

sectors, and facilitate statistical linkage by providing variables which would allow more accurate targeting of the linkage process.

6 Results for Western Australia, South Australia and Tasmania

In order for the linkage strategy to be useful in a national context, its utility across a number of different states and territories needs to be established. The linkage strategy was therefore also applied to data from Western Australia, South Australia and Tasmania. The tables corresponding to those presented above for NSW/ACT are in Appendix 2 (for Western Australia), Appendix 3 (for South Australia) and Appendix 4 (for Tasmania). The results are summarised below. Unfortunately, although Queensland provided approval for use of the appropriate hospital morbidity data, it was not received in time to allow inclusion in this study. However, Queensland could be included if further analysis were to be carried out using the linked data.

6.1 Unique linkage keys in the unlinked data

As stated above, as the number of records being tested for unique linkage keys decreases, the proportion of records with unique linkage keys increases. Consequently, for each linkage key in both the hospital morbidity and residential aged care data sets the proportion with unique keys was lowest for NSW/ACT and highest for Tasmania. There were few duplicates in the Western Australian, South Australian and Tasmanian data, with the proportion of duplicate keys being less than 2% for all keys incorporating geographic location. (See Table 1 and Table 2 for NSW/ACT, Table A11 and Table A12 for Western Australia, Table A19 and Table A20 for South Australia, and Table A27 and Table A28 for Tasmania).

With respect to different linkage keys, the results for the three states were generally the same as those for NSW/ACT, with linkage keys employing exact dates having fewer duplicates than similar keys using 3 day matches, and with the addition of a geographic indicator of usual residence also reducing the incidence of duplicate keys. Because of the relatively small numbers, an age effect in the number of unique linkage keys was only observed in the hospital data when using the least exact linkage key, that is using a linkage key based on date of birth, sex and separation dates within 3 days. (See Table A13 for Western Australia, Table A21 for South Australia and Table A29 for Tasmania).

6.2 Unique linkage keys in the linked data

As expected, the number of linked records were considerably smaller for Western Australia, South Australia and Tasmania than for NSW/ACT. The resulting samples are shown in Table 9.

For linkage keys based on exact separation/admission date matches, the proportion of unique linkage keys was between 97.1% and 99.3% for Western Australia, between 96.2% and 99.7% for South Australia and between 99.0% and 100.0% for Tasmania. In all three states there was very little difference in the results for linkage keys using postcode of usual residence and the corresponding keys using SLA group of usual residence. (See Table A14 for Western Australia, Table A22 for South Australia and Table A30 for Tasmania).

Table 9: Comparison of the number of records in the linked data sets, by state/territory and linkage key, 1999–00 (number)

State	Linkage key	Number
NSW	Date of birth, sex, exact date	13,459
NSW	Date of birth, sex, exact date, SLA group	9,922
WA	Date of birth, sex, exact date	3,312
WA	Date of birth, sex, exact date, SLA group	2,343
SA	Date of birth, sex, exact date	3,698
SA	Date of birth, sex, exact date, SLA group	2,894
Tas	Date of birth, sex, exact date	602
Tas	Date of birth, sex, exact date, SLA group	484

Sources: Table 8, Table A18, Table A26 and Table A34.

Because of the relatively small numbers involved, once an exact separation/admission date match was required, adding a geographic indicator improved the efficiency of the linkage key only marginally. However, when matches within 3 days were allowed, including postcode or SLA group noticeably reduced the proportion of duplicate keys, especially in the larger states of Western and South Australia. Age effects were again small. (See Table A15 for Western Australia, Table A23 for South Australia and Table A31 for Tasmania).

6.3 Validation

Separation mode

As for NSW/ACT, a large proportion of hospital separations said to be going to a nursing home were not matched to a residential aged care record. The difference was more pronounced in South Australia and Tasmania than in Western Australia. In the South Australian data 65% and 72% of separations 'to a nursing home' were not included in the linked data for the two linkage keys examined. For Tasmania the corresponding numbers were 58% and 66%, while for Western Australia these figures were 39% and 57%, respectively. (For NSW/ACT 55% and 63% of hospital records with separation mode of 'to a nursing home' were not matched to a residential aged care record for the two 'exact date' linkage keys examined). (See Table A16 for Western Australia, Table A24 for South Australia and Table A32 for Tasmania).

Place of assessment

In Western Australia, for both linkage keys examined around 74% of linked records had 'hospital' as the place of assessment for ACAT. For South Australia and Tasmania the corresponding figures were around 71% and 65% (compared with between 73% and 77% for NSW/ACT). As for NSW/ACT, the percentages of unlinked records with 'hospital' as the place of assessment for ACAT were considerably smaller. (See Table A17 for Western Australia, Table A25 for South Australia and Table A33 for Tasmania).

Marital status

Marital status is not collected as part of the National Minimum Data Set (NMDS) for Admitted Patient Care—the source of the hospital morbidity data. It does, however, belong to the NMDS for Admitted Patient Mental Health Care and as such is only required to be reported for patients who have psychiatric care days. Nevertheless some states report marital status.

There were very little data on marital status in both the South Australian and Tasmanian hospital morbidity data: 'hospital' marital status was not given for around 98% of linked records for both states. For Western Australia nearly all linked records had marital status from both data sources, and in 86% of cases the same marital status was given in both data sources (excluding cases with missing data). (See Table A18 for Western Australia, Table A26 for South Australia and Table A34 for Tasmania).

6.4 Summary

The Western Australian, South Australian and Tasmanian results reflect the findings from the NSW/ACT data: that a linkage key based on date of birth, sex, exact separation/admission date and a geographic indicator could provide a sample of linked records for further analysis. However, for these three states the inclusion in the linkage key of a geographic indicator finer than state was not as critical as it was for NSW/ACT. This was because of the smaller number of people involved in these states. For small states like Tasmania the linked sample is quite small, thereby limiting the type of analyses that can be undertaken for that state.

7 Analytical potential: examples⁷

Using date of birth, sex, exact separation date/admission date and SLA group of usual residence, the linkage strategy generated almost 10,000 linked records for use in cross-sectoral analysis for NSW and ACT. Just over 99% of these records had unique linkage keys. This sample of linked records can be used in conjunction with unlinked records from the hospital morbidity and residential aged care databases to illustrate the type of analyses that can be carried out when combined data are available. A number of examples illustrating how the linked data can be used to investigate a range of issues are discussed below. It must be remembered that the examples are illustrative only, and are not intended as a basis for policy or planning.

From the hospital morbidity database, information is available on such matters as patient characteristics, hospital sector, episode type, diagnoses, procedures, DRGs (Diagnosis Related Group),⁸ and length of stay. The residential aged care data contains information on client characteristics, ACAT assessment, care needs via the Resident Classification Scale (RCS), and length of stay. In analysis of the combined data the relationship between hospital episodes and residential aged care can be examined. Some examples of the types of analyses that can be undertaken are given below. The examples are quite simple, and are not meant to provide a detailed examination of the links between the hospital and residential aged care sectors. Rather, they point to what is possible and how data can be pulled together.

When carrying out analysis using the sample obtained via the above linkage strategy, several issues concerning the data need to be remembered:

- Due to the constraints used in the linkage strategy not all movements from hospital to residential aged care are included in the linked data. Consequently, the ‘unlinked’ records will include some records related to movement between the sectors, and so there is the potential for bias in the results. However, given that it is expected that the linked data set contains at least half of all movements from hospital to residential aged care (see Section 5.1) and that there are larger numbers of unlinked records compared with linked records—in both the morbidity and residential aged care data—this ‘contamination’ should have only a limited effect on the distributions in the ‘unlinked’ data, and should not affect general trends.
- The exclusion of same-day admissions and separations from the hospital morbidity data leads to a bias towards longer lengths of stay in the hospital data.

⁷These examples are presented to illustrate the capacity of the linkage methodology and are not intended as a basis for policy or planning.

⁸ Diagnosis Related Group (DRG) is a patient classification scheme which provides a clinically meaningful way of relating the number and types of patients treated in a hospital to the resources required by the hospital.

Consequently, diagnoses and procedures related to these short stays are under-represented in the hospital data.

- Length of hospital stay relates to hospital episodes rather than the total length of stay for all contiguous episodes of care for a patient. The removal of statistical separations from the hospital morbidity data means that in cases where patients changed episode type in hospital (for example, from acute care to rehabilitation) the length of stay derived for the patient was that for the last episode type before discharge. As with the same-day exclusions, diagnoses and procedures related to statistical discharges are therefore under-represented in the hospital data. In addition, if patients were transferred to another hospital, two hospital stays were recorded.
- Because the analyses presented below are for example only, and are not meant to provide definitive answers to particular questions, duplicates have not been removed from the linked data. Fewer than 1% of linked records were duplicates (Table 4). When used for targeted analysis, duplicates should be removed from the linked data set for greater accuracy.

