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**Lower-limb amputee rehabilitation in Australia: analysis of a national data set 2004-10**

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**Recommended Citation**

Hordacre, Brenton G.; Stevermuer, Tara; Simmonds, Frances; Crotty, Maria; and Eagar, Kathy, "Lower-limb amputee rehabilitation in Australia: analysis of a national data set 2004-10" (2013). *Australian Health Services Research Institute*. 190.  
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## Lower-limb amputee rehabilitation in Australia: analysis of a national data set 2004-10

### Abstract

**Objective.** Examine demographics, clinical characteristics and rehabilitation outcomes of lower-limb amputees, using the Australasian Rehabilitation Outcomes Centre (AROC) database.

**Methods.** Lower-limb amputee rehabilitation separations between 2004 and 2010 were identified using AROC impairment codes 5.3-5.7.1 Analysis was conducted by year, impairment code, Australian National Sub-acute and Non-Acute Patient (AN-SNAP) classification (S2-224, Functional Independence Measure (FIM) motor(Mot) score 72-91; S2-225, FIM (Mot) score 14-71) and states of Australia.

**Results.** Mean length of stay (LOS) for all lower-limb amputee episodes was 36.1 days (95% confidence interval (CI): 35.4-36.9). Majority of episodes were unilateral below knee (63.6%), males (71.8%) with a mean age of 67.9 years (95% CI: 67.6-68.3). Year-on-year analysis revealed a trend for increasing LOS and decreasing age. Analysis by impairment code demonstrated no significant difference in rehabilitation outcomes. Analysis by AN-SNAP found that LOS was 16.2 days longer for S2-225 than for S2-224 (95% CI: 14.7-17.8,  $P < 0.001$ ), and FIM(Mot) change was 12.0 points higher for S2-225 than for S2-224 (95% CI: 11.5-12.6,  $P < 0.001$ ). Analysis by states revealed significant variation in LOS, FIM (Mot) change and FIM (Mot) efficiency which may be associated with variations in organisation of rehabilitation services across states.

**Conclusion.** Although amputees represented a comparatively small proportion of all rehabilitation episodes in Australia, their LOS was significant. Unlike many other rehabilitation conditions, there was no evidence of decreasing LOS over time. AN-SNAP classes were effective in distinguishing rehabilitation outcomes, and could potentially be used more effectively in planning rehabilitation programs.

### Keywords

analysis, australia, rehabilitation, amputee, limb, lower, 2004, set, data, national, 10

### Publication Details

B. G. Hordacre, T. Stevermuer, F. Simmonds, M. Crotty & K. Eagar, "Lower-limb amputee rehabilitation in Australia: analysis of a national data set 2004-10", *Australian Health Review* 37 1 (2013) 41-47.

## Lower-limb amputee rehabilitation in Australia: analysis of a national data set 2004-10

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**Objective:** Examine demographics, clinical characteristics and rehabilitation outcomes of lower-limb amputees, using the Australasian Rehabilitation Outcomes Centre (AROC) database.

**Methods:** Lower-limb amputee rehabilitation separations between 2004 and 2010 were identified using AROC impairment codes 5.3–5.7. Analysis was conducted by year, impairment code, Australian National Sub-acute and Non-Acute Patient (AN-SNAP) classification (S2–224, FIM motor score 72–91; S2–225, FIM motor score 14–71) and states of Australia.

**Results:** Mean length of stay (LOS) for all lower-limb amputee episodes was 36.1 days (95%CI: 35.4–36.9). Majority of episodes were unilateral below knee (63.6%), males (71.8%) with a mean age of 67.9 years (95% CI: 67.6–68.3). Year-on-year analysis revealed a trend for increasing LOS and decreasing age. Analysis by impairment code demonstrated no significant difference in rehabilitation outcomes. Analysis by AN-SNAP found that LOS was 16.2 days longer for S2–225 than for S2–224 (95% CI: 14.7–17.8,  $P < 0.001$ ), and FIM (mot) change was 12.0 points higher for S2–225 than for S2–224 (95% CI: 11.5–12.6,  $P < 0.001$ ). Analysis by states revealed significant variation in LOS, FIM (Mot) change and FIM (Mot) efficiency which may be associated with variations in organisation of rehabilitation services across states.

