

# **The Australian National Sub-Acute and Non-Acute Patient casemix classification**

**KATHY EAGAR**

Kathy Eagar is Professor and Director of the Centre for Health Service Development, University of Wollongong.

## **Abstract**

*The Australian National Sub-Acute and Non-Acute Patient (AN-SNAP) Version 1 casemix classification was completed in 1997. AN-SNAP is designed for the classification of sub-acute and non-acute care provided in both inpatient and ambulatory settings and is intended to be useful for both funding and clinical management purposes. The National Sub-Acute and Non-Acute Casemix Classification study has produced the first version of a national classification of sub-acute and non-acute care. Ongoing refinement (leading to Version 2) will be possible through further analysis of the existing data set in combination with analysis of the results of a carefully planned and phased implementation.*

## **Introduction and background**

The use of casemix classifications is now routine in Australian hospitals. It began with the development and use of the Australian National Diagnosis Related Groups (AN-DRG) casemix classification system in the mid-1980s. This system is designed to classify acute inpatient hospital episodes. However, sub-acute and non-acute episodes are not adequately classified by diagnosis related groups (DRGs) and it is now accepted that sub-acute and non-acute care requires a different classification approach.

The limitation of the DRG system was recognised from the early 1990s and was reflected in the five-year strategic plan for the National Casemix Development Program (Casemix Implementation Project Board 1993). This strategic plan was endorsed by the

Australian Health Ministers Advisory Council in 1993. It established three priority areas – classification, costing and payments – and identified a series of required strategies, including:

- the determination of classification systems for rehabilitation, geriatric medicine, palliative care and psychiatric episodes
- the development of associated cost weights, and
- the encouragement of clinicians, managers and industrial groups to link casemix accounting, information collection and budgeting to clinical management practices.

In 1995, the Commonwealth convened the first meeting of the National Sub-Acute and Non-Acute Casemix Steering Committee. The steering committee resolved that a study should proceed (the National Sub-Acute and Non-Acute Casemix Classification (SNAP) study) with the goal of establishing an agreed national classification (Version 1) for use by 1997–98. Included in its scope would be rehabilitation, sub-acute geriatric medicine, palliative care and geriatric psychiatry episodes.

Several Australian studies had already been undertaken before the SNAP study was established (Roberts et al. 1992; Baker 1994; Lee et al. 1994; Smith & Firms 1994; Coopers & Lybrand Consultants 1995; Donnelly et al. 1995; Eagar et al. 1997; Hindle 1995; Webster 1995; Lee & Kennedy 1996). These previous studies demonstrated that the DRG system is not suitable for the classification of sub-acute and non-acute care. They also demonstrated that a viable alternate classification could not be found simply by testing those data items that were already being captured on a routine basis in national morbidity collections. While the patient's principal diagnosis (suitably modified for factors such as complications and age) may predict the cost of acute care, the patient's medical diagnosis is not a key cost driver for sub-acute and non-acute care.

The development of a casemix classification for sub-acute and non-acute care has necessitated the testing and incorporation of variables that are not collected on a routine basis. One important implication is that the introduction of a new sub-acute and non-acute casemix classification system requires that new data be routinely collected. In turn, the collection of new patient information has implications for training, information systems design and the development and application of standard national definitions. The development of the first version of the classification is thus the first step in an ongoing process of implementation and improvement.

## Scope

For the purposes of classification development, sub-acute care is care provided to a person who requires health services but whose principal medical diagnosis (modified for factors such as age and procedures) is not adequate in explaining the need for, or the cost of, the services that they receive. In sub-acute care, the predominant treatment

goal is to enhance the quality of life and/or functional status of the patient. In non-acute care, the predominant goal is to maintain the patient's current health and functional status, if possible.

The SNAP study tested several key ideas that had emerged from previous Australian studies aimed at classifying and costing sub-acute and non-acute care. The first idea tested by the study is that, within sub-acute and non-acute care, there are five clinically distinct Case Types (Eagar 1997):

1. palliative care
2. rehabilitation
3. psychogeriatric
4. geriatric evaluation and management (GEM), and
5. maintenance care.

The definition of each case type is based on both the characteristics of the patient and on the goal of intervention.