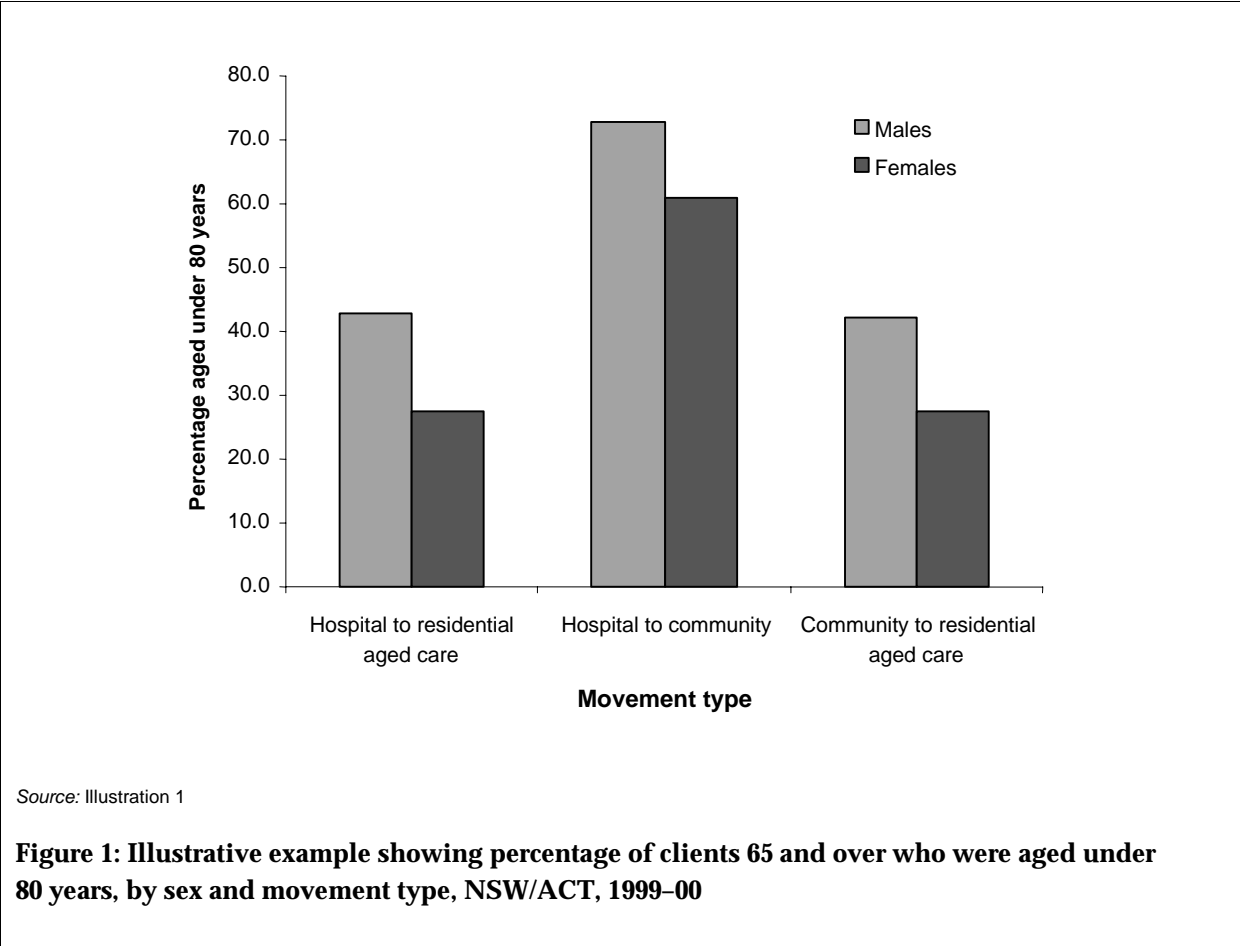
In addition, in the discussion below the terms ‘to the community’ and ‘from the community’ are used to refer to all movements other than those explicitly identified as coming from hospital in the case of movement into residential aged care, or going to residential aged care in the case of movements from hospital. It is acknowledged that a small proportion of movements from hospital may have been to another hospital or other non-aged care facility, and that similarly some movements into a residential aged care service may have been from a non-hospital service.

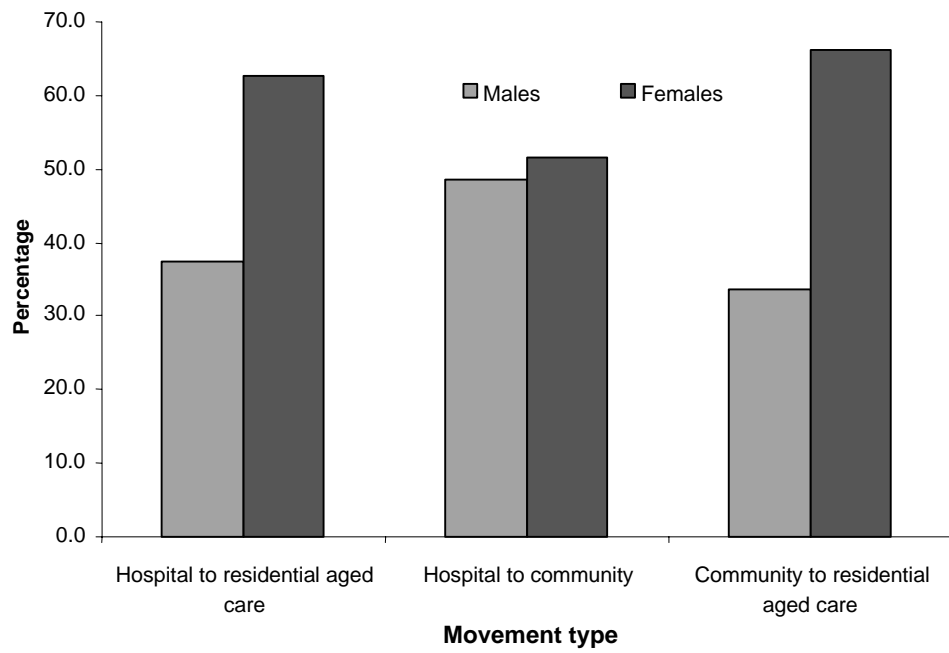
7.1 General client characteristics

The linked and unlinked data can be used to compare the characteristics of people leaving hospitals with those of people entering residential aged care. Illustration 1 shows the age and sex distribution for people who left hospital and went to residential aged care, entered residential aged care from the community, or left hospital to return to the community.

Overall, the analysis indicates that in NSW/ACT in 1999–00, the gender and age balance of people going into residential aged care was similar whether people were coming from the community (unlinked) or from hospital (linked), although a slightly smaller proportion were men among those coming from the community compared with those coming from hospital (Illustration 1). However, there were differences between those going from hospital to the community and those going into residential aged care. Over 70% of men and 60% of women returning to the community from hospital were aged under 80 years, compared with just over 40% of men and just under 30% of women moving into residential aged care (Figure 1). Also, while women made up around two-thirds of people going into residential aged care, both from hospital and from the community, there was a much more even split between the sexes among those who returned to the community after their episode in hospital (Figure 2). This was due to the younger age profile of people going to the community

from hospital, as noted above, and the fact that just over 50% of hospital separations for people aged under 80 were for men, while among people over the age of 85 women made up over two-thirds of patients. For people aged from 80 to 84 years, 43% of separations were for men and 57% were for women.





Source: Illustration 1

Figure 2: Illustrative example showing sex of clients moving between sectors, by movement type, NSW/ACT, 1999-00

Illustration 1: Hospital separations and residential aged care admissions: age and sex, by movement type, NSW/ACT, 1999–00

Record type	Sex	Age at hospital separation/residential aged care admission							All
		65–69	70–74	75–79	80–84	85–89	90–94	95+	
Column per cent									
Hospital to RACS^(a)	Males	57.5	51.8	43.8	36.7	31.5	27.0	19.9	37.3
	Females	42.5	48.2	56.2	63.3	68.5	73.0	80.1	62.7
	All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Community to RACS^(b)	Males	50.1	45.0	41.4	32.2	29.2	23.8	18.8	33.7
	Females	49.9	55.0	58.6	67.8	70.8	76.2	81.2	66.3
	All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All RACS	Males	52.7	47.2	42.2	33.6	29.9	24.9	19.2	34.9
	Females	47.3	52.8	57.8	66.4	70.1	75.1	80.8	65.1
	All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Hospital to community^(c)	Males	55.5	53.3	50.6	43.7	37.1	30.5	24.7	48.5
	Females	44.5	46.7	49.4	56.3	62.9	69.5	75.3	51.5
	All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All hospital	Males	55.6	53.3	50.4	43.4	36.7	30.2	24.1	48.2
	Females	44.4	46.7	49.6	56.6	63.3	69.8	75.9	51.8
	All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Row per cent									
Hospital to RACS^(a)	Males	7.5	13.2	22.2	24.6	21.2	9.5	1.8	100.0
	Females	3.3	7.3	16.9	25.3	27.5	15.3	4.3	100.0
	All	4.9	9.5	18.9	25.1	25.1	13.1	3.4	100.0
Community to RACS^(b)	Males	6.8	13.0	22.5	24.7	22.6	8.8	1.7	100.0
	Females	3.4	8.1	16.1	26.5	27.8	14.3	3.8	100.0
	All	4.5	9.7	18.3	25.9	26.0	12.4	3.1	100.0
All RACS	Males	7.0	13.1	22.4	24.7	22.1	9.0	1.7	100.0
	Females	3.4	7.8	16.4	26.1	27.7	14.6	4.0	100.0
	All	4.7	9.7	18.5	25.6	25.7	12.7	3.2	100.0
Hospital to community^(c)	Males	21.7	25.7	25.5	16.0	8.3	2.4	0.4	100.0
	Females	16.4	21.2	23.4	19.5	13.3	5.1	1.1	100.0
	All	19.0	23.4	24.4	17.8	10.9	3.8	0.8	100.0
All hospital	Males	21.4	25.4	25.4	16.2	8.6	2.6	0.4	100.0
	Females	15.9	20.7	23.2	19.7	13.8	5.5	1.2	100.0
	All	18.5	22.9	24.3	18.0	11.3	4.1	0.8	100.0

(a) Linked hospital and residential aged care records.

