- *Outlier days of hospital inpatient stays are low cost 'nursing care' days.*
- *The average cost per outlier bed day is \$110, based on the figure used in the Victorian casemix funding formula.*
- *In-hospital private medical expenditures are assumed to vary with DRG in accordance with the DRG cost weight components shown in Table 2.5 for the various categories of medical service.*
- *Medical charges for compensable and ineligible hospital inpatients are assumed to be the same as those for a private patient in the same DRG and type of hospital.*
- *The components of the DRG hospital cost weight that are assumed to be independent of length of stay are theatre, critical care, pathology, imaging and those components of medical cost relating to obstetrics, surgery, anaesthetics and assisting at operations. The components assumed proportional to length of stay are nursing, drugs, catering, depreciation (private hospitals), other medical costs and other costs.*
- *Inpatient casemix for public psychiatric hospitals in New South Wales and Victoria is representative of the national casemix.*
- *All inpatient bed days in public psychiatric hospitals have the same average cost.*

Box 2.2: Data sources

- *AIHW Health Expenditure Database.*
- *Tabulations of total in-hospital eligible medical charges by service category and State/Territory (Commonwealth Department of Human Services and Health).*
- *AIHW National Hospital Morbidity Database 1993–94.*
- *AN-DRG-1 and AN-DRG-2 cost weights (KPMG Peat Marwick 1993, 1994).*
- *National Health Ministers' Benchmarking Working Group 1996.*
- *Victorian Hospital Comparative Data 1994–95 (Rainbow Hospital Indicators 1996).*

2.2 Overview of hospital inpatient methodology

Hospital costs are the biggest single contributor to recurrent health expenditure, accounting for approximately 38% of the total in 1993–94. Public acute hospitals account for 28%, private hospitals for 7%, repatriation hospitals for 1% and public psychiatric hospitals for around 1.5% of total recurrent expenditure.

Public hospitals treat inpatients (admitted patients) and non-inpatients (outpatients and casualty or accident and emergency patients). The proportions of total public acute hospital expenditure which relate to inpatients are given by the inpatient fractions estimated for each State and Territory by the National Health Ministers' Benchmarking Working Group (1996). Total public acute hospital expenditure is split into inpatient and non-inpatient components on a State-by-State basis and non-inpatient expenditures attributed to diseases using the methodology outlined in Chapter 3 (Figure 2.1). Recurrent expenditure for public psychiatric hospitals included in the AIHW Health Expenditure Database relates entirely to inpatients. Outpatient expenditures by public psychiatric hospitals are included with other non-inpatient psychiatric services in the 'Community and public health' sector.

The basic approach to estimating acute hospital inpatient costs by disease category, age and sex is to apportion the total inpatient expenditure to individual episodes of hospitalisation, with an adjustment for resource intensity of treatment for the specific episode (using DRGs). The AIHW National Hospital Morbidity Database contains information on all inpatient episodes for public hospitals, repatriation hospitals and private acute hospitals in Australia in 1993–94. DRGs are coded using Version 1 or Version 2 of the Australian National DRG (AN-DRG) coding system (Table 2.1).

Total estimated hospital inpatient expenditure for each State and Territory is separately mapped to age–sex–disease groups using the methodology outlined below. Inpatient expenditure for all repatriation hospitals is similarly mapped to age–sex–disease groups as if 'repatriation' were an additional State/Territory. All estimated costs are then added across States and Territories (and repatriation hospitals) to produce national estimates.