The second key idea tested in the study is that those patient attributes that best predict resource consumption in the inpatient setting also predict resource consumption in the ambulatory setting. The study thus included four different Episode Types:

1. overnight episodes
2. same-day episodes
3. outpatient episodes
4. community episodes.

## Method

A total of 99 sites in Australia (encompassing all States and Territories) and five sites in New Zealand were selected for participation in the study. The 104 study sites represent:

- public hospitals, including principal referral hospitals, major referral hospitals, major rural base hospitals, district hospitals, small community hospitals and designated hospices, rehabilitation centres and other sub-acute and non-acute hospitals
- private hospitals, including designated hospices, rehabilitation centres and general hospitals
- community health centres, domiciliary nursing services and other community care agencies.

Between them, these sites collected a detailed clinical and service-utilisation profile on 30 604 sub-acute and non-acute episodes over the data collection period. This data

collection period began at most sites on 1 July 1996 and continued for three months. Some sites began the collection in August and September. Certain specialist spinal injury and brain injury units continued the data collection until Christmas 1996, making the maximum collection period 26 weeks.

A clinical profile was collected on each patient at the beginning and end of their episode of care. This data set was designed by the SNAP study Clinical Project Team.

A common set of data items (shown in Table 1) was collected for all five case types.

**Table 1: Common data items for the five case types**

---

**Identifiers**

Patient/client number

Patient/client name (for site use only – deleted before data was sent to the study team)

Medicare number (for use as an identifier by study team only – deleted before de-identified data provided to health authorities)

**Socio-demographic**

Date of birth

Need for interpreter service

Aboriginality

**Episode details**

Episode type

Episode start date

Assessment only

Reason for episode start

Leave days (admitted patients only)

Sole practitioner intervention

Episode end date

Reason for episode end

---

Data items specific to one or more case types were also collected. These items are shown in Table 2.

**Table 2: Specific data items for each of the five case types**

---

**Palliative care**

Episode start RUG-ADL score  
Palliative care phase (stable, unstable, deteriorating, terminal and bereaved)  
Problem severity score (pain, other symptom, psychological/spiritual, family/carer)  
Phase change  
Episode end RUG-ADL score

**Rehabilitation**

Episode start FIM score **or** Barthel score **with** RUG-ADL score  
Impairment code  
Compensable status  
First episode for this impairment  
Behaviour scale  
Mini mental state examination  
Episode end FIM score **or** Barthel score **with** RUG-ADL score

**Psychogeriatric**

Episode start RUG-ADL score  
Psychogeriatric phase (acute, rehabilitation, consolidation, monitoring and follow-up)  
Diagnosis, pick list of nine  
First episode for this impairment  
Behaviour scale  
Mini mental state examination  
Health of the Nation Outcome Scale (HoNOS)  
Episode end RUG-ADL score

**Geriatric evaluation and management**

Episode start FIM score **or** Barthel score **with** RUG-ADL score  
Impairment code  
Behaviour scale  
Mini mental state examination  
Episode end FIM score **or** Barthel score **with** RUG-ADL score

**Maintenance**

Episode start RUG-ADL score  
Type of maintenance care (convalescent, respite, nursing home type, community maintenance care, other)  
Diagnosis, pick list of 10 (Victorian ACAT list)  
Behaviour scale  
Mini mental state examination  
Episode end RUG-ADL score

---

The study adopted the following instruments to measure and code its results:

- the Functional Independence Measure (FIM), the Resource Utilisation Groups Activities of Daily Living scale (RUG-ADL), and the paediatric version of the FIM (the WeeFIM) to measure function (Centre for Functional Assessment Research 1993a, 1993b; Fries et al. 1994)
- the Folstein Mini Mental State Examination (MMSE) to measure cognition (Folstein, Folstein & McHugh 1975)
- the three behaviour items from the Resident Classification Instrument (RCI) to measure behaviour (Commonwealth Department of Health, Housing & Community Services 1992)
- the Australian Association for Hospice and Palliative Care Palliative Care Phase and the Australian Association for Hospice and Palliative Care Severity Score to measure palliative care stage and severity (Smith & Firms 1994)
- the Health of the Nation Outcome Scales (HoNOS) to measure psychogeriatric severity and function (Wing, Curtis & Beavor 1996), and
- the Uniform Data Set Functional Impairment Codes, Version 4.0, to code impairment (Centre for Functional Assessment Research 1993).