(b) Unlinked residential aged care records.

(c) Unlinked hospital records; includes some cases where patients were transferred to another hospital.

Notes

- Duplicates have not been removed from the linked data. The totals have been created by adding the linked and the unlinked data so that any effects of the duplicates on the distribution also affects the totals. Fewer than 1% of linked records were duplicates.
- These data are presented to illustrate the capacity of the linkage methodology and are not intended as a basis for policy or planning.

7.2 Length of stay in hospital

An important issue concerning movement between the hospital and aged care sector is whether people are staying longer than clinically necessary in hospital due to a scarcity of appropriate residential aged care. A way to start looking at this issue is to examine length of hospital stay for those who leave hospital to go to the community and those who leave to go to residential aged care.

Illustration 2 suggests that in NSW/ACT in 1999–00 patterns of length of stay in hospital were quite different for people who moved to residential aged care on discharge compared with those who returned to the community. Those discharged into residential aged care tended to have much longer stays in hospital than other patients. Thus, 50% of stays for people going into residential aged care were for 15 days or more, with 10% of stays lasting longer than 45 days; for people going into the community the corresponding figures were 5 days and 18 days.

While people moving to residential aged care tended to stay longer in hospital than others, stay patterns also varied with age and, to a lesser extent, with sex. Median length of stay in hospital tended to decrease as age increased among people who went from hospital into residential aged care (Illustration 2). For example, while the median length of stay was 20 days for hospital separations for people aged 65 to 69 years going into residential aged care, for those aged 80 to 84 years around 50% of hospital stays were for 15 days or less. Also, men tended to have slightly longer stays than women of the same age. Opposite patterns were observed among people who went from hospital back to the community. Among these people, older people tended to have longer stays than younger people, and, if anything, women tended to stay a little longer than men.

Illustration 2: Hospital separations: length of stay in hospital, by age, sex and movement type, NSW/ACT, 1999–00 (days)

Sex	Age at hospital separation/residential aged care admission	Hospital to RACS ^(a)		Hospital to community ^(b)		Total	
		Median	P90	Median	P90	Median	P90
Males	65–69 yrs	21	61	4	13	4	14
	70–74 yrs	17	52	4	15	4	15
	75–79 yrs	16	48	5	16	5	16
	80–84 yrs	16	46	5	17	5	18
	85–89 yrs	15	43	5	18	6	20
	90–94 yrs	15	41	6	19	6	21
	95+ yrs	12	53	6	19	6	22
	<i>All</i>	16	48	4	16	5	16
Females	65–69 yrs	19	53	4	14	4	14
	70–74 yrs	15	55	5	16	5	16
	75–79 yrs	15	42	5	17	5	18
	80–84 yrs	15	46	6	19	6	20
	85–89 yrs	15	43	6	20	7	22
	90–94 yrs	15	40	7	20	7	23
	95+ yrs	13	38	6	21	7	25
	<i>All</i>	15	44	5	18	5	19
All	65–69 yrs	20	56	4	14	4	14
	70–74 yrs	16	52	5	15	5	16
	75–79 yrs	15	45	5	17	5	17
	80–84 yrs	15	46	5	18	6	20
	85–89 yrs	15	43	6	20	6	21
	90–94 yrs	15	40	6	20	7	22
	95+ yrs	13	42	6	21	7	24
	All	15	45	5	17	5	18

(a) Linked hospital and residential aged care records.

(b) Unlinked hospital records; includes some cases where patients were transferred to another hospital.

Notes

1. Duplicates have not been removed from the linked data. The totals have been created by adding the linked and the unlinked data so that any effects of the duplicates on the distribution also affects the totals. Fewer than 1% of linked records were duplicates.
2. These data are presented to illustrate the capacity of the linkage methodology and are not intended as a basis for policy or planning.
3. P90 is the ninetieth percentile.

A possible reason for these different stay patterns could be that the patients in the two groups entered hospital for different types of treatment. That this may be the case is illustrated in Illustration 3 where length of stay is given by hospital episode type, a broad indicator of treatment type. Here it can be seen that while overall 92% of hospital episodes were for acute care, for people who moved to residential aged care on discharge only 68% of episodes were for acute care; rehabilitation (15%) and non-acute care (16%) episodes were much more common for these people.

Rehabilitation and non-acute care episodes were relatively uncommon among patients who were discharged to the community, accounting for 5% and 1% of episodes, respectively. There seemed to be few differences due to age or sex, with the most noticeable difference being an increase with age in the prevalence of rehabilitation episodes among people who returned to the community after leaving hospital.

Illustration 3: Hospital separations, by age at hospital separation, sex, hospital episode type and movement type, NSW/ACT, 1999–00 (per cent)

Movement type	Episode type	Males			Females			All		
		65–79	80+	All	65–79	80+	All	65–79	80+	All
Hospital to RACS^(a)	Acute care	65.5	68.1	67.0	67.3	68.3	68.0	66.5	68.2	67.6
	Rehabilitation	13.8	13.0	13.4	14.8	16.0	15.7	14.3	15.1	14.8
	Palliative care	3.4	1.9	2.5	2.2	0.8	1.2	2.8	1.2	1.7
	Non-acute care	17.0	16.8	16.9	15.7	14.7	15.0	16.3	15.4	15.7
	Other care	0.3	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2
	<i>Total (%)</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>
Hospital to community^(b)	Acute care	95.0	91.6	94.1	93.4	88.9	91.7	94.3	90.0	92.8
	Rehabilitation	3.2	5.3	3.8	4.6	7.7	5.8	3.9	6.8	4.8
	Palliative care	0.6	0.6	0.6	0.5	0.4	0.5	0.6	0.5	0.5
	Non-acute care	0.8	2.1	1.2	1.1	2.5	1.6	0.9	2.3	1.4
	Other care	0.3	0.4	0.3	0.4	0.5	0.5	0.4	0.4	0.4
	<i>Total (%)</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>
Total	Acute care	94.6	90.5	93.5	93.0	87.5	90.8	93.8	88.7	92.1
	Rehabilitation	3.4	5.6	4.0	4.7	8.3	6.2	4.0	7.2	5.1
	Palliative care	0.7	0.7	0.7	0.5	0.4	0.5	0.6	0.5	0.6
	Non-acute care	1.0	2.8	1.5	1.3	3.3	2.1	1.2	3.1	1.8
	Other care	0.3	0.4	0.3	0.4	0.5	0.4	0.4	0.4	0.4
	Total (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(a) Linked hospital and residential aged care records.

(b) Unlinked hospital records; includes some cases where patients were transferred to another hospital.

Notes

1. Duplicates have not been removed from the linked data. The totals have been created by adding the linked and the unlinked data so that any effects of the duplicates on the distribution also affects the totals. Fewer than 1% of linked records were duplicates.
2. These data are presented to illustrate the capacity of the linkage methodology and are not intended as a basis for policy or planning.

As expected, rehabilitation episodes tended to last longer than acute care episodes, with the median hospital stay for the former being 15 days compared with 5 days for the latter (Illustration 4). While this difference was observed both for people who moved to residential aged care and for those who returned to the community, people going on to aged care tended to have longer hospital stays than others for all episode types (Figure 3). Within episode type and movement type, there were only minor differences in length of stay by age and sex.