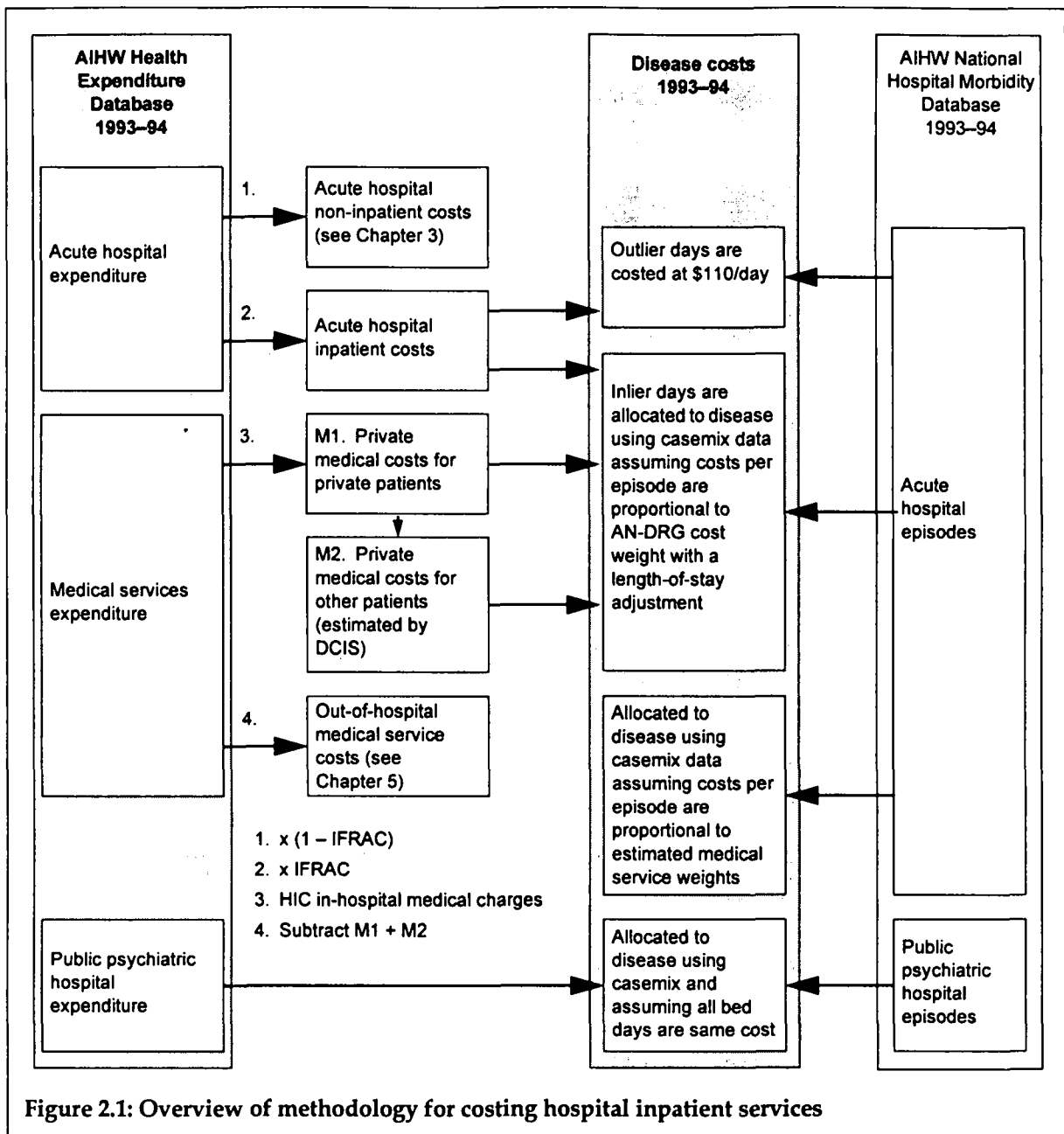


Figure 2.1: Overview of methodology for costing hospital inpatient services

Patient episodes with atypically long lengths of stay are usually excluded from analysis of casemix lengths of stay and costs using DRGs. To model the costs of patients with abnormally long lengths of stay, it is assumed that all excess or 'outlier' days are nursing home type days and costed at a separate rate, representing the lower cost of nursing home type care in hospitals. The cost of inlier days for a hospital episode is assumed to be proportional to the DRG weight for that episode, with an additional adjustment for length of stay to reflect the fact that some components of the cost of the episode (for example, ward nursing care, meals) are proportional to length of stay whereas others are more or less independent of length of stay (for example, theatre costs for a surgical DRG).

Medical costs for private, compensable and other non-public patients in public and private hospitals are included in the AIHW Health Expenditure Database as part of the 'Medical services' sector rather than the 'Hospital' sector. Medical costs of treating eligible private patients in public and private hospitals are paid by Medicare (75%), the patients, and health

insurance funds. Medical services for compensable and ineligible patients are also privately charged to the patient or compensation agency. The Health Insurance Commission is able to provide data on total medical charges for private patients in hospital where a Medicare benefit was paid. This total does not include in-hospital medical expenditure for compensable and ineligible patients.

A set of private medical weights for DRGs has been constructed by assuming that various types of in-hospital private medical expenditures (surgical, obstetric, etc.) vary with DRG in accordance with certain DRG cost weight components (Table 2.5). Medical charges for compensable and ineligible hospital inpatients are assumed to be the same as those for a private patient in the same DRG and type of hospital. This enables the estimation of the total in-hospital medical expenditure for such patients, which is allocated to disease as part of the hospital inpatient costing, and subtracted from the total medical expenditure before attribution of total out-of-hospital medical costs (see Figure 2.1 and Chapter 5).

The AIHW National Hospital Morbidity Database for 1993–94 includes public psychiatric hospital data for New South Wales and Victoria only. These data are used to allocate public psychiatric hospital inpatient costs to disease, age and sex, assuming that all bed days in psychiatric hospitals are of the same cost.