No consensus on a standard measure of function to be used for rehabilitation and GEM could be reached during the study design phase, but it was agreed that the FIM would be the preferred tool for the study. However, sites already using the Barthel Index (another commonly used measure of motor function) were given the option of using a combination of the Barthel Index and the RUG-ADL instead of the FIM. In these cases, sites were required to record both the patient score and the maximum possible score for the particular version in use. Barthel scores were converted to percentages to allow comparison across different versions of the Barthel instrument.

Participating sites collected a comprehensive service-utilisation profile of each episode of care. Each episode was costed on a daily basis. The most intensive component of the collection was the capture of a daily time log by the 14 742 participating staff.

## Results

### Overall

The sample of episodes collected by the 104 sites is shown in Table 3.

**Table 3: The edited SNAP episode data set**

Case type	Episode type				Total
	Overnight patient	Same-day patient	Outpatient	Community client	
Palliative care	1868	54	148	2526	4596
Rehabilitation	7397	603	1704	741	10445
Psychogeriatric	479	13	102	363	957
GEM	1882	262	655	2437	5236
Maintenance care	1565	58	851	6896	9370
<b>Total</b>	<b>13191</b>	<b>990</b>	<b>3460</b>	<b>12963</b>	<b>30604</b>

In total, 2.156 million hours of staff time were recorded in the SNAP database. Across all sites and all disciplines, this staff time had an average cost of 47 cents per minute (\$28.20 per hour). After the allocation of salary-related overhead costs, the average final cost was 62 cents per minute (\$37.20 per hour). The study also captured the cost of goods and services, imaging, pathology, pharmacy and non-staff-related overhead costs. In addition to collecting patient-related staff time for overnight and ambulatory episodes, the study also captured time spent on teaching and learning, research and health promotion.

Figure 1 shows the mix of overnight and ambulatory episodes for each case type. Ambulatory episodes include same day, outpatient and community episodes. There were significant differences between the case types. The majority of rehabilitation episodes were overnight episodes. Psychogeriatric episodes occurred equally in overnight and ambulatory care. The majority of palliative care, GEM and maintenance episodes were ambulatory.

Figure 2 shows the reasons why the overnight episodes started. Nearly half of all episodes began as an inter-hospital transfer, with a further 30% beginning as an admission from home. Only 5% of episodes began as a reclassification from acute care or from one of the other SNAP case types.

The reasons why the ambulatory episodes started are shown in Figure 3. Consistent with the findings of other studies, only 15% began as a transfer from overnight care. The majority (70%) began as a direct referral (including self-referral) for ambulatory care.

