



DIALYSIS HOSPITAL REPORT

2009 - 2014

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From the ANZDATA Database last surveyed on 31st December 2014



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1 Introduction

This report is an abridged version of the dialysis hospital report, prepared for general distribution. Individual hospital reports are also created, which contain more detailed information about the characteristics and outcomes within each hospital.

The data are based on reports to the ANZDATA Registry. Interpretation of these results must take into account both the limitations of the methodology and the context. There is considerable literature about interpretation of results from many fields, and further information can be provided for those seeking to better understand the results.

The results presented here are estimates of true values and are subject to random variation. Confidence intervals are a common means of presenting this variability. For example, 95% confidence intervals illustrate a range which is expected to contain the true value 19 times out of 20. By definition, therefore, it is expected that 1 result in 20 will lie outside of 95% confidence intervals due to chance alone, if the assumptions of the model used to obtain the estimate are valid.

Another key limitation is the potential for factors other than those measured, which may be outside the control of treating hospitals, to affect results. This is known as residual confounding. Despite the inclusion of many factors related to patients and their care, most models predict only around 70% of the variation in dialysis outcomes. ANZDATA results are consistent with international experience in this regard.

How then should results suggesting a hospital's results are inferior to expectation be interpreted? Perhaps the best approach is to consider them as signals for looking at a deeper level, bearing in mind that it may well be that the effects seen are driven by factors unrelated to the quality of care or beyond the control of individual hospitals (eg, chance, unmeasured confounders, or natural variation).

2 Standardised Mortality Ratios

The standardised mortality ratio (SMR) is the ratio of observed deaths to expected deaths within each Hospital. The expected deaths values for each hospital are obtained using multivariate modelling and the characteristics of patients in each hospital. A Poisson regression, including a random effect for each hospital, was used to obtain the regression coefficients predicting death, and the predicted probability of death for each patient was calculated. Those probabilities were then summed over the patients in each hospital, resulting in the expected number of deaths. The impact of each variable in the Poisson model in contributing to the expected mortality across all hospitals (incidence rate ratios) are presented in section 2.3.

All patients aged ≥ 18 years who commenced dialysis during 2009-2014 and remained on dialysis for at least 90 days were included in the model. Follow-up continued until first transplant, recovery of renal function lasting >30 days, death or most recent date of follow-up. A



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small number of observations had missing values ($n=465$) for one or more predictor variables and these cases were excluded. Dialysis modality is defined at the 90th day of treatment. Hospital is defined as the last recorded hospital for each patient.

2.1 SMRs

The following tables present the standardised mortality ratios (SMRs) for all hospitals in Australia and New Zealand. The expected number of deaths was obtained from a Poisson regression adjusted for various demographic and health indicators.

Table 1: SMRs for Australian hospitals

	Hospital Name	No. Patients*	No. Deaths	No. Expected	SMR (95% CI)
1	Alfred Hospital	319 (0)	81	75.0	1.08 (0.86-1.33)
2	Alice Springs Hospital	242 (7)	31	36.1	0.86 (0.58-1.19)
3	Allamanda Dialysis Unit	74 (1)	37	34.1	1.08 (0.76-1.46)
4	Austin Hospital	297 (5)	71	74.1	0.96 (0.75-1.19)
5	Bendigo Hospital	66 (0)	12	15.9	0.75 (0.39-1.24)
6	Bundaberg Hospital	84 (1)	16	18.6	0.86 (0.49-1.33)
7	Cairns Hospital	217 (8)	52	46.6	1.11 (0.83-1.44)
8	Canberra Hospital	273 (2)	70	68.0	1.03 (0.80-1.28)
9	Central Northern Adelaide Renal Service	731 (9)	184	178.7	1.03 (0.89-1.18)
10	Chermside Dialysis Unit (Nephrocare)	48 (1)	8	10.3	0.78 (0.34-1.40)
11	Coffs Harbour Hospital	55 (3)	15	15.1	0.99 (0.56-1.56)
12	Diamond Valley Dialysis Clinic	35 (1)	2	8.0	0.25 (0.03-0.70)
13	Dubbo Base Hospital	97 (0)	22	23.6	0.93 (0.58-1.36)
14	Eastern Health Integrated Renal Service	242 (0)	48	54.1	0.89 (0.65-1.16)
15	Epworth Richmond Hospital	24 (3)	9	6.3	1.42 (0.65-2.48)
16	Flinders Medical Centre	211 (5)	58	60.2	0.96 (0.73-1.23)
17	Forest Hill Satellite	50 (1)	8	11.2	0.72 (0.31-1.29)
18	Fremantle Hospital	349 (4)	106	98.9	1.07 (0.88-1.28)
19	Geelong Hospital	172 (3)	33	34.1	0.97 (0.67-1.33)
20	Goldcoast Hospital	210 (17)	49	49.7	0.99 (0.73-1.28)
21	Gosford Hospital	190 (2)	58	53.8	1.08 (0.82-1.37)
22	Henry Dalziel Dialysis Clinic - Greenslopes	110 (0)	34	30.8	1.10 (0.76-1.50)
23	Hervey Bay Hospital	80 (0)	27	24.5	1.10 (0.73-1.55)