2.3 Acute hospital inpatient methodology in detail

2.3.1 Calculation of hospital sector inpatient cost weights

The AIHW National Hospital Morbidity Database holds complete unit record data for separations from public acute hospitals and private hospitals for all States and Territories in 1993–94 (apart from Northern Territory private hospitals and around 19% of Victorian private hospital episodes). All episodes are classified to DRGs using either Version 1 or 2 of the AN-DRGs (Table 2.1).

Table 2.1: AN-DRG versions used for 1993–94 hospital morbidity data

| State/Territory | NSW | Vic | Qld | WA | SA | Tas | ACT | NT |
|-----------------|-----|-----|-----|----|----|-----|-----|----|
| AN-DRG | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 2 |

For AN-DRG Version 1, national cost weights are available for public acute hospitals and for private hospitals (KPMG Peat Marwick 1993). For AN-DRG Version 2 (KPMG Peat Marwick 1994), cost weights are also available for public acute hospitals by type (teaching, non-teaching, metropolitan, non-metropolitan) and by State (New South Wales, Victoria, Queensland, Western Australia, South Australia only). These cost weights include component cost weights (Table 2.2).

Table 2.2: AN-DRG cost weight components

| Component | Hospital sector | Description |
|--------------|--|---|
| Nursing | Public and private | Average ward nursing costs (excluding nursing costs reported under pathology, imaging, theatre, critical care, allied health) |
| Medical | Public only | Average medical costs (excluding medical costs reported under pathology and imaging) |
| Pathology | Public only | Average pathology costs (including medical costs) |
| Imaging | Public only | Average imaging costs (including medical costs) |
| Theatre | Public and private | Average theatre costs (excluding medical costs) |
| Drugs | Public and private | Average pharmacy costs |
| Criticare | Public and private | Average critical care costs (including intensive care, neonatal intensive care and coronary care units and excluding medical costs) |
| Allied | Public and private (AN-DRG-1) Public only (AN-DRG-2) | Average allied health costs |
| Medsurg | Public and private | Average medical and surgical supply costs |
| Catering | Private only (AN-DRG-1) Public and private (AN-DRG-2) | Average patient catering costs |
| Depreciation | Private only | Average depreciation cost |
| Overhead | Public and private | Average allocated overhead costs |
| Other | Public and private | Average of all other costs (including costs in final cost centres not elsewhere classified) |

The medical cost component for public hospital DRG cost weights includes the costs of salaried and visiting medical officers who treat public patients only. Medical services for private patients are paid through a combination of Medicare benefits and health insurance. Medical services for compensable and ineligible patients are also privately charged to the patient or compensation agency.

In calculating the medical cost component of the DRG cost weights, the DRG costing study allocated public hospital medical costs to all episodes irrespective of whether the patient was a public or private patient, although these medical costs actually applied only to public patients. To obtain a more accurate estimate of the DRG cost weights for public patients, the medical cost component was inflated using the average proportion of public hospital episodes in 1993-94 where the patient was a public patient:

$$Medical' = \frac{Medical}{\bar{p}}$$

where: \bar{p} = Proportion of public hospital episodes where patient was a public patient

This factor \bar{p} was calculated as an average for New South Wales, Victoria, Tasmania and Australian Capital Territory combined for AN-DRG Version 1 weights, and for Queensland, South Australia, Western Australia and Northern Territory combined for AN-DRG Version 2 weights.

Similar considerations apply to pathology and imaging cost components. These services are privately billed for all patients in private hospitals, and also to a large extent for private and other non-public patients in public hospitals. As it is not known what proportion of pathology and imaging costs in public hospitals relate to private patients, it has been assumed that one-

half of the total costs of imaging and pathology services per DRG apply to both public and private patients, and that the other half apply only to public patients, although they have been averaged across all patients.

The adjusted cost components for imaging and pathology services for public patients are then:

$$Pathology' = \frac{Pathology}{\frac{1}{2} + \frac{1-p}{2}}$$

$$Imaging' = \frac{Imaging}{\frac{1}{2} + \frac{1-p}{2}}$$

In the following equations, t denotes hospital sector (1 = public, 2 = private) and p denotes patient type (1 = public, 2 = private, 3 = other). The adjusted total cost weight for public patients ($p = 1$) in public hospitals ($t = 1$) for DRG i is thus:

$$W_{ipt} = Nursing + Medical' + Pathology' + Imaging' + Theatre + Drugs + Critcare + Allied + Medsurg + Catering + Overhead + Other$$

The adjusted total cost weight for private, compensable and ineligible patients ($p > 1$) for DRG i is:

$$W_{ipt} = Nursing + \frac{1}{2} \times Pathology' + \frac{1}{2} \times Imaging' + Theatre + Drugs + Critcare + Allied + Medsurg + Catering + Depreciation + Overhead + Other$$

for public hospitals ($t = 1$)

and

$$W_{ipt} = Nursing + Theatre + Drugs + Critcare + Allied + Medsurg + Catering + Depreciation + Overhead + Other$$

for private hospitals ($t = 2$)

(2.1)

Assumptions

- The average medical cost component included in AN-DRG cost weights relates entirely to public patients.
- Half of the average pathology and imaging costs per DRG relate entirely to public patients, the other half relate to all patients.