**Conclusion:** Although amputees represented a comparatively small proportion of all rehabilitation episodes in Australia, their LOS was significant. Unlike many other rehabilitation conditions, there was no evidence of decreasing LOS over time. AN-SNAP classes were effective in distinguishing rehabilitation outcomes, and could potentially be used more effectively in planning rehabilitation programs.

**What is known about the topic?** Literature reporting on the rehabilitation outcomes of cohorts of lower-limb amputees in Australia is limited to individual sites. No previous literature was identified that reported national data.

**What does this paper add?** This study investigates amputee rehabilitation at a national level over a 7- year observation period (2004–10) and comprises 6588 episodes. It reports the national demographics, clinical characteristics and rehabilitation outcomes, with the aim of identifying findings that have implications for practitioners.

**What are the implications for practitioners?** Although only a small proportion of all episodes in the AROC database, this subset of lower-limb amputee episodes has provided a useful snapshot of the current state of amputee rehabilitation in Australia. We believe these findings have significant implications for practitioners in delivery of amputee rehabilitation services across Australia. Practitioners may benefit from adjusting service delivery based upon the decreasing age of lower limb amputees. Findings from this study also indicate that AN-SNAP classifications are effective in discriminating amputee rehabilitation outcomes and may be used to streamline rehabilitation services and provide a more efficient and effective rehabilitation service to prevent further increases in LOS.

AH11138

B. Hordacre *et al.*

Running head

Key words: AN-SNAP classification, Functional Independence Measure, FIM Motor, rehabilitation centres, rehabilitation outcome.

Received 10 January 2012, accepted 13 May 2012

## Introduction

Worldwide incidence of lower-limb amputation is highly variable with incidence rates ranging from 5.8 to 31 per 100 000.<sup>1</sup> Most lower-limb amputees in the developed world are elderly dysvascular patients often presenting with diabetes mellitus.<sup>2–5</sup> It is estimated that 700 000 Australians (3.6% population) were diagnosed with diabetes mellitus, and 3394 diabetic related lower-limb amputations were performed in Australia in 2004–05.<sup>6</sup>

Amputees are a core group in Australian rehabilitation units who have a long index length of stay (LOS). The long LOS associated with the index admission is justified by clinicians as important because restoring independent mobility and community integration reduces the larger social and health service costs associated with disability.<sup>7</sup> It is widely believed that growth of interventional vascular surgery has helped reduce or postpone lower-limb amputation numbers in dysvascular patients.<sup>8,9</sup> However, it is unknown whether amputees entering rehabilitation units now present with different demographics than previously. This may result in a change in the outcomes achieved, time

taken to achieve these outcomes or in the nature of the clinical programs provided. National outcome data collected by the Australasian Rehabilitation Outcomes Centre (AROC) will allow further investigation into the demographics, clinical characteristics and rehabilitation outcomes across Australia.

AROC collects standardised data for each and every episode of inpatient rehabilitation care from rehabilitation services in Australia (private and public). It provides a national benchmarking service, as well as information to improve understanding of factors that influence rehabilitation outcomes and costs. The objective of this study was to examine the AROC database for inpatient lower-limb amputee rehabilitation episodes to understand the demographics, clinical characteristics and rehabilitation outcomes. Service implications for lower-limb amputees in Australia will be drawn from these findings. The primary outcomes of interest will include improvement in patient functional status, hospital LOS, clinical characteristics and discharge destination. In addition, the yearly trends in episode outcomes and service efficiency will be examined, as well as comparison of outcomes for service provision between impairment codes, Australian National Sub-Acute and Non-Acute Patient (AN-SNAP) classifications, and States of Australia.

## **Methods**

### *Design*

This study was a retrospective analysis of lower-limb amputee rehabilitation outcomes for separation episodes between 2004 and 2010 using the AROC database. Lower-limb amputee data were identified using AROC impairment codes 5.3 to 5.7 (Table 1). All data were de-identified before data extraction and analysis. Ethical approval for this study was provided by the Southern Adelaide Clinical Human Research Ethics Committee.

