

# Independent Hospital Pricing Authority Investigative review of classification systems for emergency care Final report

# Document control

# **Revision history**

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# Distribution

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# Acronyms

ABF	Activity based funding
ACEM	Australasian College for Emergency Medicine
ACHI	Australian Classification of Health Interventions
ACSQHC	Australian Commission for Safety and Quality in Health Care
AIHW	Australian Institute of Health and Welfare
APC	Ambulatory Payment Classification
APG	Ambulatory Patient Group
ATS	Australasian Triage Scale
AR-DRG	Australian Refined Diagnosis Related Group
Bipap	Bi-level positive airway pressure
CAC	Clinical Advisory Committee
CACS	Comprehensive Ambulatory Care Classification System
CALD	Culturally and linguistically diverse
CCI	Canadian Classification of Interventions
СНА	Children's Healthcare Australasia
CHF	Consumers Health Forum
CIHI	Canadian Institute of Health Information
CPAP	Continuous positive airway pressure
CPR	Cardiopulmonary Resuscitation
CPT	Current Procedural Terminology
CT	Computerised tomography/ Clinical terms
CTAS	Canadian Triage and Acuity System
Cth	Commonwealth
DAGS	Danish Ambulatory Grouping System
DRG	Diagnosis Related Group
DSS	Data set specification
ED	Emergency Department
EDG	Emergency Department Group
ECAWG	Emergency Care Advisory Working Group
EDRS	Emergency Department Reference Set
ESI	Emergency Severity Index
ICD	International Classification of Diseases
ICD-10-CA	International Classification of Diseases – Canadian Modification
ICD-9-CM	International Classification of Diseases – 9th Revision – Clinical Modification
ICD-10-AM	International Classification of Diseases – 10th Revision – Australian Modification
ICPC	International Classification of Primary Care
HCPCS	Healthcare Common Procedure Coding System
HRG	Healthcare Resource Groups
IHPA	Independent Hospital Pricing Authority
LHN	Local Hospital Network (or equivalent entities)
MAPE	Mean absolute percentage error
MDB	Major diagnostic block
MRI	Magnetic Resonance Imaging
MTS	Manchester Triage System

NAPEDC	Non Admitted Patient Emergency Department Care (National Minimum Data Set)
NCCH	National Centre for Classifications in Health
NEDPAC	National Emergency Department Projects Advisory Committee
NEHTA	National e-Health Transition Authority
NHCDC	National Hospital Cost Data Collection
NHISSC	National Health Information Standards and Statistics Committee
NHPA	National Health Performance Authority
NHRA	National Health Reform Agreement
NMDS	National minimum data set
NWAU	National weighted activity unit
RFT	Request for Tender
RID	Reduction in deviance
RIV	Reduction in variance
SNOMED-CT	Systematized Nomenclature of Medicine – Clinical Terms
UDG	Urgency Disposition Group
UK	United Kingdom
URG	Urgency Related Group
US	United States

# Executive summary

This report includes the findings and recommendations from a project undertaken by Health Policy Analysis on classification systems for emergency care on behalf of the Independent Hospital Pricing Authority (IHPA).

The purpose of the project was to recommend options for classifying public hospital emergency care for pricing this activity. It began with a *Literature Review* of options. This was then followed by consultations with a range of stakeholders, the outcome of which was detailed in a *Consultation Evaluation Report*. Following this, a *Draft final report* was developed, and circulated to key stakeholders for comment, including members of the Emergency Care Advisory Working Group (ECAWG), the ECAWG Clinical Sub Group and the Clinical Advisory Committee (CAC). This current report represents the final outcomes and recommendations from the project.

This report recommends that IHPA support a staged development over a five-year period of a classification system to replace the Urgency Related Groups (URGs) and Urgency Disposition Groups (UDGs), for use across all Australian emergency departments and emergency services.

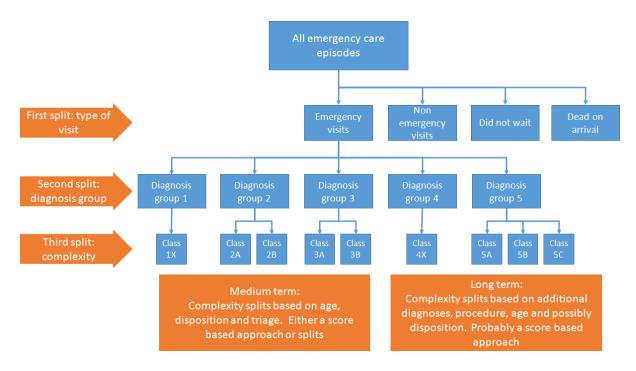
The system would have the following key features:

- Maintaining a separate classification system for emergency department services (i.e. separate from ambulatory care and admitted care), but aligning data elements and definitions as much as possible with current and future ambulatory, admitted patient, general practice and other primary care classification systems to maintain consistency and to support comparability across care settings and models of care.
- **Classes that are clinically meaningful** to facilitate data input by clinicians and to enable clinically useful analyses of emergency department patient mix and care.
- Grouping of these classes into a smaller number of price bands for pricing purposes.
- Greater prominence being given to measures of severity, assessment and treatment complexity and of patient co-morbidities and dependency, replacing proxies currently used, such as triage and disposition.

The transition to a replacement classification system **must be accompanied by appropriate costing and statistical validation studies**.

A clear and effective **national governance** of emergency department classification elements, code sets and short lists is essential.

An outline of the potential features of this classification, starting with the medium term (2-3 years) and progressing to the long term (3-5 years), has been developed in this report. The recommended classification involves a significant revision of the current URG approach, placing a higher priority on diagnosis and clinical complexity and moving away from triage as a key determinant. The broad structure of the classification would be settled in the medium term, and the longer term would be focussed on developing a better approach to the third level splits in the classification. Figure 3 depicts the broad approach recommended.



# Figure 1 – Recommended emergency care classification structure for the medium and long term

The recommended structure for the classification includes three tiers, as follows:

- Tier 1: A split based on visit type and episode end status to allocate episodes related to emergency versus non-emergency visits, patients who did not wait and patients who were dead on arrival to relevant classes.
- Tier 2: A second split for emergency patients, based on principal diagnosis. Groupings of principal diagnosis would be used for this split, and should be meaningful for clinicians, reflecting many of the high volume conditions managed by emergency departments.
- Tier 3: A third split reflecting different levels of severity, complexity and dependency. This split is to be applied only where there is evidence of the need for a further split. Severity, complexity and dependency could potentially be captured by considering a range of factors, including: in the medium term, the patient's age, disposition, triage category; and in the long term, the patient's age, disposition and additional diagnoses/ factors contributing to increased severity/ complexity (such as co-morbidities, psychosocial factors and/or patient function).

The recommended classification aligns more closely with principles desirable for an emergency care classification that were developed in the early stages of this project:

- 1. Comprehensive, mutually exclusive and consistent
- 2. Clinical meaning
- 3. Resource use homogeneity
- 4. Patient-based
- 5. Simple and transparent
- 6. Minimising undesirable and inadvertent consequences
- 7. Capacity for improvement

- 8. Utility beyond activity based funding
- 9. Administrative and operational feasibility.

One key challenge is to achieve a balance between a classification that is clinically meaningful and has an appropriate level of explanatory power and stability in prices. To achieve these twin objectives, it is recommended that IHPA explores the development of a smaller set of **price bands** to apply to a larger number of classes making up the classification.

Given the lack of support for the ongoing use of triage, and the strong interest in moving to more granular information on principal diagnosis, **Urgency Related Groups (URGs) and Urgency Disposition Groups (UDGs) have been assessed as not being suitable for classifying emergency care in the medium to long term in Australia**.

It is recommended that the new classification is suitable for both emergency departments and emergency services, subject to the requirement that the data burden and reporting requirements on emergency services is manageable and agreed to by jurisdictions. The resulting classification must be able to allocate episodes to classes, even where key classification variables are not reported for emergency services.

Although none of the other Australian and international classification systems were considered suitable to replace URGs and UDGs, important lessons emerged from the review of these systems. These are:

- There is merit in considering a greater number of classes in the classification than the number of price bands in the accompanying pricing/funding model. This maintains clinical meaning while reducing administrative burden and/or avoiding perverse incentives.
- Triage is not used as a classification variable by any other international classifications studied. However, several countries have implemented tools to standardise assignment of urgency. The potential removal of triage as a classification variable in Australia may provide similar opportunities to improve recording of triage (i.e. the variable ceases to be about funding and is used purely for triage purposes).
- The international classifications **have stronger reliance on clinical variables**, including diagnoses, presenting problem, investigations and major procedures than existing Australian emergency care classifications. Some of the international classifications use short lists and other approaches that simplify the collection and reporting of patient-level clinical data. While there has been work in Australia on the development of short lists, these have not been implemented nationally. There is merit in adopting a similar approach in Australia, with short lists developed through consultation with relevant clinical and other stakeholders.
- Some international classifications or classification tools capture other **patient-level** data that contributes to patient severity and complexity. These include measures of patient dependency, functional status and socio-demographic factors. As with the previously described clinical variables, the use of short lists in some of these systems simplifies the collection of data contributing to patient severity and complexity.

The review of individual data elements that drive costs in emergency care identified those that were suitable for inclusion in an emergency care classification in medium or long term, those for which further research is required, and those that are unsuitable for inclusion in the classification. The following conclusions were drawn from the analysis of the literature and stakeholder consultations:

Data elements suitable for the classification include:

- Visit type and components of episode end type (disposition) are required at the first tier of the classification to separate emergency presentations from non-emergency presentations, patients who did not wait and patients who are 'dead on arrival'.
- Principal (emergency care) diagnosis should play an important role at the second tier of the classification. However, it is important that diagnoses are grouped into classes that are meaningful for emergency care clinicians, representing the most frequent conditions requiring emergency care. A larger number of groups will be required compared with the major diagnostic blocks (MDBs) of the current URG system. Concurrently, efforts are required to achieve greater consistency in the approach to capturing principal diagnosis. Governance processes, with a high level of clinical leadership, are required to develop and maintain a national short list of principal diagnoses. This short list should be exhaustive and able to be implemented consistently both in systems where ICD10-AM is used for recording diagnoses, and systems where SNOMED-CT-AU terminology is used.
- The third level of the classification should group classes to reflect different levels of severity, complexity and dependency, which impact on the cost of care. This may involve combining information from several data items into a 'scoring' system similar to the patient clinical complexity level (PCCL) score used in the Australian Refined Diagnosis Related Groups (AR-DRG) system. The data elements recommended to be used at this level of the classification include:
  - The **age of the patient**, particularly reflecting 'extremes' (such as very young or very old). For some specific conditions, other age groups may be important.
  - The **disposition** of the patient at the conclusion of the episode (episode end status), which provides **a proxy indicator of severity and complexity** (impacting in turn on the cost of care). Stakeholders supported the proposal to include it in the emergency care classification in the medium term, after grouping cases using principal (emergency care) diagnosis. In the longer term, it should be replaced by more direct measures of severity and complexity.
  - The triage category of the episode, for the medium term only. Many stakeholders considered including triage as a major classification variable is problematic, and there is good evidence in the literature that highlights the reasons for the inappropriateness of this data element. Most recognised that its inclusion in the classification in the medium term may be necessary, but its importance should be reduced. In the longer term, triage should be entirely removed from the classification and be replaced by other measures more directly related to severity, complexity and dependency.

- In the longer term, information on additional diagnoses is required to ensure the emergency care classification reflects more directly differences in patient severity, complexity and dependency and their impact on the cost of care. While up to two additional diagnoses can be reported under the current national data collection specification, actual reporting is poor. Therefore, using additional diagnoses in the emergency care classification is not likely to be feasible in the medium term. The immediate focus should therefore be on assessing options for efficient data collection, which also adequately captures the factors that lead to higher levels of severity, complexity and dependency. In the longer term, the emergency care classification should use this information to better account for differences between patients in their levels of severity, complexity, dependency and cost.
- Information on selected procedures provided to emergency patients is likely to be shown to be an important predictor of costs. The initial conclusion drawn is that only a small number of procedures will be important for classification purposes. However, the potential contribution of information on procedures in explaining variation in cost needs to be assessed empirically, along with options for efficient data collection. The precise way in which procedures might be introduced into the classification will require closer examination.

Overall, a limited number of additional data elements to those currently collected are being recommended. All data elements recommended are a by-product of clinical care, but nevertheless, before adopting any data element, there should be clear evidence that it has material value in explaining cost variation in emergency care, that the benefits and/ or savings to be derived from the implementation of the new data justify the costs (which should include clinician time in capturing these data), and that the data can be captured accurately. Where possible, data elements should make use of short lists/ check boxes and be integrated into information systems routinely used by clinicians to reduce any additional burden created by parallel systems of data input.

Cost drivers that should <u>not</u> be included in the classification, but for which additional adjustments might be required in national weighted activity unit (NWAU) calculations, were identified. These included costs associated with regional and remote locations and costs for Indigenous patients. Subject to demonstrating their cost impact for emergency care, **these additional costs should be addressed on a comparable basis for other product streams**.

This report includes a plan for achieving the recommended classification outlined above. This involves the following steps:

### Stage 1: Gathering and assessment of further evidence that is currently available, involving:

- Collation and analysis of data from national and state/territory sources to further investigate particular cost drivers.
- Commission work to develop a full understanding of the contexts of the smaller emergency services. This needs to focus on the options for data collection that are feasible for these services, and a close examination of issues that have a significant impact on costs in these settings. For example, the work needs to consider the arrangements for medical staffing of emergency services and how this potentially impacts the national funding arrangements.

**Stage 2: Commission a high quality and focussed emergency care costing study.** The study would aim to provide high quality information on which to test the initial versions of the classification developed in stage 1. Given the nature of emergency care, the study could be conducted using a representative sample of hospitals and a data collection period of two to four weeks. The study should aim to collect a broad range of data related to patients, staff inputs, procedures and investigations, beyond the data that would be routinely available.

**Stage 3: National data development.** A national data development work program is required to modify and enhance selected data items in the national emergency care datasets, as reflected in the various recommendations of this review. This program should leverage prior work. The program needs to be approved through the national data governance processes.

# Introduction

# Background

In August 2011, the Commonwealth and each state and territory signed the National Health Reform Agreement (NHRA) (Council of Australian Governments, 2011). The agreement included commitment to the principle of "improved patient access to services and public hospital efficiency through the use of activity based funding based on a national efficient price".

As part of the NHRA, a nationally consistent activity based funding system commenced on 1 July 2012, with Commonwealth funding provided on an activity basis wherever practicable. Through the National Health Reform Act 2011 (Cth), the Independent Hospital Pricing Authority (IHPA) was established as a Commonwealth statutory authority on 15 December 2011.

Although activity based funding models have been adopted for various streams of health care within individual states and territories over many years, the approach was not applied to the Commonwealth component of funding until 2012 (Independent Hospital Pricing Authority, 2012b).

A building block for activity based funding is classification of patients into categories reflecting resource use. Such classifications have been developed for emergency care in Australia and internationally. In Australia, emergency classifications were first developed in the 1990s.

IHPA is responsible for developing and specifying the systems used to classify health care and other services provided by public hospitals for activity based funding in Australia. Currently IHPA uses the Urgency Related Groups (URGs) and the Urgency Disposition Groups (UDGs) to classify emergency care for activity based funding of these services (Independent Hospital Pricing Authority, 2012a). However, these classifications were implemented as interim systems, to be replaced later when the required research could be undertaken to select the best approach.

Following a public request for tender (RFT), IHPA engaged Health Policy Analysis (with Dr Sharon Willcox, Dr Tim Smyth, Dr Ralph Hanson, and Dr Peter Sprivulis) to undertake an investigative review of classification systems for emergency care, and recommend options for the development of a classification for publically funded emergency care departments/ services.

# **Project objectives**

The principal objective of this project, as specified by IHPA, is to recommend a robust, clinically-meaningful approach to classifying emergency care in Australia to drive efficiency and effectiveness of these services through pricing and funding. The classification should be based on data that is meaningful for the provision of emergency care, so that clinicians and other emergency care staff can maintain their primary role in caring for patients. The classification should also support other uses of the data, such as quality improvement, epidemiological monitoring and health services research leading to improved efficiency and effectiveness of emergency care services.

# **Project methods**

Table 1 below shows the project stages and the activities undertaken in relation to each stage.

## Table 1 – Project stages

Description

#### Literature review (July-August 2013)

Included review of literature related to:

- Principles for evaluation of classifications.
- International and Australian emergency care classifications.
- Data elements (cost drivers) considered to be candidates for inclusion in an emergency care classification.

#### Consultation (September 2013)

- The *Literature Review* and consultation questions were released on the IHPA web site and public submissions invited. Eight submissions were received.
- Face to face interviews were conducted with national stakeholder organisations, states and territories, local health networks and emergency care clinicians in each state and territory. Over 170 individuals were interviewed including 70 emergency care clinicians.
- A national workshop was held on 14 October 2013 with 34 participants (excluding IHPA representatives and the consulting team), to review results of consultations and develop a preferred approach to emergency care in the medium term (2-3 years) and long term (4-5 years).
- Prior to the national workshop, participants were invited to respond to a pre workshop survey.
- The outcomes of the national workshop were discussed with IHPA's Clinical Advisory Committee (CAC) on 10 November 2013.
- The consultation evaluation report was discussed with IHPA's Emergency Care Advisory Working Group (ECAWG) on 25 November 2013.

#### Draft and final reports (December 2013 and February 2014)

- Consolidations of findings from the *Literature Review* and consultation stages.
- Further analysis on selected issues.
- Assessment of options against evaluation principles.
- Draft description of classification approach in the medium term (2-3 years) and long term (4-5 years).
- Draft work plan to achieve classification enhancements.

# **Stakeholder consultations**

The Literature Review was posted on the IHPA web site and stakeholders were also given an opportunity to make a written submission. Eight submissions were received from seven stakeholder groups: Australasian College for Emergency Medicine (ACEM), the Consumers Health Forum (CHF), the National e-Health Transition Authority (NEHTA), Children's Healthcare Australasia (CHA), Women's Healthcare Australasia (WHA), the Queensland Emergency Department Strategic Advisory Panel and the NSW Ministry of Health.

Face to face and telephone consultations were conducted with the Commonwealth and state and territory health departments, local hospital networks, emergency department clinicians and a range of national and peak bodies including ACEM, CHF, the NEHTA and the National Health Performance Authority (NHPA). Overall, meetings were held with 171 individuals, including 70 emergency department clinicians, 82 Commonwealth, state/territory and Local Hospital Network (LHN) representatives, and 19 individuals from national agencies and other organisations (Table 2 and Table 3).

Jurisdictions	Number
Australian Capital Territory	6
Commonwealth	6
New South Wales	29
Northern Territory	30
Queensland	10
South Australia	9
Tasmania	8
Victoria	40
Western Australia	10
Other stakeholders	23
Total	171

# Table 2 – Stakeholders by jurisdiction

## Table 3 – Type of stakeholder consulted

Stakeholder type	Number
Clinician	70
Jurisdictional	82
National / other organisation	19
Total	171

A workshop was then held on 14 October 2013. This was attended by representatives from all the stakeholder groups consulted. Its purpose was to discuss and validate the findings from the consultations, and to contribute to the development of a work plan.

Prior to the national workshop, those invited were asked to complete a pre-workshop survey. Twenty responses to this survey were completed, providing additional input to the consultation (see Table 4).

Stakeholder group	Number
Consumer organisation	1
Emergency department clinician or clinical manager	6
Local Hospital Network/health service representative	1
National health agency representative	4
Representative of a professional association/Peak body	2
State or territory health agency representative	6
Total	20

### Table 4 – Stakeholder groups responding to pre workshop survey

# **Structure of this report**

This report presents the final findings and recommendations from the review of emergency care classifications. It synthesises the findings from the *Literature Review* and information provided through the consultation process, and incorporates subsequent analysis of data undertaken by the consultants. The report describes the preferred classification approach for emergency care in the medium term (2-3 years) and long term (4-5 years) and evaluates this against a set of principles developed for this purpose. It also presents a work plan to achieve the proposed classification.

The report is structured as follows:

**Chapter 2** draws from the consultation feedback to identify the agreed purposes of an emergency care classification and the agreed principles to be used for assessment of the proposed classifications. It also presents the conclusions and recommendations on several issues related to the scope of emergency care classifications based on lessons from international classifications and consultation feedback.

**Chapter 3** summarises the findings with respect to the international classifications identified in the *Literature Review*, and the stakeholder views with respect to these classifications. The Chapter draws out the lessons from these, which can help guide in the development of an Australian classification, which is fit for purpose.

**Chapter 4** summarises the literature and stakeholder feedback on specific cost drivers that were considered as possible classification data elements. The Chapter concludes by identifying the key data elements to be considered for inclusion in a classification for Australia in the medium (2-3 years) and long term (4-5 years).

**Chapter 5** recommends a broad approach to emergency care classification in the medium and long term. The recommended approach and relevant data elements are assessed against the proposed evaluation principles described in Appendix B.

**Chapter 6** recommends an implementation plan designed to support the finalisation and implementation of the recommended classification for the medium and long term. This includes work that is required to support the evidence base on which the classification is

derived, the finalisation of the classification, and the tasks required to enhance national data processes to support the classification.

**Appendix A** lists the principles for evaluating emergency care classifications desirable for Australia.

**Appendix B** assesses the current URG classification and the versions of an emergency care classification recommended in this report for the medium and long term for Australia against the evaluation criteria detailed in the previous Appendix.

**Appendix C** is an excerpt from the *Literature Review* report developed earlier in this project outlining the Australian and international classifications reviewed.

# Purpose, principles and scope

This Chapter sets out the proposed position on the purpose, principles and scope of an emergency care classification, based on feedback from stakeholders during the consultation process.

# Purpose of an emergency care classification

The 2011 National Health Reform Agreement gives responsibility to IHPA for determining classifications. It makes clear that IHPA's role in classification development is related to its responsibility for:

"Developing, refining and maintaining such systems as are necessary to calculate the national efficient price" (Clause B3f).

There was broad agreement through the consultations with stakeholders that the primary purpose of a new emergency care classification should be to facilitate the pricing of cost efficient, clinically effective emergency care services. There was also strong support that a secondary purpose of an emergency care classification should be to provide clinically useful information. In addition, there was support for an emergency care classification being able to potentially support other uses (aligning with the 'single collection, multiple use' concept) to keep the administrative and data burden manageable.

### **Recommendation 1**

That the primary purpose of a new emergency care classification is to support pricing of efficient, clinically effective emergency care by IHPA, with the proviso that the data underpinning such a classification should be clinically meaningful and useful for a range of other purposes.

# Principles and evaluation criteria underpinning the proposed emergency care classification

IHPA has adopted a set of Pricing Guidelines for its decision-making, where it is required to exercise policy judgement in undertaking its legislated functions. Many of these Pricing Guidelines relate to IHPA's broad function of determining the national efficient price of public hospital services, and are not specifically relevant to the development of classifications.

Accordingly, this project involved the development of a set of nine principles to be used to evaluate the suitability of a new emergency care classification. The consultations revealed broad support for the principles, although stakeholders expressed slight differences in the priorities they accorded to particular principles.

The nine principles are:

- 1. Comprehensive, mutually exclusive and consistent
- 2. Clinical meaning
- 3. Resource use homogeneity
- 4. Patient-based
- 5. Simple and transparent
- 6. Minimising undesirable and inadvertent consequences
- 7. Capacity for improvement
- 8. Utility beyond activity based funding
- 9. Administrative and operational feasibility.

The full set of principles, comprising a detailed description of each principle, and assessment criteria for evaluating whether the emergency care classification meets these principles, is provided in Appendix A.

The principles have been used to evaluate the proposed elements of a new emergency care classification detailed in Chapter 5. This assessment appears in Appendix B.

#### **Recommendation 2**

That the set of nine principles, including the associated assessment criteria, be adopted to help guide the development of an emergency care classification, and subsequently evaluate enhancements.

# Scope of an emergency care classification

The consultations canvassed stakeholder views on four broad questions related to the scope of an emergency care classification. A description of the issue, evidence from the *Literature Review*, consultation feedback, and a recommended position on each of the four questions are outlined below.

# A dedicated emergency care classification?

The first issue examined was whether a future emergency care classification should cover emergency care only or form part of a broader ambulatory care classification. The *Literature Review* identified that:

• Emergency care was frequently classified under broad ambulatory care classifications in other countries. In particular, the Ambulatory Payment Classification (APC) and Ambulatory Patient Group (APG) systems used in the US and the Comprehensive Ambulatory Care Classification System (CACS) used in Canada, are broad ambulatory classifications that cover a range of ambulatory services (the equivalent of Australian outpatient services and some same day surgery), in addition to emergency care. Healthcare Resource Groups (HRGs) are an English classification system that includes all types of health care service. However, in the case of the Canadian and English systems, classes for emergency services form a discrete

component of the classification. Therefore, emergency care is effectively covered in a dedicated part of a broad ambulatory classification in most international classifications.

• The potential overlap in services provided in emergency departments, outpatient clinics, general practice or primary care settings might be one reason to consider implementing a broad ambulatory care classification. It was also noted that IHPA's approach to pricing is 'setting independent', meaning that the critical issue is the type of service provided, rather than the specific location where that service is delivered. In essence, the *Literature Review* suggested that an emergency care classification may need to have the capability of covering heterogeneous patient services involving different models of care.