Data sources

- AN-DRG-1 cost weights (KPMG Peat Marwick 1993).
- AN-DRG-2 cost weights (KPMG Peat Marwick 1994).
- AIHW National Hospital Morbidity Database 1993-94 (for factor \bar{p}).

2.3.2 Costing outlier days for inpatient episodes

Outliers are patient episodes with atypically long lengths of stay. Such outliers are usually excluded from analysis of casemix lengths of stay and costs using DRGs. To model the costs of patients with abnormally long lengths of stay, it is assumed that all excess days of patients in DRG i are nursing home type days and costed at a separate rate, representing the lower cost of nursing home type care in hospitals. The excess days are defined in terms of DRG-specific high trim points as defined in the Australian Casemix Reports (Commonwealth Department of Human Services and Health 1994).

The trim point for DRG i is defined as:

$$T_i = 1.5(Q_{3i} - Q_{1i}) + Q_{3i} = 2.5Q_{3i} - 1.5Q_{1i} \quad (2.2)$$

where: Q_{1i} = Lower quartile of length of stay for DRG i
 Q_{3i} = Upper quartile of length of stay for DRG i

These quartiles are calculated for all relevant States and Territories combined for AN-DRG Versions 1 and 2 separately.

For episode e in DRG i , the number of outlier days is calculated as:

$$outlos_e = \begin{cases} los_e - int(T_i) & \text{if } los_e > T_i \\ 0 & \text{otherwise} \end{cases} \quad (2.3)$$

where: los_e = Length of stay (days) for episode e ($los_e = 1$ for same-day patients)

and the cost of these outlier days is:

$$C_e = AVNHT \times outlos_e \quad (2.4)$$

where: $AVNHT$ = Average cost per day of nursing home type patients

Outlier days are costed at the average cost for nursing home type patient bed days. Based on the Victorian casemix funding formula, the days are costed at \$110 per bed day (Rainbow Hospital Indicators 1996). The 1989-90 methodology used the national average cost per bed day for small type 3 non-metropolitan hospitals as estimated by the AIHW Hospital Utilisation and Costs Study. This figure for 1993-94 is \$287 per bed day, somewhat more than double the figure used in the Victorian casemix funding formula.

Assumptions

- Outlier days of hospital inpatient stays are low cost 'nursing care' days.
- The average cost per outlier bed day is \$110, based on the figure used in the Victorian casemix funding formula.

Data sources

- AIHW National Hospital Morbidity Database 1993–94. (Number of outlier days and DRG trim points.)
- Victorian Hospital Comparative Data 1994–95 (Rainbow Hospital Indicators 1996).

2.3.3 Costing total inlier days for inpatient episodes

Total recurrent expenditure for acute public hospitals and private hospitals by State and Territory is obtained from the AIHW Health Expenditure Database.

HOS_{gt} = Total recurrent expenditure for hospital sector t in State g in 1993–94

where: g = 1...6 denotes State or Territory. The Australian Capital Territory and Northern Territory are grouped with New South Wales ($g = 1$) and South Australia ($g = 5$) respectively because of the small number of separations and the very small number of private hospitals in the two Territories.

t = Hospital sector (1 = public hospitals, 2 = private hospitals)

Public hospitals treat inpatients (admitted patients) and non-inpatients (who present at casualty or accident and emergency departments or attend outpatient clinics). The proportion of total recurrent expenditure that relates to inpatients has been estimated for 1993–94 by the National Health Ministers' Benchmarking Working Group (1996). These proportions are available at the State and Territory level (Table 2.3) and are used to estimate the total expenditure on hospital inpatients:

$$INHOS_{gt} = IFRAC_{gt} \times HOS_{gt} \quad (2.5)$$

where: $IFRAC_{gt}$ = Inpatient fraction for State g and sector t

Table 2.3: Inpatient fractions (IFRAC) for 1993–94

| Sector | NSW | Vic | Qld | WA | SA | Tas | ACT | NT |
|-------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Public hospitals | 0.717 | 0.793 | 0.770 | 0.748 | 0.798 | 0.774 | 0.774 | 0.769 |
| Private hospitals | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | — |

Source: National Health Ministers' Benchmarking Working Group 1996.