### *AROC dataset*

AROC was established in July 2002 as a joint initiative of the Australasian Rehabilitation sector and is funded by contributions from all stakeholders, including facilities, health funds, Department of Veterans' Affairs, health departments (state and commonwealth), some general insurers and the Australasian Faculty of Rehabilitation Medicine (AFRM). AROC receives quarterly episodic data from private and public rehabilitation facilities across Australia. Thirty facilities were submitting data to AROC in 2002. However AROC coverage grew steadily with 109 facilities submitting by 2004, and 180 by 2011, representing more than 95% of Australian rehabilitation facilities and inpatient episodes. Of the rehabilitation facilities submitting data to AROC, 21 units specialise in lower-limb amputee rehabilitation and contributed the majority of amputee episode data (59.3%). The AROC dataset includes 42 items: sociodemographic, funding and employment details, episode items (admission and discharge), medical (impairment codes, comorbidities, complications), and outcome data (patient level of function at admission and discharge).<sup>10,11</sup>

Data within the AROC database are classified under the AN-SNAP casemix classification system, which was developed at the University of Wollongong in 1997.<sup>10</sup> The purpose of AN-SNAP was to provide a casemix classification system for sub and non-acute care provided in several treatment settings. It was borne out of a growing recognition that patients should be classified by functional ability, rather than by diagnosis and procedure codes as in the acute sector.<sup>11</sup> AN-SNAP subdivides case episodes according to both diagnosis and functional level, using the Functional Independence Measure (FIM). Version 2 AN-SNAP classification became operational in 2007<sup>11</sup> and includes 45 inpatient rehabilitation classes. For amputees, AN-SNAP version 2 contains two functional levels based on the FIM motor (FIM (Mot)) score. The two functional classes are S2–224 (FIM Mot 72–91) and S2–225 (FIM Mot 14–71). FIM is an internationally recognised and reliable functional-status instrument that is widely used with rehabilitation inpatients.<sup>12–15</sup> It contains 18 items, 13 of which relate to motor function, and five to cognition. Total FIM scores including both motor and cognitive aspects range from 18 to 126, with higher scores representing greater functionality. FIM scores relating to motor assessments range from 13 to 91. AROC holds a territory licence for use of the FIM in Australia and New Zealand, and is responsible for the national certification and training for all accredited rehabilitation clinicians. Clinical staff are required to be recertified in the FIM every 2 years to maximise the quality of data. All data received by AROC are screened for errors and missing data before adding the episodes to the database. If necessary, AROC will request that the submitting facility review and correct any inconsistencies.

### *Analysis*

De-identified lower-limb amputee rehabilitation episodes between 2004 and 2010 were extracted from the main AROC database using AROC impairment codes 5.3–5.7.<sup>1</sup> Data were then transferred to SPSS version 19.0 for analysis. Descriptive analysis was conducted on demographics, FIM (Mot) (admission score, discharge score, change and efficiency), LOS, clinical characteristics and discharge destination collated by year, AN-SNAP classification, impairment code and States of Australia. FIM (Mot) change is the difference between admission and discharge FIM (Mot) scores, and is an indicator of change in functional status during rehabilitation stay. FIM (Mot) efficiency is the FIM (Mot) change achieved per day of LOS. Significant differences were analysed by independent sample *t*-tests and between-subjects analysis of variance (ANOVA) with post-hoc pairwise comparisons using Tukey adjustments for significant results. Results of descriptive analysis are presented as a mean and 95% confidence interval (95% CI). Results of independent sample *t*-test and ANOVA are presented as mean difference and 95% CI.

## **Results**

### *Episodes*

A total of 6588 lower-limb amputee episodes were submitted to the AROC database between 2004 and 2010. However only 4864 (73.8%) of episodes could be analysed for rehabilitation outcomes,

which requires valid LOS and valid FIM scores. Of all rehabilitation episodes submitted to the AROC database between 2004 and 2010, lower-limb amputees contributed only 1.7% of episodes (see [Table 2](#)). Of all submitted amputee episode data, New South Wales (NSW) was the largest contributing state (48.5%), whilst the majority of episodes were submitted from public facilities (83.4%). The number of lower-limb amputee episodes submitted to the AROC database grew steadily each year as did the number of facilities submitting lower-limb amputee episodes data, reaching 99 by 2010.