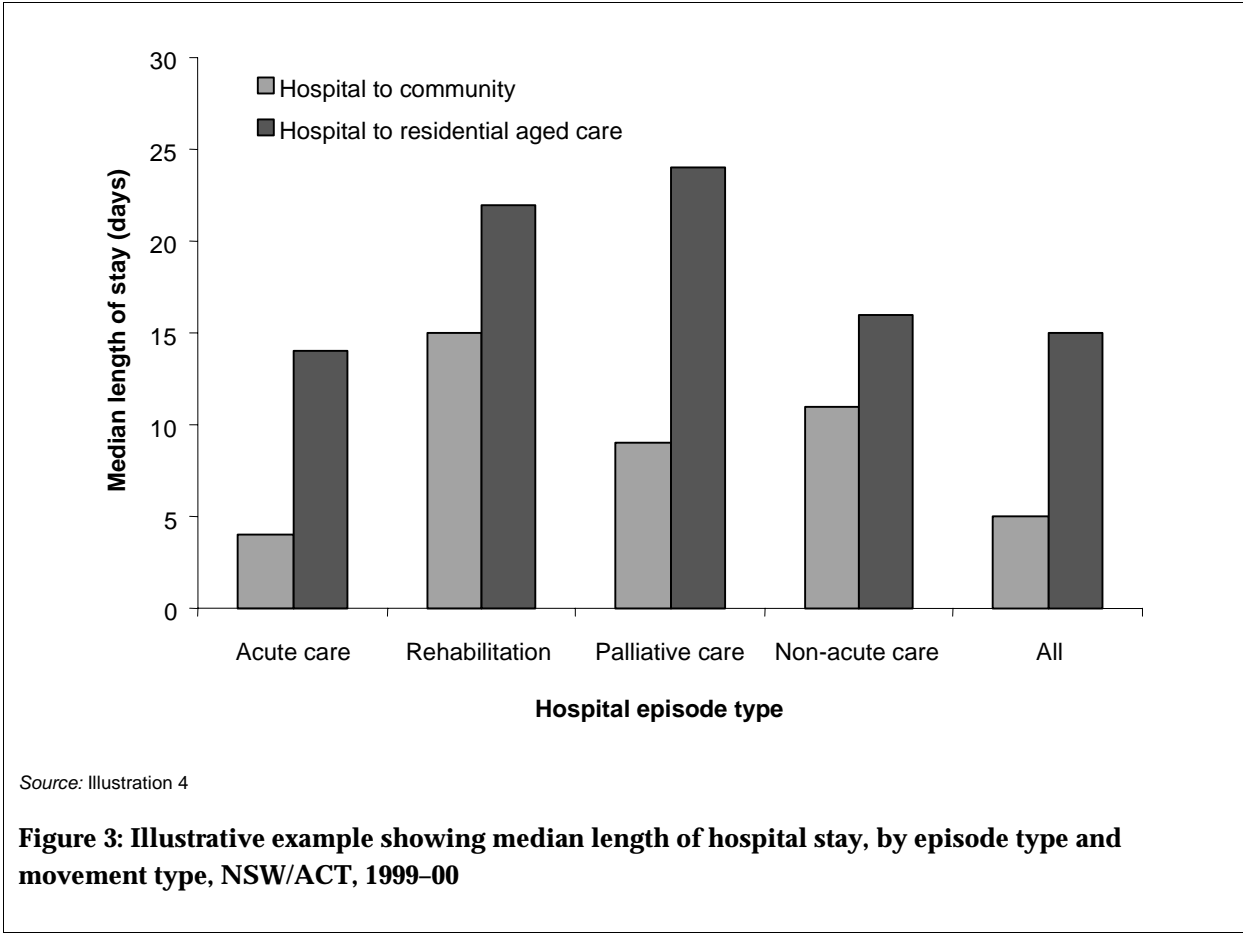


Illustration 4: Hospital separations: length of stay in hospital, by age at hospital separation, sex, hospital episode type and movement type, NSW/ACT, 1999–00 (days)

Movement type	Episode type		65–79		80+		All	
			Median	P90	Median	P90	Median	P90
Hospital to RACS ^(a)	Acute care	Males	15	41	14	37	14	39
		Females	14	36	13	36	14	36
		<i>All</i>	14	38	13	36	14	37
	Rehabilitation	Males	26	60	23	52	25	56
		Females	24	58	21	48	22	50
		<i>All</i>	25	60	22	49	22	52
	Palliative care	Males	28	54	24	55	26	54
		Females	19	67	25	63	22	63
		<i>All</i>	23	57	25	59	24	59
	Non-acute care	Males	17	90	16	90	16	90
		Females	15	77	17	73	16	75
		<i>All</i>	16	87	16	82	16	84
	Other care ^(c)	<i>All</i>	8	53	10	31	9	36
	All	Males	17	52	15	45	16	48
		Females	15	47	15	43	15	44
<i>All</i>		16	49	15	43	15	45	
Hospital to community ^(b)	Acute care	Males	4	14	5	16	4	14
		Females	4	14	5	17	5	15
		<i>All</i>	4	14	5	16	4	15
	Rehabilitation	Males	14	40	15	36	14	38
		Females	14	35	16	35	15	35
		<i>All</i>	14	37	15	35	15	36
	Palliative care	Males	9	24	10	27	9	25
		Females	10	29	10	32	10	30
		<i>All</i>	9	27	10	28	9	27
	Non-acute care	Males	12	57	10	44	11	54
		Females	11	47	11	46	11	46
		<i>All</i>	11	51	10	44	11	48
	Other care	Males	6	21	7	17	6	19
		Females	7	32	7	18	7	27
		<i>All</i>	6	28	7	18	7	23
	All	Males	4	15	5	18	4	16
		Females	5	16	6	20	5	18
		<i>All</i>	4	15	6	19	5	17

(continued)

Illustration 4 (continued): Hospital separations: length of stay in hospital, by age at hospital separation, sex, hospital episode type and movement type, NSW/ACT, 1999–00 (days)

Movement type	Episode type		65–79		80+		All	
			Median	P90	Median	P90	Median	P90
All	Acute care	Males	4	14	5	17	4	15
		Females	5	15	6	18	5	16
		All	4	14	5	18	5	15
	Rehabilitation	Males	15	42	15	38	15	40
		Females	15	36	16	37	15	36
		All	15	39	16	37	15	38
	Palliative care	Males	9	28	11	32	9	29
		Females	10	33	12	35	11	34
		All	9	29	12	34	10	31
	Non-acute care	Males	14	64	12	63	13	63
		Females	12	55	12	56	12	55
		All	13	58	12	58	12	58
	Other care	Males	6	21	7	18	6	20
		Females	7	33	7	19	7	27
		All	6	28	7	18	7	23
	All	Males	4	15	5	19	5	16
		Females	5	16	6	21	5	19
		All	5	16	6	21	5	18

(a) Linked hospital and residential aged care records.

(b) Unlinked hospital records; includes some cases where patients were transferred to another hospital.

(c) Numbers are too few to present median and ninetieth percentile by sex and age.

Notes

1. Duplicates have not been removed from the linked data. The totals have been created by adding the linked and the unlinked data so that any effects of the duplicates on the distribution also affects the totals. Fewer than 1% of linked records were duplicates.
2. These data are presented to illustrate the capacity of the linkage methodology and are not intended as a basis for policy or planning.
3. P90 is the ninetieth percentile.

The above analyses indicate that people going to residential aged care tended to have longer stays in hospital than other people in NSW/ACT in 1999–00, and that this could have been due to some extent to the type of care people were receiving. However, the question of whether people were staying longer than clinically necessary in hospital still remains. Given that DRGs are designed to provide a clinically meaningful way of relating the number and types of patients treated in a hospital to the resources required by the hospital, one possible way to investigate this issue is to see if there were any differences in length of stay within DRGs for those who went directly to residential aged care and those who went elsewhere on separation.

Illustration 5 shows the difference between the median length of hospital stay for people moving to residential aged care on discharge and those going elsewhere for

DRGs with 30 or more hospital episodes which had been linked to a residential aged care admission. This latter restriction on the analysis was applied to avoid those DRGs with only a small number of episodes; in such small DRGs differences could have been solely due to random variation. Overall, there were 61 DRGs with 30 or more linked records. For all of these DRGs the median length of stay for people going to residential aged care was at least as long as that for other people. Furthermore, for two-thirds of the DRGs the difference between the two medians was 7 days or more. These results suggest that people going into residential aged care may be staying longer than clinically necessary in hospital. However, the differences could also be caused by the greater frailty and medical needs of people who move into residential aged care compared with those who return to the community. The above analysis is only preliminary and further investigations would be required to examine this issue fully.

Illustration 5: Difference between median length of hospital stay for people moving to residential aged care and those going elsewhere on discharge from hospital, for DRGs with 30 or more hospital episodes linked to a residential aged care admission, NSW/ACT, 1999-00 (DRGs)

Difference between median length of stay		DRGs	
Days	Number		%
0	1		1.6
1-3	3		4.9
4-6	17		27.9
7-9	23		37.7
10-12	9		14.8
13-15	5		8.2
16+	3		4.9
Total	61		100.0

Note: These data are presented to illustrate the capacity of the linkage methodology and are not intended as a basis for policy or planning.

Whether the longer stays for people going to residential aged care were caused by problems with placing people in aged care services, or for other reasons—such as the need for longer stays due to greater frailty or medical complications—could be investigated using more complex analytical techniques, for example regression analysis. While such analysis is beyond the scope of the current project, the inclusion of provision ratios in investigations is illustrated in Section 7.5.

7.3 Diagnoses

The medical background of people leaving hospital may provide insight into their care needs after discharge. The distribution of principal diagnoses across hospital episodes both for those moving into residential aged care and for those going elsewhere is given in Illustration 6.

Illustration 6 suggests that in NSW/ACT in 1999-00 the profile of principal diagnosis was quite different for people who were discharged to residential aged care

compared with other patients. Overall, among people returning to the community cardiovascular disease was the most common principal diagnosis, accounting for 21% of hospital episodes. Six other principal diagnoses were also quite common: neoplasms (10%), respiratory system (9%), digestive system (10%), musculoskeletal system (8%), injury and poisoning (8%), and factors influencing health status and contact with health services (8%).

Among people who moved from hospital to residential aged care cardiovascular disease was also quite a common principal diagnosis (13%). However, the most common principal diagnosis for these people was 'factors influencing health status and contact with health services'; this diagnosis accounted for 29% of principal diagnoses in hospital episodes for people who later moved into aged care services. 'Factors influencing health status and contact with health services' covers a diverse range of diagnoses, from entering hospital for examinations and investigations to awaiting admission to an adequate facility elsewhere. Further investigation of this group may provide useful insights into movements between sectors, especially in the future as 'Person awaiting admission to residential aged care service' was introduced as a diagnosis code in the third edition of ICD-10-AM. This edition was used for data collection from July 2002.

As for people going back to the community, diagnoses related to the respiratory system (8%) and injury and poisoning (10%) were also quite common for people going from hospital to residential aged care. However, a principal diagnosis related to mental disorders was more common among people who went to residential aged care than among other hospital discharges: 8% compared with 2%. It should be noted here that Alzheimer's disease is classified as a disease of the nervous system and so is not included in these figures. The percentages diagnosed with diseases or disorders of the nervous system or sense organs were 4% and 3% for the two groups, respectively.

There were some differences in the principal diagnoses by age and sex. However, the general patterns of common diagnoses were similar within a particular movement group (that is, hospital to residential aged care, and hospital to the community).