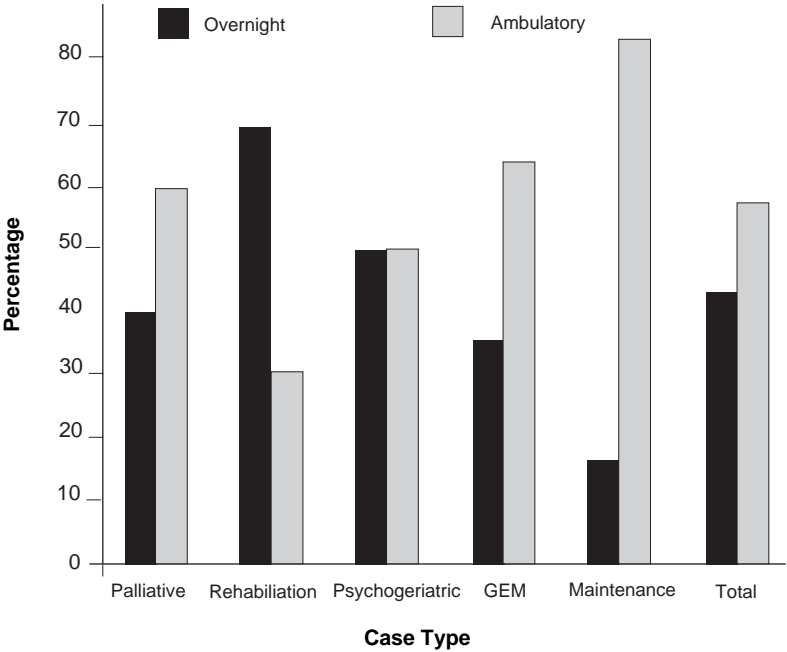


Figure 1: Overnight and ambulatory episodes x case type

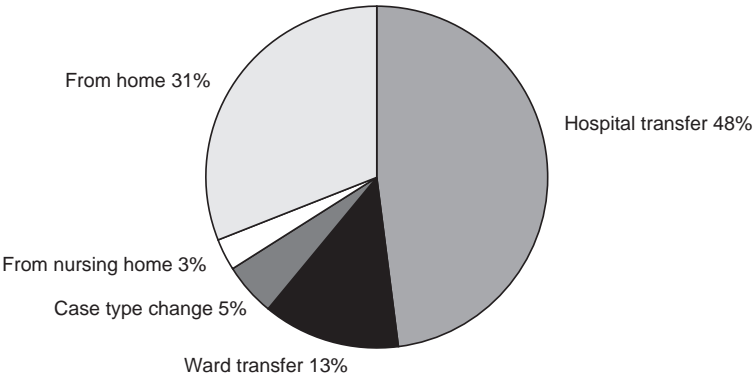
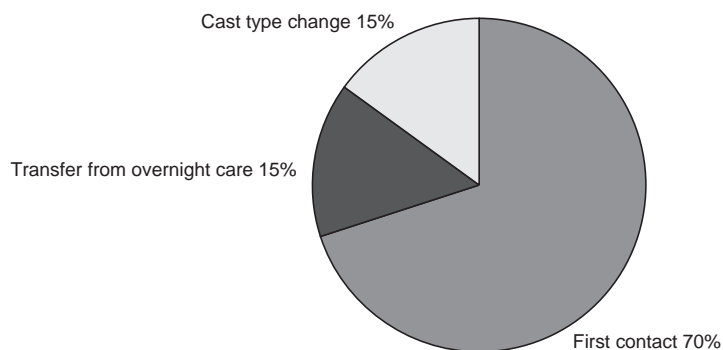


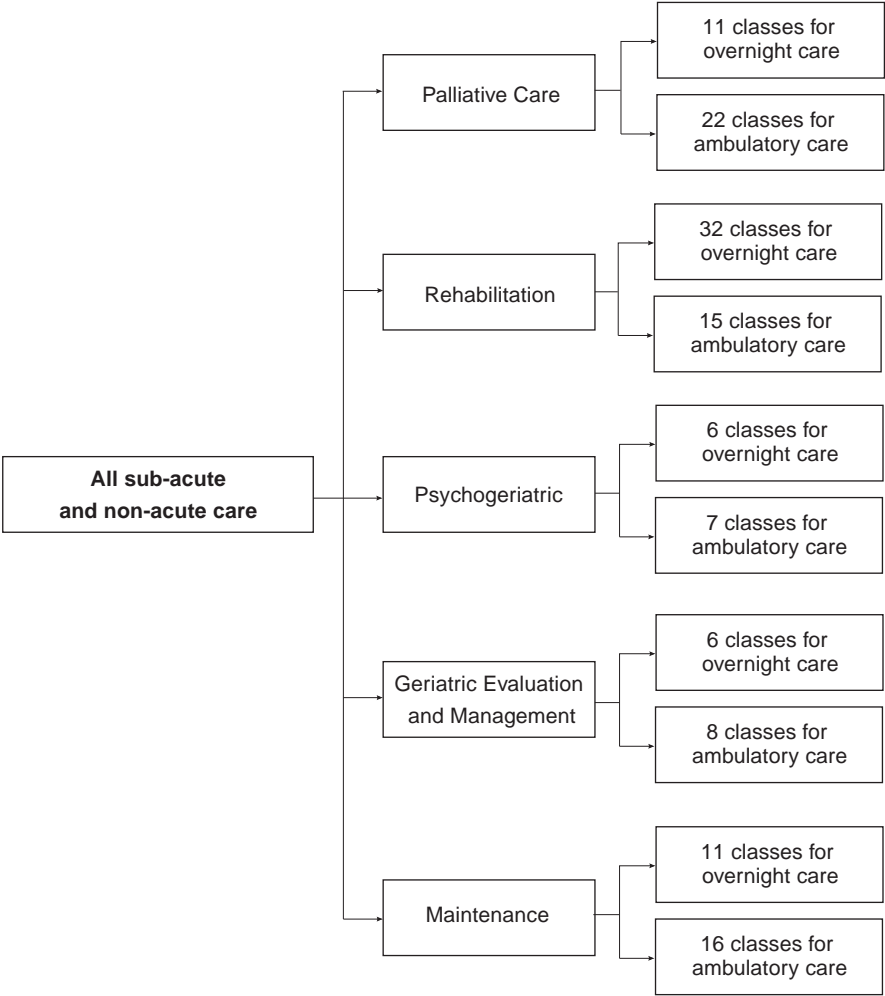
Figure 2: Reason for episodes start – overnight episodes



