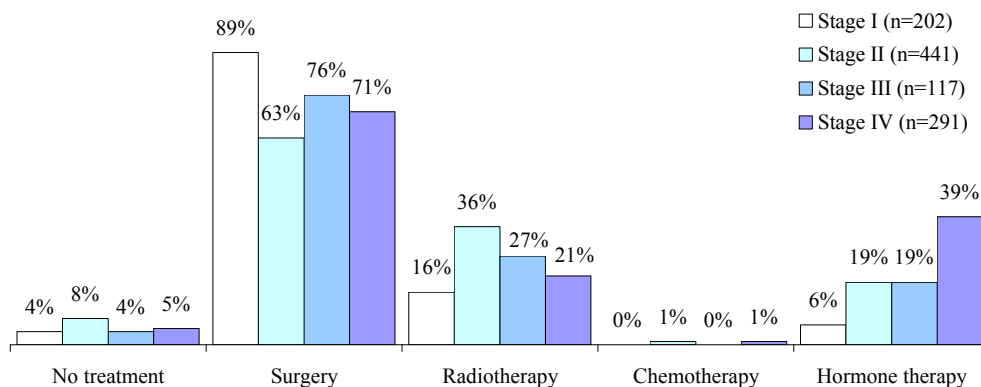


Figure 66: % prostate cancers by TNM stage and treatment mode as part of the primary course of care; SA hospital-based registries, circa 1990-97



The most common surgical procedures performed on surgical cases as part of the primary course of treatment were prostatectomies, which applied to 81% of cases. Partial prostatectomies applied to 67% and complete prostatectomies to 14%. A higher proportion of cases would have been recorded as receiving prostatectomies, had procedures performed subsequent to the primary course also been considered. Meanwhile, 32% of surgical cases had an orchidectomy, as part of their primary treatment, and 8% had another surgical procedure (apart from a nodal dissection, which often accompanied a complete prostatectomy or another procedure).

The proportion of prostatectomies that were partial was higher for TNM stage I (97%) than for stages II and III (70%), but similar to the proportion for stage IV (96%) where curative intent seldom would have applied. Orchidectomies increased in frequency among surgical cases from a low of 5% for stage I to 20% for stage II, 33% for stage III, and 74% for stage IV.

A previous analysis of 1990-96 data found that the most common of the hormone agents used for prostate cancer were antiandrogens (55%), followed by LHRH agonists (41%). During 1997, these agents remained the most common agents, with antiandrogens accounting for 42% of chemotherapies and LHRH agonists for 53%.

Testis (ICD-02: C62)

1. Population-based data

Testicular cancers had high case survivals, varying from 93% at five and 10 years from diagnosis to 90% at 15 years. Age was not predictive of outcome, using the present classification by age, nor was diagnostic period in a univariate context (Table 64). Proportional hazards regression indicated, however, that more recently diagnosed cases had a lower risk of case fatality, after adjusting for age at diagnosis (classified as under 30 years or older) and histological type. Relative risks varied as follows:

<i>Predictors</i>	<i>Relative risk (95% confidence limits)</i>
Age at diagnosis (yrs.):	
Under 30 (reference)	1.00
30+	1.79 (0.97, 3.31)
Histological type:	
Seminoma (reference)	1.00
Dysgerminoma	0.80 (0.22, 2.95)
Embryonic carcinoma	2.50 (0.75, 8.34)
Teratoma	4.97 (1.99, 12.42)
Other (choriocarcinomas etc.)	16.20 (5.12, 51.27)
Diagnostic period:	
1977-83 (reference)	1.00
1984-90	0.52 (0.26, 1.04)
1991-98	0.34 (0.16, 0.73)

Similar downward trends in case fatality have been reported for the USA and attributed, in part, to advances in chemotherapy as an adjunct to surgery, especially for non-seminomatous cancers.⁵⁹

Meanwhile, survival gains also have been suggested for other Australian states.^{27,30,37} Survival gains are associated with a reduction in population-based mortality in South Australia. Whereas the age-standardized (World Population) incidence increased by 41% between 1977-80 and 1997-99, there was a corresponding mortality reduction of 71%. This is attributed to improved treatment outcomes, including benefits of chemotherapy of metastatic disease.