Illustration 6: Hospital separations by principal diagnosis, age at hospital separation, sex and movement type, NSW/ACT, 1999–00 (per cent)

Principal diagnosis (ICD-10-AM)	Males			Females			All		
	65–79	80+	All	65–79	80+	All	65–79	80+	All
Hospital to residential aged care^(a)									
Certain infectious & Parasitic (A00–B99)	1.1	1.0	1.1	1.2	0.9	1.0	1.2	1.0	1.0
Neoplasms (C00–D48)	8.2	5.7	6.7	5.6	3.4	4.0	6.8	4.1	5.0
Blood & blood forming organs (D50–D89)	0.4	0.8	0.6	0.6	1.0	0.9	0.5	0.9	0.8
Endocrine, nutritional, metabolic & immunity (E00–E90)	2.3	1.8	2.0	1.6	1.8	1.7	1.9	1.8	1.8
Mental disorders(F00–F99)	9.2	8.5	8.8	9.8	6.3	7.3	9.5	7.0	7.8
Nervous system & sense organs(G00–G99)	7.4	4.3	5.6	4.4	3.5	3.7	5.8	3.7	4.4
Eye and adnexa (H00–H59)	0.3	0.4	0.4	0.5	0.5	0.5	0.4	0.5	0.5
Ear and mastoid process (H60–H95)	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1
Cardiovascular disease (I00–I99)	12.3	13.7	13.1	11.2	13.1	12.6	11.7	13.3	12.8
Respiratory system (J00–J99)	8.8	10.7	9.9	7.6	6.5	6.8	8.2	7.8	8.0
Digestive system (K00–K93)	3.8	3.4	3.6	2.9	4.3	3.9	3.4	4.0	3.8
Skin & subcutaneous tissue (L00–L99)	1.8	1.9	1.9	1.6	2.4	2.2	1.7	2.3	2.1
Musculoskeletal system (M00–M99)	2.3	2.2	2.2	4.3	4.2	4.2	3.3	3.6	3.5
Genito-urinary system (N00–N99)	4.0	4.4	4.2	3.2	3.9	3.7	3.6	4.0	3.9
Congenital anomalies (Q00–Q99)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Symptoms, sign & ill-defined conditions (R00–R99)	4.5	6.7	5.7	5.6	5.9	5.8	5.1	6.2	5.8
Injury & poisoning (S00–T98)	6.9	7.0	7.0	11.4	12.3	12.0	9.2	10.6	10.1
Factors influencing health status and contact with health services (Z00–Z99)	26.8	27.4	27.2	28.4	29.9	29.5	27.6	29.1	28.6
<i>Total</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>
<i>Total (row %)</i>	<i>16.0</i>	<i>21.3</i>	<i>37.3</i>	<i>17.3</i>	<i>45.4</i>	<i>62.7</i>	<i>33.3</i>	<i>66.7</i>	<i>100.0</i>
Hospital to community^(b)									
Certain infectious & Parasitic (A00–B99)	0.9	1.1	1.0	1.1	1.2	1.1	1.0	1.2	1.0
Neoplasms (C00–D48)	11.3	10.7	11.2	9.6	6.7	8.5	10.5	8.3	9.8
Blood & blood forming organs (D50–D89)	1.2	1.8	1.3	1.3	1.8	1.5	1.2	1.8	1.4
Endocrine, nutritional, metabolic & immunity (E00–E90)	1.3	1.2	1.3	1.8	1.7	1.8	1.6	1.5	1.5
Mental disorders(F00–F99)	1.4	1.6	1.5	2.2	2.2	2.2	1.8	1.9	1.8
Nervous system & sense organs(G00–G99)	3.0	2.5	2.8	2.4	2.2	2.3	2.7	2.3	2.5
Eye and adnexa (H00–H59)	2.5	3.5	2.7	3.9	4.2	4.0	3.1	3.9	3.4
Ear and mastoid process (H60–H95)	0.4	0.3	0.3	0.5	0.4	0.5	0.4	0.3	0.4
Cardiovascular disease (I00–I99)	23.2	20.1	22.4	18.6	19.6	19.0	21.1	19.8	20.6
Respiratory system (J00–J99)	10.0	11.2	10.3	8.6	8.3	8.5	9.4	9.4	9.4
Digestive system (K00–K93)	10.7	9.3	10.3	10.2	8.5	9.5	10.5	8.8	9.9
Skin & subcutaneous tissue (L00–L99)	1.7	1.9	1.7	1.9	2.6	2.2	1.8	2.4	2.0
Musculoskeletal system (M00–M99)	7.4	4.7	6.6	10.1	6.4	8.7	8.6	5.8	7.7
Genito-urinary system (N00–N99)	6.9	6.2	6.7	5.8	4.0	5.1	6.4	4.8	5.9
Congenital anomalies (Q00–Q99)	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.1
Symptoms, sign & ill-defined conditions (R00–R99)	6.2	7.4	6.5	6.2	6.5	6.3	6.2	6.9	6.4
Injury & poisoning (S00–T98)	6.2	7.4	6.5	8.5	12.3	10.0	7.3	10.4	8.3
Factors influencing health status and contact with health services (Z00–Z99)	5.8	9.0	6.7	7.4	11.4	9.0	6.5	10.5	7.9
<i>Total</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>
<i>Total (row %)</i>	<i>35.3</i>	<i>13.2</i>	<i>48.5</i>	<i>31.4</i>	<i>20.1</i>	<i>51.5</i>	<i>66.7</i>	<i>33.3</i>	<i>100.0</i>

(continued)

Illustration 6 (continued): Hospital separations by principal diagnosis, age at hospital separation, sex and movement type, NSW/ACT, 1999–00 (per cent)

Principal diagnosis (ICD–10–AM Ed. 1)	Males			Females			All		
	65–79	80+	All	65–79	80+	All	65–79	80+	All
All									
Certain infectious & Parasitic (A00–B99)	0.9	1.1	1.0	1.1	1.2	1.1	1.0	1.2	1.0
Neoplasms (C00–D48)	11.3	10.5	11.1	9.5	6.5	8.3	10.5	8.0	9.6
Blood & blood forming organs (D50–D89)	1.1	1.7	1.3	1.3	1.8	1.5	1.2	1.8	1.4
Endocrine, nutritional, metabolic & immunity (E00–E90)	1.4	1.3	1.3	1.8	1.7	1.8	1.6	1.5	1.5
Mental disorders(F00–F99)	1.5	1.9	1.6	2.3	2.4	2.3	1.9	2.2	2.0
Nervous system & sense organs(G00–G99)	3.0	2.6	2.9	2.4	2.3	2.3	2.7	2.4	2.6
Eye and adnexa (H00–H59)	2.4	3.3	2.7	3.8	3.9	3.9	3.1	3.7	3.3
Ear and mastoid process (H60–H95)	0.4	0.3	0.3	0.5	0.4	0.4	0.4	0.3	0.4
Cardiovascular disease (I00–I99)	23.1	19.8	22.2	18.5	19.1	18.8	20.9	19.4	20.4
Respiratory system (J00–J99)	10.0	11.1	10.3	8.6	8.2	8.4	9.3	9.3	9.3
Digestive system (K00–K93)	10.6	9.0	10.2	10.0	8.3	9.3	10.4	8.6	9.7
Skin & subcutaneous tissue (L00–L99)	1.7	1.9	1.7	1.9	2.6	2.2	1.8	2.3	2.0
Musculoskeletal system (M00–M99)	7.3	4.6	6.5	10.0	6.3	8.5	8.6	5.6	7.6
Genito-urinary system (N00–N99)	6.9	6.1	6.6	5.7	4.0	5.0	6.3	4.8	5.8
Congenital anomalies (Q00–Q99)	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.1
Symptoms, sign & ill-defined conditions (R00–R99)	6.1	7.4	6.5	6.1	6.5	6.3	6.1	6.8	6.4
Injury & poisoning (S00–T98)	6.2	7.4	6.5	8.5	12.3	10.1	7.3	10.4	8.3
Factors influencing health status and contact with health services (Z00–Z99)	6.1	9.9	7.1	7.8	12.7	9.7	6.9	11.6	8.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total (row %)	34.7	13.4	48.2	31.0	20.9	51.8	65.7	34.3	100.0

(a) Linked hospital and residential aged care records.

(b) Unlinked hospital records; includes some cases where patients were transferred to another hospital.

Notes

1. ICD–10–AM Ed. 1 is the international statistical classification of diseases and related health problems, 10th revision, Australian modification, first edition (NCCH 1998).
2. Duplicates have not been removed from the linked data. The totals have been created by adding the linked and the unlinked data so that any effects of the duplicates on the distribution also affects the totals. Fewer than 1% of linked records were duplicates.
3. These data are presented to illustrate the capacity of the linkage methodology and are not intended as a basis for policy or planning.

7.4 Costs

The cost of a hospital stay depends on both the treatments undertaken for particular diagnoses and the length of stay in hospital. Costs are often of interest in policy-related analyses, especially if there is reason to believe that the length of hospital stays could be shortened if alternative appropriate care could be found. As the hospital morbidity data records the DRG of a hospital episode, average costs associated with DRGs can be used to estimate the cost of hospital stays for those moving to residential aged care services and for those going to the community. Average DRG costs derived from the National Hospital Cost Data Collection 1999–00 were therefore added to the data set to illustrate how they might be used in an analysis of linked data.