The Consultation Evaluation Report highlighted that some stakeholders saw the potential benefits of including emergency care within a broad ambulatory classification. It was argued that this supports a patient-centred approach to the delivery of care, and potentially promotes flexibility to accommodate new models of care. However, most stakeholders also articulated the potential benefits of a dedicated emergency care classification which included the ability to more accurately recognise the complexity and staffing costs of emergency care services, which are likely to be quite different to those of other ambulatory care services.

There was a general acceptance amongst stakeholders that the emergency care classification should be developed using similar underlying concepts, data items and definitions of variables, to those adopted for other classifications, including for acute care and non-admitted care. This would support consistency and potential comparability across classifications. There was also recognition of the need to carefully manage boundary issues across different classifications, as well as the importance of ensuring that an emergency care classification was able to effectively capture the heterogeneity of patients presenting to emergency care services.

# In conclusion, these factors resulted in support for retaining a dedicated emergency care classification, which is aligned to IHPA's current ABF classification model.

#### **Recommendation 3**

That emergency care services be classified using a dedicated emergency care classification, but that there should be commonality in the approaches across the emergency care and other classifications maintained by IHPA (e.g. data items, definitions of variables).

# Bundling and unbundling of emergency care services

The second issue examined was whether the emergency care services provided to patients that are subsequently admitted should be 'bundled' into acute care as classified by Australian Refined Diagnosis Related Groups (AR-DRGs), or remain 'unbundled'. The current situation is that emergency services for these patients are included as part of the emergency care classification, while their subsequent admission is separately classified and funded under AR-DRGs.

The *Literature Review* identified that there were different approaches to the bundling/ unbundling of emergency services across international classifications. For example, the English HRGs unbundle the emergency and admitted care, similar to IHPA's current treatment. However, this is not the case for the US Medicare program's APCs. This American classification is similar to the previous situation in Victoria, in that the costs of emergency care are bundled into inpatient services and payable under DRGs for patients admitted after an emergency department visit. One difference is that, under the US system, admitted care generally refers only to patients who are admitted for an overnight stay.

The Literature Review also noted that in the Australian context, future classification development may involve bundling services that are currently classified separately (e.g. emergency care, admitted services, outpatient visits) into a classification that covered the entire episode of care. This does not negate the requirement for a robust classification of each of the elements that might comprise a future episodic classification. However, it serves to highlight that the existing boundaries and bundling/unbundling arrangements should not necessarily be viewed as 'set in stone'.

The Consultation Evaluation Report indicated that there was majority support for continuation of the status quo (i.e. unbundling of emergency care). The key principle driving views on this issue was that the boundary between inpatient and emergency care classifications should not distort decisions about where care was best provided. Bundling was viewed by some groups as potentially creating an incentive for inappropriate hospital admissions.

In general, there was strong support for the emergency care setting to be the location where assessment and complex management of patients occurred. This was viewed as desirable given the concentration of specialist resources and expertise available in emergency departments. Stakeholders expressed some concerns that the National Emergency Access Targets may be encouraging classification of emergency patients as admitted patients in short stay units.

Another point made was that unbundling allows AR-DRGs to achieve better explanatory power. This is because unbundling results in a higher level of funding for emergency patients compared with planned admissions. The bundling approach averages costs across emergency and planned episodes.

Support for bundling emergency care into admitted patient services was mainly limited to jurisdictions that had previously funded services under this model. However, a separate concern was raised about the relative explanatory power of URGs in regard to emergency care for patients who are subsequently admitted.

In conclusion, the strong support for continued unbundling, coupled with concerns that bundling may create incentives for admission, suggest that it is desirable to retain the status quo. However, as was suggested during the consultations, this issue should be subject to further empirical testing.

The review of URG Version 1.3 undertaken by IHPA found that the classification had different predictive power for the admitted and non-admitted arms, as shown in Table 5. URGs had low reduction in variance (RIV) scores for patients in the admitted arm, although the mean absolute percentage error (MAPE) scores were comparable for patients in the admitted and non-admitted arms. Analysis of variables currently collected in the Non Admitted Patient Emergency Department Care (NAPEDC) National Minimum Data Set (NMDS) also identified

that the predictive power of each data element differs depending on episode end status (admitted or non-admitted).

Variable	Trimming flag	RIV*	RID*	MAPE*
URG v1.3 (Full model)	Yes	27.13	35.57	54.51
URG v1.3 (Full model)	No	16.30	33.30	57.05
URG v1.3 (Admitted arm)	Yes	3.35	3.97	57.00
URG v1.3 (Admitted arm)	No	1.99	3.54	60.02
URG v1.3 (Non-admitted arm)	Yes	18.89	19.96	53.14
URG v1.3 (Non-admitted arm)	No	8.15	18.40	55.38

## Table 5 – Explanatory power of URG classification system

\* RIV = Reduction in variance; RID = Reduction in deviance; MAPE = Mean absolute percentage error.

Source: URG Review Stage 2 Report (URG V1.4B), presented to ECAWG on 26 July 2012

The further development of the emergency classification proposed in Chapter 5 should include analysis of the comparative explanatory power of the classification for patients with different disposition outcomes (including discharged, admitted etc.).

### **Recommendation 4**

The starting position is that emergency care services should continue to remain unbundled in a new emergency care classification. However, there should be further analysis of the relative explanatory power of the proposed new emergency care classification for non-admitted and admitted patients.

# Short stay admitted care

The third issue examined was whether an emergency care classification should include or exclude short stay admitted patients treated within the emergency department. Patients requiring these services can be identified in either or sometimes both the emergency care data and admitted patient data depending on local practice, and funding is allocated through both the emergency care and/ or admitted patient activity based funding arrangements.

The *Literature Review* indicated that there are different models for the provision of care for short stay patients across Australia. Approaches to the provision of care for such patients differ according to the type of patient (e.g. patients with a mental health condition) and also according to the likely disposition of the patient (e.g. expected to be discharged versus admitted to a bed). In addition, models differ with respect to whether the short stay units are located and/or managed entirely within the emergency department, or located and/or managed elsewhere in the hospital.

In international systems, patients in short stay units are often funded under the ambulatory care classifications rather than admitted patient care. The *Literature Review* suggested that the potential inclusion of these services in a broad ambulatory classification might foster debate on the most suitable settings in which such care should be delivered. This would be consistent with IHPA's Pricing Guideline of 'price equivalence', where it is intended that pricing supports dynamic efficiency and changes to models of care.

The Consultation Evaluation Report identified some support for moving towards the inclusion of short stay patients within an emergency care classification. Support for this change was particularly strong from clinicians, although this view was also expressed by some health department officials and hospital managers. Reasons advanced by stakeholders for including short stay patients within an emergency care classification (and also in emergency care funding arrangements) included:

- Some stakeholders believed that the alignment of short stay units and emergency care would provide greater control over the management of these units to emergency department staff. This feedback was underpinned by a view that short stay units were an important tool to manage access block. It was therefore important to consider them as part of the spectrum of emergency care, so that emergency department staff could make decisions about the best models of care to manage patients and demand.
- There were concerns about what were perceived as artificial incentives to admit patients, rather than manage them in the emergency department. The additional AR-DRG payment for patients treated in short stay units was viewed as creating a perverse incentive to admit patients. Specifically, inadequate prices/funding for short stay care through emergency care classification/funding encouraged admission, even where it was not clinically desirable.

Stakeholders also raised concerns about the differences across jurisdictions in interpreting admission policies, which has resulted in short stay units being classified and funded differently across Australia. Although one way to standardise admission is through time-based criteria, some stakeholders did not support this to determine whether a patient should be classified as 'admitted', arguing that time-based criteria are inherently perverse.

In summary, there were some significant concerns raised with IHPA's current approach to classifying and pricing short stay patients under the admitted patient stream, notwithstanding that IHPA has simply adopted pre-existing national definitions relating to the treatment of short stay patients.

The recommended direction is to maintain the current approach where patients admitted to short stay units are admitted, and therefore, funded under the admitted care arrangements. However, IHPA should ensure that pricing supports the most clinically effective care for patients, regardless of whether they are treated in the emergency department, admitted to a short stay unit or admitted to an inpatient unit. The objective is to achieve the 'right price' for these services, while ensuring that pricing does not distort models of care and create perverse incentives for admission. This approach would be in accordance with IHPA's 'price harmonisation' pricing guideline that states "pricing should facilitate best practice provision of appropriate site of care".

While this project is about an emergency care classification rather than the subsequent stage of pricing these services, there is inevitably a 'chicken and egg' relationship between classification and pricing. It is recognised that achieving the recommended endpoint will be challenging. It will be necessary to more accurately capture the costs of services for patients admitted to short stay units, recognising that similar services are included in emergency care costing as well as admitted patient costing data. Further analysis will be required to understand how these patients are handled under both the emergency care classification system and the acute inpatient funding model (as many will be short stay outliers or be

allocated a same day DRG price weight). In the longer term, a more sophisticated emergency care classification is required, such as that recommended in this report.

Chapter 5 outlines the recommended strategy for the development of a new emergency care classification that would have a much stronger reliance on diagnosis and patient complexity (including potentially additional diagnoses and procedures). If this approach is adopted, it would be possible to identify whether short stay patients are best classified as emergency care (based on the range of diagnoses and procedures) or whether their care is more similar to services classified and funded through AR-DRGs.

### **Recommendation 5**

IHPA undertake further analysis (in collaboration with jurisdictions and other stakeholders) to disaggregate, describe and cost short stay services. This work should recognise the existing diversity of models of care both across and within jurisdictions (including between metropolitan and rural hospitals). The aim should be to determine the best approach to pricing short stay services, regardless of the setting in which such care is delivered.

#### **Recommendation 6**

In undertaking the development of a future emergency care classification, IHPA analyse the 'best fit' of short stay services by reference to the diagnoses and procedures of short stay patients, relative to emergency care and admitted patient services.

# **Emergency care classification for different role levels**

The fourth issue examined was whether an emergency care classification should continue to distinguish between hospitals with different levels of emergency care ('emergency departments' described as Levels 3B-6; and 'emergency services' described as Levels 1-3A). The current situation is that URGs are used to classify services in hospitals with 'emergency departments', and UDGs are used to classify services in hospitals with 'emergency services'.

The *Literature Review* identified that across the international classifications examined, it was more common to have a single emergency care classification across all types of hospitals, but for pricing and/or reporting arrangements to vary by the size of the hospital/level of the emergency care provided. For example:

- Both the English HRGs and the US Medicare APCs have two price schedules such that the 'same' service is priced at a lower rate in emergency departments that are not open on a 24/7 basis compared with those that are. In other words, there is a common classification that applies across all types of emergency care providers, but two sets of prices. The English and US Medicare approaches to pricing assume that the same service costs less in 'smaller' emergency services that are not open on a 24/7 basis than in 'larger' emergency departments.
- The Canadian Institute of Health Information has a single classification system for emergency care, but there are different reporting requirements for different types of hospitals. Smaller hospitals report data related to waiting time performance but do not report clinical data on diagnoses, presenting complaints or interventions.

The general approach adopted by IHPA is to have the same prices for the same services, regardless of the hospital in which they are delivered. This aligns with IHPA's approach to recognise patient-based, rather than provider-based, differences in costs. However, the

existing approach to emergency care classification and pricing by IHPA is somewhat of a hybrid. In essence, the application of UDGs to the smaller (Levels 1-3A) hospitals implies that different services are provided by these hospitals (than by the Levels 3B-6 hospitals) and the prices for these services are based on the cost structure of that sub-group of hospitals.

The *Literature Review* also raised the issue that if a single classification was to be implemented by IHPA across all types of hospitals/emergency care providers, there were two options for the subsequent pricing of these services, as follows:

- Maintain the separation of emergency care services into two broad classes, with prices set based on the relative costs of emergency services within each 'class'.
- Remove the distinction between types of emergency care providers and use a single price across all emergency care.

The Consultation Evaluation Report concluded that most stakeholders supported the retention of a simpler, separate classification for small rural hospitals than would apply to larger hospitals with Level 3B-6 emergency departments. The key factor driving this position was the desire to keep the data burden manageable for small hospitals, particularly if a new emergency care classification had a stronger emphasis on patient-level clinical data, such as diagnosis. Several stakeholders pointed out that the use of 'triage' in smaller emergency services was problematic, as triaging patients in these settings rarely occurs (which is understandable given the purpose of triage is to prioritise who gets care first, but in these emergency services, there is usually not a queue).

Stakeholders raised some issues that were specific to small rural hospitals that may impact on the classification and pricing of emergency care services in these hospitals. These included concerns that the classification (and/or the pricing model) should adequately recognise the costs of inter-hospital transfers. There were also concerns that different models for the provision of medical services may impact on the cost (and hence the price) of emergency care services in small rural hospitals.

While the majority of consultation feedback supported the retention of a separate classification for emergency services, views on this issue differed across stakeholders. Emergency department clinicians were more likely to support application of the same classification to all types of emergency care services than were health department officials. The argument was that the classification should be driven by the type of care provided to the patient, rather than the hospital in which the treatment was provided. This is consistent with IHPA's approach to pricing being on patient-based, rather than provider-based, factors. Some stakeholders also suggested that it would be useful to assess the impact on funding outcomes of application of the two existing classifications. This suggestion is consistent with feedback reported on the previous two issues that indicated support for further empirical testing.

In summary, it is evident that the overriding principle driving views on this issue is that any future classification has to be 'manageable' for emergency services in terms of data burden and costs of collection. However, this does not necessarily mean that there should be two separate (and unrelated) emergency care classifications in the future. The international experience offers some valuable lessons for Australia on this issue.

IHPA could choose to apply the same new emergency care classification across all hospitals in the future, noting that:

- In applying the 'same' emergency care classification across all hospitals, IHPA could decide (with advice from jurisdictions) whether emergency services would be required to provide data on all variables or only some variables in the classification. This is similar to the CACS where the underlying classification is the same, but there are different reporting requirements for small hospitals. This means that the classification needs to be able to handle situations in which one of the key variables (such as diagnosis), is not reported. This challenge is discussed further in Chapter 5.
- Consideration would also need to be given to whether prices determined by IHPA for the same services would be the same across all hospitals or differ according to the type of emergency care service. While this should be subject to empirical examination, rather than reaching any *a priori* position, the structural and staffing requirements specified for a service to be designated as an emergency department of Level 3B-6 imply a higher cost structure than might be expected in smaller emergency services.
- It is likely that smaller emergency services will provide a different range of services to those provided by larger emergency departments. This will be more apparent in an emergency classification that has a stronger focus on diagnosis, presenting problem and complexity. It is probable that if a common classification was applied, analysis would indicate that small rural hospitals provide a subset of services relative to larger emergency departments. Of course, this needs to be empirically tested.

#### **Recommendation 7**

Consideration is given to the development and application of a single emergency care classification across all types of emergency care departments/services, subject to the requirement that the data burden and reporting requirements on emergency services is manageable and agreed to by jurisdictions. This may mean that reporting requirements for emergency services are less onerous. The resulting classification must be able to allocate episodes to classes, even where key classification variables are not reported by emergency services.

### **Recommendation 8**

IHPA examine whether the costs of emergency services vary across different types of hospitals. The approach to pricing emergency services should be in accordance with the approach adopted by IHPA for all other public hospital services.

# Lessons from international classifications

This Chapter draws out further lessons from the review of international emergency care classifications that was undertaken as part of the *Literature Review*. It sets the scene for the review of classification variables based on stakeholder feedback and the recommended strategy for developing a new Australian emergency care classification outlined in the next Chapter.

# **Overview of international classifications**

The Literature Review examined the following six international classifications:

- Healthcare Resource Groups (HRGs): a classification that is used in England for funding purposes.
- Ambulatory Payment Classifications (APC): a classification used for payment purposes under the US Medicare program and several private insurers.
- Ambulatory Patient Groups (APG) and Enhanced Ambulatory Patient Groups (EAPGs): classifications implemented in several US states under Medicaid and used by several private insurers
- *Emergency Department Groups* (EDG): a classification developed in California in the early 1990s. No descriptions of its implementation could be found in the literature.
- Comprehensive Ambulatory Care Classification System (CACS): the Canadian national (albeit voluntary) classification for ambulatory services that is used for collection and reporting but not funding purposes; and
- Danish Ambulatory Grouping System (DAGS): a classification that has been in use in Denmark for over a decade.

Some information on these classifications has also been provided in the previous Chapter. Table 6 summarises the number of classes and data elements used in each of these classifications, relative to the existing Australian classifications.

Classification	Number of classes	Triage	Dispos- ition	Diag- nosis	Invest- igations*	Other proc- edures	Mode of visit	Age
URGs	66	•	•	•				
UDGs	12	•	•					
HRGs	11				•	•		
APCs	850 all ambulatory care 5 emergency care				•	•		
APGs/EAPGs	290			•	•	•		
EDGs	216		•	•	•	•		•
CACS	240 all ambulatory care 52 emergency care		•	•		•	•	
DAGS	198 all ambulatory care 1 emergency care							

## Table 6 – Classes and data elements in international and Australian classifications

# Findings and lessons from international classifications

Some of the key lessons relevant to the development of an Australian classification are identified below.

The summary in Table 6 suggests that most international classifications have more classes than the existing URG classification. However, two factors influence this comparison between Australian and international classifications for emergency care:

- As discussed in Chapter 2, most of the international classifications extend beyond emergency care to cover ambulatory care services more broadly. Hence, they are not directly comparable to URGs for the purpose of determining the 'right number' of classes for a future Australian classification.
- In the classifications that are used for pricing/funding, the number of classes is not necessarily the same as the number of price bands in the funding model. An example of this is the English HRGs. Until 2013-14 the number of price bands (5) was fewer than the number of classes (11) in the classification.

Recommendation 1 is that while the primary purpose of a new classification is to support efficient pricing of emergency care, it is important that the classification is also clinically meaningful and useful for a range of purposes. The international experience suggests that this can be achieved through considering a greater number of classes to achieve clinical meaning, with fewer price bands for efficient pricing.

### Key finding 1

In developing an Australian classification, there is merit in considering a greater number of classes in the classification than the number of price bands in the accompanying pricing/funding model. This enables a suitable balance between clinical meaningfulness (with more classes in the classification) and administrative ease/avoiding perverse incentives (with fewer price bands in the funding model).

A striking feature of Table 6 is the complete absence of triage/urgency in any of the international classifications examined in the *Literature Review*. While triage is at the core of both URGs and UDGs, Australia is unique in this regard.

This does not mean, however, that triage/urgency is not considered important as a clinical management tool in other countries. Triage is collected in several of the national data collections and national surveys reviewed.

The *Literature Review* also identified a number of systems designed to improve or standardise the allocation of triage. These include the Manchester Triage System (MTS), the Emergency Severity Index (ESI) and the Canadian Triage and Acuity System (CTAS). These systems are discussed further in the next Chapter.

In summary, it is clear from Table 6 that Australia is unique in triage/urgency being a major variable in the emergency care classification. However, the international experience indicates that there is significant commitment to using triage for patient management, notwithstanding the absence of triage as a variable in these classifications.

#### Key finding 2

None of the international classifications that were studied use triage as a classification variable. However, several countries have implemented tools to improve the standardisation of assigning patient urgency. The potential removal of triage as a classification variable in Australia may provide similar opportunities to improve reporting of triage.

There is considerable heterogeneity in the specific clinical variables collected in the international classifications. In some cases, data are collected at a granular level before being grouped into a smaller number of classes and/or price bands. Information on the specific clinical variables and their collection is summarised for selected classifications in the following dot points:

- Healthcare Resource Groups: The English HRGs covering emergency care are based on investigations and treatment, but diagnosis is not used. Data are collected at a granular level through the International Classification of Diseases, 10<sup>th</sup> Revision (ICD-10) and OPCS-4 (the English classification system for interventions and procedures). Investigations are grouped into one of three categories (e.g. blood tests are Category 1, an x-ray is Category 2 and an MRI is Category 3), while treatments are grouped into one of five categories (e.g. resuscitation is Category 5, the most intensive treatment category). The three categories of investigations and the five categories of treatments are grouped into 11 HRGs).
- Ambulatory Payment Classifications: The US Medicare APCs are also based on procedures and do not use diagnoses. These are collected at a granular level using the Current Procedural Terminology (CPT) and the Healthcare Common Procedure Coding System (HCPCS). Most emergency care (over 80%) is described by five high-volume 'evaluation and management' CPT codes. However, hospitals also use hundreds of other APCs to claim for individual procedures (e.g. IV infusion, chest x-ray) that are part of the emergency department visit. This means that APCs are much more 'unbundled' than the English HRGs or the Australian URGs.

- Ambulatory Patient Groups/Extended APGs: The clinical variables used in APGs/EAPGs are procedures (using CPT and HCPCS) and diagnosis (using ICD), although procedures are the main organising variable in the classification. Patients can be assigned multiple APGs during a single visit. The classification first assesses whether there is a significant procedure or therapy CPT. If so, the classification then also records additional procedures and ancillary tests. If there is not a significant procedure, the patient may be assigned an 'evaluation and management' CPT code, resulting in a medical APG. The assignment to medical classes also considers 'signs, symptoms and findings', before moving to diagnosis codes based on 'body systems'. If there are no significant procedures and no medical visit evaluation and management codes, the patient visit may be coded using ancillary tests or procedures (e.g. radiology, pathology, administration of chemotherapy drugs).
- Comprehensive Ambulatory Care Classification System: The CACS uses a combination of diagnoses and procedures for emergency care services, coded using the International Classification of Diseases 10<sup>th</sup> Revision Canadian modification (ICD-10-CA) and the Canadian Classification of Intervention (CCI) codes respectively. The CACS classification gives more prominence to diagnoses than interventions (the converse of APGs). The Canadian Institute of Health Information (CIHI) has published short lists of diagnoses and presenting complaints to standardise the collection and reporting of information (instead of relying on the full ICD-10-CA and the CCI). The level of reporting varies across hospitals, with smaller hospitals not required to provide patient-level diagnostic and intervention data.

This summary of the four classifications highlights the significance of procedures/interventions as a classification variable. While diagnosis is collected in the underlying data systems for both HRGs and APCs, it is less prominent in determining the final categories for these classifications.

### Key finding 3

The international classifications have stronger reliance on clinical variables including diagnoses, presenting problem, investigations and major procedures than the current Australian emergency care classifications. Some of the international classifications use short lists and other approaches that simplify the collection and reporting of patient-level clinical data. While there has been work in Australia on the development of short lists, these have not been implemented nationally.

In addition to the short lists used in the Canadian classification, the United States National Hospital Ambulatory Medical Care Survey for Emergency Departments has short lists for additional diagnoses and procedures, imaging, blood tests and other tests. These short lists are intended to simplify the collection of data that are most relevant to understanding the provision of emergency care services.

There are likely to be other factors than the presenting complaint, intervention and patient diagnosis that impact on the cost of emergency care services, such as the impact of patient dependency on nursing staff (e.g. dimensions captured by the Jones Dependency Tool, to be discussed in the next Chapter).

There is likely to be overlap between classification tools capturing 'clinical' and 'functional' information. As with short lists for diagnoses and procedures, some of the existing tools related to measuring functional status focus on identifying the most relevant factors that are likely to impact on resource use for emergency care visits.

Rather than having a goal of collecting, recording and reporting detailed granular information on all of these factors, subject to an empirical costing study, for pricing purposes it is likely that the presence of one or more of these factors will be sufficient information for classification and pricing.

### Key finding 4

Some international classifications or classification tools capture other patient-level data that may contribute to the measurement of patient severity and complexity and its impact on costs. This includes measures of patient dependency, functional status and sociodemographic factors. As with the previously described clinical variables, the use of short lists in some of these systems simplifies the collection of data contributing to patient severity and complexity. It may be possible to condense this information for classification and pricing purposes to indicate whether one of more of these factors were present.

# Potential classification variables

This Chapter reviews data elements that the literature and stakeholders identified as driving emergency care costs that are potential candidates for inclusion in an emergency care classification. Bond, Erwich-Nijhout, Phillips, & Baggoley (1997) define cost drivers (in the context of emergency care) as "the key variables that determine the greatest proportion of costs of an emergency patient attendance" (p. 182). These may include clinical or non-clinical characteristics of patients receiving emergency care. Not all factors correlated with costs are appropriate for inclusion in a clinical classification. For example, some reflect provider characteristics or the ways in which providers respond to demand, rather than characteristics of patients and their needs.

The data elements discussed below include the main data elements in the classifications reviewed in the *Literature Review* (both Australian and international), as well as other data elements identified in the literature as driving cost. They are as follows:

- Emergency visit type
- disposition (episode end status)
- urgency (triage)
- principal diagnosis
- presenting problem
- severity, complexity, dependency
- investigations and procedures
- age
- regional and remote location

- Indigenous status
- other disadvantaged groups
- consultation and liaison services
- mental health legal status
- mode of arrival
- time of day/ week
- time in emergency department
- treatment area.

Each of the above variables is reviewed in turn, drawing from three sources of information (where relevant):

- the Literature Review
- consultation feedback
- additional analysis undertaken by the consulting team based of the 2011-12 Emergency Department Care Activity Based Funding (ABF) Data Set Specification (DSS)<sup>1</sup>.

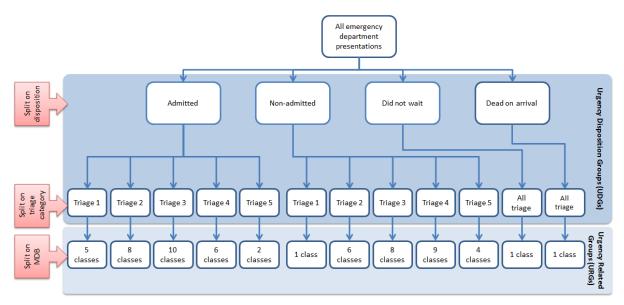
Following this analysis of each individual variable, the Chapter concludes with a summary Table that identifies for each variable:

- Whether or not it should be included in a future emergency care classification in the medium-term or the long-term.
- Whether additional data development is required for the variable to be successfully included in a future emergency care classification.