The total cost for all inlier days in State g and sector t is then:

$$IC_{gt} = INHOS_{gt} - \sum_{e \in gt} OC_{eg} \quad (2.6)$$

where the second term is the total outlier cost for all outlier bed days (Equation 2.4).

This total inlier cost is attributed to individual episodes e in proportion to the DRG cost weight for that episode:

$$IC_{egt} = IC_{gt} \times \frac{W_{ipt}}{\sum_{e \in gt} W_{ipt}} \quad (2.7)$$

where episode e has DRG i , patient type p and is in sector t , State g . Because of the small number of separations and the very small number of private hospitals in the two Territories, inlier costs are calculated for New South Wales and Australian Capital Territory combined and South Australia and Northern Territory combined.

Assumptions

- The proportion of total public acute hospital expenditure that relates to inpatients is given by the inpatient fractions estimated for each State and Territory by the National Health Ministers' Benchmarking Working Group (1996).
- The cost of inlier days for a hospital episode is proportional to the DRG weight for that episode, using AN-DRG-1 or AN-DRG-2 national cost weights for public hospitals and private hospitals.

Data sources

- National Health Ministers' Benchmarking Working Group (1996). (Inpatient fractions.)
- AIHW Health Expenditure Database.

2.3.4 In-hospital private medical costs

Total in-hospital medical costs for private patients

Medical costs of treating eligible private patients in public and private hospitals are paid by Medicare (75%), the patients, and health insurance funds. The Health Insurance Commission has provided data on total medical charges for private patients in hospital for which a Medicare benefit was paid. This expenditure is broken down into a number of medical service categories (Table 2.4). Unfortunately, Health Insurance Commission data do not enable these charges to be broken down by hospital sector (public hospital, private hospital).

Table 2.4: Components of in-hospital medical expenditure for private patients

| Component c | Medical service category |
|---------------|--|
| 1 | Obstetrics |
| 2 | Operations |
| 3 | Anaesthetics and Assisting in Operations |
| 4 | Pathology |
| 5 | Imaging |
| 6 | Other (GP, Specialist, Other) |

In order to attribute these private medical expenditures to private patient episodes in hospitals, it is assumed that the medical cost relativities for DRGs for private patients are given by relevant DRG cost weight components that relate to medical services. It is therefore assumed that relative medical costs, but not total costs, are the same across DRG categories in the public and private sectors. The DRG cost components for public patients derived in Section 2.3.1 include the following components for medical costs:

| | |
|---------------------------------------|---|
| <i>Medical'</i> _{<i>i</i>} | Adjusted medical costs for DRG <i>i</i> |
| <i>Pathology'</i> _{<i>i</i>} | Adjusted pathology costs for DRG <i>i</i> |
| <i>Imaging'</i> _{<i>i</i>} | Adjusted imaging costs for DRG <i>i</i> |

These DRG weight components are used to derive relative weights for the components of medical costs for private patients (Table 2.5).

Table 2.5: Relative weights for component private medical costs

| Medical service category <i>c</i> | DRG cost component used to estimate relative weight (<i>RW</i> _{<i>ic</i>}) | Comment |
|--|--|--|
| 1 Obstetrics | Medical' | For obstetric DRGs only (670–686) |
| 2 Operations | Medical' | For surgical DRGs only (excluding obstetric DRGs)* |
| 3 Anaesthetics & Assisting in operations | Theatre | All DRGs |
| 4 Pathology | 0.5* Pathology' Pathology' | Public hospitals Private hospitals |
| 5 Imaging | 0.5* Imaging' Imaging' | Public hospitals Private hospitals |
| 6 Other | Medical' | All DRGs excluding obstetric DRGs |

* Medical charges for operations are assumed to vary with the medical weight for surgical DRGs since the Medicare benefit for most surgical procedures includes all medical aftercare.

The private medical cost weights are scaled to add to the total in-hospital medical component expenditure for each State (Australian Capital Territory and Northern Territory included with New South Wales and South Australia respectively). Thus the private medical cost weight component *c* for DRG *i* in hospital sector *t* for State *g* is given by:

$$MCW_{igct} = \frac{IHEME_{gc} \times RW_{ict}}{2 \sum_{t=1} \sum_{e \in gct} RW_{ict}} \quad (2.8)$$

where: $IHEME_{gc}$ = Total in-hospital eligible medical expenditure for State *g* and service category *c* (Health Insurance Commission data)

RW_{ict} = Relative medical weight for service category *c* for DRG *i* in hospital sector *t*

The total in-hospital private medical expenditure for an episode e with DRG i is thus:

$$PME_{igt} = \sum_{c=1}^6 MCW_{igct} \quad (2.9)$$

Adding the component medical costs across all private patient episodes in State g gives the total in-hospital private patient medical expenditure for each service category:

$$\begin{aligned} \sum_{t=1}^2 \sum_{e \in gct} MCW_{egct} &= \frac{IHEME_{gc} \times \sum_{t=1}^2 \sum_{e \in gct} RW_e}{\sum_{t=1}^2 \sum_{e \in gct} RW_e} \\ &= IHEME_{gc} \end{aligned} \quad (2.10)$$

Assumptions

- In-hospital eligible medical expenditures for various medical service categories are assumed to be distributed among private patient episodes in accordance with the DRG cost weight components shown in Table 2.5.