**Figure 3: Reason for start – ambulatory episodes**

### **The AN-SNAP Version 1 classification**

A casemix classification, termed the AN-SNAP Version 1 casemix classification, was developed. It is designed to classify both overnight and ambulatory care. The overall structure of the classification is shown in Figure 4. There are five branches, one for each of the five case types. The structure of the overnight classification is shown in Figure 5 and the ambulatory classification in Figure 6.



**Figure 4: The all episode AN-SNAP Version 1 classification**

AN-SNAP has 134 classes and explains 57.99% of the variation in all episode costs. Of this 58%, 21% is contributed by episode type and 37% by the classes. The overnight branch has 66 classes and explains 47.29% of the variation in the cost of overnight care. The ambulatory branch has 68 classes and explains 28.11% of the variation in the cost of ambulatory care.

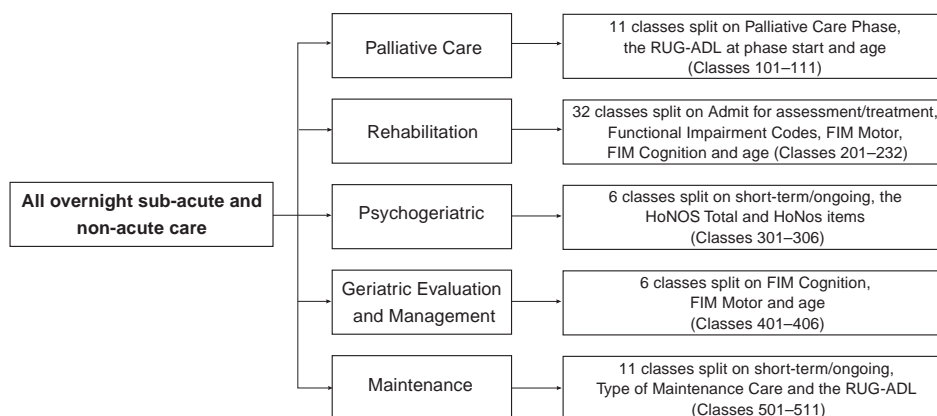


Figure 5: AN-SNAP classification of overnight care

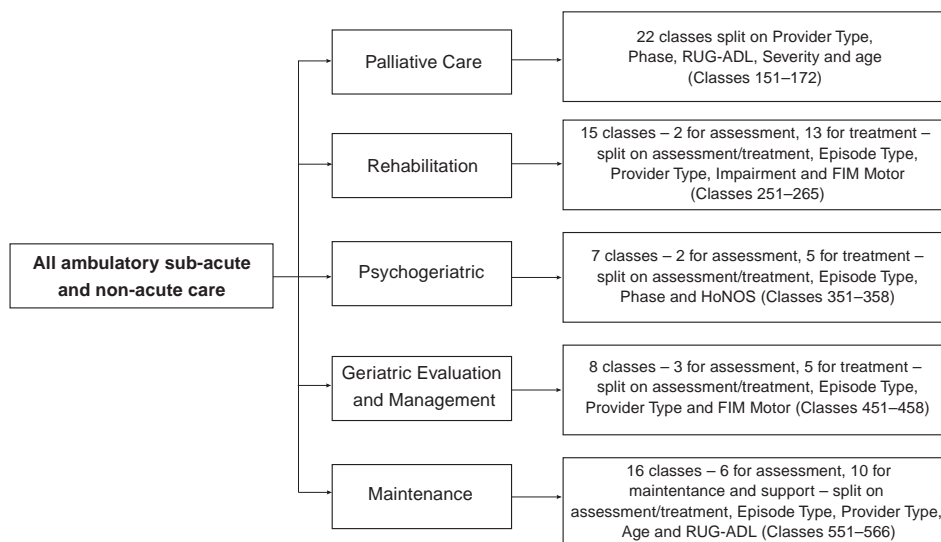


Figure 6: AN-SNAP classification of ambulatory care

## Discussion

The results suggest that there is an underlying episode classification, not just in overnight care, but also in ambulatory care. It is possible to classify both inpatient and ambulatory episodes (outpatients and community health) on an episode basis and not just a *per diem* basis. The statistical results for the overnight care branch (35.4%) compare well with the reported performance of the AN-DRG classification in explaining variance in length of stay of overnight medical episodes (Palmer et al. 1997). The statistical results for the ambulatory branch suggest that it provides a viable structure for further development.

The AN-SNAP study findings are diverse. Major findings emerging from the study cover diversity, cost drivers, opportunities for service substitution and information collection.

### Diversity

A critical finding of this study is that there is significant diversity in the cost of sub-acute and non-acute care. There is a 30-fold variation in episode cost between the most expensive and the least expensive class in the AN-SNAP overnight classification and a five-fold variation in *per diem* cost.

Likewise, there is significant diversity in the cost of ambulatory sub-acute and non-acute care. There is a 48-fold variation in episode cost and a five-fold variation in *per diem* cost between the most expensive and the least expensive class in the ambulatory classification.

### Cost drivers

The variables driving costs in the inpatient setting are also important cost drivers in the ambulatory setting. However, there are other factors at work in the ambulatory setting. Community care is inherently more complex than institutional care. Common patient variables across institutional and community care are necessary but they are insufficient to adequately explain cost variation in ambulatory care.

The key cost drivers identified by the study have been used to create the classification. They are:

- case type – characteristics of the person and the goal of treatment
- function (motor and cognition) – all case types
- phase (stage of illness) – palliative care
- impairment – rehabilitation
- behaviour – psychogeriatric
- age – palliative care, rehabilitation, GEM and maintenance.

There are additional cost drivers in ambulatory care which have been incorporated in the ambulatory branches:

- problem severity – palliative care
- phase – psychogeriatric