<sup>&</sup>lt;sup>1</sup> Which includes data items from the Non Admitted Patient Emergency Department Care (NAPEDC) National Minimum Data Set (NMDS). However, it also includes diagnosis, and is limited to activity based funding reporting hospitals.

Prior to discussing cost drivers, it is useful to overview the current URGs and UDG classifications, for the purpose of reviewing the data elements used by these classifications, and the level at which they are incorporated.

Figure 2 below shows the structure of the UDGs and URGs. (Note that the number of classes for URGs reflect version 1.3 of the classification.) After the initial split on visit type (not shown in the Figure), episodes with an emergency visit type are split based on disposition. Following this, admitted and non-admitted episodes are split into triage categories. This reflects the UDG classification. URGs then split the episodes into further classes beyond triage category based on major diagnostic blocks (MDBs).



# Figure 2 – Structure of UDGs and URGs (no. of classes for URGs reflect version 1.3)

# **Emergency visit type**

The emergency visit type variable defines whether a presentation relates to an emergency presentation, a return or planned visit, a pre-arranged admission, or whether the patient was dead on arrival<sup>2</sup>. Table 7 below shows the numbers of patients allocated to these categories in the Emergency Department Care ABF DSS, in 2011-12. The vast majority of episodes (97.8%) are reported as emergency presentations. A further 1.9% of visits are reported as return visit, planned, and small proportions are reported under the other visit types.

<sup>&</sup>lt;sup>2</sup> Dead on arrival is also an 'episode end status' (disposition) value.

# Table 7 – Type of visit to emergency department values in the Emergency Department Care ABF DSS, 2011-12

Value	Meaning	Episodes	% of episodes
1	Emergency presentation: attendance for an actual or suspected condition which is sufficiently serious to require acute unscheduled care.	6,403,457	97.80%
2	Return visit, planned: presentation is planned and is a result of a previous emergency department presentation or return visit.	124,055	1.89%
3	Pre-arranged admission: a patient who presents at the emergency department for either clerical, nursing or medical processes to be undertaken, and admission has been pre- arranged by the referring medical officer and a bed allocated.	11,518	0.18%
4	Patient in transit: the emergency department is responsible for care and treatment of a patient awaiting transport to another facility.	745	0.01%
5	Dead on arrival: a patient who is dead on arrival and an emergency department clinician certifies the death of the patient.	5,405	0.08%
9	Not reported	2,017	0.03%
All episo	odes	6,547,197	100.00%

Under the current URG classification (version 1.3), episodes with a visit type of Return visit, planned are allocated to one of three classes (76, 77, 78) based on episodes end status and triage. All other visit types are treated in the same way as emergency presentations. (In the case of visit types that are dead on arrival, these are allocated to the URG dead on arrival class based on episode end status rather than the visit type.)

Some stakeholders raised the possibility that all non-emergency visits be assigned to separate classes. The rationale for this was that these episodes are similar to other non-admitted care, rather than emergency care visits, and these should be treated and priced in a similar way to other non-admitted care. It was pointed out that in some hospitals the emergency department is sometimes used for the provision of non-emergency care. The proposal for separate classes for non-emergency visits for the purposes of classification was supported at the national workshop. It was also noted that the National Health Information Standards and Statistics Committee (NHISSC) is currently reviewing NAPEDC NMDS data items, including the emergency visit type data item, which may impact this proposal.

# **Disposition (Episode end status)**

Disposition is the second splitting variable (after type of visit) applied in the URG and UDG classifications. There are seven values of disposition reported in the Emergency Department Care ABF DSS, and the current classification (version 1.3) groups these into six categories: admitted, non-admitted, transfer, did not wait, died in emergency department and dead on arrival. The mapping is shown in Table 8. The majority of emergency department episodes are non-admitted, accounting for 63.4% of episodes. Around 28.3% of emergency department of admissions are to short stay units, although national data is unable to precisely identify these units.

Table 8 – Episode end status values in Emergency Department Care ABF DSS and				
mapping to URG/UDG (version 1.3)				

Value	Meaning	URGs/UDGs	Episodes	% of
		Version 1.3	2011-12	episodes
1	Admitted to this hospital (either short stay unit, hospital-in-the-home or non-emergency department hospital ward)	Admitted classes	1,855,102	28.33%
2	Non-admitted patient emergency department service episode completed - departed without being admitted or referred to another hospital	Non-admitted classes	4,147,595	63.35%
3	Non-admitted patient emergency department service episode completed - referred to another hospital for admission	Transfer classes (74)	70,498	1.08%
4	Did not wait to be attended by a health care professional	Did not wait class (73)	326,095	4.98%
5	Left at own risk after being attended by a health care professional but before the non- admitted patient emergency department service episode was completed	Left at own risk classes (combined with type of visit 2 in URG v1.3)	101,633	1.55%
6	Died in emergency department as a non- admitted patient	Died in ED classes (75)	1,954	0.03%
7	Dead on arrival, emergency department clinician certified the death of the patient	Dead on arrival class (38)	5,578	0.09%
9	Not reported	Error	38,742	0.59%
All episodes			6,547,197	100.00%

Disposition, in particular, whether a patient is subsequently admitted to hospital, has been found to be correlated with higher acuity, work load and resource use within the emergency department in a number of studies, including Cameron, Baraff, & Sekhon (1990), Jelinek (1992), Erwich-Nijhout et al. (1997), Wuerz et al. (2001), Varndell, Macgregor, Gallagher, and Fry (2013)<sup>3</sup>. For example, Cameron et al. (1990), after assigning records initially to major diagnostic categories (MDCs), partitioned these into three disposition groups (home/ other non-acute; transfer; and admission). The authors pointed out that "the use of 'disposition' as a partitioning variable proved to be a clinically relevant surrogate for severity of patient disorder. The cost of care of patients admitted to inpatient status was substantially greater than patients with similar diagnoses who were sent home" (p. 52). They also observed that, "the cost of care for transferred patients was significantly greater than patients who were discharged home, but less than those who were admitted for the same disorder" (p. 52).

It is worth emphasising that the Australian approach to classifying same day care as admitted care means that caution is required in interpreting the literature on the impact of disposition based on studies from other countries. An important example is that in the US, a category of 'observation care' has been established within the ambulatory classification, rather than classified to admitted patient care. Patients admitted to observation units (the equivalent of many of the short stay unit models discussed elsewhere in this report) are not

<sup>&</sup>lt;sup>3</sup> There is some difference between systems with respect to what is classified as admitted patient care. In several other systems (e.g. the US and Canada), hospitalisation generally refers to patients admitted for an overnight stay, and excludes patients treated on a same day basis. In these systems patients with a disposition of 'admitted' are those with an overnight hospital stay, whereas in Australia this includes patients admitted to short stay observation units.

typically considered to be admitted patients (Baugh, Venkatesh, & Bohan, 2011). Several studies of these units in the US suggest that around 20% of patients admitted to observation units are subsequently admitted for an inpatient stay, and the remaining 80% are discharged home (Baugh et al., 2011 p 34.). It has been argued that admission to an observation unit is a third disposition option after hospital admission and discharge home.

Although it would seem that disposition explains cost to an extent, the literature highlights that its use in a payment systems may be problematic, as it results in a higher payment for admitting a patient compared with managing them on an ambulatory basis. Sprivulis, (2004) points out that "emergency departments now invest considerable efforts to prevent admission to hospital. These efforts are neither identified nor rewarded by [activity based funding] systems using disposition as a partition variable" (p. 64, referencing Sprivulis, 2003) and leraci, 2003).

Another issue identified in the literature and is discussed in the previous Chapter of this report, is that admission practices may be inconsistent between hospitals. These inconsistencies are potentially further exacerbated by the implementation or availability of short stay units/models of care, with the proportion of admissions being determined by whether or not the hospital has one or more of these models. The issue of inconsistency in admission practices is as much of an issue for admitted care as it is for emergency departments.

Stakeholders expressed several quite divergent views concerning the splitting of classes between patients discharged from the emergency department and those subsequently admitted. These views ranged from:

- Admitted/non-admitted disposition **should not be included in the classification**, as this distorts incentives (providing a higher level of funding for patients who are admitted), is not well aligned with good practice (which is to avoid admission where possible), and may not be a good indicator of cost. The NSW Ministry of Health submission noted that: "...the 20-year-old UDG and URG systems where disposition is a major driver were set up before admissions in the emergency department, extensive work-up in the emergency department without inpatient admission, or the range of alternatives to admission. Disposition can be seen as a perverse incentive with variability in admission practices between states. A study of current models of care and cost drivers would be useful."
- Disposition is a good explanatory variable with respect to costs, and on a pragmatic basis **should continue to be included in the classification**. But on a simple admitted/non-admitted basis, at least until better account can be taken of whether the underlying factors that influence disposition can be brought into the classification.
- A greater degree of granularity of disposition categories could be collected that would provide better information about the severity and complexity of patients. It was pointed out in discussions that most states and territories, and all hospitals, typically record more detailed information about the disposition of patients. It was suggested that where a patient is admitted to an intensive care unit, this indicates that the patient was severely ill as compared with a patient admitted to a ward or a short stay unit for observation. Proponents for using more information on disposition argued this approach indirectly captures information on severity and complexity, without additional data collection required. Suggestions made included:

- o transfer to an intensive care/critical care unit
- o transfer to operating theatre
- o transfer for a specialised mental health unit
- o return to residential care facility (for non-admitted patients).

Several stakeholders representing rural hospitals without a regional support role emphasised that **patients requiring transfer to a referral hospital** are often very resource intensive. Under the current URG and UDG systems, patients transferred to other hospitals are grouped to the 'non-admitted' arm of the classification. Transferred patients often have a serious medical condition or injury that cannot be managed in the local hospital. While waiting for inter-hospital transport to arrive, several staff of the referring hospital are allocated to managing the patient. In addition, the referring hospital is responsible for meeting the cost of inter-hospital transfers, and this can add significantly to the cost of transferred patients. It was argued that these costs vary according to the distance to the nearest referring hospital and the options available in terms of air and land ambulance. These stakeholders argued that transferred patients should continue to be classified in the same way as admitted patients. They also argued that appropriate adjustments were required to address the costs of inter-hospital transfers.

The need for a separate class for patients who '**did not wait**' was confirmed by some stakeholders, recognising that these patients consume emergency department resources.

At the national workshop, there was some discussion of the treatment of episodes where the patient 'left at own risk after being attended by a health care professional but before the non-admitted patient emergency department service episode was completed'. Workshop participants confirmed that these patients should be included within the more general classification, as with other non-admitted patients.

'Dead on arrival' is identified in both the disposition (episode end status) data element and the 'type of visit' data element. In consultations, allocation of episodes to the 'dead on arrival' class was said to be impacted by administrative arrangements which vary across jurisdictions. In particular, the arrangements for obtaining a death certificate vary. One view was that these episodes should be excluded entirely from the classification. However, developing a better understanding of the actual administrative arrangements should occur first, with a view to establishing a consistent approach to whether the body should be taken to an emergency department. In the meantime, there is likely to be a need for a separate 'dead on arrival' class.

At the national workshop, a pragmatic approach to disposition was supported by participants. It was recognised that **disposition is a proxy indicator of severity and complexity**. In the medium term there is a case for including this data element in the classification, but at a lower level in the classification tree. In the long term, it was considered that more direct measures of severity, complexity and cost are required. There was some support for dealing with 'transfers' in the same way as admitted patients. The continuation of classes for 'did not wait' and 'dead on arrival' was also accepted.

#### **Recommendation 9**

Disposition is a proxy indicator of severity, complexity and cost. Stakeholders supported the proposal to include it in the emergency care classification in the medium term, but it should be given lower priority in the classification after grouping cases using principal diagnosis. In the longer term it could be replaced by more direct measures of severity, complexity and dependency.

The development of additional categories in episode end status to reflect a finer grain of disposition types should be investigated. Based on further empirical work, this could be useful for better reflecting different levels of complexity and cost in the emergency care classification.

Transferred patients should be handled in the same way as admitted patients within the emergency care classification. The need for separate classes for 'did not wait' and 'dead on arrival' should be reviewed.

## **Urgency (triage)**

The primary purpose of triage in emergency departments is to "ensure patients are treated in the order of their clinical urgency which refers to the need for time-critical intervention... Triage also allows for the allocation of the patient to the most appropriate assessment and treatment area, and contributes information that helps to describe the departmental casemix" (Australasian College for Emergency Medicine, 2005).

Triage assignment is closely related to the concept of urgency, which is predominantly about timeliness with which assessment and treatment is required. Urgency does not necessarily reflect the *severity* of a patient's condition nor the *complexity* of that condition (Forero & Nugus, 2011).

In Australia, triage is assigned to emergency department episodes using the Australasian Triage Scale (ATS). This scale was developed from the Ipswich Triage Scale (ITS) introduced at Ipswich Hospital in Queensland, Australia, in the late 1980s (FitzGerald, Jelinek, Scott, & Gerdtz, 2010). Following the validation of the ITS (G. A. Jelinek, 1994), it became the National Triage Scale (NTS) (in 1994), and subsequently the ATS in 2000.

The ATS has five categories, as shown in Table 9. These categories are identified as being "...the triageur's response to the question: 'This patient should wait for medical care no longer than ...?'" (METEOR, 2012a]. The categories are not defined further in the national definitions, but reference is made to guidance provided by ACEM in its *Guidelines for the implementation of the Australian Triage Scale in Emergency Departments* (Australasian College for Emergency Medicine, 2005), which were last updated in 2005. The guidelines provide a description of each category and some indicative examples of conditions that could be classified to each category.

Triage category 1 (resuscitation) patients are relatively rare, accounting for less than 1% of episodes. Triage category 2 (emergency) patients account for fewer than 10% of episodes. The majority of patients are allocated a triage category 3 (urgent) or 4 (semi-urgent) representing 33.6% and 44.7% of episodes respectively. Triage category 5 patients account for around 11% of patients. A range of studies has found that a material proportion of patients allocated to triage categories 4 and 5 are subsequently admitted to hospital.

Value	Meaning	Episodes 2011-12	% of episodes
1	Resuscitation: immediate (within seconds)	42,628	0.65%
2	Emergency: within 10 minutes	647,775	9.89%
3	Urgent: within 30 minutes	2,200,146	33.60%
4	Semi-urgent: within 60 minutes	2,923,211	44.65%
5	Non-urgent: within 120 minutes	724,319	11.06%
9	Not assigned	9,118	0.14%
All episod	All episodes		100.00%

## Table 9 – Triage category values in Emergency Department Care ABF DSS and numbers of emergency care episodes, 2011-12

The ATS has been widely studied and is accepted as the standard triage system for Australia (Forero & Nugus, 2011). The *Literature Review* identified several other triage systems used in other countries, including the following:

- The Canadian Triage and Acuity Scale (CTAS): The CTAS was developed in the 1990s and first published in 1999 (Bullard, Unger, Spence, Grafstein, & Group, 2008) with a paediatric version published in 2001 (Warren et al., 2008). The initial work used the Australian triage systems as a starting point. However, the CTAS now goes significantly further in providing guidance based on a standardised set of presenting complaints and other modifying factors. A standardised short list of around 180 presenting complaints has been developed for adults and a similar but slightly modified short list for paediatric patients (Grafstein, Bullard, Warren, Unger, & Group, 2008). These are integrated into national data collection for emergency departments. The CTAS utilises information on the presenting complaint, then requires consideration of first level modifiers, which apply to a broad range of presenting complaints. First level modifiers include factors such as level of consciousness, haemodynamic status (e.g. presence of shock), respiratory distress, temperature, bleeding, mechanism of injury, and pain severity (e.g. acute central pain, chronic central pain, acute peripheral pain, and chronic peripheral pain). Second level modifiers are identified for specific complaints.
- The Manchester Triage System (MTS): The MTS is widely used across the UK and Europe (Manchester Triage Group, 2006) and has been implemented in some Australian emergency departments (Grouse, Bishop, & Bannon, 2009). The system is based on flow charts for about 50 common problems experienced by patients presenting to emergency departments. It uses a combination of presenting problem and other 'discriminators'. These other discriminators may be general discriminators that apply across all categories of presenting problem (e.g. severe pain) or context specific (e.g. cardiac pain). In theory, there are around 1,000 combinations of major presenting problems and discriminators within the system. However, in the underlying codes, there are about 50 major presenting problems, which combine with 30 discriminator states, making the data collection manageable. The MTS can provide an approach to standardising and/or auditing triage assignment.
- Emergency Severity Index (ESI): The ESI is a five-level triage system that has been developed in the US. It takes a two-tiered approach to determining the care needed by patients. The first tier differentiates patients based on urgency, for example, where a patient is unresponsive, intubated, apnoeic or pulseless. A second tier identifies

whether a patient is at high risk, confused/lethargic/disoriented or in severe pain or distress. A third tier relates to patients who can wait for treatment. These are assigned to three groups according to the resources typically required. Depending on vital signs, some patients within the third tier may be assigned to the second tier. The ESI aims to distinguish between patients who must be seen immediately (broadly equivalent to Categories 1 & 2 in the ATS) and patients who can wait (broadly equivalent to Categories 3, 4 & 5 in the ATS). These systems apply more explicit algorithms, compared with the ATS. The types of information used for triage assignment in these systems, give some indication of what may be alternatives to triage for a casemix classification system. For example, presenting complaint/problem is an important aspect of both the CTAS and MTS. Various modifiers/discriminators such as level of consciousness, respiratory distress, bleeding and type/severity of pain, are used in each of these systems, most frequently to identify the most urgent patients where treatment will be time critical, from less urgent patients.

The literature highlights a number of issues around the validity, safety and reliability of triage assignment, and also the potential for triage assignment to be impacted by local practices. A recent systematic review suggests that the available evidence on validity and safety is limited (Farrohknia et al., 2011).

Reliability of assigning triage has been a key topic of discussion and research (Farrohknia et al., 2011, Forero & Nugus, 2011; Oredsson et al., 2011). There have been a range of efforts to improve triage consistency in Australia such as the Emergency Triage Education Kit (ETEK) (Gerdtz et al., 2008) and training has been one factor that has been found to improve consistency of assignment (Forero & Nugus, 2011, Fernandes, Wuerz, Clark, & Djurdjev, 1999). Other researchers have looked to ways of automating the process and/ or using algorithms as an aid to decision making during the triage process (Zmiri, Shahar, & Taieb-Maimon, 2012) such as the algorithms underpinning the international systems discussed above.

However, the literature points to a large degree of variation between hospitals and individuals in assignment of triage (FitzGerald et al., 2010, Gill, Reese, & Diamond, 1996). This is related to a range of factors, including clinical diversity of patients, personality and experience of the rater, culture, incentives and policies. FitzGerald et al., (2010) point out that "the diversity and complexity of health is such that it is never possible to have a correct answer for triage of any individual patient. Indeed, there is probably no such thing as a 'correct' answer, so there is no gold standard against which to measure triage accuracy" (p. 89). Therefore, there is no clear or consistent basis on which it might be audited (e.g. in the way that diagnosis assignment might be audited through a review of the medical chart). Consequently, FitzGerald et al., assert that "[i]ncorporation of funding linked to triage assessment creates an incentive to over-triage and the potential for 'gaming' to achieve higher returns" (p. 90).

There is evidence triage is strongly correlated with cost. Erwich-Nijhout et al., (1997) analysed cost drivers in the emergency department and found that urgency "...was a potent predictor" of staff time, resource use and costs (p. 184). This replicated Jelinek's (1992) earlier findings. Based on a range of studies, there is no doubt that triage is highly correlated with costs in emergency departments.

At the consultations most clinicians argued for removing triage from the emergency care classification as soon as possible. Clinicians recognised the importance of using triage for managing the clinical work flow within an individual emergency department. However, the use of triage in a classification used for funding purposes was considered problematic both because of inconsistencies in triage assignment between and within emergency departments, and because it does not adequately capture key clinical aspects of patients that impact cost. For example, the ACEM submission stated:

"The continued inclusion of triage as an element of the emergency care classification is <u>not supported</u>. ACEM asserts that triage should only be used to describe clinical urgency. Separate measures are required to describe the factors such as severity, complexity, quality of care, workload and staffing, which are more appropriate to ascribing resource utilization associated with care provision."

The lack of capacity to independently review or audit triage assignment was also raised as an issue. Stakeholders did not support strategies to achieve greater standardisation of triage assignment for activity based funding purposes, including the potential adoption of alternative systems, such as the international systems mentioned above.

Some clinicians recognised that using triage within the classification may be required in the medium term, but emphasised the need for better and more direct measures of the underlying cost drivers. For example, the Queensland Emergency Department Strategic Advisory Panel, observed that:

"Broadly speaking triage is not necessarily reflective of contemporary models of emergency department care... Generally, the emergency department community is ready to move on from triage forming the basis for analysis of all things 'emergency department'. Consensus regarding replacement measures designed to capture complexity is required to be developed and adopted. It is envisaged until this time, it is likely that triage will continue to perform functions for which it was never intended".

Several stakeholders pointed out that the use of triage in smaller hospitals is potentially problematic, as in these settings there is rarely a need to triage patients.

Most stakeholders were keen to see a reduction in the importance of triage within the classification. For example, there was wide support for a medium term strategy of:

- grouping the five levels of triage in the Australasian Triage Scale to two or three levels for classification purposes; and
- introducing this modified approach to triage at a lower level within the classification tree.

This was the broad conclusion drawn at the national workshop, with a clear preference that triage be removed entirely from the classification in the long term (4-5 years), and replaced by more direct measures of severity, complexity and cost. Workshop participants emphasised that reducing the importance of triage or removing triage from the classification may reduce the explanatory power of the classification, until better patient level costing of emergency care becomes available.

#### **Recommendation 10**

In the medium term it may be necessary to continue to use triage within the classification, but the way in which triage is used should change to reduce its importance. In the longer term triage should be entirely removed from the classification and replaced by other measures more directly related to severity, complexity, dependency and their impact on cost.

## **Principal emergency department diagnosis**

As a result of the implementation of activity based funding, the principal diagnosis assigned to a patient during the emergency department stay has been incorporated into the NMDS for emergency care, along with up to two additional emergency care diagnoses. The principal diagnosis in this context is defined as "the diagnosis established at the conclusion of the patient's attendance in an emergency department to be mainly responsible for occasioning the attendance following consideration of clinical assessment" (METEOR, 2012b). This may vary from the principal diagnosis coded during the hospital admission that follows when an emergency patient is admitted.

Typically, recording of diagnosis occurs within the emergency department through entry by a clinician either directly into an emergency department information system or onto a form, which is subsequently entered into a system by a clerical officer. Coding is not performed by a clinical coding workforce, although expert advice may be provided to clinicians to guide their coding practice.

Diagnoses in Australian emergency departments are coded using one of three systems:

- International Statistical Classification of Diseases and Related Health Problems 10th Revision - Australian Modification (ICD-10-AM) 6th edition, 7th edition and 8th edition
- International Classification of Diseases 9th Revision Clinical Modification (ICD-9-CM) 2nd edition
- Emergency Department Reference Set (EDRS) Systematized Nomenclature of Medicine Clinical Terms Australian version (SNOMED CT-AU).

Table 10 and Table 11 shows the use of the different coding systems based on data reported to IHPA for 2011-12. The table also shows an analysis of the number of unique codes used for reporting. These range from over 27,000 unique codes for SNOMED-CT-AU to between 1,500 and 5,500 for various ICD coding approaches. Importantly, across each of the coding systems with the largest number of episodes reported, **between 1,000 and 1,500 codes account for the vast majority of episodes** (between 85 and 97% of all episodes).

The small number of codes used for reporting under the ICD system, reflects the adoption by several states of **short lists of ICD-10-AM codes**. In consultations, emergency department clinicians commented that a short list of 1,000-2,000 codes is considered sufficient to capture all the major diagnoses within an emergency department, with other rarer codes offering little additional informational value. The short lists also offer efficiency advantages as emergency department clinicians can become familiar with codes that are used often and are able to quickly record relevant data. Short lists are also common for international systems, such as in Canada (i.e. for use in the CACS). The state and international short lists have usually been developed with considerable clinical input.