### *Demographics*

The majority of lower-limb amputee episodes were male (71.8%), with mean age of all episodes being 67.9 years (95% CI: 67.6–68.3). Episodes in the private sector had a mean age 6.1 years lower than those in the public sector (95% CI: 5.1–7.0,  $P < 0.01$ ). Episodes categorised to the higher functioning AN-SNAP class (S2–224) had a lower mean age by 10.0 years than did those in S2–225 (95% CI: 9.2–10.8,  $P < 0.001$ ). Year-on-year analysis revealed a trend for decreasing age, with the mean age in 2004 being 70.2 years (95% CI: 69.1–71.3), dropping in 2010 to 67.1 years (95% CI: 66.2–68.0).

### *Clinical characteristics*

The majority (63.6%) of episodes within the AROC database were unilateral below-knee amputees, with most episodes being the lower functioning AN-SNAP classification, S2–225 (71.8%). [Table 3](#) demonstrates this to be the case across all states of Australia. The majority of episodes were admitted from private residence (89.5%), with 87.1% of those admitted from private residence also returning there upon completion of rehabilitation.

Complications and comorbidities occurring during rehabilitation were not well recorded in the dataset before 2007. In 2004, 94.7% of episodes did not record complications during rehabilitation. This figure dropped to 51.1% in 2007, and by 2010 there were only 2.7% of episodes with missing data for complications during rehabilitation. Of submitted data where complications were recorded from 2007 to 2010, 44.2% reported at least one complication, commonly being a wound infection (33.3%) or a fall (12.5%). Of submitted comorbidities data between 2007 and 2010, 67.4% had at least one comorbidity, with 43.4% having multiple comorbidities. The most commonly reported comorbidity was diabetes mellitus (43.4%). Comorbidities and complications did not vary by year or impairment code. However, analysis by AN-SNAP classification revealed that episodes in S2–225 were significantly more likely to have at least one complication (45.8%) compared with those in S2–224 (31.2%) ( $\chi^2(1) = 49.9$ ,  $P < 0.001$ ). Episodes in S2–225 were also significantly more likely to have multiple comorbidities (36.2%) compared with those in S2–224 (27.4%) ( $\chi^2(1) = 40.6$ ,  $P < 0.001$ ).

Program suspension recording changed in 2007 to enable reporting of the number of suspensions, total number of days of the suspension period, and if the suspension was planned or not. Since 2007 38.1% of episodes reported a suspension to treatment during inpatient rehabilitation. Of those, only 17.1% reported the number of suspensions, 21.1% the length, and all reported if the suspension was

planned. Of those episodes with only one suspension (75.4%), the mean length of suspension was 4.7 days (95% CI: 3.8 – 5.6). The program suspension was a planned occurrence in 49.1% of episodes.

### *Rehabilitation outcomes*

Mean LOS for all lower-limb amputee episodes was 36.1 days (95% CI: 35.4–36.9). FIM (Mot) change was 13.5 (95% CI: 13.2–13.8) and FIM (Mot) efficiency was 0.5 (95% CI: 0.5–0.5). Year-on-year analysis (see [Table 4](#)) revealed a trend for increasing LOS and FIM (Mot) change, however this did not reach significance. [Table 5](#) provides results of rehabilitation outcomes from submitted episode data for lower-limb amputee impairment codes. Post-hoc analysis revealed that impairment code 5.5 had a significantly lower admission FIM (Mot) than did all other impairment codes. Impairment code 5.5 also had significantly lower discharge FIM (Mot) scores than did all other impairment codes, while impairment code 5.4 had significantly higher discharge FIM (Mot) scores than did all other impairment codes. Analysis by AN-SNAP classification revealed that LOS was longer for S2–225 at 40.6 days (95% CI: 39.8–41.5) than for S2–224 at 24.4 days (95%CI: 23.4–25.4), with a significant difference of 16.2 days (95% CI: 14.7–17.8,  $P < 0.001$ ). FIM (mot) differences were also found between AN-SNAP classifications, with S2–225 achieving a higher FIM (mot) change of 16.8 (95%CI: 16.5–17.2) than the 4.8 (95%CI: 4.5–5.0) achieved for S2–224, with the mean difference of 12.0 reaching significance (95% CI: 11.5–12.6,  $P < 0.001$ ). FIM (mot) efficiency was also found to be different between AN-SNAP classifications, with S2–225 being 0.6 (95%CI: 0.5–0.6) compared with 0.3 (95%CI: 0.3–0.3) for S2–224, and the mean difference of 0.3 reaching significance (95% CI: 0.2–0.3,  $P < 0.001$ ). Analysis by states (see [Table 6](#)) revealed significant variations in LOS, FIM (Mot) change and FIM (Mot) efficiency. Post-hoc analysis revealed NSW had shorter LOS than did either South Australia (SA) (by 3.7 days, 95% CI: 0.6–6.8,  $P < 0.01$ ) or Victoria (Vic) (by 6.3 days, 95% CI: 3.7–9.0,  $P < 0.001$ ), but Queensland (Qld) had significantly shorter LOS than did Vic, by 4.4 days (95% CI: 0.9–7.9,  $P < 0.01$ ). Vic achieved a significantly greater FIM (Mot) change than did Qld, by 1.6 points (95% CI: 0.1–3.1,  $P < 0.05$ ). FIM (Mot) efficiency was significantly greater for NSW than for SA by 0.1 (95% CI: 0.0–0.2,  $P < 0.05$ ) and for Vic by 0.1 (95% CI: 0.0–0.1,  $P < 0.05$ ). Caution should however be taken when considering these results due to variations in organisation of rehabilitation and prosthetic services across Australia.