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* The number in brackets is the number of patients excluded from Poisson regression due to missing data



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	Hospital Name	No. Patients*	No. Deaths	No. Expected	SMR (95% CI)
24	John Flynn Hospital	81 (0)	39	31.3	1.24 (0.89-1.66)
25	John Hunter Hospital	322 (7)	106	100.3	1.06 (0.87-1.27)
26	Kew Private Dialysis Centre	20 (0)	4	6.6	0.60 (0.16-1.32)
27	Launceston Hospital	141 (0)	38	32.9	1.15 (0.82-1.55)
28	Lismore Hospital	114 (4)	33	39.3	0.84 (0.58-1.15)
29	Lismore Private Dialysis Clinic	23 (0)	10	8.8	1.13 (0.54-1.94)
30	Mackay Hospital	85 (4)	17	18.8	0.90 (0.53-1.38)
31	Macleay Dialysis Centre Kempsey	15 (0)	5	5.2	0.96 (0.31-1.97)
32	Malvern Dialysis Centre	44 (0)	12	9.7	1.24 (0.64-2.03)
33	Manning Rural Referral Hospital	57 (1)	15	12.4	1.21 (0.68-1.90)
34	Mater Hospital	21 (0)	4	7.2	0.56 (0.15-1.22)
35	Mayo Private Hospital - Taree	23 (0)	8	7.5	1.07 (0.46-1.93)
36	Monash Medical (Adults)	614 (16)	99	102.9	0.96 (0.78-1.16)
37	Nambour Hospital	119 (1)	20	23.0	0.87 (0.53-1.29)
38	Nambour Selangor and Caloundra Private	29 (0)	9	9.9	0.91 (0.41-1.59)
39	Newcastle Nephrocare	42 (1)	6	9.7	0.62 (0.23-1.20)
40	North Melbourne Dialysis Clinic (Diaverum)	36 (3)	13	12.5	1.04 (0.55-1.67)
41	Northern Health Service Melbourne	80 (0)	20	18.9	1.06 (0.65-1.57)
42	Orange Hospital	90 (2)	25	24.8	1.01 (0.65-1.44)
43	Port Macquarie Hospital	61 (3)	8	13.0	0.62 (0.27-1.11)
44	Port Macquarie Private Hospital	22 (0)	11	7.2	1.53 (0.76-2.55)
45	Prince Of Wales Hospital	125 (0)	24	26.5	0.90 (0.58-1.30)
46	Princess Alexandra Hospital	481 (10)	84	84.0	1.00 (0.80-1.22)
47	Rockhampton Hospital	109 (0)	17	19.4	0.88 (0.51-1.34)
48	Royal Brisbane Hospital	290 (15)	60	59.5	1.01 (0.77-1.28)
49	Royal Darwin Hospital	224 (14)	49	43.6	1.12 (0.83-1.46)
50	Royal Hobart Hospital	119 (0)	40	34.9	1.15 (0.82-1.53)
51	Royal Melbourne Hospital	620 (36)	140	134.6	1.04 (0.87-1.22)
52	Royal North Shore Hospital	224 (32)	41	44.2	0.93 (0.67-1.23)

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* The number in brackets is the number of patients excluded from Poisson regression due to missing data