- usage of other health and community services.

In addition, it is likely that carer availability and functional ability in domestic or instrumental activities of daily living (for example, medication management; food preparation) are also important cost drivers in sub-acute and non-acute care. The study report recommends that these variables be tested for incorporation in future versions.

### **Opportunities for service substitution**

The majority of patients being treated in the overnight setting were clinically different to those treated in the ambulatory setting. However, there was a significant group of episodes that shared a similar profile across both overnight and ambulatory care. The results suggest that there are opportunities, at least in some cases, to use the classification to promote service substitution between overnight care, institutional ambulatory care and community-based ambulatory care.

### **Information collection**

Many of the data items used in AN-SNAP are currently collected by individual service providers but few are included in national and State data collections. This had been anticipated because it had already been demonstrated that a viable classification could not be found simply by employing those data items already captured on a routine basis. Any new classification would require the use of new variables.

There are obvious implications for service providers. For those already using the particular measurement instruments and collecting the required items on a routine basis, AN-SNAP poses no additional burden. For those already assessing the underlying attributes but by the use of different measurement instruments, implementation of AN-SNAP would require either a change in the instruments used or a successful mapping from one instrument to another. For those not assessing their patients with respect to attributes such as motor function, cognition and stage of illness, implementation of AN-SNAP will require additional work.

Irrespective of the current practices of local providers, implementation of AN-SNAP has important implications for information systems, coding and data entry. If for no other reason, this implies the need for a gradual, planned approach to implementation.

However, one important feature of the variables used in AN-SNAP is that many of them are not only driving costs, they are also key measures of health outcomes. The collection of the one source data set (that is designed specifically for this care) can be an efficient investment of resources that can produce information which is useful:

- for funding

- for clinical management, and
- for measuring health outcomes.

## Implementation issues

The AN-SNAP classification is designed to be used in several different ways:

- each of the two major branches (overnight and ambulatory) can be employed on their own or in combination with another classification (such as DRGs), and/or
- the classes can be used on a mix and match basis (for example, an overnight rehabilitation class can be combined with an ambulatory rehabilitation class to form a total payment for care that crosses treatment settings), or
- it may be possible that, with experience, each of the classes could be employed as a building block in the development of standard packages of care that encompass different treatment settings – the existing SNAP data set could be further analysed to assess the feasibility of moving from a classification of ‘episodes of care’ to a classification of ‘episodes of illness’.