### **Discussion**

The AROC dataset proved useful for providing a snapshot of lower-limb amputee rehabilitation nationally. Since inception of the database, several modifications and improvements have been implemented to ensure that data recording is correct and accurate and provides a realistic picture of the current state of rehabilitation. For lower-limb amputees, an adjunct dataset was introduced to specifically target outcomes related to amputees. Once sufficient data has been collected, the addition of the adjunct dataset should allow a more comprehensive analysis of amputee rehabilitation. In the



meantime, results from the current version of the AROC database indicate that the majority of cases were managed by the public sector, and unilateral below-knee episodes were the most common in this database, which is typically the case in amputee rehabilitation facilities.<sup>16,17</sup> Overall LOS can also be considered to be quite long compared with other patient populations including stroke (27 days) and orthopaedic fractures (23 days),<sup>18,19</sup> and amputees entering rehabilitation facilities can be considered old. The significant LOS may be attributed to several factors such as waiting for suitable wound healing to occur before prosthetic casting, waiting for adequate home modifications to be made so that the amputee may safely return home, or the earlier arrival of amputees from acute setting to rehabilitation facilities.

Year-on-year analysis revealed a trend for increasing LOS, FIM (Mot) change and decreasing age. As discharge to private residence has remained relatively steady over the observation period, it appears that the lower admission FIM (Mot) scores entering rehabilitation may contribute to the longer LOS to achieve a greater FIM (Mot) change and ensure similar discharge FIM (Mot) scores. Increasing LOS in this population appears to be contradictory to other rehabilitation patient populations who are typically experiencing decreasing rehabilitation LOS.<sup>18,19</sup> The decreasing age observed may be related to the increasing prevalence of diabetes mellitus in younger adults due to the increasing incidence of obesity and physical inactivity.<sup>20-22</sup> However several other factors may also have contributed, such as rehabilitation facilities admitting older amputees for transfer training only under reconditioning (rather than rehabilitation), or facilities not admitting older amputees from care facilities for rehabilitation as their care is already maximal.

The trend of increasing LOS and decreasing age should raise concerns within the wider amputee rehabilitation community. Clinicians and public health physicians may need to review current rehabilitation practice and pursue service delivery modifications aimed at reducing LOS and promoting good rehabilitation outcomes. To assist in the review of current rehabilitation practice, clinicians should ensure active data collection of all items within the AROC amputee adjunct dataset, to provide a comprehensive overview of lower-limb amputee rehabilitation in Australia. Attention should be directed towards the increasing LOS to determine if improved services, such as early identification and implementation of home modifications, may assist in reducing LOS. Service delivery modifications may also need to be considered and may include earlier admittance to rehabilitation facilities to ensure rehabilitation begins as soon as possible.

Discrimination of episodes by AN-SNAP classification through use of the FIM appears to be an effective method of distinguishing functional abilities and rehabilitation outcomes of lower-limb amputees. Significant differences were found in LOS, FIM (Mot) change and efficiency between classifications. Potential exists for AN-SNAP classes to be used more effectively in planning and targeting rehabilitation programs for the lower-limb amputee population and may be a useful service-modification option to assist in the reduction of LOS. Although the FIM itself is not an amputee-

specific tool, it is a widely used and useful tool for obtaining a broad snapshot of a patient's potential and allows comparison of amputees with other patient populations. AROC has recently introduced an amputee adjunct dataset which will provide more specific amputee-related rehabilitation outcomes. Although insufficient data are currently available for analysis, we believe the addition of this adjunct dataset will prove useful for investigating amputee rehabilitation nationally.