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	Hospital Name	No. Patients*	No. Deaths	No. Expected	SMR (95% CI)
53	Royal Perth Hospital	556 (52)	130	124.7	1.04 (0.87-1.23)
54	Sir Charles Gairdner Hospital	457 (50)	96	95.2	1.01 (0.82-1.22)
55	South West Sydney Renal Service	573 (13)	139	140.0	0.99 (0.83-1.16)
56	St Andrews Dialysis Clinic - Toowoomba	11 (0)	2	4.5	0.44 (0.05-1.23)
57	St George Hospital	276 (0)	58	59.8	0.97 (0.74-1.23)
58	St Vincent's Hospital (NSW)	113 (1)	28	24.9	1.12 (0.75-1.57)
59	St Vincent's Hospital (VIC)	295 (9)	60	61.6	0.97 (0.74-1.24)
60	Statewide Renal Services	458 (10)	118	116.8	1.01 (0.84-1.20)
61	Sydney Adventist Hospital	53 (0)	14	14.0	1.00 (0.55-1.59)
62	Tamworth Hospital	118 (2)	37	32.1	1.15 (0.81-1.55)
63	The Tweed Hospital	58 (4)	18	16.7	1.08 (0.64-1.63)
64	Toowoomba Hospital	148 (8)	21	24.7	0.85 (0.53-1.25)
65	Townsville Hospital	214 (5)	57	57.9	0.98 (0.75-1.26)
66	Varsity Lakes Hospital	2 (0)	0	0.0	0.00 (-.)
67	Wesley Hospital	53 (5)	10	10.7	0.93 (0.45-1.60)
68	Western Health	261 (6)	66	67.4	0.98 (0.76-1.23)
69	Western Renal Service	674 (4)	159	156.4	1.02 (0.86-1.18)
70	Wollongong Hospital	200 (3)	51	52.8	0.97 (0.72-1.25)

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Table 2: SMRs for New Zealand hospitals

	Hospital Name	No. Patients*	No. Deaths	No. Expected	SMR (95% CI)
71	Auckland Hospital	300 (3)	78	78.9	0.99 (0.78-1.22)
72	Christchurch Hospital	179 (7)	55	50.7	1.08 (0.82-1.39)
73	Dunedin Hospital	106 (1)	31	29.7	1.04 (0.71-1.44)
74	Hawkes Bay Hospital	133 (13)	41	36.1	1.14 (0.82-1.51)
75	Middlemore Hospital	580 (27)	136	134.5	1.01 (0.85-1.19)
76	Palmerston Hospital	159 (4)	35	39.0	0.90 (0.62-1.22)
77	Taranaki Hospital	66 (0)	24	17.3	1.39 (0.89-1.99)
78	Waikato Hospital Hamilton	566 (12)	190	184.5	1.03 (0.89-1.18)
79	Waitemata Renal Service	249 (1)	38	49.1	0.77 (0.55-1.04)
80	Wellington Hospital	316 (1)	94	90.9	1.03 (0.84-1.25)
81	Whangarei Hospital	165 (2)	36	40.3	0.89 (0.63-1.21)

* The number in brackets is the number of patients excluded from Poisson regression due to missing data