A range of issues will need to be addressed as the AN-SNAP classification is progressively implemented. AN-SNAP has been recommended as the first version of the national classification and, as such, will run in parallel with the DRG system. As with DRGs, implementation is a matter for each jurisdiction. Implementation commenced in 1998 in New South Wales, South Australia and Queensland, and in Tasmania, Western Australia and the Northern Territory work to explore its applicability has commenced (Beaver 1998; Crawford 1998; Pearse & Mazevska 1998; Rohwedder & McGuire 1998; Thiedeman 1998; Van der Wel 1998). Likewise, private hospitals are seeking creation of a mechanism to support the introduction of AN-SNAP or a suitable modification (Badham 1998).

A key issue to be resolved is the interface between the various casemix classification systems that are available or being developed. One consequence of developing a separate classification for sub-acute and non-acute care is that it requires the boundary with acute care to be more clearly defined. A fundamental issue to be resolved is whether, for casemix purposes, the unique feature of acute care is the ‘acuity’ of the patient or rather the presence of a clearly identified principal diagnosis that can be used to assign a patient to a DRG. Once that issue is resolved, it will be possible to test the boundary between acute care and the care reported in this study (Eagar 1997). It will also be necessary to resolve the treatment of psychogeriatric episodes, as this care is also included in the classification developed in the recently completed Mental Health Classification and Service Cost study (Buckingham et al. 1998).

A further issue is that this care is provided both by designated services (such as palliative care and rehabilitation teams) and by non-designated services (such as geriatric medicine, general medicine, rural hospitals and generalist community health services).

The question of how to both identify and capture data on sub-acute and non-acute care episodes that occur other than in designated units is yet to be resolved.

A range of issues will need to be addressed in the planning for the phased implementation of the classification in a way that takes account of the implications for training and information systems and the need to model the impact on providers. The dilemma is that the data that are currently collected on a routine basis do not explain the need for, or the cost of, care for these patients. However, collecting new data has significant implications for training, data collection and data entry. Implementation issues, including timing, policy, method and scope, are matters for each jurisdiction.

The final issue is the ongoing improvement of the classification itself. The SNAP study has produced the first version of the classification. Ongoing refinement (leading to Version 2) will be possible through further analysis of the existing data set in combination with analysis of the results of a carefully planned and phased implementation. Future versions could incorporate new clinical measures as better measurement instruments become available. They could also more specifically address the needs of special needs groups, including Aboriginal and Torres Strait Islander patients.

## **Conclusion**

The national SNAP study was a resource-intensive project and required considerable effort by the national, State and local coordinators, the Clinical Project Team and the 15 000 health professionals who participated in the study. The relevant clinical bodies have endorsed the classification on the basis that it makes clinical sense and the statistical performance of AN-SNAP is more than adequate. However, AN-SNAP can be improved.

Further work is required, especially in the ambulatory classification, in the development of more sensitive measurement instruments and in the design of funding systems. The most important result of the SNAP study is that it has developed a classification structure which provides the framework for progressive improvement over time.

## **Acknowledgements**

This study was funded jointly by the Commonwealth Department of Health and Aged Care and participating States and Territories.