Data sources

- Refer to Section 2.3.1 for derivation of DRG cost weight components.
- Commonwealth Department of Human Services and Health. Tabulations of total in-hospital eligible medical charges by service category and State/Territory.
- AIHW National Hospital Morbidity Database.

Estimation of medical costs for other patients

Like private patients, compensable and ineligible hospital inpatients are charged privately for medical (and some pathology and imaging) services. These charges are included in the medical expenditure category in the AIHW Health Expenditure Database, but information on the proportion that relates to in-hospital patients is not available.

Medical costs for these 'other' patient episodes are assumed to be the same as those for private patients estimated according to DRG as described in the previous section. For 'other patient' episode e with DRG i in State g and hospital sector t , the medical cost is:

$$OME_{igt} = PME_{igt} \quad (2.11)$$

where: PME_{igt} is given by Equation 2.9

The total estimated medical costs for all 'other' patient episodes is:

$$HOME = \sum_{g=1}^6 \sum_{t=1}^2 \sum_{e \in other} OME_{igt} \quad (2.12)$$

The total in-hospital eligible and ineligible medical charges are given by adding this estimate to the total eligible in-hospital medical expenditure (see Equation 2.8):

$$IHME = \sum_{g=1}^6 \sum_{c=1}^6 IHME_{gc} + IHOME \quad (2.13)$$

This total is subtracted from total medical expenditure to estimate total expenditure on out-of-hospital medical services (see Section 5.3.4).

Assumptions

- Medical charges for compensable and ineligible hospital inpatients are assumed to be the same as those for a private patient in the same DRG and type of hospital.

Data sources

- AIHW National Hospital Morbidity Database.

2.3.5 Total hospital inpatient treatment costs for disease d

The DRG cost weights reflect the average cost of all episodes included in the DRG. Some components of the cost of an individual episode will vary with the length of stay (for example, ward nursing costs), whereas others will be essentially independent of the length of stay (for example, theatre costs). Since a number of disease groups d with different average lengths of stay may fall into the same DRG, it is important to adjust the individual episode costs to reflect the dependence of cost on length of stay.

For an individual episode, the total hospital cost for inlier days is adjusted to reflect the proportion of the overall cost that is dependent on length of stay, as follows:

$$HIC_{egt} = IC_{egt} \times \left(1 - x_i + x_i \frac{inlos_e}{alos_{ig}} \right) \quad (2.14)$$

- where:
- IC_{egt} = Unadjusted cost of inlier days for episode e in State g and sector t (from Equation 2.7)
 - x_i = Proportion of the cost weight that varies with the length of stay for DRG i (in which episode e falls)
 - $inlos_e$ = Inlier length of stay
= $los_e - outlos_e$

$alos_{ig}$ = Average inlier length of stay for all episodes in DRG i in State g

The factor x_i is calculated assuming that the various cost components of the total DRG weight vary with length of stay (Table 2.6) for private patients. Thus:

$$x_i = \frac{\text{Other (Medical)} + \text{Nursing} + \text{Drugs} + \text{Catering} + \text{Depreciation} + \text{Other}}{\text{Total} - \text{Allied} - \text{Medsurg} - \text{Overhead}} \quad (2.15)$$

Table 2.6: Assumed variation of DRG cost components with length of stay for private patients

| Assumption | Component |
|---|--|
| Independent of length of stay | Theatre Critical care Obstetrics Operation Anaesthetics and Assisting in operation Pathology Imaging |
| Proportional to length of stay | Nursing Drugs Catering Depreciation Other Other (medical) |
| Proportion x_i varies with length of stay | Allied Medical and surgical supplies Overhead |

Because the medical costs for public patients include all medical costs except pathology and imaging, it is not possible to calculate the comparable factor x_i for public patients. It is assumed to be the same as the factor x_i for private patients for a given DRG i .