Hospital stays identified as being associated with people who moved from hospital to a residential aged care service accounted for 3.1% of the hospital stays in the

current analysis, but 3.9% of the estimated costs (Illustration 7). These differences may have been due to a different mix of DRGs for hospital stays for people going into residential aged care compared with those for other people. Given the differences in principal diagnoses for the two groups observed in Table 15, this seems quite likely to have been the case. On average, hospital stays by people who then went to residential aged care cost nearly 30% more than stays for other people (\$5,730 compared with \$4,450—see Illustration 7).

Illustration 7: Hospital separations: estimated costs of hospital stay, by movement type, NSW/ACT, 1999–00

	Hospital to RACS ^(a)	Hospital to community ^(b)	All	Relative costs (a/b)
				Ratio
Average costs (\$)	5,730	4,450	4,490	1.29
Total costs (%)	3.9	96.1	100.0	..
Hospital separations (%)	3.1	96.9	100.0	..

(a) Linked hospital and residential aged care records.

(b) Unlinked hospital records; includes some cases where patients were transferred to another hospital.

Notes

1. Duplicates have not been removed from the linked data. The totals have been created by adding the linked and the unlinked data so that any effects of the duplicates on the distribution also affects the totals. Fewer than 1% of linked records were duplicates.
2. These data are presented to illustrate the capacity of the linkage methodology and are not intended as a basis for policy or planning.
3. Costs are estimated using DRG average costs.

7.5 Examining particular issues: an example

One of the prime reasons for linking data is so that information obtained for one data set can be combined with that from a second data set. In the current study, the main types of information contained in the hospital morbidity data which are not available in the residential aged care data are clinical diagnoses and procedures. On the other hand, data on care needs assessment are reported in the residential aged care data but not in the hospital data. In this section, the utility of combining these data is illustrated by looking at a particular issue: dementia (including Alzheimer’s disease).⁹ For this example, people with dementia include those with either a principal or additional diagnosis of dementia.

Client characteristics and length of stay in hospital

Analysis suggests that people diagnosed with dementia were more likely to be over 80 years old than other patients (Illustration 8). However, this trend was much more marked among patients not going into residential aged care than among other patients. Among people with dementia going into residential aged care 72% were aged over 80 compared with 64% of people with diagnoses that did not include

⁹ In this example dementia includes diagnoses of dementia and Alzheimer’s disease (ICD–10–AM Ed. 1 categories F00 Dementia in Alzheimer’s disease, F01 Vascular dementia, F02 Dementia in other diseases classified elsewhere, F03 Unspecified dementia, and G30 Alzheimer’s disease).

dementia; among those going into the community the corresponding percentages were 67% and just 32%.

Among people going to residential aged care from hospital, the split between the sexes was affected very little by whether or not the hospital diagnoses included dementia: around 37% of these separations were for men. However, among those going elsewhere after discharge, 38% of hospital separations involving dementia were for men while nearly half of all other separations (49%) were for men.

There were only minor differences in median length of hospital stay for people with and without dementia going from hospital to residential aged care (Illustration 9). However, among those who went from hospital into the community, people diagnosed with dementia tended to stay longer in hospital than other patients: the median length for stay for those with dementia was 7 days compared with 4 days for other patients.

Illustration 8: Hospital separations, by movement type by diagnosis, age at hospital separation and sex, NSW/ACT, 1999–00

Movement type and diagnosis	Sex	Age			Age		
		65–79	80+	All	65–79	80+	All
Hospital to RACS^(a)		Column per cent			Row per cent		
Dementia	Males	47.7	32.5	36.8	36.3	63.7	100.0
	Females	52.4	67.5	63.2	23.2	76.8	100.0
	<i>All</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>28.0</i>	<i>72.0</i>	<i>100.0</i>
Other diagnosis	Males	48.3	31.7	37.6	45.7	54.3	100.0
	Females	51.7	68.3	62.4	29.5	70.5	100.0
	<i>All</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>35.6</i>	<i>64.5</i>	<i>100.0</i>
All	Males	48.1	32.0	37.3	42.9	57.1	100.0
	Females	51.9	68.0	62.7	27.6	72.4	100.0
	All	100.0	100.0	100.0	33.3	66.7	100.0
Hospital to community^(b)							
Dementia	Males	47.6	33.2	38.0	41.5	58.5	100.0
	Females	52.4	66.8	62.0	28.0	72.1	100.0
	<i>All</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>33.1</i>	<i>66.9</i>	<i>100.0</i>
Other diagnosis	Males	53.1	40.3	49.0	74.1	25.9	100.0
	Females	46.9	59.7	51.0	63.0	37.0	100.0
	<i>All</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>68.4</i>	<i>31.6</i>	<i>100.0</i>
All	Males	53.0	39.6	48.5	72.9	27.2	100.0
	Females	47.1	60.4	51.5	61.0	39.0	100.0
	All	100.0	100.0	100.0	66.7	33.3	100.0

(a) Linked hospital and residential aged care records.

(b) Unlinked hospital records; includes some cases where patients were transferred to another hospital.

Notes

1. Duplicates have not been removed from the linked data. The totals have been created by adding the linked and the unlinked data so that any effects of the duplicates on the distribution also affects the totals. Fewer than 1% of linked records were duplicates.
2. These data are presented to illustrate the capacity of the linkage methodology and are not intended as a basis for policy or planning.

Illustration 9: Hospital separations: length of stay in hospital by movement type by diagnosis, age at hospital separation and sex, NSW/ACT, 1999–00 (days)

Movement type and diagnosis	Sex	65–79	80+	All	65–79	80+	All
		Median			P90		
Hospital to residential aged care^(a)							
Dementia	Males	16	15	16	49	44	47
	Females	15	15	15	44	44	44
	<i>All</i>	16	15	15	46	44	44
Other diagnosis	Males	17	15	16	52	45	49
	Females	15	15	15	48	42	44
	<i>All</i>	16	15	15	50	43	46
All	Males	17	15	16	52	45	48
	Females	15	15	15	47	43	44
	All	16	15	15	49	43	45
Hospital to community^(b)							
Dementia	Males	7	7	7	24	22	22
	Females	7	7	7	24	22	23
	<i>All</i>	7	7	7	24	22	23
Other diagnosis	Males	4	5	4	15	17	15
	Females	5	6	5	16	20	17
	<i>All</i>	4	6	5	15	19	16
All	Males	4	5	4	15	18	16
	Females	5	6	5	16	20	18
	All	4	6	5	15	19	17

(a) Linked hospital and residential aged care records.

(b) Unlinked hospital records; includes some cases where patients were transferred to another hospital.

Notes

1. Duplicates have not been removed from the linked data. The totals have been created by adding the linked and the unlinked data so that any effects of the duplicates on the distribution also affects the totals. Fewer than 1% of linked records were duplicates.
2. These data are presented to illustrate the capacity of the linkage methodology and are not intended as a basis for policy or planning.
3. P90 is the ninetieth percentile.

Availability of residential aged care

One reason for the longer hospital stays for patients who move from hospital to residential aged care could be difficulty in finding appropriate residential aged care for such people. Adding provision ratio information to the linked data set allows this issue to be investigated. More complex analysis than is possible here is required to examine this issue properly. However, a table by locality of hospital (Illustration 10) and another showing median length of stay by provision ratio (Illustration 11), show the type of data available.

Illustration 10: Hospital separations: length of stay in hospital by movement type, diagnosis and locality of hospital, NSW/ACT, 1999–00 (days)

Diagnosis	Locality of hospital	Hospital to residential aged care ^(a)		Hospital to community ^(b)	
		Median	P90	Median	P90
Dementia	Capital city	14	37	7	21
	Other metropolitan centre	19	47	7	25
	Large rural centre	17	86	6	24
	Small rural centre	17	73	6	25
	Other rural area	15	63	6	26
	Other remote area	^(c) *	^(c) *	6	34
	<i>All</i>	15	44	7	23
Other diagnosis	Capital city	16	42	5	17
	Other metropolitan centre	17	54	5	17
	Large rural centre	13	47	4	14
	Small rural centre	17	57	4	14
	Other rural area	13	59	4	14
	Other remote area	9	23	4	13
	<i>All</i>	15	46	5	16
All	Capital city	15	40	5	17
	Other metropolitan centre	18	51	5	17
	Large rural centre	14	54	4	15
	Small rural centre	17	60	4	15
	Other rural area	13	60	4	14
	Other remote area	11	28	4	14
	All	15	45	5	17

(a) Linked hospital and residential aged care records.

(b) Unlinked hospital records; includes some cases where patients were transferred to another hospital.

(c) Sample was too small to allow meaningful comparisons.

Notes

1. Duplicates have not been removed from the linked data. The totals have been created by adding the linked and the unlinked data so that any effects of the duplicates on the distribution also affects the totals. Fewer than 1% of linked records were duplicates.
2. These data are presented to illustrate the capacity of the linkage methodology and are not intended as a basis for policy or planning.
3. P90 is the ninetieth percentile.
4. 98 cases had missing data for locality of hospital.

In this study median length of stay varied little with the location of the hospital, especially among patients who returned to the community after hospital discharge (Illustration 10). The median length of hospital stay for these people was slightly longer in hospitals in capital cities or other metropolitan centres than in other hospitals for patients both with and without a diagnosis of dementia, but the median stays were only a day different. Among patients who moved on to residential aged care, median length of stay was more variable by locality of hospital. For these patients, those diagnosed with dementia had their shortest median length of stay in hospitals in capital cities (14 days) and longest in hospitals in other metropolitan areas (19 days). For patients without a diagnosis of dementia length of stay tended to be shorter in hospitals in large rural centres and other rural areas (median length of

stay 13 days), and longest in small rural centres and other metropolitan centres (17 days). Analysis by the locality of a patient's usual residence may also be of interest and could also be carried out.