### *Limitations*

Outcomes from this study rely upon the quality of data recorded within the database. Data within this database are recorded at various rehabilitation facilities by a wide variety of clinical staff throughout Australia. To help ensure quality of data submitted to the AROC database, clinical staff undergo regular training. Data submitted to AROC are checked for validity and returned for correction if required.

Not all Australian rehabilitation facilities submit episode data to the AROC database. Currently 180 facilities submit data to AROC, and this represents more than 95% of rehabilitation facilities in Australia. However, that number has not remained constant over the observation period with the number of submitting facilities growing over time.

Although interesting, there are limitations in reporting outcomes by States of Australia. Whilst there were variations in rehabilitation outcomes across Australia, results also indicated variations in episodes discriminated by AN-SNAP, and impairment codes exist that may have contributed to this (see [Table 3](#)). However, there may be other factors influencing the variation in rehabilitation outcomes across Australia. These factors may include the variation in funding structures and organisations of rehabilitation and prosthetic facilities across Australia. This study is also unable to detail the variation in amputee clinical practice across Australia that would impact rehabilitation outcomes.

Finally, some amputee-specific items should be addressed to provide a clearer picture of the state of amputee rehabilitation. Although admission and discharge FIM scores are provided, information regarding level of function before amputation is lacking. Factors such as mobility before amputation are known to affect the ability of amputees to achieve successful rehabilitation with a prosthesis.<sup>23</sup> Inclusion of additional outcomes may prove useful in describing rehabilitation and functional outcomes of amputees.

### **Conclusion**

Although only a small proportion of all episodes in the AROC database, this subset of lower-limb amputee episodes has provided a useful snapshot of the current state of amputee rehabilitation in Australia. Mean age of amputees was 67.9 years with a trend for decreasing age over the observation period. Overall LOS of this amputee subset was considered high in comparison to other patient

populations. However, unlike other patient populations there does not appear to be a trend for decreasing LOS. AN-SNAP classes appear effective in distinguishing rehabilitation outcomes, and could potentially be used more effectively in planning rehabilitation programs.

### Competing interests

The authors of this paper declare that there are no competing interests. Brenton Hordacre receives an Australian Postgraduate Award Scholarship.

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**Table 1. Definition of AN-SNAP and impairment codes used for lower-limb amputees**

Term	Definition
AN-SNAP Code:	
S2–224	Functional Independence Measure Motor score 72–91
S2–225	Functional Independence Measure Motor score 14–71
Impairment Code:	
5.3	Unilateral amputation above knee or through the knee
5.4	Unilateral amputation below the knee
5.5	Bilateral amputation, both above knee or through knee
5.6	Bilateral amputation, one above or through the knee, one below the knee
5.7	Bilateral amputation, both below the knee

**Table 2. Episodes submitted to the AROC database from 2004 to 2010**

Impairment code 5.3, unilateral amputation above knee or through the knee; Impairment code 5.4, unilateral amputation below the knee; Impairment code 5.5, bilateral amputation above knee or through knee; Impairment code 5.6, bilateral amputation above/below the knee; Impairment code 5.7, bilateral amputation below the knee

Impairment Code	Year							All Years
	2004	2005	2006	2007	2008	2009	2010	
5.3	193	252	242	264	248	294	260	1753
5.4	479	531	579	667	636	695	615	4202

5.5	12	19	21	21	23	17	26	139
5.6	28	32	31	15	32	26	24	188
5.7	40	47	45	53	45	47	29	306
All amputee episodes	752	881	918	1020	984	1079	954	6588
All rehabilitation episodes	37 920	45 338	50 755	55 393	60 797	67 306	75 621	393 130
% Amputee	2.0%	1.9%	1.8%	1.6%	1.6%	1.3%	1.3%	1.7%

**Table 3. Variation in lower-limb amputee admissions (%) across impairment codes and AN-SNAP classifications by states of Australia**