South Australian survivals were similar to those reported for other Australian states,^{27,30,37} and the USA (SEER data),²⁸ but higher than reported for Europe.²⁹

2. Hospital-based data

Contributed by:

- the Urology Department, Royal Adelaide Hospital.
- the Urology Unit, Department of Surgery, Flinders Medical Centre.

There were 69 cases recorded by the hospital registries for the diagnostic period circa 1990-97. Their five-year survival of 92% was similar to the 93% applying for all testicular cancers in South Australia in 1977-98. Small numbers precluded comparisons for longer periods from diagnosis. The main predictor of survival for this hospital series in the univariate analyses was TNM stage (Table 65) (Figure 67).

Table 64: Case survivals (\pm SE) by period from diagnosis, age at diagnosis, and diagnostic year; SA Cancer Registry, 1977-98*

Cancer site: testis

Category		Period from diagnosis (yrs.)															P value**
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
All cases (n=704)	100%	98.1% \pm 0.6	95.1% \pm 0.9	94.1% \pm 1.0	93.5% \pm 1.1	93.0% \pm 1.2	93.0% \pm 1.2	93.0% \pm 1.3	92.7% \pm 1.4	92.5% \pm 1.4	91.8% \pm 1.6	91.5% \pm 1.7	90.6% \pm 1.8	90.6% \pm 1.9	90.4% \pm 2.0	-	
By age (yrs.):																	
Under 55 (n=654)	100%	98.3% \pm 0.5	95.2% \pm 0.9	93.9% \pm 1.0	93.1% \pm 1.1	92.6% \pm 1.2	92.6% \pm 1.2	92.6% \pm 1.3	92.3% \pm 1.3	92.1% \pm 1.4	92.0% \pm 1.4	92.0% \pm 1.4	91.6% \pm 1.6	91.6% \pm 1.6	91.6% \pm 1.7	p=0.733	
55-64 (n=32)	100%	98.0% \pm 3.2	95.7% \pm 4.7	95.7% \pm 4.8	95.7% \pm 4.8	95.7% \pm 4.8	95.7% \pm 4.8	95.7% \pm 4.8	95.7% \pm 4.8	95.7% \pm 4.8	95.7% \pm 4.8	88.4% \pm 14.6	81.4% \pm 16.5	81.4% \pm 17.2	73.7% \pm 20.1		
65-74 (n=12)	100%	94.1% \pm 8.6	86.9% \pm 12.5	86.9% \pm 13.0	86.9% \pm 13.5	86.9% \pm 14.1	86.9% \pm 14.7	86.9% \pm 20.7	86.9% \pm 21.8	74.4% \pm 27.6	74.4% \pm 29.3	-	-	-	-		
75+ (n=6)	100%	90.0% \pm 16.4	90.0% \pm 17.8	90.0% \pm 17.8	90.0% \pm 17.8	90.0% \pm 17.8	-	-	-	-	-	-	-	-	-		
By diagnostic year:																	
1977 - 83 (n=164)	100%	96.7% \pm 1.5	92.7% \pm 2.1	91.2% \pm 2.3	89.7% \pm 2.5	88.8% \pm 2.7	88.8% \pm 2.7	88.8% \pm 2.8	88.4% \pm 2.9	87.6% \pm 3.0	86.8% \pm 3.1	86.0% \pm 3.2	85.9% \pm 3.2	85.9% \pm 3.3	85.6% \pm 3.4	p=0.083	
1984 - 90 (n=193)	100%	99.3% \pm 0.7	95.5% \pm 1.6	94.8% \pm 1.8	94.7% \pm 1.8	94.7% \pm 1.8	94.7% \pm 1.8	94.7% \pm 1.9	94.5% \pm 2.0	94.7% \pm 2.1	-	-	-	-	-		
1991 - 98 (n=347)	100%	98.1% \pm 0.8	96.3% \pm 1.2	95.3% \pm 1.4	95.1% \pm 1.5	93.9% \pm 1.8	-	-	-	-	-	-	-	-	-		
By age and year:																	
Under 55 yrs.																	
1977 - 83 (n=151)	100%	96.2% \pm 1.6	91.7% \pm 2.3	89.9% \pm 2.5	88.1% \pm 2.7	87.0% \pm 2.8	87.0% \pm 2.9	87.0% \pm 3.0	86.3% \pm 3.0	85.4% \pm 3.1	85.4% \pm 3.1	85.4% \pm 3.1	85.4% \pm 3.1	85.4% \pm 3.1	85.4% \pm 3.2	p=0.014	
1984 - 90 (n=180)	100%	99.1% \pm 0.8	94.8% \pm 1.7	93.8% \pm 1.9	93.4% \pm 1.9	93.4% \pm 1.9	93.4% \pm 2.0	93.4% \pm 2.0	93.4% \pm 2.0	93.4% \pm 2.0	-	-	-	-	-		
1991 - 98 (n=323)	100%	98.8% \pm 0.7	97.4% \pm 1.0	96.2% \pm 1.3	95.7% \pm 1.4	95.1% \pm 1.6	-	-	-	-	-	-	-	-	-		
55 - 64 yrs.																	
1977 - 83 (n=11)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	-	-	-	-	p=0.254	
1984 - 90 (n=7)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	-	-	-	-		
1991 - 98 (n=14)	100%	93.1% \pm 7.5	84.7% \pm 11.2	84.7% \pm 11.3	84.7% \pm 11.5	84.7% \pm 11.6	-	-	-	-	-	-	-	-	-		
65 - 74 yrs.																	
1977 - 83 (n=2)	100%	100%	100%	100%	100%	100%	100%	100%	77.1% \pm 56.6	77.1% \pm 58.7	-	-	-	-	-	p=0.424	
1984 - 90 (n=3)	100%	100%	100%	100%	100%	100%	100%	-	-	-	-	-	-	-	-		
1991 - 98 (n=7)	100%	87.2% \pm 14.6	70.0% \pm 21.2	70.0% \pm 22.0	70.0% \pm 22.9	70.0% \pm 23.9	-	-	-	-	-	-	-	-	-		
75+ yrs.																	
1977 - 83 (n=0)	100%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	p=0.273	
1984 - 90 (n=3)	100%	100%	100%	100%	100%	100%	-	-	-	-	-	-	-	-	-		
1991 - 98 (n=3)	100%	71.4% \pm 29.1	71.4% \pm 31.4	71.4% \pm 33.7	71.4% \pm 36.3	71.4% \pm 39.3	-	-	-	-	-	-	-	-	-		