Private medical charges are assumed to be independent of length of stay for all episodes falling in a given DRG. The total hospital and medical inpatient costs for disease d , age group a and sex s are calculated by sector by summing inlier, medical and outlier costs for all episodes whose principal diagnosis falls in disease group d :

$$\begin{aligned}
 INHC_{dsat} &= \sum_{g=1}^6 \sum_{e \in dsagt} [HIC_{egt} + PME_{egt} + AVNHT \times outlos_e] \\
 &= \sum_{g=1}^6 \sum_{e \in dsagt} \left[IC_{gt} \times \frac{W_{ipt}}{\sum_{e \in gt} W_{ipt}} \times \left(1 - x_i + x_i \frac{inlos_e}{alos_{ig}} \right) + PME_{egt} + AVNHT \times outlos_e \right]
 \end{aligned} \quad (2.16)$$

This methodology ensures that the sum of the costs across all disease, age and sex groups within State g and sector t adds to the correct total hospital inpatient expenditure (hospital and medical), apart from estimated 'other' patient medical expenditure. The latter is subtracted from the total medical expenditure prior to its attribution, ensuring that the total hospital and medical expenditure sums to that recorded in the AIHW Health Expenditure Database.

Assumptions

- The components of the DRG hospital cost weight that are assumed to be independent of length of stay are theatre, critical care, pathology, imaging and those components of medical cost relating to obstetrics, surgery, anaesthetics and assisting at operations. The components assumed proportional to length of stay are nursing, drugs, catering, depreciation (private hospitals), other medical costs and other costs.

2.4 Public psychiatric hospital methodology in detail

The AIHW National Hospital Morbidity Database for 1993–94 includes public psychiatric hospital data for New South Wales and Victoria only. These data are used to allocate public psychiatric hospital inpatient costs to disease, age and sex, assuming that all bed days in psychiatric hospitals are of the same cost. At this stage, mental disorders are not disaggregated below chapter level in the Disease Costs and Impact Study (DCIS), and the methodology distributes this among age–sex categories in accordance with the casemix data. The proportion of total public psychiatric hospital inpatient expenditure attributable to chapter ‘Mental disorders’, sex s and age a is given by:

$$\alpha_{sa} = \frac{obd_{sa}}{\sum_s \sum_a obd_{sa}} \quad (2.17)$$

where: obd_{sa} = Total bed days for public psychiatric hospital inpatients (in New South Wales and Victoria) with age a and sex s

Assumptions

- Inpatient casemix for public psychiatric hospitals in New South Wales and Victoria is representative of the national casemix.
- All inpatient bed days in public psychiatric hospitals have the same average cost.

Data sources

- AIHW National Hospital Morbidity Database.

2.5 Data issues

The AIHW Hospital Morbidity Database records are screened to exclude:

- (a) any records with unknown length of stay;
- (b) records with invalid DRG codes for which cost weights are not available;
- (c) trimming of extremely long lengths of stay; and
- (d) inappropriate diagnosis for sex (for example, pregnancy-related condition in a male).

2.6 Differences from 1989–90 methodology

- The 1989–90 methodology used a United States-derived DRG grouper and cost weights based on United States Medicare cost weights, adjusted for Australian average lengths of stay. The current version uses the AN-DRG Versions 1 and 2 and AN-DRG cost weights.
- The 1989–90 methodology assumed that the entire DRG cost weight varied in proportion to the length of stay of the individual episode. The current version assumes that some components of the DRG cost weight are independent of length of stay.
- The 1989–90 methodology assumed that private medical costs per bed day were constant across DRGs. The current methodology derives and uses private medical cost weights for distributing private medical costs.
- The 1989–90 methodology was a bottom-up approach that started with average inpatient costs per episode and average private medical costs per episode estimated from the AIHW Hospital Utilisation and Costs Study. It did not produce disease costs that added to the total inpatient expenditure estimated from the AIHW Health Expenditure Database. The current methodology is a top-down approach which ensures that all disease costs add to the total inpatient expenditure estimated from the AIHW Health Expenditure Database.
- Expenditure for public psychiatric hospitals and repatriation (Department of Veterans' Affairs) hospitals was not included in the 1989–90 methodology.

Figure 2.2 compares the 1989–90 methodology and the revised methodology for acute hospitals in 1993–94. The ICD-9 chapters with the most substantial changes in relative costings are mental disorders, nervous system and sense organs, digestive system disorders and complications of pregnancy.