## Table 10 – Coding systems used for reporting diagnosis, Emergency Department Care ABF DSS , 2011-12

Coding system/Terminology	Total number of episodes reported	% of episodes
SNOMED-CT-AU	1,424,693	23.8%
ICD-9-CM, 2nd edition	70,458	1.2%
ICD-10-AM, edition not specified	297,176	5.0%
ICD-10-AM, 6th edition	1,953,620	32.7%
ICD-10-AM, 7th edition	2,077,202	34.7%
Other system	142,224	2.4%
No diagnosis classification	17,517	0.3%
Total episodes	5,982,890	100.0%

## Table 11 – Number of unique diagnosis codes/terms reported and proportion of episodes, Emergency Department Care ABF DSS, 2011-12

		Unique c	odes with:		
System	One episode reported	2-10 episodes reported	11-100 episodes reported	101 or more episodes reported	Total number of codes reported
SNOMED-CT-AU	10,143	8,189	4,848	1,575	27,460
ICD-9-CM, 2nd edition	280	391	498	155	1,528
ICD-10-AM, edition not specified	268	280	511	368	1,547
ICD-10-AM, 6th edition	538	746	1,214	1,229	4,083
ICD-10-AM, 7th edition	1,294	1,332	1,270	1,172	5,584
Other system	•	•	1	21	22
No diagnosis classification provided	•	•	1	1	2
	% c	of episodes	reported aga	inst these co	des
SNOMED-CT-AU	0.7%	3.2%	10.9%	85.3%	100.0%
ICD-9-CM, 2nd edition	0.4%	3.9%	24.2%	71.5%	100.0%
ICD-10-AM, edition not specified	0.1%	0.6%	7.0%	92.3%	100.0%
ICD-10-AM, 6th edition	0.0%	0.3%	2.3%	97.4%	100.0%
ICD-10-AM, 7th edition	0.1%	0.4%	2.1%	97.4%	100.0%
Other system	0.0%	0.0%	0.1%	99.9%	100.0%
No diagnosis classification provided	0.0%	0.0%	0.4%	99.6%	100.0%

In Australia, work was undertaken to develop a short list of diagnoses and presenting problems between 2005 and 2007, under the auspice of the predecessor to the National Health Information Standards and Statistics Committee (NHISSC). This work led to the development of a short list of emergency care diagnoses in ICD-10-AM, which was adopted by Victoria. This code set has approximately 1,400 codes. However, work on a list of presenting problems stalled and was not progressed.

In 2011, in consultation with the National Emergency Department Projects Advisory Committee (NEDPAC), NEHTA developed **four emergency department reference sets**, **collectively known as the EDRS** (Hansen et al., 2011), which included around 5,168 diagnoses and 389 presenting problems. A mapping from the EDRS to ICD-10-AM was commissioned by the then Department of Health and Ageing, and developed. However, it is now out of date, having been built against ICD-10-AM 6<sup>th</sup> edition (the current edition is the 8<sup>th</sup>) and using a pre-2010 SNOMED-CT-AU release. Governance arrangements for the maintenance of the EDRS and mappings have not been agreed as yet, and there is no agreed arrangement for maintaining and updating the term sets. The impetus to record diagnosis using SNOMED-CT has mainly come from the attempt to implement an electronic medical record for emergency departments with a capability of interfacing with other electronic health systems (inter-operability). SNOMED-CT is a terminology rather than a classification system (as ICD-10-AM is).

Diagnosis has been found to be correlated with cost in a number of studies, and has been included as an important data element in some international classifications. Cameron et al. (1990) included diagnosis in the design of the EDGs. For EDGs, diagnosis is used at two levels. The first is the initial partitioning, which is on MDC. This is followed by disposition. Diagnosis is used again in the partitioning within MDC/ disposition clusters. (Cameron et al. (1990) coded diagnosis using ICD-9-CM.)

Diagnosis was found to be one of the data elements correlated with work load and resource use by Jelinek (1992), and thus included in the development of the URGs. In the Jelinek study, diagnosis was coded using a locally developed system. Both Jelinek (1992, 1994) and Sprivulis, (2004) showed an increase in resource use associated with patients presenting to the emergency department with an illness compared with those presenting with an injury.

Using diagnosis within the emergency care classification was strongly supported by almost all stakeholders. However, achieving consistent and valid recording of this information using efficient methods was also considered imperative. In consultations and at the national workshop there was strong support for the development and maintenance of national short lists of diagnosis codes and other codes such as presenting problem, which are relevant to emergency care. Many expressed the view that maintaining a short list could potentially improve data quality and have efficiency advantages. Clinicians indicated that a short list of diagnoses is sufficient to capture the range of conditions managed in emergency departments, and that there was a good case for adoption of agreed national short lists.

The consultancy team observed that there are potentially several ways in which the approach taken to date could be improved. In particular, the process for determining short lists could be shaped by more empirical analysis, designed to ensure that conditions identified within short lists are reported at a reasonable level of frequency. This is likely to improve the quality of data reported and the efficiency of reporting. Secondly, the short lists need to be exhaustive. That is, despite their brevity, all diagnoses encountered need to be represented in some way (e.g. 'other injury').

Participants in the national workshop agreed that it was important to build on national developments that were already in place, for example, the work on the EDRS developed by NEHTA and NEDPAC. However many were puzzled by the apparent lack of ongoing mechanisms for governance of this term set, the associated mapping to ICD codes and the absence of a process to achieve a national approach to these through the national data governance processes. There was strong support for an ongoing governance approach for these lists that has strong clinical engagement and leadership.

For the purpose of a classification, diagnoses are grouped into higher level groupings. In the URG classification, these groupings are referred to as *major diagnostic blocks* (MDBs). Many stakeholders indicated that this approach to the grouping of diagnoses requires fundamental review. The current URG system continues to use the basic structure adopted

by Jelinek in his 1990 study, which was in turn, driven by the way diagnosis was recorded in one Perth hospital at that time. Several clinicians indicated that there was a need for a more clinically meaningful approach to using data on diagnosis within the classification, and that this will require a larger number of groups.

#### **Recommendation 11**

Principal emergency department diagnosis should play an important role in the emergency care classification. It should result in clinically meaningful classes, meaning that it should represent conditions commonly encountered in emergency departments at an appropriate level (i.e. not group them up into higher level categories that are almost meaningless, such as 'circulatory system diseases and disorders'). This is partly dependent on how diagnoses are captured in the first instance (i.e. the level of granularity of the clinical coding system/ terminology), as well as how they are represented in the classification system.

Efforts are required to achieve greater consistency in the approach to recording principal emergency department diagnosis, which will contribute to improvements in the quality of data. Governance processes, with a high level of clinical leadership, are required to develop and maintain an agreed short list of principal diagnoses. This short list should be exhaustive and able to be implemented consistently both in systems where ICD10-AM is used as the system for recording diagnoses and systems where SNOMED-CT-AU terminology is used.

## **Presenting problem**

During the consultations several clinicians suggested that the presenting problem (often referred to as the 'presenting complaint' in the North American literature), was potentially a more important predictor of costs than principal diagnosis. The reasoning behind this view was that patients with a particular presenting problem, such as abdominal pain, will require a similar level of resources at least for the diagnostic component of an episode. It was acknowledged that once a particular diagnosis had been established, treatment pathways will diverge, and consequently, costs will vary. A recent US study found a poor correspondence between emergency department discharge diagnosis and presenting complaint (Raven, Lowe, Maselli, & Hsia, 2013).

Clinicians indicated there were a relatively small number of presenting problems, which account for a large proportion of cases, and that the development of a short list of presenting problems was feasible. This view is supported by the fact that several international systems such as the CTAS and MTS use a small number of presenting problem categories (180 and 50 respectively) with slightly modified paediatric versions (Grafstein et al., 2008; Manchester Triage Group, 2006). The lists are 'exhaustive' in the sense that they can be applied to all emergency department presentations. Both systems were developed through a process led by clinicians and involved very extensive clinical consultation.

The Canadian system of presenting complaints includes a mapping to ICD-10 codes (Grafstein, Bullard, Warren et al., 2008). ICD-10 and its modifications include a range of codes that relate to symptoms and signs, which are equivalent to presenting problem concepts. In many instances the presenting problem will also be the final emergency care diagnosis (e.g. chest pain). This occurs when other specific diagnoses have been ruled out (e.g. acute coronary syndrome).

Presenting problem is not currently included in the NAPEDC NMDS. It is collected locally, but usually through free text entry or local coding systems. Clinicians and LHNs consulted indicated that presenting problem is typically initially recorded by the triage nurse, and then accepted by the treating doctor and clinical staff.

The Australian EDRS includes a list of 389 presenting problems, although this has not been widely implemented. This list includes some of the more common conditions presenting to an emergency department, but it is not exhaustive in the sense that some presenting problems will require additional terms not within the list of 389 problems.

The literature on the extent to which presenting problems explain variation in cost is limited and equivocal. Jelinek (1992) employed a prospective coding system for presentations, which meant that in the study, it was the presenting problem rather than diagnosis that was captured to develop URGs. He argued that presenting problem may be more relevant as it drives the investigations and consequently the resources used in attending to a patient in an emergency department. Sprivulis (2004) collected both presenting problem and diagnosis, but found "relatively poor discrimination of diagnosis with respect to complexity<sup>4</sup> compared to [Australasian Triage Score] odisposition although performance appears slightly better than presenting problem" (p. 63).

Most clinicians consulted supported the development of a national short list, and considered that collection of presenting problem should be considered for national data collection. This view was confirmed at the national workshop. These developments will be useful for reasons beyond the implementation of activity based funding, for example, providing a better basis for understanding variation in triage assignment and potentially achieving greater consistency in triage assignment. It was recognised that as presenting problem is typically identified at the commencement of the episode by the triage nurse, a shorter list is required compared with emergency department diagnoses, and probably shorter than the list of 389 presenting problems in the EDRS. This list must be exhaustive in the technical sense that all episodes can be assigned to one of the presenting problem categories.

It was also acknowledged that further empirical work is required to answer the question of whether presenting problem represents a better underlying concept for developing an emergency care classification, compared with principal emergency department diagnosis. This question should be on the agenda for longer term development of the emergency care classification. However, implementation could not be considered until presenting problem becomes part of the national data collection.

<sup>&</sup>lt;sup>4</sup> Defined as "the total diagnostic and procedural effort expended in assessing and managing a patient during an emergency department attendance" (Sprivulis 2004, p. 60).

#### **Recommendation 12**

The use of presenting problem within the emergency care classification should be evaluated as an option for the longer term. In the medium term there is a need for national efforts to agree a short list of presenting problems, to be used locally, and assessed for potential inclusion in the national data collection. As discussed above, a clinically led governance process is required to achieve and maintain a short list of presenting problems that is exhaustive and reflects practical considerations associated with implementation.

## Severity, complexity and dependency

The concept of urgency is predominantly about timeliness of care rather than the **severity**, **complexity or dependency** of a patient's condition (Forero & Nugus, 2011). FitzGerald et al. (2010) illustrate situations in which a patient has an urgent condition that is not severe (a dislocated joint) and situations in which urgency is low but the condition is severe (terminal malignancy).

**Complexity** has been defined in different ways including as "the total diagnostic and procedural effort expended in assessing and managing a patient during an emergency department attendance" (Sprivulis, 2004, p. 60). As with severity, complexity may not always be associated with urgency, but it is an independent driver of costs. For example, an older patient with a minor injury but with moderate or severe behavioural or psychological disturbances of dementia may be assessed to have a low level of urgency, but require involvement of a range of disciplines within and outside the hospital. Complexity is often impacted by the presence of comorbidities, such as chronic illnesses, mental disorders and the social circumstances of a patient. Examples of comorbidities which contribute to more complex care include:

- cancer
- cerebrovascular disease/history of stroke or transient ischaemic attack
- chronic obstructive pulmonary disease
- condition requiring dialysis
- congestive heart failure
- dementia
- diabetes
- history of heart attack
- history of pulmonary embolism or deep vein thrombosis
- HIV infection/AIDs
- a mental health condition.

(Centre for Disease Control and Prevention, 2013)

Examples of social circumstances that may impact the complexity of care include:

- homelessness
- children at risk
- law enforcement involvement.

Patient **dependency** is another related concept referred to in the literature, which particularly impacts the level of nursing input required for patients and consequently costs (e.g. Varndell et al., 2013). Dependency may be impacted by a patient's level of functioning, while often associated with urgency, severity and complexity, it is does

potentially have a separate impact on costs. Various systems for assessing dependency have been developed, including the Jones Dependency Scale. Examples of factors that reflect dependency within this scale include:

- consciousness
- level of pain
- extensive behavioural problems (psychological or drug related)
- presence of a developmental disability
- capacity to communicate in English
- ability to self-manage daily living tasks
- mobility

(Varndell et al., 2013)

Clinicians consulted during the project emphasised that severity, complexity and dependency are unlikely to be well reflected in the urgency (triage level) of a patient or through using a single principal diagnosis. In some cases, a single principal diagnosis is also insufficient to fully capture the nature of the principal condition resulting in a patient presenting to an emergency department (e.g. patients presenting as a result of poisoning who are unconscious).

To adequately capture the impact of these cost drivers, an emergency care classification needs to harness additional information related to these concepts. This additional information is most likely to be captured through the recording of **additional diagnoses**. Currently there is provision within the NAPEDC NMDS for the reporting of up to two additional diagnoses. However, the reporting of additional diagnoses is low.

## Most clinicians consulted considered that use of additional diagnoses was important for achieving a robust approach to addressing severity, complexity and dependency. ACEM argued:

"Severity and complexity of patient presentation are the most relevant elements for the classification, particularly with regard to cost drivers for emergency care, as these factors reflect the intensity of care provided to patients during their time in the emergency department... In terms of complexity of patient presentation, the presence and degree of comorbidity/ies is a significant factor that should be incorporated into the emergency care classification."

However, clinicians were sensitive to **the additional burden** associated with more complete reporting of additional diagnoses. Various options for improving reporting while managing data collection costs were discussed. These included:

- Taking a similar approach to acute care, where any additional diagnosis can be reported.
- Creation of a 'very short list' of additional conditions that, at a minimum, need to be reported when present. A common reflection was that there were about 30 conditions that had the most impact on costs.
- Creating business rules to report the most significant two additional diagnoses.

- Designating data elements within the NMDS that relate to specific concepts, for example, separate data elements for:
  - o qualifying the principal diagnosis
  - o comorbidities
  - o presence of mental health conditions
  - o social circumstances
  - o factors impacting dependency.
- Creating 10-20 variables that flag the presence of each of the agreed priority additional diagnoses (e.g. through the use of tick boxes).
- Creating a variable that indicates the presence of any diagnosis within a group of comorbidities commonly thought to lead to more complex care. This could be implemented as a small set of flags (tick boxes), which would allow for some differentiation of underlying concepts, or a pick list with, for example, 5 categories of complexity.

At the national workshop, the need for using additional diagnoses within the classification was recognised, but no clear preference emerged amongst the above approaches. There was recognition that the concept of short lists should also be applied in collecting additional diagnoses.

Piloting of data collection approaches is appropriate to determine a national strategy that balances the value of the additional information and data collection burden.

#### **Recommendation 13**

Information on additional diagnoses is required to ensure the emergency care classification can adequately account for differences in patient severity, complexity and dependency and their impact on cost. While up to two additional diagnoses can be reported under the current national data collection specification, actual reporting of additional diagnoses is poor. Therefore using additional diagnoses in the emergency care classification is not likely to be feasible in the medium term. The immediate focus should therefore be on assessing options for efficient data collection, which also adequately captures the factors that lead to higher levels of severity, complexity and dependency. In the longer term, the emergency care classification should utilise this information to better account for differences between patients in their levels of severity, complexity and dependency.

## **Procedures and investigations**

Currently, procedures undertaken on patients in emergency departments are not extracted into any of the national emergency care data sets. This is not to say that they are not collected at the local level (i.e. within hospital emergency department systems). For patients that are subsequently admitted, procedures are coded using the Australian Classification of Clinical Interventions (ACHI, part of the ICD-10-AM suite), and extracted into the Admitted Patient Care (APC) NMDS.

As discussed previously, many of the international classifications reviewed utilise information on the nature of the investigations undertaken, procedures performed. In these systems, reporting of procedures often includes consultation and management 'procedures' as well as interventional procedures.

In the APC, APG and CACS systems, episodes are allocated to classes first based on whether a 'significant' or designated procedure has occurred in the episode. In the APC and APG systems there is a broad range of potential classes to which an episode might be allocated, depending on the precise procedure undertaken. In the Canadian CACS, episodes in which designated procedures are undertaken are allocated to a single class - *B051 Emergency Visit Interventions*.

Mixed views expressed during the stakeholder consultations over whether procedures undertaken in the emergency department should be a classification data element. A substantial number of clinicians indicated strong support for this option, although there was recognition that for classification, this should be limited to procedures that were largely 'nondiscretionary'. One comment made was that there should be recognition of procedures undertaken in the emergency department that lead to avoidance of admitting the patient to undergo the procedure. An example given is a reduction of a fracture, which can appropriately be undertaken in the emergency department.

A smaller number of clinicians did not support use of information on procedures within the classification, and this was also the view of ACEM which stated:

"Including procedures and investigations as a classification element for emergency care is not supported, as these are not strongly correlated with the intensity of care provided to patients".

In discussing options for addressing this issue many stakeholders indicated some support for exploring options which targeted a range of procedures. These could include procedures which flag the provision of other more complex procedures. For example, recording provision of *procedural sedation* or a *regional anesthetic technique* could be a marker of a wide range of other procedures. Examples of procedures that might be included in a short list relevant for emergency care included:

- procedural sedation
- regional anesthetic technique
- CPR
- BiPAP/CPAP
- intubation
- insertion of a central line
- thrombolysis.

Most stakeholders recognised that including diagnostic investigations in the classification would be problematic. However, a small number of stakeholders thought that collection of the use of some types of diagnostic imaging could be considered. It was pointed out that generally, information on diagnostic investigations is captured electronically, and that incorporation of this information into a DSS/NMDS would be possible without significant additional data collection burden.

At the national workshop, stakeholders agreed that in the long term the classification should be enhanced to incorporate data related to major procedures provided, but with the focus on a limited set of these. Participants also suggested exploring capturing information on diagnostic imaging, but were not clear this should ultimately be utilised within the classification.

#### **Recommendation 14**

Information on selected procedures provided to emergency care patients is likely to be shown to be an important predictor of costs. Only a small number of procedures are likely to be important for classification purposes. However, the potential contribution of information on procedures in explaining variation in cost needs to be assessed empirically, along with options for efficient data collection.

## Age

A range of studies has found that the age of the patient is correlated with cost of emergency care. For example, in the work on Emergency Department Groups (EDGs) Cameron et al., (1990) found an empirical basis for introducing age as a partitioning variable after consideration of principal diagnosis and disposition. The EDG classification used three age groups: 0-35, 36-64 and 65+ years.

Bond, Erwich-Nijhout, Phillips, & Baggoley (1998) also found age to be an important predictor of costs, accounting for 12.5% of cost variance. They developed the Urgency Disposition and Age Group (UDAG) classification by splitting classes in into four age groups ( $\leq 14$ , 15 – 34, 35-64 and 65+), after consideration of disposition and triage.

Sprivulis (2004) also found a strong relationship between age and emergency department workload complexity. He suggests that "patient age is very highly correlated with complexity and [emergency department] age distribution could potentially be used as a proxy for complexity, particularly if used in conjunction with age vs. complexity tables validated for specific types of emergency departments." (p. 64).

One of the factors driving this relationship is that age informs the differential diagnosis assigned by clinicians (Samaras, Chevalley, Samaras, & Gold, 2010), and consequently the diagnostic and treatment pathway. On this basis, age should be predictive of costs over and above the relationship with diagnosis. Another aspect of this relationship is that age is correlated with the presence of comorbidities and other factors impacting complexity. In this sense, age is a proxy for complexity. In this respect, the importance of age in explaining cost variation would reduce as a classification became more sophisticated in addressing patient complexity.

An advantage of incorporating age into the classification, mentioned in the literature and by many stakeholders, is that it is easily collected and "*it is a difficult variable to manipulate in the face of funding incentives*" (Sprivulis, 2004, p. 63).

Most clinicians consulted supported the proposal to introduce age into the classification in the medium term and potentially the long term. ACEM argued that age:

"as a measure of patient dependence, is another factor for consideration as a potential classification element but the degree of interrelationship with comorbidity, particularly for older-aged patients, needs to be factored. As such, age cannot necessarily be considered as a proxy for other factors driving resource use".

The CHA submission highlighted a range of reasons why provision of emergency care to children was different clinically and in terms of resources. The CHA argued that there was a case for addressing these issues both through the classification and potentially through relevant adjustments in the NWAU calculation.

Many clinicians supported the view that if the classification is to incorporate age, this should be done only for the extremes of age: the very young and the very old. However, at some consultations it was pointed out that the impact of age on cost may vary across conditions. For example for patients with a severe mental health issue, it was suggested that complexity and costs can be more significant for adolescent and young adults.

At the national workshop participants agreed that age should be a contributing data element for the classification in the medium term and, based on analysis of evidence, in the long term. It was also recognised that there may be alternatives to introducing age into the classification as a specific partitioning variable. The nature of these alternatives is discussed in Chapter 5.

#### **Recommendation 15**

The impact of the age of the patient on costs should be considered in an emergency care classification in the medium term and, based on further empirical analysis in the longer term.

## **Regional and remote locations**

Various stakeholders highlighted additional costs associated with location in rural and remote areas. At the national workshop, it was proposed and agreed that these issues were best handled through NWAU adjustments. It was also suggested that these adjustments should be developed on a consistent basis across acute, subacute, emergency care, non-admitted and mental health streams.

As discussed earlier, where a patient is transferred the referring hospital is responsible for meeting the cost of inter-hospital transfers, and this can add significantly to the cost of transferred patients. This arrangement has a significant impact for hospitals located in rural and remote settings, although the cost impact will vary according to the distance to the nearest referral hospital, and/or the nature of transport that is selected. Several stakeholder representing rural hospitals argued that appropriate adjustments were required to address the costs of inter-hospital transfers.

#### **Recommendation 16**

The impact on costs associated with regional and remote locations, over and above the impact of other factors addressed through the emergency care classification, needs to be demonstrated through empirical investigation. Subject to demonstrating this impact, these additional costs should be addressed on a comparable basis for other product streams, that is, through a regional and remote adjustment within the NWAU calculations, rather than through the emergency care classification.

The transport costs incurred by hospitals transferring emergency care patients to referral hospitals are likely to be significant. There is a need to investigate the characteristics of these costs and how they vary between hospitals. If considered in scope for activity based funding under the NHRA, these costs should be addressed through an appropriately designed adjustor, rather than through the emergency care classification.

## **Indigenous status**

While costs of Aboriginal and Torres Strait Islander patients have been studied for admitted patients, there is little published evidence with respect to emergency care patients. Some research suggests rates of discharge against medical advice is five times higher for Indigenous patients compared with other patients (2012, Indicator 3.09). This pattern is also likely to be found in emergency care episodes. In addition, the reasons that Indigenous patients present for emergency care may vary from those of other Australians.

Most stakeholders recognised that there may be additional costs associated with the provision of emergency care for Aboriginal and Torres Strait Islander patients associated with:

- additional comorbidities
- social circumstances
- language and communication issues
- cultural issues.

While there is a need for further research, there are reasons to believe that Indigenous status will have an impact on cost, over and above the other factors impacting costs (such as diagnosis). Most stakeholders agreed that these issues should be addressed through **an Indigenous status adjustment**, in the same way as is applied for acute care, based on empirical analysis of data, rather than through the classification itself. This approach was supported at the national workshop.

It was also highlighted that Indigenous status interacts with locational issues, as Aboriginal and Torres Strait Islander patients are a higher proportion of patients in hospitals located in rural and remote regions.

Some stakeholders argued that, as the classification is refined to address some of the issues outlined above, the need for an Indigenous status adjustment may diminish.

#### **Recommendation 17**

The higher cost of Indigenous emergency care patients, over and above the impact of other factors addressed through the classification, should be demonstrated through empirical investigation. Subject to demonstrating this impact, these costs should be dealt with on a comparable basis for other product streams, that is, through an Indigenous patient adjustment within the NWAU calculations, rather than through the emergency care classification.

Despite reviewing and making recommendations on a range of cost drivers, the resulting classification should not require the collection of a large number of data elements in addition to those already collected. Where possible, and as discussed in relation to individual data elements, new data elements should make use of short lists, check boxes to reduce the burden of data collection on clinicians.

#### **Recommendation 18**

That the new classification be limited to requiring no more than five additional data elements to be collected. Data elements should make use of short lists/ check boxes to reduce the burden of data collection on clinicians.

## **Other disadvantaged groups**

Various stakeholders highlighted the impact on costs of other disadvantaged groups. Specific groups mentioned included refugees, Pacific Islanders and people from culturally and linguistically diverse (CALD) backgrounds. It was generally accepted that these issues could not be addressed through classification design. However, these stakeholders argued that IHPA should analyse evidence concerning whether there is a case for relevant adjustments to the NWAUs to address these issues.

## **Other cost drivers**

Stakeholder consultations highlighted a range of other cost drivers. However, there was only limited support for addressing these through classification development. The factors highlighted included:

- Consultation and liaison roles: Emergency department clinicians in referral hospitals • play a role in supporting general practitioners and referring hospitals. This role is often undertaken by telephone, and in some instances by videoconference. In many instances the objective of consultation is to discuss whether a patient requires transfer to a major hospital, or whether they can continue to be managed in their current setting. An objective of these consultations is to avoid a presentation to the referral hospital (where clinically appropriate), and to support the local general practitioner or hospital in managing the patient. However, this activity is not recognised or counted for activity based funding purposes. While telemedicine consultations may be recognised for non-admitted care, there is no provision for reporting this activity under the NAPEDC NMDS. Without inclusion of these consultations in the NMDS, inclusion of this activity in the emergency care classification is not feasible. It is worth noting that at least one international classification (Canadian CACS system) includes a specific class for telephone/telemedicine consultation. This issue touches on a broader policy matter that will require the attention of IHPA. In the medium term, it will be important to study the nature and costs of this activity, to determine whether it is best addressed through reporting of data and recognition in the classification, or a cost that would generally be expected to be incurred by an emergency department, and best handled by absorbing these costs into other emergency episodes.
- Consultation and liaison with hospital staff: In many instances, emergency care staff call on other clinical staff within a hospital to assist with a patient. Although local practice varies, these consultation and liaison costs are generally not explicitly captured in the national hospital cost data collection and allocated as emergency care costs. More typically, these costs are incorporated into the costs associated with the relevant clinical staff member's provision of admitted and non-admitted care. Some research has highlighted that patients requiring consultation and liaison services are more costly (Sprivulis, 2004). Stakeholders who raised this issue generally recognised that this is more a matter for improving the accuracy of costing of emergency care rather than for classification.
- Teaching, training and research: ACEM and several clinicians mentioned that emergency departments have an important role in clinical teaching. They asked that these issues be highlighted with respect to a separate project that IHPA has

commissioned to advise on appropriate models for supporting teaching, training and research.