Illustration 11 shows the length of hospital stay for people entering residential aged care with and without a diagnosis of dementia by the level of provision of residential aged care places in the SLA of the residential aged care service.¹⁰ Among permanent admissions with a hospital diagnosis of dementia the median length of stay declined from 21 days where the provision ratio was between 61 and 70 places per 1,000 people aged 70 or more to 15 days where the provision ratio was greater than 110. Interestingly, the median length of stay was relatively short where the provision ratio was very low (less than 61 places per 1,000). A similar pattern was not obvious for people without a hospital diagnosis of dementia. The decline in median hospital stay with increasing provision ratio for the receiving residential aged care service was also observed to some extent for respite admissions for people diagnosed with dementia. However, the trend was not apparent among respite admissions without a dementia diagnosis.

These results suggest that in some cases length of hospital stay may be related to the availability of residential aged care places. However, the provision ratio is an imperfect measure of care availability as it does not indicate how many places are vacant at a particular time. Consequently, a better indicator of care availability would be needed in order to investigate fully the relationship between availability of residential aged care and length of hospital stay. Furthermore, Illustration 11 considers the provision ratio of the area of the receiving residential aged care service, and not of either the hospital where the patient came from or of the usual residence of the person prior to hospital admission. Analysis of the provision ratio by either of these areas may be more useful for planning purposes.

The analysis presented in Illustration 11 is very simple and is presented only to illustrate how provision ratio data could be included in an analysis involving linked data. An example of the more sophisticated analyses which can be undertaken to examine the relationship between both individual characteristics (for example, marital status and health status) and system characteristics (such as provision ratio) and a variable like length of stay in hospital is contained in the AIHW report *Entry Period for Residential Aged Care* (AIHW 2002). In this report, the variable of interest is entry period, that is the number of days which elapse between assessment of a person by an Aged Care Assessment Team as being eligible for residential aged care and the entry of that person into a residential aged care service for permanent care. Both bivariate and multivariate analyses are presented in the report. While there was evidence of a bivariate relationship between provision ratio and entry period, after allowing for other factors the provision ratio in the region containing the residential aged care service seemed to have little effect on entry period.

¹⁰ SLA of patient was not reliably available.

Illustration 11: Residential aged care admissions linked to hospital separations: length of stay in hospital by diagnosis, admission type and provision ratio, NSW/ACT, 1999–00 (days)

Provision ratio (residential aged care places per 1,000 aged 70+) ^(a)	Dementia		Other		All	
	Median	P90	Median	P90	Median	P90
Respite admissions						
Less than 61 places	13	42	14	43	14	42
61–70 places	26	45	15	38	15	42
71–80 places	15	37	13	36	14	37
81–90 places	17	47	14	42	15	44
91–100 places	14	32	14	39	14	38
101–110 places	14	35	17	38	16	37
More than 110 places	13	25	14	28	14	28
<i>All</i>	<i>15</i>	<i>42</i>	<i>14</i>	<i>38</i>	<i>14</i>	<i>39</i>
Permanent admissions						
Less than 61 places	17	42	19	56	18	50
61–70 places	21	71	23	65	23	71
71–80 places	20	61	23	62	22	61
81–90 places	19	54	19	54	19	54
91–100 places	18	58	20	56	20	58
101–110 places	17	42	22	51	20	48
More than 110 places	15	34	17	37	16	37
<i>All</i>	<i>18</i>	<i>52</i>	<i>21</i>	<i>55</i>	<i>20</i>	<i>54</i>
Total						
Less than 61 places	16	42	18	51	17	49
61–70 places	22	64	20	57	20	58
71–80 places	19	56	19	51	19	53
81–90 places	19	51	16	49	17	50
91–100 places	17	56	18	52	18	54
101–110 places	17	41	19	47	18	46
More than 110 places	14	32	15	34	15	34
All	17	48	18	49	18	49

(a) Provision ratio of the area within which the residential aged care facility is placed (that is, of the aged care facility into which the patient is admitted).

Notes

1. Duplicates have not been removed from the linked data. The totals have been created by adding the linked and the unlinked data so that any effects of the duplicates on the distribution also affects the totals. Fewer than 1% of linked records were duplicates.
2. These data are presented to illustrate the capacity of the linkage methodology and are not intended as a basis for policy or planning.
3. Residents returning from hospital leave are not included in the table.

Care needs

Using hospital diagnoses, the relationship between diagnosis and dependency on admission to residential aged care can be examined. Illustration 12 suggests that in 1999–00 in NSW/ACT people going from the community into residential aged care were less dependent than those going from hospital. Among those who went from the community into residential aged care, 55% were rated as needing high care while among those with a hospital diagnosis of dementia (either principal or additional) over 92% were high care admissions. At 81% of admissions, people entering from hospital with diagnoses which did not include dementia were more likely to be rated high care than those going from the community, but less likely than those with a diagnosis of dementia.

Illustration 12: Residential aged care admissions: RCS levels by diagnosis, NSW/ACT, 1999–00 (per cent)

RCS level	Hospital to residential aged care ^(a)			Community to residential aged care—no diagnosis ^(b)	All
	Principal diagnosis of dementia	Other dementia diagnosis	Other diagnoses		
High care					
S1	24.1	21.3	15.4	9.8	13.1
S2	43.6	40.7	35.1	20.9	27.8
S3	21.5	26.1	24.7	18.9	21.4
S4	4.3	4.6	5.5	5.8	5.6
<i>Total</i>	93.5	92.6	80.6	55.4	67.9
<i>Total (row %)</i>	3.5	15.9	33.8	46.8	100.0
Low care					
S5	1.5	3.6	6.1	10.2	8.0
S6	3.9	1.8	5.8	11.6	8.6
S7	1.2	1.9	6.9	19.8	13.6
S8	—	0.1	0.6	3.0	1.9
<i>Total</i>	6.5	7.4	19.4	44.6	32.1
<i>Total (row %)</i>	0.5	2.7	17.2	79.6	100.0
Total (%)^(c)	100.0	100.0	100.0	100.0	100.0
Total (row %)^(c)	2.5	11.6	28.5	57.4	100.0

(a) Linked hospital and residential aged care records.

(b) Unlinked residential aged care records.

(c) RCS scores are not calculated for people admitted to residential aged care for respite care.

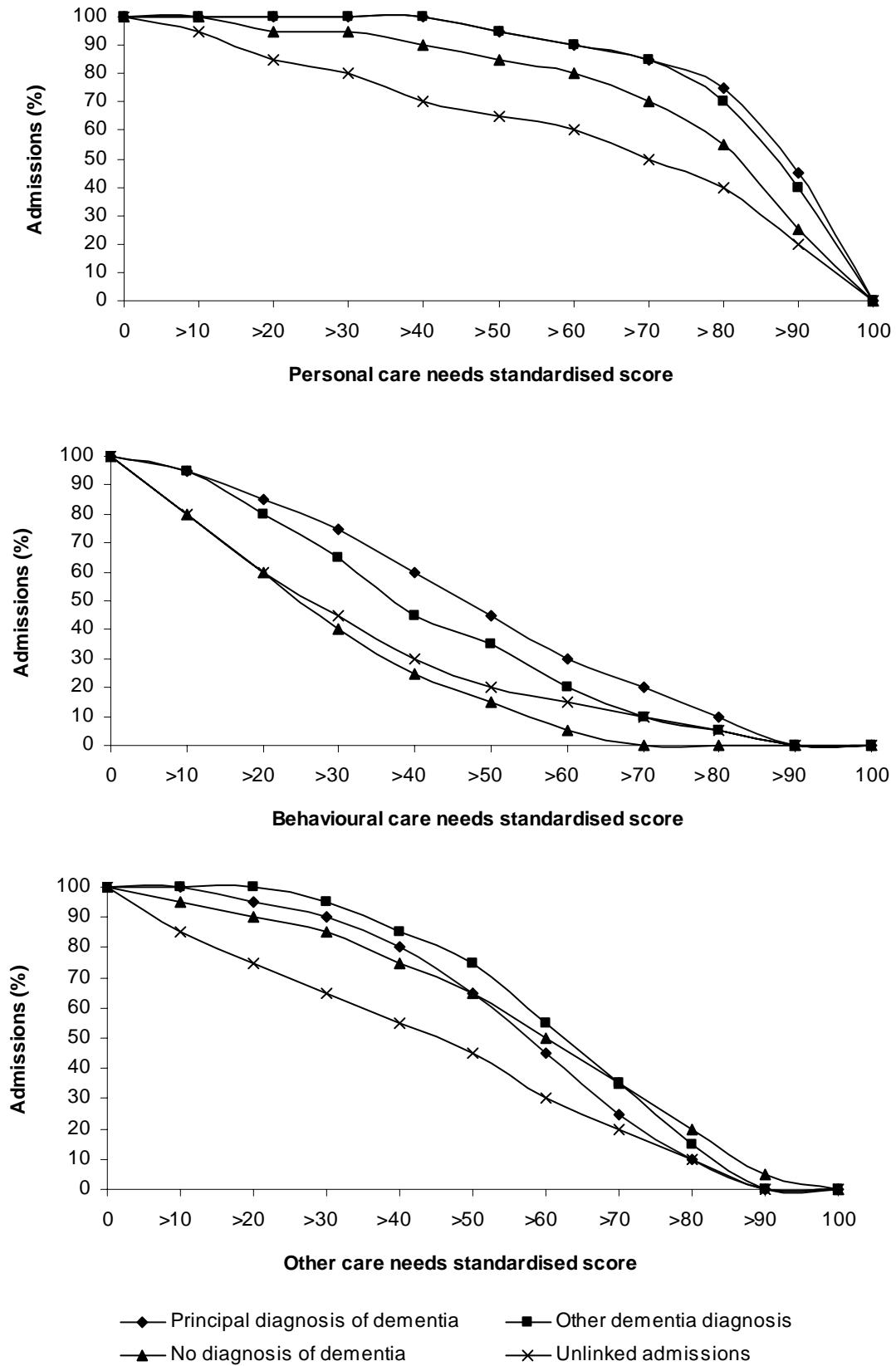
Notes

1. Diagnosis of dementia includes diagnoses of dementia and Alzheimer's disease (ICD-10-AM Ed. 1 categories F00–F03, and G30) (NCCH 1998).
2. Duplicates have not been removed from the linked data. The totals have been created by adding the linked and the unlinked data so that any effects of the duplicates on the distribution also affects the totals. Fewer than 1% of linked records were duplicates.
3. These data are presented to illustrate the capacity of the linkage methodology and are not intended as a basis for policy or planning.