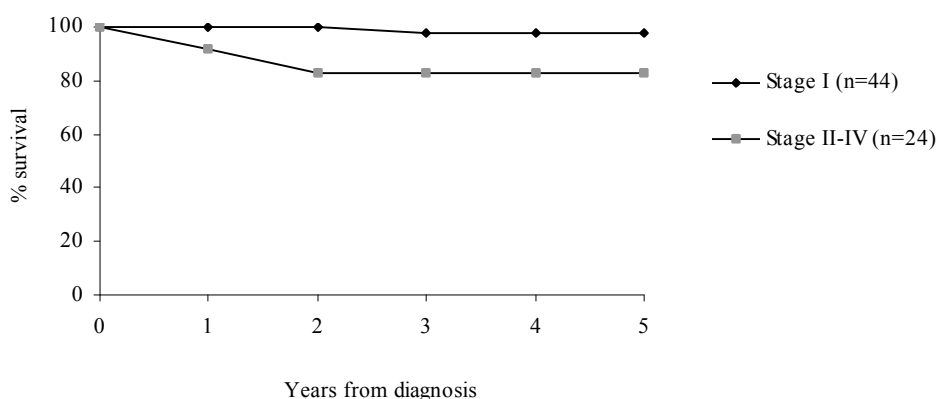
* Survival from the primary cancer (see text). ** P value derived from Charles Brown test, or equivalent for multiple samples (see text).

Table 65: Case survivals (\pm SE) from testicular cancers; SA hospital-based registries, circa 1990-97*