- Mental health legal status: Several stakeholders highlighted that patients with mental health problems who are involuntarily admitted require significant additional resources. Often there is a delay until a psychiatrist is able to attend and examine the patient. Mental health legal status is currently used within the AR-DRG system. While the presence of a mental health presenting problem or co-morbidity was agreed as being a relevant factor in patient complexity and assessment and treatment, whether mental health legal status also needs to be recognised in an emergency care classification was agreed to be an issue for which further research may be required.
- Mode of arrival: Some stakeholders referred to research that indicated that patients arriving by ambulance are more costly than those arriving by other means. Others pointed out that patients referred from another emergency department are more complex. For example, both Jelinek (1992) and Sprivulis (2004) found patients arriving by ambulance to the emergency department had a higher number of procedures, investigations and/ or consultations in the emergency department than those arriving by other means. Stakeholders pointed out that these patterns are changing over time. Those who discussed this issue did not support the inclusion of mode of arrival in the classification.
- Time of day and day of week of presentation: There is some evidence that average cost of patients varies across the time of day and day of week. It is well known that demand fluctuates significantly over time and emergency departments are impacted by 'patient surge' Varndell et al. (2013). While staffing of emergency departments is adjusted across shifts to reflect these fluctuations, the alignment of available staff and patients presenting is imperfect. This impacts waiting times, but it also impacts the 'treatment time' within emergency departments. When emergency departments are very busy, treatment times may be longer for some patients. In addition, treatment time is also impacted by the access block, which also varies over the time of the day and day of the week. These differences in treatment time result in differences in costs, as treatment time is often an important input to estimates of costs. However, it was considered that this source of cost variation would be inappropriate to include in an emergency care classification, as this reflects the provider response to variation in patient demand, rather than the characteristics of patients themselves.
- Time in emergency department: A range of research studies has shown that treatment time is closely correlated with costs (G.A. Jelinek, 1992; Sprivulis, 2004; Varndell et al., 2013). Several stakeholders argued that there should be classification or other adjustment to reflect patients who have very long stays in emergency departments due to access block. ACEM pointed out that:

"the significant impact of access block is not acknowledged, including delays to patient care and emergency department overcrowding. Requirements to care for access blocked patients divert valuable emergency medicine resources and reduce the capacity of the emergency department to treat other/new patients." However, most other stakeholders pointed out that incorporating these factors into the classification or an adjustment would not be appropriate, as these reflect the characteristics of the provider's response to demand rather than patient based factors. Including treatment time in the classification would also create significant perverse incentives. ACEM did suggest that IHPA examine:

"whether a new ABF model could offer incentives to improve patient flow, such that a portion of inpatient funding was redirected to emergency departments, for access blocked patients".

• Treatment area/bay. Patients are often assigned to a treatment area within an emergency department, based on their presenting problem and triage level (Varndell et al., 2013). As these are staffed at different levels, costs vary across treatment area/bays. Stakeholders who commented on this cost driver agreed that this reflects characteristics of the care provider, and as a consequence, should not be included in the classification.

#### **Recommendation 19**

That an ongoing research agenda be created beyond the five years for which recommendations have been made in this report in relation to the development and ongoing refinement of an emergency care classification. This agenda should include research on the cost impact of consultation liaison, mental health legal status, and other disadvantaged groups not specifically addressed in the classification or through price adjustments.

Several variables that may be correlated with cost should <u>not</u> be included in the emergency care classification including: mode or arrival, time of day/day of week of presentation, time in emergency department and treatment area/bay. These are likely to reflect local demand management processes rather than systematic cost variation, and should not be addressed by an emergency care classification designed for funding purposes.

## Summary of classification data elements

Table 16 summarises the conclusion drawn on the data elements that are potential cost drivers for emergency care, and therefore, may be considered for inclusion in a classification. The broad conclusions are:

- Several of the data elements are inappropriate for inclusion within a classification, because they reflect the inputs to care (e.g. the patient's time in the emergency department).
- Some data elements may be more appropriately handled as patient level NWAU adjustors rather than within the classification itself. An example of this is Indigenous status, which could be an adjustor applied across all classes (as is the current approach adopted by IHPA for acute admitted care).
- Similarly, some cost drivers may be best handled as a service level adjustor. In acute care, IHPA currently applies paediatric hospital loadings. These vary across AR-DRGs, reflecting average costs of specialist paediatric hospitals compared with other hospitals at the AR-DRG level.

• For other cost drivers, other issues such as clinical meaning, independence from other factors, and potential for undesirable and inadvertent consequences or variation in interpretation locally need to be considered. Some data elements, such as complexity, potentially require more than one data item (e.g. additional diagnoses, which may also include measures of function/ dependency).

Possible classification element	Data development required	Medium term classification	Long term classification
Visit type	No	Yes	Yes
Disposition	Yes	Yes	Possibly
Urgency (triage)	No	Yes, but less prominent	No, provided better measures of severity complexity and dependency are available
Principal diagnosis	Yes, to better standardise reporting	Yes, should be more prominent and clinically meaningful	Yes
Presenting problem	Yes	No	Possibly
Severity, complexity, dependency	Yes, through additional diagnosis reporting and data sets on co- morbidities and patient dependency	No	Yes
Procedures and investigations	Yes, focused on those with great cost impact	No	Possibly
Age	No	Yes	Yes
Regional and remote location	No	No, but consider for NWAU adjustments	No, but consider for NWAU adjustments
Indigenous status	No	No, but consider for NWAU adjustments	No, but consider for NWAU adjustments
Other disadvantaged groups	Not within the time frame for the proposed emergency care classification	No	No, further research required beyond this time frame
Consultation and liaison services	Not within the time frame for the proposed emergency care classification	No	No, further research required beyond this time frame
Mental health legal status	Not within the time frame for the proposed emergency care classification	No	No, further research might be required to examine whether this represents additional complexity, over and above the presence of a mental health condition.
Mode of arrival	No	No	No
Time of day/day of week	No	No	No
Time in emergency department	No	No	No
Treatment area	No	No	No

#### Table 12 – Recommendations on potential classification variables for emergency care

# Strategy

This Chapter outlines stakeholder views on the broad strategy to be adopted for the development if a future emergency care classification, arising from the analysis and consultation undertaken for this project.

## **Stakeholder views on broad strategy**

In the *Literature Review* report, three broad strategies were identified for advancing the emergency care classification. Stakeholders were asked:

Which of the following strategies should be adopted by IHPA:

- a. Renovate: Build upon the existing URG and UDG classifications, including new data elements where feasible to improve clinical meaning and explanatory power;
- b. Import: Implement a new (to Australia) classification for emergency care services; or
- c. Build: Develop and implement a classification system from first principles suitable for Australia.

As discussed earlier in this report, there was no real interest from stakeholders in the 'import' option. However, there was support for identifying lessons from international classification approaches and some of the tools used (e.g. the Canadian short lists of diagnoses and presenting problems).

In terms of the 'renovate' and 'build' options, most stakeholders believed that the URG classification is not satisfactory and required considerable change. Some groups interpreted the level of required change as meaning 'build' rather than 'renovate'. For example, ACEM commented that:

"ACEM recommends that IHPA adopt a 'build' strategy in developing a classification for public hospital funded emergency care. The current URG and UDG classifications are sub-optimal as this system is not consistent across all emergency care settings. Furthermore, other international classifications are not directly comparable with the Australian healthcare context. Therefore, the most relevant elements from existing Australian and international classifications should inform the development of a new classification system that is fit for purpose."

However, other groups (with similar views about the level of change required) interpreted this as a 'renovate' option, noting their desire not to 'throw the baby out with the bath water'. In practical terms, this equated to identifying how to move from URGs through adding new variables and removing some variables, rather than beginning 'from scratch'.

An alternative pathway suggested by a jurisdiction involved starting with UDAGs (comprising urgency, disposition and age) as the 'base classification', and then to subsequently undertake analyses to add or subtract variables.

In considering the extent of required change, one guiding question that was raised by a few groups was to determine the end-point or number of expected classes for an emergency care classification. For example, one jurisdiction suggested that it was important to 'beware of false precision' in producing a new classification through over-specification of the number of variables and classes.

There was also recognition that development of a reformed emergency care classification had to be staged, beginning with existing data, but evolving over time as data improved and new data were collected. One jurisdiction suggested that this meant that it would be preferable to identify a development pathway with short-term, medium-term and long-term improvements to an emergency care classification. Other jurisdictions supported the concept of not moving too quickly to adopt an interim solution as the final classification, but being prepared to refine the classification over a more extended timeframe. The extent of change to the emergency care classification needed to be balanced against other system changes.

There was also strong support for a refined classification to be based on 'hard evidence', including testing the explanatory power of including additional variables, which in turn needs to be underpinned by a robust costing study. The Queensland Emergency Department Strategic Advisory Panel identified examples of research that could be undertaken to build the evidence base for the development of a reformed classification. Some of their examples focused on 'provider-related' issues, such as the staffing mix, the models of care and the impact of size (treatment spaces and presentations) on optimal emergency department functioning, clinician productivity and quality indicators. However, under IHPA's *Pricing Guidelines*, price adjustments are based on patient-related characteristics rather than provider-related characteristics.

#### **Recommendation 20**

The Urgency Related Group (URG) and the Urgency Disposition Group (UDG) classifications need to be replaced by a classification or classifications that are constructed from first principles, guided by the findings of this review.

The development and assessment of the new classification should be based on high quality evidence related to costs of emergency care. At the same time it is important that evidence sources that are readily available are fully exploited and understood.

## **Recommended broad strategy**

At the workshop, participants discussed the nature and structure of the emergency care classification in the medium (2-3 years) and long term (4-5 years). The majority view was that there was a need to develop a new emergency care classification that could be implemented in the medium term and enhanced in the long term. The proposed basic structure of the classification in the medium term (pending further testing and evidence), would be as follows:

 In the first tier of the classification, episodes would be separated into those requiring emergency care and a small set of other final classes (non-emergency care, did not wait and dead on arrival). It is possible for the non-emergency episodes to be handled through the non-admitted classification, but this needs to be tested empirically.

- In the second tier of the classification, emergency episodes would be grouped into clinically meaningful groups using emergency department diagnosis (perhaps enhanced by presenting problem and/or procedure in the long term). The groups need to reflect emergency care (i.e. the major categories of diagnoses managed in emergency care). This will be slightly different to admitted acute care, but may look like the medical adjacent DRGs.
- Where there is an empirical basis, these diagnosis groups would then be split to reflect different levels of severity and/or complexity (consequently also reflecting resource use). Not all classes will need to be split beyond diagnosis group. In the medium term, these splits would be based on age, disposition and triage. In the longer term, the splits could be based on additional diagnoses (which may include functional/ dependency factors), procedure, age, and possibly disposition. Rather than using these variables to create separate splits for each class, a 'patient emergency care clinical complexity score' could be applied. This would be similar to the patient clinical complexity score (PCCL) used in AR-DRGs. It would summarise relevant information across the variables used to assess overall severity/ complexity of the patient.

The broad structure of the classification would be settled in the medium term, and the longer term would be focussed on developing a better approach to the third level splits in the classification. Figure 3 depicts the broad approach discussed at the national workshop.

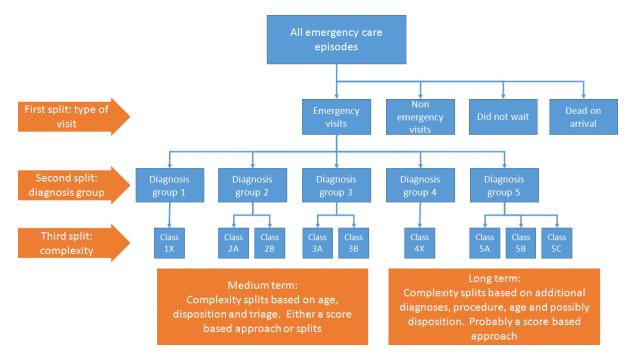


Figure 3 – Possible emergency care classification structure for the medium and long term

Note that any new data elements introduced into the national data sets for emergency care should be a by-product of clinical care wherever possible, and only introduced where:

- there is clear evidence that they add material value in explaining cost variation in emergency care
- they can support other uses (e.g. quality improvement, clinical redesign and process flow, operational management of the emergency department)
- the data element might also be useful in other classifications (e.g. inpatient. ambulatory care)
- the benefits to be derived from the implementation of the new data justify the costs (which should include clinician time in capturing any new data).

#### **Recommendation 21**

The starting point for the development of a new emergency classification is a structure based on three tiers as follows:

- Tier 1: A split based on visit type and episode end status to allocate episodes related to emergency versus non-emergency visits, patients who did not wait and patients who were dead on arrival to relevant classes.
- Tier 2: A second split for emergency patients, based on principal diagnosis. Groupings of principal diagnosis would be used for this split, and should be meaningful for clinicians, reflecting many of the high volume conditions managed by emergency departments.
- Tier 3: A third split reflecting different levels of severity, complexity and dependency. This split is to be applied only where there is evidence of the need for a further split. Severity, complexity and dependency could potentially be captured by considering a range of factors, including: in the medium term, the patient's age, disposition, triage category; and in the long term, the patient's age, disposition and additional diagnoses/ factors contributing to increased severity/ complexity (such as co-morbidities, psychosocial factors and/or patient function).

The balance between a classification that is clinically meaningful, and achieves an appropriate level of explanatory power and stability in prices was discussed at the national workshop. A more clinically meaningful classification would have a relatively larger number of classes. However, explanatory power and stability in prices might be achieved through a much smaller set of price bands. Stakeholders from one jurisdiction noted there is a danger of achieving 'false precision', which does not contribute greatly to the prospective prediction of costs.

The participants at the workshop were receptive to the idea of exploring the development of a smaller set of **price bands** to apply to a larger number of classes within the classification.

#### **Recommendation 22**

IHPA consider the introduction of a small number of price bands to apply to a larger number of classes to accommodate clinical meaning as well as achieve better explanatory power and stability in the classification for funding purposes.

The proposed medium and long term classifications have been evaluated using the principles developed at the outset of this project for this purpose. URGs have also been evaluated using these principles. A summary of the results of this is shown in Table 13. Table 15 in Appendix B shows the detailed results.

The evaluation shows that the proposed long term classification achieves the highest scoring against criteria relating to the principles as a whole. It is particularly superior to URGs in terms of clinical meaning (principle 2), minimising undesirable and inadvertent consequences (principle 6), capacity for improvement (principle 7), and utility beyond activity based funding (principle 8).

Principle	URG	Proposed medium term	Proposed long term	Weighting (1)	Re-scaled (2)
1. Comprehensive, mutually exclusive and consistent	2.0	2.0	2.5	13	3.4
2. Clinical meaning	1.0	3.0	3.0	17	4.5
3. Resource use homogeneity	2.0	2.5	3.0	14	3.7
4. Patient-based	2.0	2.5	3.0	11	2.9
5. Simple and transparent	2.5	2.5	2.5	11	2.9
6. Minimising undesirable & inadvertent consequences	1.0	2.0	2.5	9	2.4
7. Capacity for improvement	1.0	2.0	2.5	7	1.9
8. Utility beyond activity based funding	1.0	2.0	2.5	9	2.4
<ol> <li>Administrative and operational feasibility</li> </ol>	2.5	2.5	2.3	11	2.9
Raw score	15.0	21.0	23.8		
Weighted score	15.3	21.6	24.1		
Maximum score possible	27.0	27.0	27.0		27.0

#### Table 13 – Summary of scoring against criteria

Weighting reflects the mean weights assigned to each principle by respondents to a survey of participants in the national workshop; (2) The re-scaled weights reflect the weights from the previous column, re-scaled to reflect an average score of 3 for each principle.

## Implementation plan

In the consultations, several stakeholders emphasised the need to implement changes through a process that is well considered and paced, ensuring changes recommended are evidence-based. They argued that hasty changes should be avoided and could be counter-productive. The implementation plan presented here reflects these requirements.

At the national workshop it was also emphasised that preparatory work was required to develop the evidence base and the underlying data elements for classification enhancements.

Stage 1: Gathering and assessment of further evidence that is currently available. This stage will involve the following:

- Collation and analysis of data from national and states/territory sources to further investigate particular cost drivers. This could include:
  - Using the existing NHCDC emergency care data to investigate relevant diagnosis groupings. The investigations could start with grouping episodes to the relevant medical adjacent DRG, using the AR-DRG system. Emergency care may require alternatives to the adjacent DRG in some areas (for example injuries). Options could be analysed within the existing data to develop a preliminary version of emergency care diagnosis groupings.
  - Investigating additional disposition categories that are recorded by states and territories and potentially at the hospital level.
  - Ascertaining whether these additional disposition categories can be linked to the NHCDC emergency care data to empirically test whether these categories are relevant.
  - Reviewing additional diagnoses reported in the current data, and determining whether these are sufficiently well reported from some hospitals to explore the potential utility of using this information to address severity, complexity and dependency.
  - Investigating alternative methods to combining data on age, disposition, triage and other sources to address the splits for the third tier of the recommended classification.
- Commission work to develop a full understanding of the contexts of the smaller emergency services. This needs to focus on the options for data collection that are feasible for these services, and a close examination of issues that have a significant impact on costs in these settings. For example, the work needs to consider the arrangements for medical staffing of emergency services and how this potentially impacts the national funding arrangements.

**Stage 2:** Commission a high quality and focussed emergency care costing study. The study would aim to provide high quality information on which to test the initial versions of the classification developed in stage 1. Given the nature of emergency care, the study could be conducted using a representative sample of hospitals and a data collection period of two to four weeks. The study should aim to collect a broad range of data related to patients, staff inputs, procedures and investigations, beyond the data that would be routinely available. By taking this approach, the results of the study should provide a basis for considering classification and data collection improvements for some time into the future.

An additional benefit of the study would be to provide better utilisation statistics to improve the quality of routine costing of emergency care through the National Hospital Cost Data Collection (NHCDC), for example with respect to medical inputs to the care process.

**Stage 3: National data development.** A national data development work program is required to modify and enhance selected data items in the NAPEDC NMDS, as reflected in the various recommendations of this review. This program should leverage prior work (e.g. the work of NEDPAC on the EDRS). The program needs to be approved through the national data governance processes. Key areas of development include:

- Establishing governance arrangements for the development and maintenance of national short lists relevant for emergency care are required (including for diagnosis, additional diagnoses/ patient function/ social factors, presenting problem and procedures) using work done to date. The governance arrangements need to span across settings in which SNOMED-CT-AU and ICD-10-AM are used as a basis for recording diagnoses, presenting problems and other issues, ensuring there is close coordination in this respect. The governance arrangements need to have a high level of clinical leadership and involvement. The development of proposals for setting or refining short lists should be informed by empirical analysis of the value of these items in the emergency care classification and for other purposes. An assessment of the impact of collection on clinicians, and costs of data collection will also be required. These lists must be appropriate for the emergency care setting, allowing for efficient recording at an appropriate level of specificity.
- Subject to the work mentioned above proposals need to be developed for including the collection of procedures and presenting problem into the NAPEDC NMDS.
- Reviewing and establishing the most cost effective mechanisms for collecting additional diagnoses.
- The work program should also include assessment of options for enhancing the categories of emergency disposition (episode end status) collected in the NAPEDC NMDS.

As emphasised in the previous Chapter, proposals for new data should be accompanied by a business case(s) that clearly detail(s) the benefits and/ or savings to be derived from the implementation of these new data that justify the costs/ burden of data collection (which should include clinician time in capturing these data, where relevant). They should also consider data quality and address factors that may impede accurate capture of data (e.g. IT systems) to ensure that the system is administratively and operationally feasible in addition to explaining costs and being clinically sound.

# Appendix A - Evaluation principles and assessment criteria for a classification of emergency care

The Table 14 below represents the agreed principles for an emergency care classification for Australia. A description is provided, as well as a system for assessing each principle.

Principles	Description	Assessment criteria
1. Comprehensive, mutually exclusive and consistent	<ul> <li>The classification is comprehensive, with all possible cases (episodes) within the scope of the classification able to be grouped to a class.</li> <li>Should be able to be applied to all emergency care services in scope of activity based funding and perform similarly (clinically and statistically) when applied to different models and/ or settings of care.</li> <li>The classification should be scalable to take account of lower levels of detail required by settings at a lower role level, such as emergency care services.</li> <li>Classes within the classification are mutually exclusive, with every case (episode) in scope only be able to be grouped to a single class.</li> <li>Class definitions and assignment to classes are clear, consistent and unambiguous.</li> </ul>	<ul> <li>Comprehensive, mutually exclusive and consistent:</li> <li>1 - Does not meet all requirements for comprehensiveness, mutual exclusivity of class and consistent assignment of cases to classes.</li> <li>3 - Meets all requirements for comprehensiveness, mutual exclusivity of class and consistent assignment of cases to classes.</li> <li>Scope of application:</li> <li>1 - Classification could only be applied in some emergency care services in scope of activity based funding.</li> <li>2 - Applicable/scalable to the majority, but not all emergency care services in scope of activity based funding.</li> <li>3 - Applicable/scalable to all emergency care services in scope of activity based funding.</li> </ul>

#### Table 14 – Evaluation principles and assessment criteria for a classification of emergency care

Principles	Description	Assessment criteria
2. Clinical meaning	<ul> <li>The underlying data elements are useful for clinical management purposes in addition to funding purposes.</li> <li>Should group patients with similar clinical and other characteristics and/ or requiring similar treatment.</li> <li>The data element makes sense to clinicians, and aligns with the language used by clinicians for clinical management of their patients.</li> </ul>	<ul> <li>When applied to a classification:</li> <li>1 - Classes have no or limited clinical meaning</li> <li>2 - Classes have some clinical meaning</li> <li>3 - Classes group cases that are clinically meaningful and would typically have similar treatment responses</li> <li>When applied to an individual data element:</li> <li>1 - Has no or limited clinical meaning</li> <li>2 - Has some clinical meaning</li> <li>3 - Would be typically considered important for clinical care</li> </ul>
3. Resource use homogeneity	<ul> <li>Events (episodes) should be assigned to classes with similar levels of resource use.</li> <li>Estimates of resource use within classes should be stable over time.</li> <li>When applied prospectively, the classification should explain a substantial level of the cost variation between classes, while minimising the variability of costs within each class.</li> <li>When assessing an individual data element for its inclusion in the classification, there is strong evidence that the data element explains variation in costs over and above other cost drivers.</li> </ul>	<ul> <li>When applied prospectively the classification explains:</li> <li>1 - Less than 30% of variation in patient level cost</li> <li>2 - Between 30% and 50% of variation in patient level cost.</li> <li>3 - Over 50% of variation in patient level cost</li> <li>When applied to an individual data element, there is:</li> <li>1 - No current evidence that the data element explains variation in cost</li> <li>2 - Limited evidence that the data element explains variation in cost</li> <li>3 - Good evidence that the data element explains variation in cost over and above other cost drivers</li> </ul>
4. Patient based	<ul> <li>Should be based on data elements that reflect the characteristic of patients, rather than characteristics of the service provider or inputs to care.</li> <li>Classification should be able to be applied consistently across different settings.</li> </ul>	<ol> <li>1 - Data elements reflecting service provider characteristics or resource inputs to care dominate the classification</li> <li>2 - There is a mix of data elements reflecting patient and service provider characteristics in the classification</li> <li>3 - Data elements reflecting patient characteristics dominate the classification</li> </ol>

Principles	Description	Assessment criteria
5. Simple and transparent	<ul> <li>The classification has as many classes as are needed for its purpose and no more.</li> <li>Assignment of cases to classes should occur through a process that is transparent and able to be understood by clinicians and health service managers.</li> </ul>	<ul> <li>Number of classes</li> <li>1 - The classification has more than 100 classes</li> <li>2 - The classification has 50-100 classes</li> <li>3 - The classification has 50 or less classes</li> <li>Transparency</li> <li>1 - The assignment of cases to classes involves a complex algorithm</li> <li>3 - The assignment of cases to classes involves a simple algorithm</li> </ul>
6. Minimising undesirable and inadvertent consequences	<ul> <li>The classification relies on data elements that are collected consistently and uniformly.</li> <li>The classification minimises the reliance on data elements that are open to local interpretation and/or provide incentives to change reporting to optimise funding.</li> <li>The classification should minimise susceptibility to gaming, inappropriate rewards and perverse incentives.</li> <li>The underlying data contributing to the classification are able to be audited.</li> </ul>	<ul> <li>Local interpretation/manipulation:</li> <li>1 - Explanatory power of classification relies mostly on data elements that are open to manipulation/ local interpretation</li> <li>2 - Explanatory power of classification partly relies on data elements that are open to manipulation/local interpretation</li> <li>3 - Explanatory power of classification relies on data elements which are not able to be manipulated</li> <li>Auditability:</li> <li>Key data elements in the classification are:</li> <li>1 - Not able to be audited</li> <li>2 - Could potentially be audited with the development of standards</li> <li>3 - Could be audited with the existing standards</li> </ul>
7. Capacity for improvement	<ul> <li>The classification and the underlying data elements should provide information of sufficient granularity to facilitate improvement in the classification over time, for example, to reflect changes in practice patterns and technological advances, and to incorporate emerging knowledge about cost drivers.</li> <li>The system should be sufficiently flexible to adapt to such change without requiring major restructuring.</li> </ul>	<ul> <li>Data elements reported for classification:</li> <li>1 – Allows little room for classification improvement over time.</li> <li>2 – Reflects some cost drivers, supplied at a level of detail that would facilitate classification improvement over time.</li> <li>3 – Reflect all key cost drivers, supplied at a level of detail that would facilitate classification improvement over time.</li> </ul>

Principles	Description	Assessment criteria
8. Utility beyond activity based funding	<ul> <li>The classification and the underlying data elements should allow the analysis of best practice and facilitate benchmarking.</li> <li>The data elements required for the classification are useful for purposes other than funding. These may include health services management, monitoring of quality and safety, epidemiological monitoring, understanding practice and cost variation, health services planning and performance reporting.</li> </ul>	<ul> <li>Contributing data items or the classification:</li> <li>1 - Are not useful for any other activity/ purpose other than its use in a classification meant for funding and reflect only current practice.</li> <li>2 - Have a limited use for other activities/ purposes other than for funding.</li> <li>3 - Have a comprehensive range of uses for other activities/ purposes other than for funding, including health services management, monitoring of quality and safety, epidemiological monitoring, understanding practice and cost variation, health services planning and performance reporting.</li> </ul>
9. Administrative and operational feasibility	<ul> <li>The benefits of the data collected for the classification outweigh the administrative cost and burden of collection.</li> <li>The additional cost of systems to maintain integrity of data required for classification is negligible or reasonable.</li> <li>The collection of data utilises approaches that assist with or consistent with the implementation of the electronic health/medical record.</li> <li>The cost to establish/ purchase and maintain the classification system is balanced by the benefits that it offers, and is affordable to the health system relative to other priorities.</li> </ul>	<ul> <li>Information systems:</li> <li>1 - Requires new items to be added to existing data collection.</li> <li>2 - Could be collected with minor enhancements to existing data collection (e.g. standardising the collection of an item already collected in a non-standardised way by services).</li> <li>3 - Currently collected in a standardised manner by the majority of services.</li> <li>Other costs:</li> <li>1 - Requires coding of records by clinical coders OR Has a significant impact on clinicians in capturing/ recording the data.</li> <li>2 - Has a minor impact on clinicians in capturing/ recording the data.</li> <li>3 - Has no additional impact on clinician (currently collected).</li> <li>eHealth - contributing data elements:</li> <li>1 - Will not contribute to foundations for eHealth.</li> <li>3 - Potentially form the basis of emergency care data feeds for the electronic health/medical record.</li> <li>System costs:</li> <li>1 - The cost to establish/ purchase and maintain the classification system is not balanced by the benefits that it offers, and is not affordable to the health system relative to other priorities.</li> <li>3 - The cost to establish/ purchase and maintain the classification system is balanced by the benefits that it offers, and is not affordable to the health system relative to other priorities.</li> </ul>

# Appendix B – Evaluation of URGs and proposed classification (medium and long term)

The Table 15 below applies the evaluation criteria shown in the previous Appendix to URGs, and to the proposed medium and long term classifications.