While the linked data set cannot be used to determine flows between hospitals and residential aged care, Illustration 12 suggests that a minimum of 15% of residential aged care admissions were for people who had a clinical diagnosis of dementia. Among high care admissions this percentage was about 20%.

The level of dependency in various areas can be examined by looking at the responses to particular questions in the Resident Classification Scale (RCS). For example, Figure 4 shows relative levels of dependency in the areas of personal care, behavioural care, and other care needs for people entering residential aged care from hospital (with and without a diagnosis of dementia) and for those entering from the community (see Table 10 for RCS question groupings). Dependency levels for a need group have been measured using the contribution that the relevant questions make to the total RCS score for an individual. To aid interpretation, standardised scores are used in the figure, where standardised scores have been obtained by dividing the relevant score for an admission by the corresponding maximum possible score and multiplying by 100. Consequently, standardised scores are between zero and 100, with zero being least dependent and 100 most dependent.

Figure 4 indicates that people admitted to aged care from hospital with a diagnosis of dementia had higher personal care needs than others. For example, around 85% of people diagnosed in hospital with dementia had a standardised personal care needs score greater than 70, compared with just over 70% of those entering from hospital with other diagnoses, and just under half of those entering from the community. The differences were not so marked for dependency related to behaviour: those entering with dementia again had higher needs than others, but the dependency levels for those entering from the community and from hospital with diagnoses other than dementia were similar. For other care needs, on average those entering residential aged care from the community had lower dependency levels than those entering from hospital, with hospital diagnosis affecting care needs only a little.



Source: Table A6

Figure 4: Illustrative example showing RCS scores for residential aged care admissions, by diagnosis, NSW/ACT, 1999-00

Table 10: Resident Classification Scale questions by care need group

RCS question	Need area
Personal care needs	
Q1	Communication
Q2	Location change, mobility and transfers
Q3	Meals and drinks
Q4	Personal hygiene
Q5	Toileting
Q6	Bladder management
Q7	Bowel management
Q8	Understanding and undertaking living arrangements
Behavioural care needs	
Q9	Problem wandering or intrusive behaviour
Q10	Verbally disruptive or noisy
Q11	Physically aggressive
Q12	Emotional dependence
Q13	Danger to self or others
Q14	Other behaviour
Other care needs	
Q15	Social and human needs—care recipient
Q16	Social and human needs—families and friends
Q17	Medications
Q18	Technical and complex nursing procedures
Q19	Therapy
Q20	Other services
Q21	Overall service need

Length of stay in residential aged care

In New South Wales over 90% of permanent residents who left the residential aged care system during 1999–00 either died (86%) or went to hospital (5%) (derived from AIHW 2001b:Table 3.5). A question of interest is whether people with certain illnesses or conditions tend to stay longer in residential aged care than others. As not all of those admitted in 1999–00 had left residential aged care at the time of taking the residential aged care data extract, the analysis of length of stay in residential aged care cannot be comprehensive. However, for this current study data are available to look at whether or not people who were admitted permanently in the first 6 months of 1999–00 were still living in the same residential aged care service 9 months after admission.

Overall, in Australia among those permanent residents who died while in residential aged care during 1999–00, 31% had been with the service for less than 9 months (AIHW 2001b:Table 3.8). Of the people admitted permanently into residential aged

care in NSW/ACT between 1 July and 31 December 1999, 26% died at the service within 9 months (Illustration 13).¹¹

People coming from the community were less likely to have died within 9 months than those coming from hospital: 37% of those coming from hospital had died within 9 months compared with 18% of those who came from elsewhere (Illustration 13). In addition, a smaller proportion of those who entered residential aged care from hospital with a diagnosis including dementia died within 9 months than those who had other diagnoses only (32% compared with 39%).

Relatively more men than women died within 9 months, and, as expected, the chance of survival decreased as age increased. These age/sex patterns were seen in nearly all groups, irrespective of whether people came from hospital or the community and whether or not they had been diagnosed with dementia. However, there was a wide range of survival rates by age and sex. For example, 50% of men aged 80 years or more who came from hospital without a diagnosis of dementia had died within 9 months of admission, compared with just 14% of women aged 65 to 79 who came from the community.

The preceding discussion shows that length of stay in residential aged care can be examined using the linked data. More detailed analysis of resident survival could be carried out in the future (in 12 or 24 months) when more information on the separation of people admitted to the residential aged care service in 1999–00 is available. Lengths of stay for people who moved out either to hospital or to the community could also be investigated.

¹¹ This assumes that people were admitted only once in the period.

Illustration 13: Permanent admissions into residential aged care: proportion who died in the residential aged care service within 9 months of admission, by movement type, diagnosis, age and sex, NSW/ACT, admissions 1 July–31 December 1999 (per cent)

Movement type and diagnosis	Sex	Per cent of residents who died within 9 months		
		65–79	80+	All
Hospital to residential aged care^(a)		Per cent within age/sex group		
Dementia	Males	32.1	43.3	39.6
	Females	20.3	28.3	26.5
	<i>All</i>	26.2	33.8	31.8
Other diagnosis	Males	36.5	50.1	43.8
	Females	37.2	35.1	35.7
	<i>All</i>	36.8	40.3	39.1
Total	Males	35.4	47.5	42.3
	Females	31.9	32.6	32.5
	All	33.8	37.9	36.6
Community to residential aged care^(b)				
No hospital diagnosis	Males	20.6	24.1	22.6
	Females	14.2	17.1	16.4
	All	16.9	19.0	18.4
All permanent admissions				
	Males	27.3	34.6	31.5
	Females	20.3	22.7	22.1
	All	23.6	26.3	25.5

(a) Linked hospital and residential aged care records.

(b) Unlinked residential aged care records.

Notes

1. Diagnosis of dementia includes diagnoses of dementia and Alzheimer's disease (ICD-10-AM Ed. 1 categories F00–F03, and G30) (NCCH 1998).
2. Duplicates have not been removed from the linked data. The totals have been created by adding the linked and the unlinked data so that any effects of the duplicates on the distribution also affects the totals. Fewer than 1% of linked records were duplicates.
3. These data are presented to illustrate the capacity of the linkage methodology and are not intended as a basis for policy or planning.
4. Data reflects notifications of residential aged care separations processed by 28 September 2000. Some notifications of discharge may not have been processed by this time.

7.6 Possible future analyses

The above examples give an indication of the types of data available for analysis, how data from the two data sources can be combined, and how external data can also be brought into the analysis. Furthermore, while the above analyses are illustrative only, the differing results for people moving variously between the hospital sector, the community and residential aged care were generally as would be expected, again confirming the face validity of the linkage strategy.

Only simple analyses have been presented above. However, using the linked data and more sophisticated analytical tools (for example, logistic regression or log linear modelling) a range of questions can be addressed. These include such matters as:

- How is the likelihood of transfer of older people from hospital to residential care instead of returning to the community associated with diagnosis, type of episode (acute care/non-acute care/rehabilitation), length of stay in hospital, marital status and usual accommodation, controlling for age and sex. Are there differences between regions (however defined) in the likelihood of transfer?
- How do people in aged care who have been transferred from hospital differ from those who came from the community with regard to sex, age and dependency levels. Are there differences between regions (however defined) in the variation between these two groups?
- How does length of stay in hospital for people who transfer to aged care vary with demographic factors, level of provision of residential aged care places, dependency levels, presence of dementia, diagnosis and episode type? Are there differences between regions (however defined) in length of stay after controlling for all these factors?
- How does length of stay in residential aged care vary with demographic factors, whether people come from hospital, level of provision of residential aged care places and dependency levels? Are there differences between regions (however defined) in length of stay after controlling for all these factors?

8 Data development

As stated in Section 5.4, revision of the current 'mode of separation' data item in the hospital morbidity collection, and the creation of a new variable in the residential aged care collection which indicates where the resident has come from would be an important first step towards improving national information on the movements of clients between the residential and acute care sectors. To this end, draft data definitions have been developed and are presented below. Development and implementation of these items would provide greatly improved information on the size of client flows between the two sectors, and facilitate statistical linkage by providing variables which would allow more accurate targeting of the linkage process.

The draft definitions given below are presented in the standard national template for data element specifications as used in national data dictionaries and national minimum data sets, for example, the *National Health Data Dictionary* (AIHW 2001a). Before the draft items are put forward for implementation, interested parties will need to be consulted to ensure that the new items are both useful and collectable.