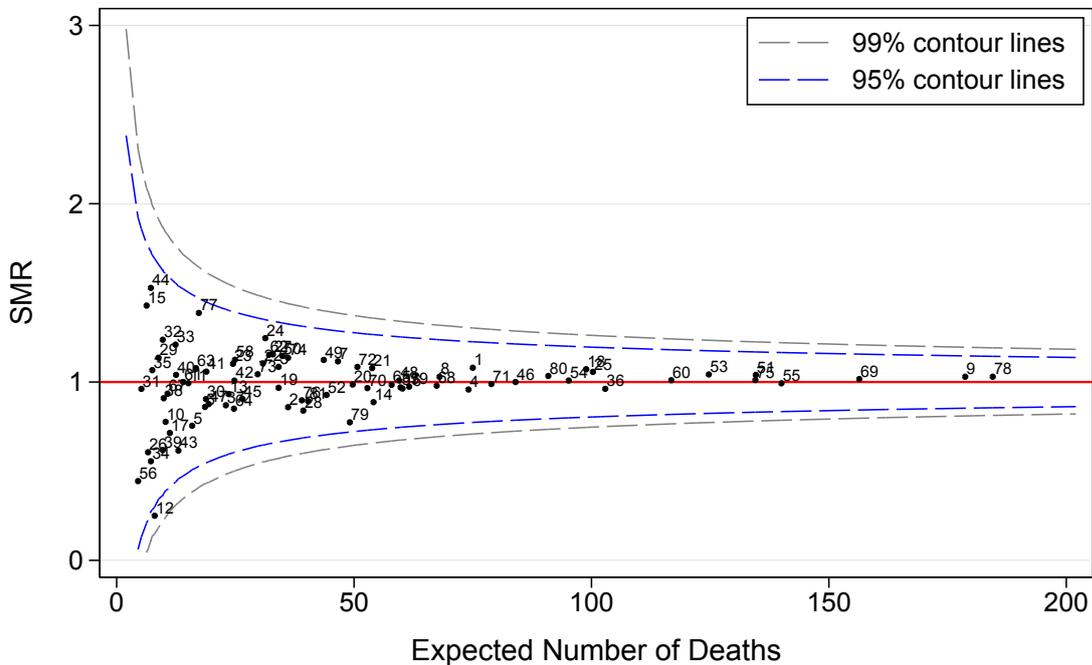


2.2 Funnel Plot

This funnel plot shows the SMRs for all hospitals (y-axis) plotted against the expected number of patient deaths (x-axis). The red line indicates an SMR of 1.0, and the contours indicate 95% and 99% confidence intervals. (Note that the contours approximately correspond to ± 2 and ± 3 standard deviations from 1.0, respectively). If a hospital lies within the confidence intervals then that hospital has an observed to expected ratio that is statistically consistent (at the 5% level) with 1.0 (i.e. there is no statistical difference in the number of observed and expected events). If a hospital lies above the upper control lines, this indicates that the number of observed deaths is statistically greater than the number expected under the model. Conversely, if a hospital lies below the lines, this indicates statistically fewer observed deaths than expected under the model.

In interpreting the SMR and funnel plots it should be borne in mind that the precision of these estimates is strongly influenced by the number of patients in a hospital. As such, smaller hospitals will have less precise estimates and greater uncertainty about where the true effect lies. This is shown in wider confidence intervals for the SMR estimates and likely greater change in these estimates as they are updated over time.

Note that the numbers identifying hospitals in the funnel plot below correspond to the first column in SMR tables



Observations with missing values are dropped from the model

2.3 Poisson Model Coefficients

Table 3: Poisson regression model incidence rate ratios (IRR)

	IRR	95% CI
Era of Treatment Start		
2009-2010	ref.	
2011-2012	1.000	(0.930-1.075)
2013-2014	0.963	(0.862-1.076)
Time Since Beginning Dialysis		
0-0.99 years	ref.	
1-1.99 years	1.168	(1.074-1.269)
2-2.99 years	1.389	(1.264-1.526)
3+ years	1.600	(1.448-1.767)
Age	1.032	(1.029-1.035)
Male	1.044	(0.973-1.119)
Country and Race		
Australian non-indigenous	ref.	
Australian Aboriginal/Torres Strait Islander	1.031	(0.887-1.200)
New Zealand non-indigenous	1.495	(1.263-1.771)
New Zealand Māori/Pacific	1.214	(1.013-1.456)
Diabetes (as comorbidity)	1.134	(1.022-1.259)
Chronic Lung Disease	1.305	(1.208-1.410)
Peripheral Vascular Disease	1.303	(1.208-1.405)
Cerebrovascular Disease	1.284	(1.183-1.394)
Coronary Artery Disease	1.308	(1.217-1.407)
Current or Former Smoker	1.136	(1.059-1.218)
Late Referral	1.297	(1.200-1.400)
BMI		
Underweight	1.680	(1.396-2.023)
Normal	ref.	
Overweight	0.834	(0.769-0.905)
Obese	0.741	(0.681-0.806)
Primary Renal Disease		
GN	ref.	
Analgesic	1.268	(0.982-1.638)
Polycystic	0.676	(0.533-0.857)
Reflux	0.789	(0.542-1.149)
Hypertension	1.236	(1.095-1.395)
Diabetes	1.638	(1.469-1.827)
Other	1.845	(1.627-2.091)
Uncertain diagnosis	1.403	(1.192-1.651)