#### Table 15 – Evaluation of URGs against proposed medium and long term classification using evaluation criteria

#### See Table 14, p. Error! Bookmark not defined. for evaluation criteria

Note: The minimum score for each principle is 1 and the maximum score is 3. Where a principle has more than one subcategory, the scores across the subcategories have been averaged to obtain a single score for the principle. Therefore, for any one option, this translates to a minimum score of 9 and a maximum score of 27 across all of the principles.

Principles	Urgency related groups	Score	Proposed classification – medium term	Score	Propo	osed classification – Long term	Score
1. Comprehensive, mutually exclusive and consistent	<ul> <li>Is comprehensive, with all possible episodes within the scope of the classification able to be grouped to a class.</li> <li>Able to be applied to emergency care services in scope of activity based funding and perform similarly (clinically and statistically) when applied to different models and/ or settings of care.</li> <li>Classes within the classification are mutually exclusive.</li> </ul>	2	<ul> <li>Similar to current URGs, except may achieve slightly better consistency by not relying heavily on triage and disposition, and also using patient age.</li> <li>Issue of application to emergency services needs to be addressed.</li> </ul>	2	great consi of ad proce Issue emer	ar to current URGs, with ter degree of istency through the use dditional diagnoses, edures and age. of application to gency services needs addressed.	2.5
2. Clinical meaning	<ul> <li>Amongst the variables used in the classification, diagnosis is the key variable useful for clinical management</li> </ul>	1	More clinically     meaningful grouping of     principal diagnosis will     result in classes that are	3	group diagr	e clinically meaningful oing of principal nosis will result in classes are more relevant to	3

Principles	Urgency related groups	Score	Proposed classification – medium term	Score	Proposed classification – Long term	Score
	<ul> <li>purposes, but current approach does not adequately group patients with similar clinical and other characteristics requiring similar treatment.</li> <li>Amongst the variables used in the classification, diagnosis makes sense to clinicians, and aligns with the language used by clinicians for clinical management of their patients.</li> </ul>		<ul> <li>more relevant to emergency care, representing the main clinical groups treated in emergency departments.</li> <li>Simpler grouping of severity/complexity levels within diagnosis groupings will also enhance clinical meaning.</li> </ul>		<ul> <li>emergency care, representing the main clinical groups treated in emergency departments.</li> <li>Simpler grouping of severity/complexity levels within diagnosis groupings will also enhance clinical meaning.</li> </ul>	
3. Resource use homogeneity	<ul> <li>Events/ episodes are not necessarily assigned to classes with similar resource use – there is still considerable variation within classes.</li> <li>Estimates of resource use within classes are NOT stable over time.</li> <li>The classification does NOT prospectively explain a substantial level of cost variation between classes, and does not minimize the variability of cost within each class.</li> </ul>	2	<ul> <li>Better use of information inherent in the principal diagnosis code, and the addition of age will improve the resource homogeneity of the classes.</li> <li>However, in short term, due to the use of triage in costing, the explanatory power of the classification may be reduced when applied to the NHCDC, due to the reduced importance of triage.</li> </ul>	2.5	<ul> <li>Resource use homogeneity could be greatly improved through the inclusion of additional diagnoses and procedure(s), which are known cost drivers.</li> <li>Classes created for clinical meaning could be assigned to a smaller number of 'price bands' to reflect resource use.</li> </ul>	3
4. Patient based	<ul> <li>Of the variables used in the classification, triage and disposition are not wholly associated with characteristics of patients and may instead reflect the response of providers.</li> <li>Diagnosis is a patient</li> </ul>	2	<ul> <li>Similar to current URGs. However, the importance of triage and diagnosis would be reduced for grouping purposes, relying to a greater extent on diagnosis, which is a patient0based</li> </ul>	2.5	<ul> <li>This classification would reduce/ eliminate those variables that are not wholly associated with characteristics of patients (namely triage and disposition).</li> <li>Instead, it would introduce</li> </ul>	3

Principles	Urgency related groups	Score	Proposed classification - medium term	Score	Proposed classification – Long term	Score
	characteristic.		<ul> <li>variable.</li> <li>The addition of age would also increase the degree to which the classification is patient based compared with the current URGs.</li> </ul>		a host of other patient based variables, such as additional diagnoses, age and procedure. (Note that although procedures may sometimes be viewed as characteristics of the provider, only non- discretionary procedures, given the patient's condition, would be selected for classification.)	
5. Simple and transparent	<ul> <li>The classification potentially has more classes than required given that the cost between many classes is not sufficiently differentiated.</li> <li>The assignment of cases to classes is somewhat transparent, although, it relies on mapping of individual diagnoses to MDBs, which is not altogether intuitive.</li> <li>Scores: <ul> <li>No. of classes: 3</li> <li>Transparency: 2</li> <li>Overall for principle: 2.5</li> </ul> </li> </ul>	2.5	<ul> <li>Number of classes to be determined, but this is likely to be above 100. However the use of price bands could reduce complexity in applying the classification for funding purposes.</li> <li>The use of diagnosis in the second tier of the classification should improve transparency.</li> <li>This may be offset by the use of a score-based approach for splitting diagnosis categories into classes to reflect different levels of severity/complexity.</li> <li>Scores:         <ul> <li>No. of classes: 3</li> <li>Transparency: 2</li> <li>Overall for principle: 2.5</li> </ul> </li> </ul>	2.5		2.5
6. Minimising undesirable and inadvertent consequences	Triage is not collected     consistently and uniformly	1	The reduced reliance on triage and disposition	2	• Except for disposition, which may or may not be used in	2.5

Principles	Urgency related groups	Score	Proposed classification – medium term	Score	Proposed classification – Long term	Score
	across and within hospitals, and is not able to be audited. The classification relies on data elements that are subject to local interpretation and/or provide incentives to change reporting to optimize funding (namely, triage and disposition).		means that the inconsistencies associated with the collection of these variables will be reduced in the classification.		<ul> <li>the classification, there is little opportunity to 'interpret' the remaining proposed data elements and/ or change reporting of them in any way to optimise funding.</li> <li>All of the data elements proposed are able to be audited.</li> </ul>	
7. Capacity for improvement	<ul> <li>The classification and the underlying data elements do NOT provide information of sufficient granularity to facilitate improvement in the classification over time (e.g. to reflect changes in practice patterns and technological advances), or to incorporate emerging knowledge about cost drivers.</li> <li>The system is NOT sufficiently flexible to adapt to such changes without requiring major restructuring.</li> </ul>	1	The proposed structure provides opportunities for improving the classification while maintaining the basic structure down to the second tier.	2	There is considerable capacity for improvement in the classification given the proposed variables, especially the collection of additional diagnoses and procedure(s).	2.5
8. Utility beyond activity based funding	<ul> <li>The classification and the underlying data elements do NOT allow the analysis of best practice and facilitate benchmarking.</li> <li>Apart from diagnosis, the data elements required for the classification are not particularly useful for purposes other than funding. (Triage and disposition are useful for internal operational/ work load management, but not</li> </ul>	1	The use of a more meaningful diagnosis grouping significantly expands the potential use of the classification beyond funding.	2	• This classification offers a great deal of utility beyond activity based funding. It will be able to be used for: health services management; monitoring quality and safety; epidemiological monitoring; understanding practice and cost variation, health services planning or performance reporting.	2.5

Principles	Urgency related groups	Score	Proposed classification – medium term	Score	Proposed classification – Long term	Score
9. Administrative and	<ul> <li>necessarily for monitoring quality and safety, epidemiological monitoring, understanding practice and cost variation, health services planning or performance reporting, except for waiting times.)</li> <li>The additional cost of systems</li> </ul>	2.5	No additional data	2.5	There are additional data	2.25
Administrative and operational feasibility	<ul> <li>The additional cost of systems to maintain integrity of data required for classification is negligible or reasonable.</li> <li>The collection of data uses approaches that assist with or are consistent with the implementation of the electronic health/medical record.</li> <li>The cost to maintain the classification system is balanced to an extent by the benefits that it offers, and is affordable to the health system relative to other priorities.</li> <li>Scores <ul> <li>Information systems: 3</li> <li>Other costs: 3</li> <li>System costs: 2</li> </ul> </li> </ul>		<ul> <li>No additional data elements are proposed to be collected for this classification; therefore, the administrative and operational feasibility is as for the current URGs.</li> <li>Scores         <ul> <li>Information systems: 3</li> <li>Other costs: 3</li> <li>eHealth: 2 (diagnosis)</li> <li>System costs: 2</li> <li>Overall for dimension: 2.5</li> </ul> </li> </ul>	2.3	<ul> <li>Intere dre daditional data items being proposed for this classification (additional diagnoses, possibly presenting problem and procedure(s)), which will mean a greater burden of data collection.</li> <li>However, these variables are collected by most emergency departments across the country, and national approaches will offset local costs of collection and significantly improve potential use.</li> <li>The benefits of the collection of these additional data items outweigh the administrative cost and burden of data collection, as it will contribute to better funding arrangements and improved capacity for local management including quality and safety.</li> <li>The major current IT systems used around the country can accommodate the</li> </ul>	2.23

Principles	Urgency related groups	Score	Proposed classification – medium term	Score	Proposed classification – Long term	Score
					<ul> <li>collection of these items so costs of changes to IT systems will be small.</li> <li>The collection of data uses approaches that assist with or are consistent with the implementation of the electronic health/medical record.</li> <li>The cost to establish/ purchase and maintain the classification system is balanced by the benefits that it offers, and is affordable to the health system relative to other priorities.</li> <li>Scores <ul> <li>Information systems: 2</li> <li>Other costs: 2</li> <li>Overall for dimension: 2.25</li> </ul> </li> </ul>	

# Appendix C – Summary of literature review of classification and related systems

This Appendix is an extract from the *Literature Review* report developed earlier in this project. It outlines Australian and international classification systems for emergency care. In addition, it outlines other systems that may be relevant to emergency care classifications, such as systems to classify patients into severity or dependency groups.

This extract of the *Literature Review* report is provided to ensure that this final project report is a stand-alone report. The *Literature Review* was developed as the first deliverable of this project. The most relevant findings from the *Literature Review* are summarised in Chapter 3 in the main body of this report. These findings are based on stakeholder feedback to the *Literature Review* report and therefore supersede the discussion included in the initial *Literature Review*, replicated below.

### **Australian systems**

This first section overviews the Australian classifications for emergency care. The systems reviewed are:

- Urgency and Disposition Groups (UDGs) and Urgency Related Groups (URGs)
- Urgency, Disposition and Age Groups (UDAGs)
- Summated procedures, investigations or consultations (PICsum)
- Other Australian classifications for emergency care, namely the Australian Ambulatory Classification (AAC) and the Australian Paediatric Ambulatory Classification (APAC).

### Urgency Related Groups (URGs) and Urgency and Disposition Groups (UDGs)

In 2010, URGs were identified as the preferred initial classification for the national implementation of activity based funding for emergency care. To prepare for their implementation, IHPA took the original version as developed by G.A. Jelinek, (1992) and modified it for implementation (i.e. in view of for the fact that hospitals Australia-wide are using different systems to code diagnoses than those used by Jelinek in his original study). Since its implementation, the classification has undergone further refinements, the latest of which is described further below.

URGs apply to emergency departments for the purposes of Commonwealth funding. UDGs are used for emergency services.

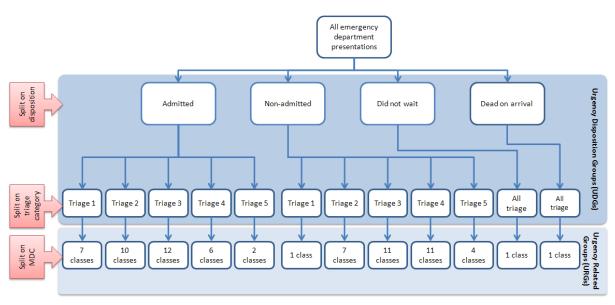
IHPA is currently in the process of completing a review of the emergency care classifications (URGs and UDGs), which is scheduled for implementation in July 2014. Issues addressed in this review are discussed further below. Prior to this, the initial development of URGs and UDGs is outlined.

G.A. Jelinek, (1992) developed URGs and UDGs based on an analysis of a cohort of 2,458 patients from three teaching hospital emergency departments in Western Australia.

UDGs classify patients into 12 groups based on combinations of two data elements: disposition (admitted/ transferred to another hospital, discharged, did not wait and dead on arrival) and urgency (triage category 1-5).

URGs are an extension of UDGs, incorporating diagnoses. Jelinek used the concept of major diagnostic categories (MDCs) for the URGs. These were different from the ones used in the Australian National Diagnosis Related Groups (AN-DRGs) available at the time, but based on a similar concept of grouping diagnoses based on body systems/ specialties. Jelinek came up with the MDCs used in the URGs based on his intuition as an emergency clinician. He identified 26 MDCs, and combining these with disposition and triage, 73 URGs were formed (37 for admitted patients; 34 for non-admitted patients; one class for those who died; and one for those who did not wait to be seen).

The structure of both UDGs and URGs, as developed by Jelinek (1992) is shown in Figure 4 below.



### Figure 4 – Structure of UDGs and URGs as developed by Jelinek 1992

The MDCs in the URGs were underpinned by an emergency department-specific clinical coding system used at Sir Charles Gairdner Hospital: the Perth Metropolitan Hospital Emergency Department Coding System (PEDCO), which was adapted into the Modified Sir Charles Gairdner Hospital Coding System (SCGH(m)). PEDCO uses a four digit code that is determined by the presenting problem of the patient, plus a fifth digit to represent triage (based on the Ipswich Triage Scale - ITS). The four letter code is determined through assignment to a group such as poisoning/ injury, spontaneous illness or drug reaction. Then the next three digits are used to code the specifics of the presentation.

Jelinek noted several important advantages of the PEDCO system: prospective coding, represented on a single sheet, and generally very simple to use. The simplicity of the system meant that extensive training was not necessary, and consequently, that the error rate was lower.

Example codes are:

- cardiac arrest: 7238S
- mild asthma: 7628H
- coma due to diazepam overdose: 5188M
- influenza: 7128D
- threatened abortion: 7485A
- acute cholecystitis: 7159A

- conjunctivitis: 7112H
- acute psychosis: 7807A
- ingestion mothballs: 5807M
- motor vehicle accident multiple injuries: 6599S
- epistaxis: 7721

The fact that the MDCs developed by Jelinek were based on local presentation codes meant that they were not easily transferrable to other emergency departments. Consequently, with the implementation of URGs nationally in 2012, a great deal of work was required to re-create an MDC structure based on the classifications used by emergency departments across Australia (predominantly ICD-10-AM and ICD-9-CM).

In Jelinek's (1992) study, the UDG classification system was shown to account for 41-47% (the lower percentage was that derived from data that included outliers) of the variance in total resource use (cost) in the teaching hospital emergency department sample. The URG classification system was shown to account for 53-58% of the variance in total resource use applied to the same sample.

It is relevant to note that Jelinek also applied DRGs<sup>5</sup> to the data, as a comparison to the UDGs and URGs. He found that the explanatory power of DRGs applied to the same data was lower than for both UDGs and URGs (38%), despite the much higher number of classes. He concluded that this was due to the use of urgency in the URGs and UDGs compared with DRGs, as he had found urgency to be the key factor influencing resource use (particularly nursing time, which accounted for the highest cost) in emergency departments. Nevertheless, he highlights the potential for 'over-triaging', and recommends 'certain features' to be incorporated in any system using a triage scale to predict resource use.

(An important aspect of applying DRGs to emergency department data that Jelinek highlights is that DRGs rely on a discharge diagnosis, whereas the emergency department diagnosis can be best regarded as a provisional diagnosis for most patients.)

A follow up study of costs in emergency departments (Erwich-Nijhout, Bond, & Baggoley, 1996, Erwich-Nijhout et al., 1997) found similar overall costs (i.e. the differences were accounted for) and relative costs to the Jelinek (1992) study. The authors found costs to vary by urgency, outcome, age and diagnosis, and on this basis recommended the potential construction of a funding/ classification model using these cost drivers.

Using the same data as the costing study described above, Bond et al. (1998) evaluated the URGs as developed by Jelinek (1992). The original 73 URGs were reduced to 29 (13 for admitted patients; 15 for discharged patients and one for those patients who did not wait).

In addition to the URGs being based on a local coding system that has been difficult to translate to other settings, cases used for the development of the system are not necessarily representative of those encountered more widely in Australian hospitals. For example, the Victorian Department of Health (Department of Health (Vic.), 2011) pointed out that the classification was developed based on data from three city-based teaching hospitals

<sup>&</sup>lt;sup>5</sup> Jelinek used a US version of DRGs, with 474 classes.

(thereby excluding the mix of cases that might be representative of non-city, non-teaching facilities) in a single state, on a small sample size. The exclusion of paediatrics, obstetrics and major trauma were also noted. It is likely that the casemix of emergency departments may have changed over time. However, Bond et al. (1998) attempted to apply the classification to data from Flinders Medical Centre in Adelaide (also a tertiary facility) from 1995 and 1996 (just a short while after Jelinek's study). The authors concluded that "the [URGs] produced in the WA study' were not useful in our setting. When the two sets of URGs were examined to assess equivalence, little was found. WA URGs were represented across several [Flinders Medical Centre] URGs, and [Flinders Medical Centre] URGs were represented across several WA URGs." (p. 109).

As mentioned above, on 1 July 2012, IHPA introduced a version of URGs, modifying the Jelinek version to accommodate their implementation in Australian hospitals, given the extent of capture (or reporting) of diagnoses. Although Jelinek's (1992) MDC structure was retained, renamed 'major diagnostic blocks' (MDBs), some of the MDBs, when applied to the triage categories, are collapsed into a single URG due to the inability to differentiate patients to the level available through the PEDCO system, due to low numbers within classes and/ or due to lack of differentiation of classes based on cost (as collected for emergency care through the *National Hospital Cost Data Collection*). For example, patients with multiple injuries are grouped together with single site injuries in the IHPA URGs (the current version is 1.3). Also, major and minor single site injuries are grouped together. The IHPA version of URGs has 66 classes (as opposed to Jelinek's 73 classes). A comparison of the numbers of classes within each disposition/ triage combination between Jelinek's (1992) version and IHPA URGs version 1.3 is shown in Table 16.

Table 16 – Comparison of URG number of classes by disposition (episode end stat	us)
and triage category combination, Jelinek 1992 and IHPA version 1.3	

Class (disposition/ triage	No. of	classes
level only)	Jelinek 1992	IHPA version 1.3
Admitted – Triage 1	7	5
Admitted – Triage 2	10	8
Admitted – Triage 3	12	10
Admitted – Triage 4	6	6
Admitted – Triage 5	2	2
Total admitted	37	31
Non-admitted – Triage 1	1	1
Non-admitted – Triage 2	7	6
Non-admitted – Triage 3	11	8
Non-admitted – Triage 4	11	9
Non-admitted – Triage 5	4	4
Total non-admitted	34	28
Did not wait	1	1
Dead on arrival	1	1
Error	0	5
Total	73	66

The IHPA MDB (version 1.3) structure is shown in Table 17 below. IHPA is currently working on a new version of URGs, to apply from 1 July 2014.

Code	Meaning
1A	Poisoning, comatose
1B	Poisoning, conscious
1C	Drug reaction
1D	Alcohol/drug abuse and alcohol/drug induced mental disorders
2A	Injury, multiple sites
2B	Injury, single site, major
2Ba	Injury, single site, minor
3A	Circulatory system illness
3B	Respiratory system illness
3C	Digestive system illness
3D	Urological illness
3E	Neurological illness
3F	Illness of the eyes
3G	Illness of the ear, nose and throat
3H	Musculoskeletal/connective tissue illness
31	Illness of skin, subcutaneous tissue, breast
3J	Blood/immune system illness
3K	Obstetric illness
3L	Gynaecological illness
3M	Male reproductive system illness
3N	System infection/parasites
30	Illness of other and unknown systems
3P	Newborn/neonate
3Q	Hepatobiliary system illness
4	Psychiatric illness
5	Social problem
6	Other presentation

### Table 17 – URG major diagnostic block (MDB) structure (IHPA version 1.3)

Source: 2013a

### Urgency, Disposition and Age Groups (UDAGs)

Following on from Jelinek's (1992) study, Bond et al. (1998) evaluated UDGs and URGs at Flinders Medical Centre in Adelaide, Australia. The study was based on 17,819 patients. It achieved slightly lower reduction in variance (RIV) scores for UDGs and URGs than Jelinek's (1992) study. In addition, the researchers developed UDAGs, further splitting some of the UDG classes by up to four age groups, as follows:

- ≤]4
- 15 34
- 35-64
- ≥65.

UDAGs were found to account for 44-51% of the variance in total resource use. The structure of UDAGs as developed by Bond et al. (1998)s shown in Figure 5 below.

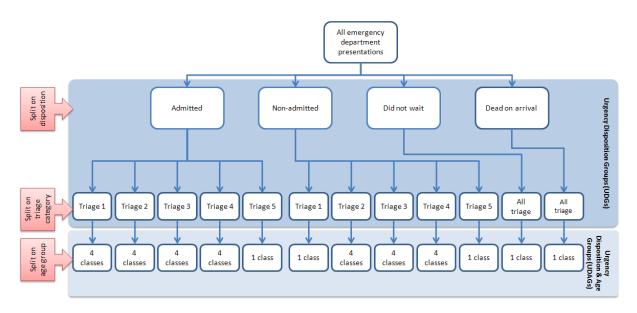


Figure 5 – Structure of UDAGs

### Summated procedures, investigations or consultations (PICsum)

Sprivulis (2004) assessed emergency department patient complexity using the number of procedures, investigations or consultations (PICsum), at Sir Charles Gairdner Hospital in Perth, Australia. The impetus for the work was the concerns about using disposition as a classification data element for payment purposes, given access block. He specifically states that "[e]mergency departments now invest considerable efforts to prevent admission to hospital. These efforts are neither identified nor rewarded by casemix systems using disposition as a partition variable." (p. 60). The idea for PICsum comes from the Emergency Severity Index (ESI) (Wuerz et al., 2001), which is a five-level triage tool incorporating the number of procedures, investigations and/ or consultations that a patient presenting to an emergency department may require, grouped into three categories: none, one or many.

The number of presentations available for the study was 35, 852. 'Consultations' referred to requests for consultations with medical specialities and allied health staff rather than those with emergency physicians, which were not included in the summation. Also, some conventionally grouped investigations (such as 'full blood count', 'cardiac enzymes' or 'liver function tests') were each considered a single investigation in the summation.