Impairment code 5.3, unilateral amputation above knee or through the knee; Impairment code 5.4, unilateral amputation below the knee; Impairment code 5.5, bilateral amputation above knee or through knee; Impairment code 5.6, bilateral amputation above/below the knee; Impairment code 5.7, bilateral amputation below the knee

	Impairment Code					AN-SNAP	
	5.3	5.4	5.5	5.6	5.7	S2-224	S2-225
NSW	653 (28)	1424 (60)	58 (2)	73 (3)	150 (6)	628 (27)	1714 (73)
Vic	180 (21)	602 (72)	7 (1)	16 (2)	36 (4)	154 (18)	685 (82)
Qld	203 (32)	383 (59)	21 (3)	16 (2)	21 (3)	196 (31)	443 (69)
SA	166 (28)	379 (65)	14 (2)	10 (2)	18 (3)	165 (28)	421 (72)
Other	108 (25)	306 (71)	2 (0)	12 (3)	6 (1)	186 (45)	228 (55)

**Table 4. Comparison of lower-limb amputee rehabilitation outcomes 2004–2010**

LOS = length of stay, FIM = Functional Independence Measure, FIM Mot = motor score of the Functional Independence Measure

	2004 <i>n</i> = 535	2005 <i>n</i> = 600	2006 <i>n</i> = 686	2007 <i>n</i> = 747	2008 <i>n</i> = 743	2009 <i>n</i> = 823	2010 <i>n</i> = 730	Total <i>n</i> = 4864	<i>P</i> value*
LOS (95% CI)	33.4 (31.0–35.8)	34.2 (32.4–36.1)	35.4 (33.5–37.3)	34.8 (33.1–36.6)	34.6 (32.9–36.4)	38.1 (36.3–40.0)	39.1 (37.0–41.1)	36.1 (35.4–36.9)	0.000
LOS casemix adjusted mean (95% CI)	-1.0 (-3.3-1.3)	-0.1 (-1.9-1.7)	-0.2 (-1.9-1.6)	0.1 (-1.6-1.9)	-0.9 (-2.6-0.7)	3.1 (1.3-4.8)	3.8 (1.8-5.8)	0.8 (0.1-1.5)	0.000
Admission FIM Mot (95% CI)	61.1 (59.8–62.5)	61.4 (60.2–62.7)	60.3 (59.1–61.5)	61.5 (60.4–62.6)	60.8 (59.7–61.9)	59.6 (58.5–60.7)	59.1 (58.0–60.3)	60.1 (59.7–60.6)	0.018
Discharge FIM Mot (95% CI)	73.8 (72.7–75.0)	75.1 (74.1–76.1)	73.7 (72.7–74.7)	74.9 (74.1–75.8)	73.7 (72.8–74.6)	73.6 (72.6–74.5)	74.0 (73.0–75.0)	73.6 (73.3–74.0)	0.101
FIM Mot change (95% CI)	12.7 (11.8–13.6)	13.6 (12.8–14.5)	13.4 (12.5–14.2)	13.4 (12.6–14.2)	12.9 (12.1–13.6)	14.0 (13.2–14.7)	14.9 (14.0–15.7)	13.5 (13.2–13.8)	0.001
FIM Mot efficiency (95% CI)	0.5 (0.4–0.5)	0.5 (0.5–0.6)	0.5 (0.4–0.5)	0.5 (0.5–0.6)	0.5 (0.4–0.5)	0.5 (0.4–0.5)	0.5 (0.5–0.5)	0.5 (0.5–0.5)	0.540
FIM casemix adjusted mean (95% CI)	-1.5 (-2.3–0.6)	-0.6 (-1.4–0.3)	-0.9 (-1.7– -0.1)	-0.6 (-1.4–0.2)	-1.8 (-2.5– -1.1)	-0.5 (-1.3–0.3)	0.3 (-0.5–1.1)	-0.8 (-1.1– -0.5)	0.007
Discharge to private residence <i>n</i> (%)	144 (73)	348 (81)	480 (81)	596 (84)	611 (86)	648 (83)	603 (86)	3430 (83)	0.000
Sector: private <i>n</i> (%)	122 (23)	125 (21)	91 (13)	123 (16)	119 (16)	127 (15)	100 (14)	807 (17)	0.000
Ppublic <i>n</i> (%)	413 (77)	475 (79)	595 (87)	624 (84)	624 (84)	696 (85)	630 (86)	4057 (83)	

\*Excluding ‘Total’ in analysis.