## References

- Badham J 1998, 'Recent private hospital activity on casemix issues', *Proceedings of Looking Back, Moving Forward: The 10th Casemix Conference in Australia*, Melbourne.
- Baker W 1994, 'Casemix in Rehabilitation: Is it safe to dip into functionally-related groups?' *Conference Proceedings of the 6th National Casemix Conference*, Commonwealth Department of Human Services and Health, Canberra.
- Beaver C 1998, 'Northern Territory – Update Casemix Developments', *Proceedings of Looking Back, Moving Forward: The 10th Casemix Conference in Australia*, Melbourne.
- Buckingham B, Burgess P, Solomon S, Pirkis J & Eagar K 1998, *Developing a casemix classification for Mental Health Services*, Commonwealth Department of Health and Family Services, Canberra.
- Casemix Implementation Project Board 1993, *Casemix Development Program: Strategic Plan, 1993–94 to 1997–98*, Commonwealth Department of Health, Housing, Local Government and Community Services, Canberra.
- Centre for Functional Assessment Research 1993a, *Guide for the Uniform Data System for Medical Rehabilitation (Adult FIM), Version 4.0*, Buffalo, NY, State University of New York, Buffalo.
- Centre for Functional Assessment Research 1993b, *Guide for the Uniform Data System for Medical Rehabilitation for Children (WeeFIM), Version 4.0 – Community and Outpatient*, State University of New York, Buffalo.
- Commonwealth Department of Health, Housing and Community Services 1992, *Classification of Nursing Home Residents, Handbook for Directors of Nursing*.
- Coopers & Lybrand Consultants 1995, *Rehabilitation Casemix Project Final Report*, Victorian Department of Health and Community Services.
- Crawford M 1998, 'Casemix in Tasmania 1997–98', *Proceedings of Looking Back, Moving Forward: The 10th Casemix Conference in Australia*, Melbourne.
- Donnelly C, Kelly J, Stewart K & Armstrong K 1995, *Community Home Nursing Groups: Report on the Australian Community Home Nursing Casemix Development Project*.
- Eagar K, Cromwell D, Kennedy C & Lee L 1997, 'Classifying sub-acute and non-acute patients: Results of the New South Wales casemix area network study', *Australian Health Review*, vol 20, no 2, pp 26–42.
- Eagar K 1997, 'Defining an episode of care: A study of five case types', *Australian Health Review*, vol 20, no 3, pp 105–19.
- Folstein MF, Folstein SE & McHugh PR 1975, 'Mini-mental state: A practical method for grading the cognitive state of patients for the clinician', *Journal of Psychiatry Res*, vol 12, pp 189–98.

Fries BE, Scheider DP, Foley WJ, Gavazzi M, Burke R & Cornelius E 1994, 'Refining a casemix measure for nursing homes: Resource utilisation groups (RUG-III)', *Medical Care*, vol 23, pp 668–85.

Hindle D 1995, *The Victorian palliative care casemix project: Statistical analysis and funding recommendations*, Centre for Health Service Development, University of Wollongong.

Lee L & Kennedy C 1996, 'Does the NAIP classification predict length of stay in rehabilitation, geriatrics and palliative care?', *Australian Health Review*, vol 19, no 2, pp 56–74.

Lee L, Goor E, Kennedy C, Walters S & Kirby L 1994, 'Non-acute casemix in the Illawarra', *Journal of Quality Clinical Practice*, vol 14, pp 22–30.

Palmer G et al. 1997, *Evaluating the Performance of the Australian National Diagnosis Related Groups*, the Centre for Hospital Management and Information Systems Research, University of New South Wales, the School of Health Information Management, University of Sydney and LAETA.

Pearse J & Mazevska 1998, 'Update on casemix developments in New South Wales', *Proceedings of Looking Back, Moving Forward: The 10th Casemix Conference in Australia*, Melbourne.

Roberts R, McKinley S, Brooks B, Ganley E & Hindle D 1992, *The Australian Non-Acute Inpatient Project group report to the Casemix Development Program*, Commonwealth Department of Health, Housing and Community Services, Canberra.

Rohwedder E & McGuire T 1998, 'Casemix Progress Report, Western Australia', *Proceedings of Looking Back, Moving Forward: The 10th Casemix Conference in Australia*, Melbourne.

Smith M & Firms P 1994, 'Palliative care casemix classification: Testing a model in a variety of palliative care settings – preliminary results', *Conference proceedings from the 6th National Casemix Conference*, Commonwealth Department of Human Services and Health.

Thiedeman J 1998, 'Developing a viable purchasing strategy for sub- and non-acute patient services in Queensland', *Proceedings of Looking Back, Moving Forward: The 10th Casemix Conference in Australia*, Melbourne.

Van der Wel O 1998, 'State Update – South Australia', *Proceedings of Looking Back, Moving Forward: The 10th Casemix Conference in Australia*, Melbourne.

Webster F 1995, 'The development of a casemix classification system for inpatient rehabilitation services – Stage 1 of the Victorian Rehabilitation Project', *Conference proceedings from the 7th National Casemix Conference*, Commonwealth Department of Human Services and Health.

Wing J, Curtis R & Beevor A 1996, *HoNOS: The Health of the Nation Outcomes Scales report on research July 1993–December 1995*, College Research Unit, Royal College of Psychiatrists, London.