The study grouped patients into one of two categories: those with up to one each of a procedure, investigation and/or consultation (up to a total of 3) (the 'Max1' group) and those with at least two procedures or two investigations or two consultations (the 'Min2' group). The former group made up 41% of presentations, and the latter 59%. The second group accounted for 93% of estimated total procedures, consultations and investigations.

In addition to presenting an alternative to disposition as a grouping data element, the study also found a 'near perfect' linear correlation between age and complexity (as measured by either mean PICsum or proportion of patients with at least two procedures or two investigations or two consultations). However, the author acknowledges the absence of paediatric patients (i.e. the study was undertaken at an adult hospital), and thus the inability to generalise this strong relationship to patients aged less than 18 years.

### Other Australian classifications for emergency care

The Australian Ambulatory Classification (AAC) and the Australian Paediatric Ambulatory Classification (APAC) were two projects resulting from the National Ambulatory Casemix Project (Lagaida & Hindle, 1992), in the early days of Australia's investment in casemix. The AAC was designed for use in general outpatient settings, and the APAC in specialised paediatric settings. Both the AAC and APAC included emergency components, with the former resulting with 36 classes based on diagnostic category, procedure and the presence of a doctor. However, the authors concluded that the AAC classification was not suitable to be taken up nationally due to the small reduction in variance it achieved (16%).

### **International systems**

A search of international classifications covering emergency care was undertaken, as described in the *Introduction*. Information is presented below on the identified classifications, which comprised:

- *Healthcare Resource Groups (HRGs)*: a classification that is used in England for funding purposes.
- Ambulatory Payment Classifications (APC): another classification used for payment purposes under the US Medicare program.
- Ambulatory Patient Groups (APG) and Enhanced Ambulatory Patient Groups (EAPG): classifications implemented in several US states under Medicaid and used by several large private insurers.
- Emergency Department Groups: a classification developed in California in the early 1990s.
- Comprehensive Ambulatory Care Classification System (CACS): the Canadian national (albeit voluntary) classification for ambulatory services that is used for collection and reporting but not funding purposes.
- Danish Ambulatory Grouping System (DAGS): a classification that has been in use in Denmark for over a decade.

### Healthcare Resource Groups (HRGs) (England)

The English National Health Service (NHS) introduced Payment by Results (PbR), a form of activity based funding, in 2003-04 (Department of Health (U.K.), 2010, 2011). The generic classification that applies across all types of health services (e.g. admitted, emergency, outpatient) is known as Healthcare Resource Groups (HRGs).

The implementation of HRGs for emergency departments was considerably delayed (Hughes, Volans, Higginson, Brayley, & Benger, 2011). The development of HRG Version 4.0 (HRG4) in 2006 for application to accident and emergency services was based on reviewing over 30,000 attendances in 11 different types of urgent care settings. It recommended the introduction of 11 HRGs for emergency departments based on a combination of 'investigations' and 'treatments'. While HRG4 was introduced in 2010 for other hospital services, it was only implemented for accident and emergency services in April 2011.

The 11 HRGs were initially grouped into five price bands, but in 2013-14 separate prices have been introduced for each of the 11 emergency department HRGs (Department of Health (UK), 2013) (see Table 18). There are separate tariffs (prices) for the admitted component of care for patients admitted from emergency departments (known as the non-elective

inpatient tariffs). In other words, hospitals receive one payment (based on the 11 HRGs) for emergency department care and a separate payment for admitted care.

HRG code		Tariff (£)		
	HRG name	Type 1 and 2	Туре 3	
		Departments	Departments	
VB01Z	Any investigation with category 5 treatment	237	58	
VB02Z	Category 3 investigation with category 4 treatment	210	58	
VB03Z	Category 3 investigation with category 1-3 treatment	164	58	
VB04Z	Category 2 investigation with category 4 treatment	139	58	
VB05Z	Category 2 investigation with category 3 treatment	130	58	
VB06Z	Category 1 investigation with category 3-4 treatment	102	58	
VB07Z	Category 2 investigation with category 2 treatment	119	58	
VB08Z	Category 2 investigation with category 1 treatment	110	58	
VB09Z	Category 1 investigation with category 1-2 treatment	78	58	
VB10Z	Dental care	59	58	
VB11Z	No investigation with no significant treatment	58	58	

Table 18 – Emergency	denartment	HRGs (and	2013-14	tariffs) England
Table To - Linergency	uepartment	TINGS (anu	2013-14	tarins), England

The HRG4 Grouper uses two fields (first and second investigations, and first and second treatments) to produce the 11 HRGs applicable to emergency department services. In general, the HRG4 Grouper uses data from ICD10 and OPCS-4 (the English classification of Interventions and Procedures), but diagnosis is not used for the emergency department HRGs. The 11 HRGs are intended to reflect the different costs of treating emergency department patients. Table 7 provides some examples of the three categories of investigations and the five categories of treatment that are combined to produce the 11 HRGs (The College of Emergency Medicine, 2013).

Category:	1	2	3	4	5
Investigation (examples)	Blood test, ECG	X-ray	CT or MRI		
Treatment (examples)	Steristrips	Plaster of Paris	Electrical cardioversion	Intubation	Resuscitation

The 11 emergency department HRGs exclude patients who are dead on arrival. Hence, unlike the Australian UDGs and URGs, the English HRGs do not use either 'disposition' or 'urgency' as data elements in classifying emergency department patients. Another point of difference is that the English PbR approach sets lower tariffs for emergency department care provided in Type 3 (non-24 hour) emergency departments.

The implementation of HRGs for payment purposes for emergency department services resulted in additional data collection requirements on hospitals. Specifically, hospitals were required to report procedures (i.e. treatments) for emergency department care, whereas previously they only reported investigations (The College of Emergency Medicine, 2011).

The College of Emergency Medicine (UK) has criticised the lack of granularity in the 11 HRGs, arguing that it is flawed to use investigations and procedures as a surrogate for complexity (The College of Emergency Medicine, 2013). In addition, the College has suggested that 'best practice' tariffs should be introduced to incentivise hospital avoidance and short stay units, rather than rewarding admissions (through the non-elective tariffs). In discussing the 'data vacuum' in English emergency and urgent care, Hughes et al., (2011) have suggested that an emergency department classification should reflect the 'value added', rather than

simply recording the investigations and treatment provided. This could include universal implementation of triage scales at patient presentation (such as the Manchester Triage Scale) and greater attention to coding diagnosis at the end of the emergency department attendance. While this may be useful for clinical purposes, Hughes et al. have not explicitly proposed using triage or diagnosis for payment purposes.

### **Ambulatory Payment Classifications (APC) (US Medicare)**

The US Medicare program (that funds the health costs of the elderly and severely disabled) uses a classification called Ambulatory Payment Classifications (APCs) to pay hospitals for the costs of ambulatory services. Unlike the English HRGs, the APCs exclude the cost of medical services provided in emergency departments; these medical costs are paid for separately by the Centers for Medicare and Medicaid Services (CMS) on a fee-for-service basis.

The APCs are broader in scope than the Australian URGs/UDGs and the English HRGs. This classification covers payments made by CMS for outpatient clinics, emergency department services, 'observation services' (similar to many of the short stay models used in Australia), many of the services that would be recognised as same day admitted services in the Australian system (e.g. chemotherapy and same day medical and surgical procedures<sup>6</sup>). It also includes diagnostic and pharmaceutical that are not packaged with other services.

The APCs are derived based on grouping of submitted data from hospitals. Hospitals report data at very disaggregated level, reflecting all procedures undertaken with respect to patients visits. The key data item supplied related to 'procedures' which are reported either through:

- Healthcare Common Procedure Coding System (HCPCS) Level II codes: this describes the supplies used.
- Current Procedural Terminology (CPT) codes: this describes the services delivered by physicians.

However, hospitals are also required to supply a range of other data items including the patient's diagnosis. The provision of details of the diagnosis is required to demonstrate the 'medical necessity' of services provided.

The grouper first applies a set of rules to assign 'payment status indicators' to each record. The indicators determine whether a payment is to be provided with respect to a particular record. Records may not be eligible for an APC payment because the particular type of services is not covered under Medicare, the procedure is one that can be provided only on an inpatient basis, or the record relates to a services that is regarded as being 'packaged' with other records, and hence do not attract a payment.

<sup>&</sup>lt;sup>6</sup> There is a separate Ambulatory Surgery Centre (ASC) classification that applied to providers whose a provider whose sole purpose is to furnish services in connection with surgical procedures that do not require inpatient hospitalisation.

HCPCS codes are then grouped into APC groups. The APC system has several major categories including:

- Significant procedures. These split into those which are discounted when multiple procedures are reported, and those which are not discounted.
- Clinic or emergency department visits.
- Observation episodes.
- Drug/biological and radiopharmaceutical agents which are paid separately (and not packaged with other services).
- Ancillary services which are paid separately (and not packaged with other services).
- Medical devices which are paid separately (and not packaged with other services).

Where an emergency visits involves one of the 'significant procedures', it will be allocated to the relevant significant procedure APC. Otherwise the visit will be allocated to one of the following:

- an emergency department evaluation and management (E&M) APC
- the critical care APC
- the observation care APC.

While there are hundreds of procedural codes relevant to emergency department services, it has been estimated that over 80 per cent of all emergency department care falls under five CPT/HCPC evaluation and management codes (McConnell, Gray, & Lindrooth, 2007). Table 20 provides clinical examples of the types of care that would be coded under the five high-volume evaluation and management codes.

# Table 20 – Five most common emergency department APCs, United States Medicare program

APC code	CPT code	Description	Level of medical decision making	Clinical examples
609	99281	For the lowest level of care and represents an emergency department visit for a self- limited or minor problem. The medical decision-making is straight-forward.	Straight- forward	<ul> <li>Suture for uncomplicated laceration</li> <li>Tetanus toxoid immunization</li> </ul>
613	99282	For an emergency department visit of low to moderate severity. The visit requires an expanded problem-focused medical history and examination and a medical decision of low complexity.	Low complexity	<ul> <li>Rash on legs from poison ivy</li> <li>Red, swollen cystic lesion</li> <li>Minor traumatic extremity injury with localised pain and swelling</li> </ul>
614	99283	For a visit of moderate severity and needs a medical decision of moderate complexity	Moderate complexity	<ul> <li>Afebrile female with vaginal discharge, no abdominal/back pain</li> <li>Inversion ankle injury, unable to bear weight</li> <li>Blunt head injury, local swelling; no confusion or loss of consciousness</li> </ul>
615	99284	For an emergency department visit of high severity that requires urgent evaluation, but the problem is not an immediate	Moderate complexity	<ul> <li>Fall with head injury and brief loss of consciousness</li> <li>Female with lower abdominal pain and vaginal discharge</li> </ul>

APC code	CPT code	Description	Level of medical decision making	Clinical examples
		and significant threat to the patient's life or physiological function. Unlike the previous codes, the visit re-quires a detailed patient's history and examination, but the complexity of the decision- making is still moderate.		<ul> <li>Elderly female with fall, complaint of hip pain and inability to walk</li> </ul>
616	99285	This is similar to 99284 but the problem poses an immediate and significant threat to the patient's life or physiological function. The visit requires a comprehensive examination and history and a medical decision of high complexity	High complexity	<ul> <li>Active upper GI bleed</li> <li>Rapid heart rate requiring IV medication</li> <li>Acute onset of cerebral vascular accident</li> </ul>

Source:McConnell et al., 2007, American College of Emergency Physicians, 2011

It can be seen that the management and evaluation codes are quite subjective and open to interpretation. The CMS monitors the patterns of claiming against these codes to track trends in 'upcoding'.

APCs differ from the English HRGs and the current Australian UDGs/URGs in that they relate only to the cost of emergency department care for patients who are discharged. The cost of emergency department care is bundled into the cost of inpatient services (and payable under DRGs) for patients who are admitted following an emergency department visit.

While the evaluation and management APCs are the high-volume APCs, hospitals also use hundreds of other APCs to claim for individual procedures that may be concurrently provided to emergency department patients. For example, some of the commonly-used APCs for emergency department services include:

- IV injection
- IV infusion first hour
- IV infusion, add on
- 2 view chest x-rays
- CPR.

It can be seen that the US APCs are 'unbundled' to a much greater degree relative to the Australian UDGs/URGs (and indeed AR-DRGs). This issue of the level of granularity and/or bundling of services within a classification is a key design choice that needs to be considered. The US approach to APCs places high reliance on hospitals accurately reporting each and every procedure that occurs in emergency departments in order to receive full reimbursement. This level of data collection and reporting may not be viewed as acceptable in the Australian context of capped (State Government) budgets for public hospital services.

As with the English HRGs, there are different prices paid by CMS for APCs depending upon the type of emergency department. Lower prices are paid to 'Type B' emergency departments that are not open on a 24/7 basis (American College of Emergency Physicians, 2013). This approach to classifying different types of hospital emergency departments, in addition to classifying the services received by patients, differs from the classification/pricing approach currently used by IHPA. Under the *Pricing Framework* (2013b), IHPA sets prices that are related to the relative costs of delivering services to patients, rather than recognising differences in costs across different types of hospitals.

### Ambulatory Patient Groups (APG) (US)

Within the US Medicare system, there has been a longstanding interest in the development of a classification that would underpin prospective payment for ambulatory services. From the commencement of Medicare in the 1960s to 2000, ambulatory care had been managed through a cost reimbursement arrangement. The interest in developing a prospective payment systems lead to the Health Care Financing Agency (HCFA) commissioning work on the original version of the APG system undertaken between 1988 and 1990 by 3M Health Information Systems (Averill et al., 1993; Averill, Norbert, Goldfield, Gregg, Grant, et al., 1997). However, this system was never implemented, largely due to the challenges and interests affected by the implementation of a prospective payment system, rather than the attributes of the classification system itself.

In 1997, the US Congress, as a part of a more general set of initiatives designed to curb cost growth in the US Medicare program, directed HCFA (now the Centres for Medicare and Medicaid or CMS) to develop a prospective payment system for ambulatory care. HCFA engaged 3M Health Information Systems to develop a second version of APGs (Averill, Goldfield, Gregg, & Shafif, 1997; Averill, Norbert, Goldfield, Gregg, & Grant, 1997; Averill, Norbert, Goldfield, Gregg, Grant, et al., 1997).

The APG classification was not implemented within the Medicare program due to a complex set of political events, and instead CMS proceeded with implementation of the APC system described previously. However, several US states adopted the APG for use with their Medicaid program. Subsequently 3M has developed the Enhanced Ambulatory Patient Groups (EAPGs), which several states have implemented within the Medicaid systems, including New York (State of New York Department of Health, 2012), Maryland, Oklahoma Virginia, Iowa and South Dakota. APGs and EAPGs are also used by a significant number of private payers across the US.

The APG/EAPG systems have a similar set of data requirements to the APC system, except they make greater use of diagnosis. However, there are a much lower number of classes overall (290 classes in the version 2 of the APG system compared with 850 APC classes). They are designed to process and group data related to same day surgery units, hospital emergency rooms and outpatient clinics. In the initial versions, the classification did not address phone contacts, home visits, nursing home services or inpatient services (Averill, Norbert, Goldfield, Gregg, Grant, et al., 1997). Key variables used in classifying activity are:

- Current Procedural Terminology (CPT) procedure codes<sup>7</sup>, with descriptive terms and identifying codes that are used primarily to identify medical services and procedures furnished by physicians and other health care professionals.
- Healthcare Common Procedure Coding System (HCPCS) procedure codes<sup>8</sup>, which include additional codes to identify products, supplies, and services not included in

<sup>&</sup>lt;sup>7</sup> CPT is a system owned and maintained by the American Medical Association.

the CPT-4 codes, such as ambulance services and durable medical equipment, prosthetics, orthotics, and supplies

• ICD-9-CM diagnosis codes.

More than one APG may be assigned a patient during a single visit. Ambulatory visits are grouped into three major categories: significant procedure or therapy, medical, or ancillary only. There is also a class for errors. The assignment logic broadly works as follows:

- Significant procedure: If a significant procedure or therapy CPT is present, then one or more significant procedure APGs are assigned and no medical visit APG is assigned. If ancillary tests or procedures are also present, then additional APGs are assigned for the ancillary tests or procedures. Each significant procedure is assigned to a body system, and the procedures in each body system are subdivided into clinically similar classes. For example, endoscopic procedures are often divided into separate classes depending on purpose (i.e. diagnostic or therapeutic). In the original system, there were 139 classes of 'significant procedure' or 'therapy'.
- Medical: If there is no significant procedure or therapy present, but an evaluation and management CPT code indicating a medical visit is present, then a medical APG is assigned based on the ICD-9-CM diagnosis codes. If ancillary tests or procedures are also present, then additional APGs are assigned for the ancillary tests or procedures. The assignment to medical classes considers signs, symptoms and findings (SSF) codes first, with each record assigned to a Major SSF group. Only a subset of SSF codes are considered appropriate. These are principally those with a relatively precise clinical meaning, significant enough not to be a routine part of most diseases, and significant enough to tend to dominate the resources used during the visit (Averill, Norbert, Goldfield, Gregg, & Grant, 1997). Examples of SSFs included in the major SSF APG are meningismus and coma (Averill, Norbert, Goldfield, Gregg, & Grant, 1997). Other diagnosis codes were used in the next stage of the assignment, in particular with respect to body systems. Overall, there were 83 medical APG classes in the original version.
- Ancillary only: If there are no significant procedures or therapies, no medical visit evaluation and management codes, and if there are ancillary tests or procedures present, then only ancillary test or procedure APGs are assigned. Ancillary services are allocated to 49 classes as follows:

Laboratory – 20 classes Radiology – 11 classes Pathology – 3 classes Anaesthesia – 1 class Ancillary Tests and Procedures – 16 classes Ancillary Mental Illness and Substance Abuse Services – 2 classes Incidental Procedures - 2 classes Chemotherapy Drugs - 5 classes

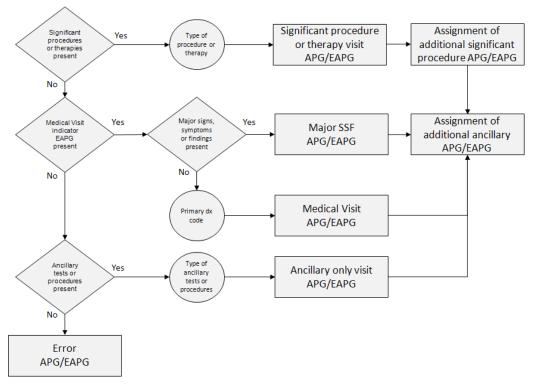
<sup>8</sup> HCPCS is the procedure coding system managed by CMS. Level 1 of the system is the CPT system, while Level 2 related to the additional codes for products, supplies and codes not included in CPT.

• *Error:* If there are no significant procedures or therapies, no medical visit evaluation and management codes, and no ancillary tests or procedures present, then the error APG 999 is assigned (Averill, Norbert, Goldfield, Gregg, & Grant, 1997).

Figure 6 describes the assignment logic for the APG and EAPG systems.

As noted above, the system groups ancillary services separately. This was a deliberate strategy by the designers. They argued that the system provides flexibility with respect to the extent of bundling of ancillary services, which can vary depending on the payer's preference (Averill, Norbert, Goldfield, Gregg, Grant, et al., 1997).

Averill R.F., Norbert M.S., et al. (1997) report R<sup>2</sup> statistics in various applications of the APG Version 2 model, which range from around 0.70 to 0.82. The implementations tested involved alternative packaging of ancillary costs and different windows of time around the visit.



#### Figure 6 – Assignment logic for the APG/EAPGs

Source: Based on Averill, Norbert, Goldfield, Gregg, Grant, et al., 1997; State of New York Department of Health, 2012

### **Emergency Department Groups (EDGs) (US)**

Emergency Department Groups (EDGs) were derived from a 20,000 patient sample taken from three Los Angeles area community hospitals (Cameron et al., 1990). Patient visits were classified into homogeneous groups, using five types of data elements: MDC, disposition, ICD-9-CM diagnosis, age and physician procedures. The classification resulted in 216 classes. The first splitting data element in EDGs is diagnosis (i.e. based on MDCs). The second split is disposition (four groups, including home/other non-acute; transfer-acute; admit; and death). For patients discharged home, a further split by diagnosis is made, and for transferred and admitted patients, a split by both procedure and diagnosis is made. Age splits, if applicable, are introduced at the lowest point in the splitting hierarchy. Cameron et al., (1990) estimated an R-square statistic (R<sup>2</sup>) for trimmed cases for EDGs of 0.63. The EDG system was evaluated in the WA study (G.A. Jelinek, 1992) and its performance was compared with the URG system. As in the Cameron et al. study, the EDGs accounted for a significant variance reduction. However, the data collection requirements were extensive, which Jelinek (1992) concluded makes it a complex and expensive system to implement.

# Comprehensive Ambulatory Care Classification System (CACS) (Canada)

The Comprehensive Ambulatory Care Classification System (CACS) covers emergency visits, ambulatory interventions (similar to day procedures), rehabilitation and clinic visits (similar to outpatient services). It also groups telephone consultations and direct diagnostic imaging.

Ambulatory care reporting in Canada (and the CACS) largely grew out of the Alberta Ambulatory Care Classification System (ACCS), which was developed in the mid-1990s and implemented in 1997 (Alberta Health Services, 2009).

While the Canadian Institute of Health Information (CIHI) operates a *National Ambulatory Care Reporting System* (NACRS) based on the CACS, decisions about the collection and reporting of ambulatory care data are determined at the level of individual provinces (not the Canadian federal government). Hence, CACS is not used for national funding or pricing of ambulatory care services, including emergency department visits.

According to CIHI, the CACS grouper places client visits into groups that are clinically and resource homogenous (Canadian Institute for Health Information, 2013). The data elements that are used to assign patients to groups include: emergency visit indicator, visit disposition, mode of visit, ambulatory care type and program area. In addition, anaesthetic, age and investigative technology are used in the 'factor overlay methodology' to assist in the assignment of resources. CIHI publishes, on behalf of Ontario, a set of resource weights and associated data.

The order of the splits for the data elements in CACS is not publicly available, as it is a commercial product sold by CIHI. However, an examination of the classes reveals that of the 240 classes, 42 relate specifically to emergency care. The grouper appears to partition classes into emergency care and other ambulatory care as one of the initial steps. Within emergency care, there are five classes related to cases that are associated with an 'admission or transfer', a separate class for 'emergency visit intervention' and then a range of other classes grouped by diagnosis.

A001-Dead on Arrival
A002-Left without being seen or Triage and not seen
A003-Telephone Visit
A101-Direct Diagnostic Imaging - Nuclear Imaging
A102-Direct Diagnostic Imaging - MRI
A103-Direct Diagnostic Imaging - CT Scan
A104-Direct Diagnostic Imaging - Other Minor
B001-Cardiovascular Condition with Acute Admission/Transfer
B002-Respiratory Condition with Acute Admission/Transfer
B003-Digestive System Condition with Acute Admission/Transfer

B004-Trauma with Acute Admission/Transfer
B005-Other Condition with Acute Admission/Transfer
B051-Emergency Visit Interventions
B052-Interventions Generally Performed by non Emergency Department Service: GI
B053-Interventions Generally Performed by non Emergency Department Service: Other
B054-Interventions Not Generally Performed in the Emergency Department
B055-Mental Health Intervention and Other Counselling
B101-Stroke
B102-Seizure Disorder
B103-Migraine & Headache

- B104-Other Disease or Disorder Nervous System B108-Disease or Disorder Eye B112-Disease or Disorder Ear, Nose or Throat B116-Disease or Disorder Respiratory System B120-Acute Myocardial Infarction/Angina **B121-Congestive Heart Failure** B122-Other Disease or Disorder Cardiac System B123-Disease or Disorder Vascular System B128-Disease or Disorder Digestive System B132-Disease or Disorder Skin & Breast B136-Disease or Disorder Musculoskeletal and Connective Tissue B140-Diabetes/Glucose Intolerance B141-Endocrine, Nutritional and Metabolic Disease or Disorder excluding Diabetes B145-Renal Failure & Other Disorders of the Kidnev/Ureter B146-Other Disease or Disorder Urinary System B150-Disease or Disorder Male Anatomy
- B154-Disease or Disorder Female Anatomy

- B158-Disease or Disorder Neonatal and Congenital
- B160-Disease or Disorder Blood or Blood Forming Organ
- B165-Systemic Infection
- B170-Mental Health & Psychosocial Condition
- B175-Head Injury
- B178-Foreign Body Eye, Ear, Nose/Throat
- B179-Foreign Body Excluding Eye/Ear/Nose
- B180-Contusion, Dislocation, Nerve & Other Soft Tissue Injury
- B181-Closed Fracture Fingers & Toes
- B182-Closed Fracture Other Site
- B183-Burn
- B184-Poisoning
- B186-Other Trauma, Shock (without admission/intervention)
- B187-Follow-up Examination and Other Non Emergent Condition
- B188-Open Wound and Vascular Injury

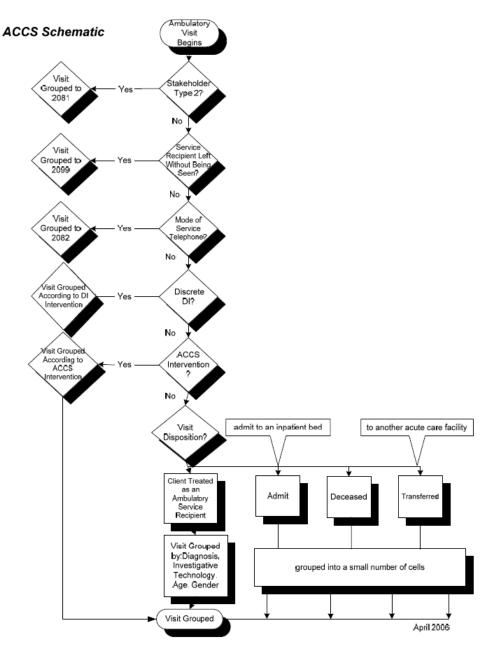
(Canadian Institution for Health Information, 2013a)

Figure 7 provides a schematic of the Alberta Ambulatory Care Classification System (ACCS), which is understood to be very similar to the national classification. This illustrates that in the Alberta classification, the main data elements used in grouping are diagnosis, investigative technology, age and gender. Ambulatory care services (including emergency department visits) exclude patients who leave without being seen, who receive service via telephone, who are dead on arrival or who receive a discrete diagnostic intervention.