**Table 5. Comparison of lower-limb amputee rehabilitation outcomes by impairment code**

Impairment code 5.3, unilateral amputation above knee or through the knee; Impairment code 5.4, unilateral amputation below the knee; Impairment code 5.5, bilateral amputation above knee or through knee; Impairment code 5.6, bilateral amputation above/below the knee; Impairment code 5.7, bilateral amputation below the knee

LOS = length of stay, FIM = Functional Independence Measure, FIM Mot = motor score of the Functional Independence Measure.

	5.3 <i>n</i> = 1310	5.4 <i>n</i> = 3094	5.5 <i>n</i> = 102	5.6 <i>n</i> = 127	5.7 <i>n</i> = 231
LOS (95% CI)	35.7 (34.3–37.1)	36.3 (35.4–37.2)	39.3 (33.1–45.5)	31.3 (27.2–35.4)	37.8 (34.1–41.6)
Admission FIM Mot (95% CI)	59.0 (58.1–59.9)	61.2 (60.7–61.8)	49.4 (45.8–53.0)	58.5 (55.4–61.7)	56.7 (54.6–58.9)
Discharge FIM Mot (95% CI)	72.4 (71.7–73.2)	74.8 (74.4–75.3)	64.6 (61.0–68.2)	70.3 (67.7–72.9)	70.1 (68.0–72.2)
FIM Mot change (95% CI)	13.4 (12.8–14.0)	13.6 (13.2–14.0)	15.2 (12.8–17.7)	11.7 (9.9–13.6)	13.4 (11.7–15.0)
FIM Mot efficiency (95% CI)	0.5 (0.5–0.6)	0.5 (0.5–0.5)	0.6 (0.4–0.7)	0.5 (0.4–0.6)	0.5 (0.4–0.6)
Discharge to private residence <i>n</i> (%)	889 (81)	2256 (85)	59 (74)	78 (79)	148 (79)
Sector: private <i>n</i> (%)	244 (19)	497 (16)	19 (19)	14 (11)	33 (14)
public <i>n</i> (%)	1066 (81)	2597 (84)	83 (81)	113 (89)	198 (86)

**Table 6. Comparison of Lower-limb amputee rehabilitation outcomes by states of Australia**

NSW = New South Wales, Vic = Victoria, Qld = Queensland, SA = South Australia, LOS = length of stay, FIM = Functional Independence Measure, FIM Mot = motor score of the Functional Independence Measure

	NSW <i>n</i> = 2358	Vic <i>n</i> = 841	Qld <i>n</i> = 644	SA <i>n</i> = 587	Other <i>n</i> = 434	<i>P</i> value*
LOS (95% CI)	34.3 (33.3–35.3)	40.7 (38.9–42.4)	36.3 (34.0–38.6)	38.1 (36.0–40.2)	34.3 (32.1–36.5)	0.000
Admission FIM Mot (95% CI)	59.3 (58.6–59.9)	58.6 (57.6–59.5)	60.2 (59.0–61.4)	60.8 (59.7–62.0)	66.9 (65.6–68.2)	0.029
Discharge FIM Mot (95% CI)	73.0 (72.4–73.6)	73.1 (72.3–73.9)	73.1 (72.1–74.1)	74.3 (73.3–75.2)	78.3 (77.4–79.2)	0.223
FIM Mot change (95% CI)	13.7 (13.3–14.2)	14.5 (13.8–15.3)	12.9 (12.1–13.7)	13.4 (12.6–14.2)	11.4 (10.3–12.4)	0.036
FIM Mot efficiency (95% CI)	0.5 (0.5–0.6)	0.5 (0.4–0.5)	0.5 (0.4–0.5)	0.4 (0.4–0.5)	0.5 (0.4–0.5)	0.002
Discharge to private residence <i>n</i> (%)	1506 (81)	642 (83)	514 (85)	422 (89)	346 (84)	0.000
Sector: private <i>n</i> (%)	364 (15)	40 (5)	333 (52)	16 (3)	54 (12)	0.000
public <i>n</i> (%)	1994 (85)	801 (95)	311 (48)	571 (97)	380 (88)	

\*Excluding 'Other' in analysis.