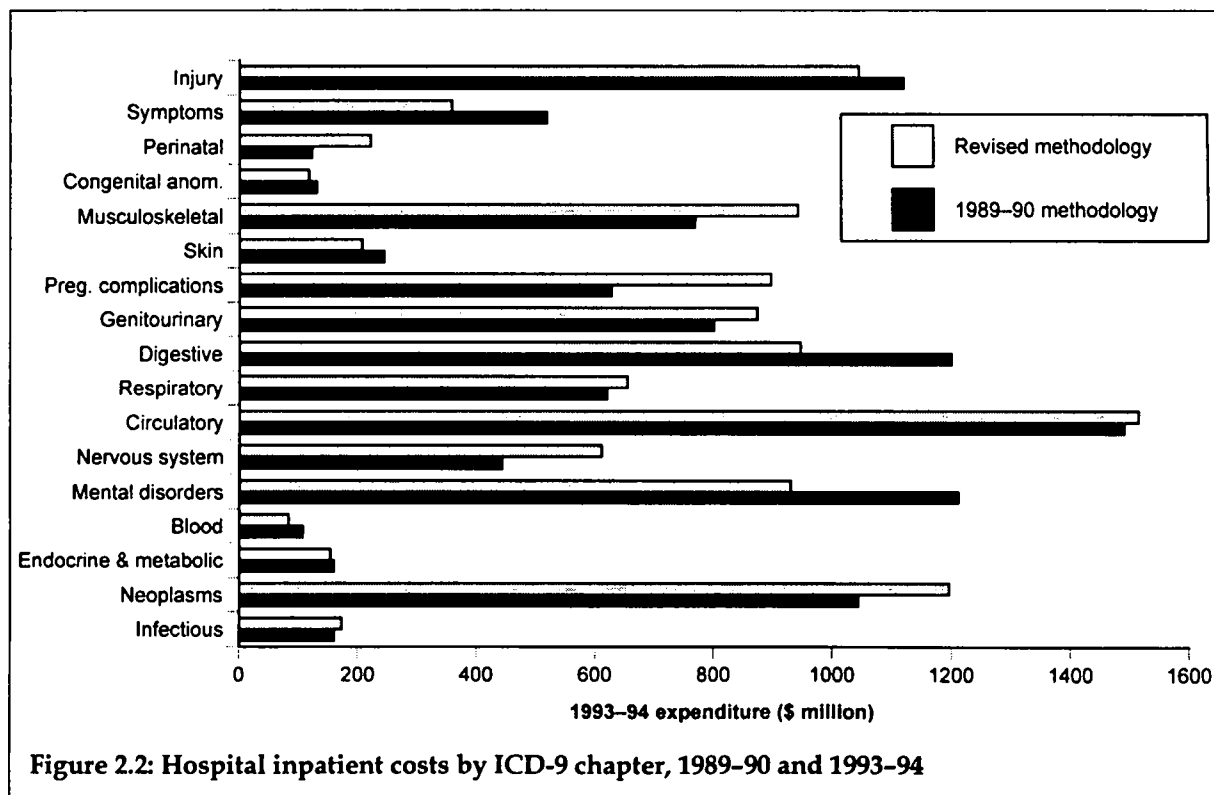


Table 2.7 shows the same data as Figure 2.2 in tabular form. Note that the 1989–90 cost estimates have been inflated to add to the same total as the 1993–94 estimates for the comparison in Figure 2.2 and the comparison as a percentage increase in the final column of Table 2.7.

Table 2.7: Hospital inpatient costs by ICD-9 chapter, 1989–90 and 1993–94

| ICD-9 chapter | 1989–90 actual costs (\$ million) | 1989–90 inflated costs (\$ million) | 1993–94 estimated costs (\$ million) | Per cent increase from 1989–90 to 1993–94 |
|----------------------------|---|---|--|--|
| 1 Infectious | 123 | 161 | 173 | 8 |
| 2 Neoplasms | 798 | 1,044 | 1,196 | 15 |
| 3 Endocrine & metabolic | 122 | 160 | 154 | –4 |
| 4 Blood | 82 | 107 | 83 | –23 |
| 5 Mental disorders | 926 | 1,212 | 930 | –23 |
| 6 Nervous system | 339 | 443 | 611 | 38 |
| 7 Circulatory | 1,140 | 1,492 | 1,514 | 2 |
| 8 Respiratory | 474 | 621 | 655 | 6 |
| 9 Digestive | 918 | 1,201 | 947 | –21 |
| 10 Genitourinary | 612 | 801 | 874 | 9 |
| 11 Pregnancy complications | 480 | 628 | 897 | 43 |
| 12 Skin | 186 | 244 | 207 | –15 |
| 13 Musculoskeletal | 588 | 769 | 942 | 23 |
| 14 Congenital anomalies | 100 | 131 | 117 | –11 |
| 15 Perinatal | 93 | 122 | 221 | 81 |
| 16 Symptoms | 397 | 519 | 358 | –31 |
| 17 Injury | 858 | 1,122 | 1,046 | –7 |
| 18 V codes | 673 | 881 | 731 | 83 |
| Total | 8,910 | 11,654 | 11,654 | |

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