Returning to the national CACS, CIHI publishes reports on the profile of emergency department visits including the top 25 main diagnoses, the main interventions, the CACS groups, the emergency department discharge diagnoses and the emergency department presenting complaints. The level of reporting on ambulatory care/emergency department visits varies across Canadian hospitals as follows:

- Level 1 data submission includes data elements required for emergency department wait time indicators, such as date and time of triage, date and time of physician initial assessment and date and time of disposition. Diagnostic and intervention information is not collected at this level. CACS grouping information is also not available.
- Level 2 data submission is as for Level 1, with the added option to submit information on presenting complaint and emergency department discharge diagnosis using so-called 'pick lists'. No intervention information is collected.
- Level 3 data submission includes all mandatory and optional data elements collected in NACRS, including diagnoses and interventions coded with ICD-10-CA/CCI. Administrative and clinical data not collected at Level 1 or Level 2 is collected at Level 3. Data for day surgery and other ambulatory care services must be submitted at this level.

It can be seen that the Level 1 data submission (including some information on triage and disposition) is somewhat similar to the Australian UDGs. However the Levels 2 and 3 data reporting requirements under the CACS require the collection of more patient-level clinical data than currently occurs under the Australian URGs. In order to standardise this information, the CIHI has published data code sets including emergency department diagnosis short list includes 837 Canadian Emergency Department Diagnosis Shortlist which is a subset of the full ICD-10-CA developed through an expert consultation process involving emergency department physicians across Canada (Unger et al., 2010; 2013b). Similar data is collected on a short list of Presenting Complaints (Canadian Institution for Health Information, 2013b).



### Figure 7 – Classification schematic for the Alberta Ambulatory Care Classification System

Source: Alberta Health Services, 2009

### Danish Ambulatory Grouping System (DAGS) (Denmark)

The Danish National Board of Health is responsible for the development and regular updating of the Danish Ambulatory Grouping System (DAGS). Under DAGS, ambulatory care in hospitals is classified into three major types of visits: ambulatory visits, emergency visits and telephone consultations (Bilde, Ankjaer-Jensen, Danneskiold-Samsoe, & Kramhoft, 2005). In 2005 ambulatory visits were then further split into 84 groups as follows:

- Visits for patients with specified diagnosis (5 groups) (e.g. includes cancer).
- Visits where specified procedures have occurred (78 groups) (these procedure groups are organised along similar lines to the MDCs or 'body function' sections).
- Other visits (where none of the specified diagnosis or procedures were present).

The number of groups in the DAGS classification has continued to increase and in 2011 there were 198 groups (Olejaz et al., 2012). Note, however, that no published information was identified that suggested any further split within the single emergency visit category; the growth in the number of DAGS classes appears to be concentrated in the 'ambulatory visits' category.

The DAGS classification is focussed on hospital-based same-day care (but see below regarding the 'Grey Zone'). Denmark uses the term 'outpatient care' to describe care provided by medical, allied health and other health professionals in the community.

The DAGS classification is broader in scope (but less granular) than the existing Australian emergency care classifications. In effect, the DAGS classification covers what would be described in Australia as outpatient services, emergency care services and same-day admitted services.

In addition, there is considerable blurring between DAGS and the Danish DRGs (Dk-DRGs), with same-day patients being classified according to the 'Department' (ambulatory or bedbased) in which the patient is treated. 'Grey Zone' tariffs apply for some DRGs, irrespective of whether the patient has been treated in an inpatient or ambulatory setting (Ankjær-Jensen, Rosling, & Bilde, 2006). The price set for 'Grey Zone' patients is between the cost of inpatient care and day cases (Bilde & Ankjaer-Jensen, 2005).

Given the lack of granularity in the emergency department classes, the DAGS classification appears to offer no lessons for future development of Australian emergency care classifications.

### **Other systems informing classification of emergency**

### care

This section describes systems that are not classification systems as such, but may contribute to the improvement or redesign of classification systems for emergency care. Note that this section does not review every available system within the category (e.g. triage system, dependency tool), but overviews a few systems that may inform classification of emergency care.

### Triage systems

The Canadian Triage and Acuity Scale (CTAS) was developed in the 1990s and first published in 1999 (Bullard et al., 2008) with a paediatric version published in 2001 (Warren et al., 2008). The initial work used the Australian triage systems as a starting point. However, the CTAS now goes significantly further in providing guidance based on a standardised set of presenting complaints and other modifying factors. A standardised short lists of around 180 presenting complaints has been developed for adults and a similar but slightly modified short list for paediatric patients (Grafstein et al., 2008). These are integrated into national data collection for emergency departments. The CTAS utilises information on the presenting complaint, them requires consideration of first level modifiers, which apply to a broad range of presenting complaints. First level modifiers include factors such as level of consciousness, haemodynamic status (e.g. presence of shock), respiratory distress, temperature, bleeding, mechanism of injury, and pain severity (e.g. acute central pain, chronic central pain, acute peripheral pain, chronic peripheral pain). Second level modifiers are identified for specific complaints.

The Manchester Triage System (MTS) is used widely across the UK and Europe (Manchester Triage Group, 2006) and also in several other countries, including Australia (Grouse et al., 2009). Note that this is not being presented here as a replacement for the Australasian Triage Scale (ATS), but as a potential strategy for standardising triage assignment and/or providing a basis for auditing it.

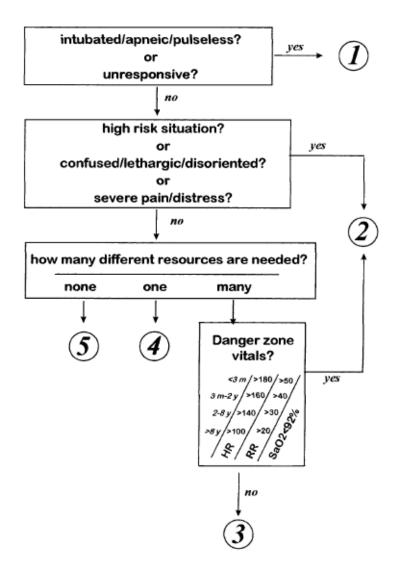
The Emergency Severity Index (ESI), a five-level triage system, was developed to overcome the limitations of three-level triage systems predominant in the US (Wuerz, Milne, Eitel, Travers, & Gilboy, 2000). It is a unique approach to triaging combining a range of concepts that are relevant to emergency care, and better reflecting resulting resource use of patients. While most triage systems are based on the question: "Who should be seen first?", the ESI also asks "What does the patient need to reach a disposition?" (Eitel, Travers, Rosenau, Gilboy, & Wuerz, 2003, pp. 1076-1077). Therefore, the ESI uses a two-tiered approach to classify patients:

- Tier 1: Differentiates patients based on urgency ('traditional' purpose of triage). This level effectively differentiates those patients that need to be seen immediately from those that can wait.
- Tier 2: For the patients that have been assessed as being able to wait, this second tier streams them following triage. The goal for this set of patients is "getting the right patient to the right resources at the right place and at the right time" (Eitel et al., 2003, p. 1077).

The ESI algorithm is shown in Figure 8 below. After sorting out level 1 and 2 patients, the algorithm asks, for the remaining patients: "*How many different resources are needed*? [in order for the patient to reach a disposition]". For patients where the answer is many, key physiological measures (heart rate [considering the patient's age], respiratory rate and oxygen saturation [SaO2]), then determine whether they are up-triaged, or stay at the assigned triage level.

The resulting triage categories have been shown to have a clinically meaningful association with the subsequent hospitalisation of the patient and emergency department length of stay (Wuerz et al., 2001).

The ESI's use of the number of different 'resources' needed for a patient to reach a disposition is similar to Sprivulis' (2004) summation of the number of procedures, investigations or consultations to group patients into resource homogenous categories in his PICsum classification.



### Figure 8 – Emergency Severity Index Version 2 triage algorithm

Source: Eitel et al., 2003, p. 1071

The ESI is not being suggested as an alternative system to triaging patients in Australian emergency departments. It raises some important considerations for classification of emergency department patients, which are:

- The initial separation of the patients that need to be seen immediately from those that can wait (i.e. Triage 1 and 2). This raises whether these two categories might be collapsed into a single group for classification purposes.
- The importance of the number of different resources needed/ used by the remaining patients. This raises the possibility of then grouping the remainder of patients based on the predicted number of resources used, based on their presenting condition/ diagnosis.

### Diagnosis Grouping System (DGS)

The Diagnosis Grouping System (DGS) is a system of grouping ICD-9-CM diagnoses relevant to paediatric patients attending emergency departments into major groups and subgroups. The DGS were developed to be intuitive to emergency department clinicians, and are also relevant for reporting, research and disease surveillance (Alessandrini, Alpern, Chamberlain, Shea, & Gorelick, 2010).

The researchers used a consensus approach to assign 3,041 ICD-9 diagnosis codes into 21 major groups and 77 subgroups.

Examples of major groups and subgroups that comprise the DGS are shown in Table 22.

# Table 21 – Examples of major groups and subgroups making up the DiagnosisGrouping System (DGS)

Major group and subgroup	Number of ICD-9 codes in major group/ subgroup
Circulatory and cardiovascular diseases	92
Congenital circulatory and cardiovascular diseases	24
Devices and complications of the circulatory system	9
Dysrhythmias	18
Other circulatory and cardiovascular diseases	41
Eye diseases	80
Infectious diseases of the eye	25
Noninfectious diseases of the eye	55
Endocrine, metabolic, and nutritional diseases	92
Diabetes mellitus	16
Other endocrine, metabolic, and nutritional diseases	76
Gastrointestinal diseases	253
Abdominal pain	22
Appendicitis	8
Devices and complications of the gastrointestinal system	17
Gastroenteritis	25
Infectious gastrointestinal diseases	19
Vomiting	5
Other gastrointestinal diseases	157
Musculoskeletal and connective tissue diseases	143
Chest pain	5
Devices and complications of the musculoskeletal system	5
Infectious musculoskeletal and connective tissue diseases	14
Musculoskeletal pain	20
Noninfectious musculoskeletal and connective tissue diseases	99

In a later paper, the researchers describe an additional process for identifying five severity groups for paediatric emergency department patients, and assigning the 3,041 ICD-9 diagnoses to these groups. The severity groups are based on "the intensity of resources needed to diagnose and treat a patient in the emergency department with a given diagnosis" (Alessandrini et al., 2012, p. 72).

The researchers also used a consensus approach to assign severity scores to the ICD-9 diagnosis codes relevant to paediatric patients in emergency department. Fourteen practicing general practitioners and paediatric emergency physicians were assembled into a panel. Each diagnosis was rated at minimum by six panel members. Where there was not

initial consensus on the rating for a particular diagnosis, a process was worked through until consensus was gained on the rating of all 3,041 diagnoses.

Five severity levels were identified, with 1 being the lowest, and 5 being the highest. Following the assignment to severity group through the consensus approach, actual resource utilisation data was used to validate the assignment of the diagnoses to the severity groups. It was found that the consensus approach was strongly associated with measures of emergency department resource use amongst 20 paediatric departments.

Examples of diagnoses relating to the identified severity levels are in Table 22.

# Table 22 – Most common diagnosis codes (ICD-9) within each Diagnosis Grouping System (DGS) severity category

ICD code	Description	Percentage of all visits in the study database (2002)
Severity	Rating 1	
6929	Contact dermatitis and other eczema, due to unspecified cause	0.57
V583	Attention to surgical dressings and sutures	0.41
6910	Diaper or napkin rash	0.31
Severity	Rating 2	
4659	Acute upper respiratory infections of unspecified site	4.44
3829	Unspecified otitis media	3.91
07999	Unspecified viral infection in conditions classified elsewhere and of unspecified site	3.73
Severity	Rating 3	
7806	Fever	4.98
49390	Asthma, unspecified, unspecified	2.30
78703	Vomiting alone	1.83
Severity	Rating 4	
78039	Other convulsions	0.84
7850	Unspecified tachycardia	0.31
49391	Unspecified asthma, with status asthmaticus	0.26
Severity	Rating 5	
7990	Asphyxia	0.08
0389	Unspecified septicemia	0.06
78603	Apnea	0.06

Source: Alessandrini et al., 2012, p. 74

### Jones Dependency Tool (JDT)

Varndell et al. (2013) examined the potential for using the Jones Dependency Tool (JDT) in an Australian emergency department. The researchers point to the need to use a system to reflect the severity and variability of illness/ injury and/ or the mix of patients managed in an emergency department for predicting nursing requirements (i.e. numbers and nurse-patient ratio). They believe that triaging alone does not adequately account for the nursing care required by patients, and that there are factors that impact on care requirements that are independent of the patient's clinical condition, such as functional capacity. They define patient dependency as "the specific care needs of each patient and the nursing time that they might require" (p. 65).

The JDT has six domains: (1) communication; (2) airway, breathing and circulation (ABC); (3) mobility; (4) eating, drinking, elimination and personal care; (5) environment, safety, health and social needs; and (6) triage category. Each domain is rated on a three-point scale: 1 (not present) to 3 (fully present). The criteria for scoring from present to fully present in each of

these domains are particularly relevant for factors that may contribute to increased patient severity. They are shown in Table 23.

			<u> </u>
Domain	3 points	2 points	1 point
Communication	<ul> <li>Complete impairment* due to either loss of one or more senses*</li> <li>Pain being at the higher range of the visual analogue scale (7-10)</li> <li>Complete language barrier*</li> <li>Extensive behavioural problems*</li> </ul>	<ul> <li>Impairment* or potential for impairment</li> <li>of one or more senses*</li> <li>Pain at the mid-range</li> <li>of the visual analogue</li> <li>scale (4-6)</li> <li>Responding only to</li> <li>verbal/pain stimulation</li> <li>Difficulty due to</li> <li>language barrier*</li> <li>Anxious / tearful / distressed</li> </ul>	<ul> <li>Able to communicate through all senses</li> <li>Pain at the lower range of the visual analogue scale (1-3)</li> <li>Alert</li> <li>No language barrier</li> <li>Co-operative / relaxed</li> </ul>
Airway, breathing and circulation (ABC)	<ul> <li>Cardiac/resp. arrest (or risk of arrest)</li> <li>Complete impairment of ABC or shock*</li> </ul>	□ Risk of impairment to ABC (potential for shock due to condition)	<ul><li>No ABC problems</li><li>Minor wounds</li></ul>
Mobility	Total immobility*	*Partial mobility loss: pt requires trolley / wheelchair	Fully mobile
Eating, drinking, elimination and personal care	<ul> <li>Total loss* of bowel/bladder function and/or hyperemesis</li> <li>Total loss* of independent self-care</li> </ul>	<ul> <li>Partial loss of</li> <li>bowel/bladder function</li> <li>and/or vomiting</li> <li>Partial loss of</li> <li>independent self-care</li> </ul>	<ul> <li>Normal bowel/bladder control. No vomiting.</li> <li>Able to maintain independent self-care</li> </ul>
Environment, safety, health and social needs	<ul> <li>Demonstrates danger to others</li> <li>Appears to require extensive social support*</li> </ul>	<ul> <li>Appears unable to fully understand risks</li> <li>Appears to require some social support*</li> </ul>	<ul> <li>Shows total ability to fully understand risks</li> <li>Does not appear to require social support*</li> </ul>
Triage Category	□1&2	□ 3	□ 4 & 5

### Table 23 – Jones Dependency Tool (JDT) domains and criteria for scoring

Source: Varndell et al., 2013, p. 67

\* Terms: Complete impairment - complete loss; Impairment - some degree of loss.

Senses - any one of the five especially sight, hearing or touch.

Language barrier - inability to speak or because of different language to nurse.

Behavioural problems - psychological or drug related.

Total loss - total inability to control own functions (may be ongoing).

Social support - co-ordination of relatives/environment/service provision.

Shock - hypovolaemic, cardiogenic, obstructive or distributive requiring immediate intervention.

Mobility loss - relates to loss or partial loss of normal mobility in any limb(s).

Partial mobility loss - has some ability to move limbs but may require help with sitting/standing/personal care.

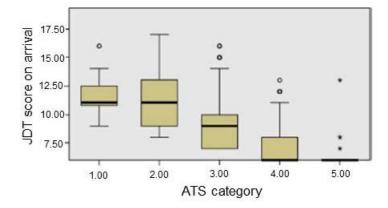
The summation of a patient's score on each of these dimensions results in a total score classifying the patient into one of four dependency levels. Nursing dependency is then predicted based on these levels. This is shown in Table 24.

When implementing the JDT in an Australian emergency department, Varndell et al., (2013) found patient dependency was moderately correlated with triage score ( $r_s$ =-.671, p<0.001), but that the degree of patient dependency varied significantly across the triage categories. This is shown in Figure 9 below.

implications for nursing requirement				
Score category	Score range	Implication for nursing		
Low	6-7	Requires minimal nursing intervention.		
Moderate	8-12	Requires regular nursing intervention, but encouraged to become independent.		
High	13-15	Requires skilled frequent nursing interventions and regular observation.		
Total [dependency]	16-18	Requires one to one nursing advanced care, constant observation and 15 minute interventions.		

Table 24 – Meaning of patient final scores in Jones Dependency Tool (JDT) and implications for nursing requirement

Source: Varndell et al., 2013, p. 66



### Figure 9 – Variance between degree of patient dependency (using Jones Dependency Tool - JDT) and urgency (using the Australasian Triage Scale - ATS)

#### Source: Varndell et al., 2013, p. 69

The researchers concluded that "while urgency is a factor in the level of patient dependency, and that in some cases the higher the urgency the greater the patient dependency, it does not fully represent the patient's total need of nursing care and therefore nursing workload" (p. 68). Another interesting finding was that the correlation between dependency and triage varied by domain. The highest correlations were for the airway, breathing and circulation (ABC) and the eating, drinking, elimination and personal care domains. Also, there was a positive and moderate correlation between age and dependency, with dependency increasing with older patients.

### International Classification of Primary Care (ICPC)

The International Classification of Primary Care (ICPC) is a clinical terminology used predominantly in primary care to code the reasons for the patient encounter, health problems and processes of care (e.g. procedures, counselling and referrals).

Australia has its own version of ICPC, which is based on version 2 of the classification (known as ICPC-2). The Australian version is known as ICPC-2 PLUS, and is maintained by the Family Medicine Research Centre (FMRC) at the University of Sydney (University of Sydney, 2011). ICPC-2 PLUS forms part of the Bettering the Evaluation and Care of Health (BEACH) national data collection program of Australian general practice. Apart from being used in general practice, it is also used in some primary care settings, including Aboriginal Medical Services, prisoner health community health and allied health (University of Sydney, 2011).

Classification	Classification data elements	Classes
Urgency disposition groups (UDGs)	<ul><li>Triage</li><li>Disposition</li></ul>	12
Urgency disposition age groups (UDAGs)	<ul><li>Triage</li><li>Disposition</li><li>Age group</li></ul>	33
Urgency related groups (URGs)	<ul> <li>Triage</li> <li>Disposition</li> <li>Age group</li> <li>Diagnosis</li> </ul>	73
Summated procedures, investigations or consultations (PICsum)	<ul> <li>No. of procedures, investigations or consultations (categorical – up to leach of a procedure, investigation and/or consultation to a total of 3, vs. all others)</li> </ul>	2

### Table 25 – Characteristics of Australian-developed emergency department classification systems

One of the key findings was that the results varied by hospital for each system when including all cases versus trimmed cases<sup>9</sup>. In addition, trimming of cases led to a significant increase in the explanatory power of each system overall (as measured by R<sup>2</sup>).

The authors' overall conclusion was that URGs did not provide any advantages over UDGs and UDAGs, especially when considering the additional complexities and investment associated with URGs (i.e. the collection and mapping of diagnosis). Similarly, Bond et al., (1998) had expressed earlier that "[a] system that depends on three outcomes, four age groups and five priorities has appealing simplicity and validity. It has more appeal than a relatively complicated system involving manipulation or combination of MDCs" (p. 109).

A summary of the performance of UDGs, UDAGs and URGs based on the original studies during which these classifications were developed and/ or subsequent evaluations, is shown in Table 26 below.

Study	Urgency disposition groups (UDGs)	Urgency disposition age groups (UDAGs)	Urgency related groups (URGs)	Scope of cases/ hospitals
G.A. Jelinek, 1992				2,882 patients,
Incl. outliers	41%		53%	3 tertiary
Excl. outliers	47%		57%	hospitals
Bond et al., 1998				17,889 patients,
Incl. outliers	37%	44%	49%*	1 tertiary
Excl. outliers	40%	51%	55%*	hospital
Department of Health (Vic.), 2011				603,762 patients, 21
Incl. outliers	38%	39%	38%	hospitals (11
Excl. outliers	62%	58%	56%	hospitals with non-admitted

### Table 26 – Reduction in variance (RIV) achieved by various studies developing/ evaluating Australian emergency department classifications

\* Based on a modified URG system with 29 rather than 73 classes.

<sup>&</sup>lt;sup>9</sup> To remove cases less than a third of the mean cost of the data set group and those three times greater.

Table 27 summarises the key features of the identified international classifications. For most of the international classifications we were unable to obtain information showing the performance of the system in terms of the level of variation in cost that the classification was able to explain. The exception was the APG system where the developers of the system tested a number of implementation in which R<sup>2</sup> statistics ranged from .70 to .82 (Averill, Norbert, Goldfield, Gregg, Grant, et al., 1997).

Characteristics:	Healthcare Resource Groups (HRG)	Ambulatory Payment Classifications (APC)	Ambulatory Patient Groups (APG)/ Enhanced Ambulatory Patient Groups (EAPG)	Emergency Department Groups (EDG)	Comprehensive Ambulatory Care Classification System (CACS)	Danish Ambulatory Grouping System (DAGS)
Scope (breadth of coverage)	Most broad – covers all hospital services including inpatients and all ambulatory care	Medium breadth – covers day procedures, outpatient clinics, emergency department services	Medium breadth – covers day procedures, outpatient clinics, emergency department services	Narrow – covers emergency department services only	Medium breadth – covers emergency department visits, day procedures, rehabilitation and outpatient visits	Medium breadth – covers ambulatory visits, emergency visits and telephone consultations
Boundary between emergency department and inpatient services (and any exclusions)	All care in the emergency department is funded through emergency department HRGs	Excludes the cost of medical services provided which are paid separately. Emergency department costs for patients who are admitted are funded through DRGs	May or may not exclude cost of medical services depending on implementation. Emergency department costs for patients who are admitted are funded through DRGs	Appears to cover all emergency department services (irrespective of whether patient subsequently admitted)	Appears to cover all emergency department services (irrespective of whether patient subsequently admitted)	There is overlap between DAGs and the Danish DRGs, with same-day patients able to be classified under both systems
Number of classes	11	850 covering all ambulatory care. 5 codes account for 80% of emergency care activity)	290 groups for version 2.0 APGs	216	240 covering all of ambulatory care. Approximately 52 classes related to emergency care	198 covering all ambulatory care
Data elements used in the classification	Investigations, Procedures (treatments)	Procedures	Procedures Diagnoses, with a particular emphasis on Signs, Symptoms and Findings (SSF)	Diagnosis, Disposition, Procedures Age	Emergency visit indicator (used to partition into emergency care and other ambulatory), Disposition, Diagnosis, Other variables such as used to define very specific classes (intervention and mode of visit e.g. telephone visit),	No information available; appears to be only one category for emergency department visits

Table 27 – Characteristics of international emergency department classification systems
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Characteristics:	Healthcare Resource Groups (HRG)	Ambulatory Payment Classifications (APC)	Ambulatory Patient Groups (APG)/ Enhanced Ambulatory Patient Groups (EAPG)	Emergency Department Groups (EDG)	Comprehensive Ambulatory Care Classification System (CACS)	Danish Ambulatory Grouping System (DAGS)
ls classification used for funding?	Yes	Yes	Yes, at state level for Medicare and private payers	No	In two provinces	Yes
Duration and extent of use	Since 2003-04 (but 2011 for the emergency department component); applies across all English hospitals	National use for all patients funded through the Medicare program	State level use since around 2000	Developed in early 1990s, unclear whether in use (academic study based on 3 Californian hospitals only)	Applies across all of Canada on a voluntary basis (provinces specify collection or not)	Applies across all Danish hospitals
Does classification (or pricing) vary by type of hospital?	Yes, lower prices are paid for non-24 hour emergency departments	Yes, lower prices are paid for non-24 hour emergency departments	Depends on implementation	Not applicable	Not used for pricing, but different types of hospitals report different levels of data (most rigorous includes diagnoses and interventions)	No information identified, appears to be the one classification across all hospitals

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