Category		Period from diagnosis (yrs.)										P value
		1	2	3	4	5	6	7	8	9	10	
All (n=69)	100%	97.1% \pm 2.0	94.0% \pm 2.9	92.4% \pm 3.3	92.4% \pm 3.3	92.4% \pm 3.3	92.4% \pm 3.3	92.4% \pm 3.3	92.4% \pm 3.3	-	-	-
By age (yrs.):												
Under 35 (n=37)	100%	100%	97.2% \pm 2.7	97.2% \pm 2.7	97.2% \pm 2.7	97.2% \pm 2.7	97.2% \pm 2.7	97.2% \pm 2.7	97.2% \pm 2.7	-	-	p=0.100
35+ (n=32)	100%	93.8% \pm 4.3	90.4% \pm 5.3	86.6% \pm 6.3	86.6% \pm 6.3	86.6% \pm 6.3	86.6% \pm 6.3	86.6% \pm 6.3	86.6% \pm 6.3	-	-	
By residence:												
Adel - mid/lower SES (n=25)	100%	100%	95.5% \pm 4.4	95.5% \pm 4.4	95.5% \pm 4.4	95.5% \pm 4.4	95.5% \pm 4.4	95.5% \pm 4.4	95.5% \pm 4.4	-	-	p=0.430
Adel - mid/upper SES (n=30)	100%	96.7% \pm 3.3	93.3% \pm 4.6	89.7% \pm 5.6	89.7% \pm 5.6	89.7% \pm 5.6	89.7% \pm 5.6	89.7% \pm 5.6	89.7% \pm 5.6	-	-	
Adelaide (n=55)	100%	98.2% \pm 1.8	94.3% \pm 3.2	92.3% \pm 3.7	92.3% \pm 3.7	92.3% \pm 3.7	92.3% \pm 3.7	92.3% \pm 3.7	92.3% \pm 3.7	-	-	p=0.975
Country SA (n=14)	100%	92.9% \pm 6.9	92.9% \pm 6.9	92.9% \pm 6.9	92.9% \pm 6.9	92.9% \pm 6.9	92.9% \pm 6.9	92.9% \pm 6.9	92.9% \pm 6.9	-	-	
By TNM stage:												
I (n=44)	100%	100%	100%	97.4% \pm 2.5	97.4% \pm 2.5	97.4% \pm 2.5	97.4% \pm 2.5	97.4% \pm 2.5	97.4% \pm 2.5	-	-	p=0.031
II - IV (n=24)	100%	91.5% \pm 5.8	82.8% \pm 7.8	82.8% \pm 7.8	82.8% \pm 7.8	82.8% \pm 7.8	82.8% \pm 7.8	82.8% \pm 7.8	82.8% \pm 7.8	-	-	
UK (n=1)	(100%)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	-	-	
By differentiation:												
Well-mod. (n=9)	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	-	p=1.000
Poor/undiff. (n=9)	100%	100%	88.9% \pm 10.5	88.9% \pm 10.5	88.9% \pm 10.5	88.9% \pm 10.5	88.9% \pm 10.5	88.9% \pm 10.5	88.9% \pm 10.5	-	-	
UK (n=51)	(100%)	(96.0%) \pm 2.7	(94.0%) \pm 3.4	(91.7%) \pm 4.0	(91.7%) \pm 4.0	(91.7%) \pm 4.0	(91.7%) \pm 4.0	(91.7%) \pm 4.0	(91.7%) \pm 4.0	-	-	
By histological type:												
Seminomas (n=30)	100%	100%	100%	96.3% \pm 3.6	96.3% \pm 3.6	96.3% \pm 3.6	96.3% \pm 3.6	96.3% \pm 3.6	96.3% \pm 3.6	-	-	p=0.420
Other germ cell (n=33)	100%	93.8% \pm 4.2	90.7% \pm 5.1	90.7% \pm 5.1	90.7% \pm 5.1	90.7% \pm 5.1	90.7% \pm 5.1	90.7% \pm 5.1	90.7% \pm 5.1	-	-	
Other (n=6)	(100%)	(100%)	(80.0%) \pm 17.9	(80.0%) \pm 17.9	(-)	(-)	(-)	(-)	(-)	-	-	

* P values derived from Cox proportional hazards regression (data in brackets excluded).

Figure 67: Case survivals from testicular cancers circa 1990-97 by TNM stage; SA hospital-based registries*



*Date of censoring: December 31st, 1998.

Despite the imprecision associated with these stage-specific survival estimates, due to small numbers of cases, they equate with the international experience.³¹

A multivariate proportional hazards regression analysis indicated that both age at diagnosis and stage were outcome predictors, with the relative risk of case fatality varying as follows:

<i>Predictors</i>	<i>Relative risk (95% confidence limits)</i>
Age at diagnosis (yrs.):	
Nominated age (reference)	1.00
10 years older	2.48 (1.35, 4.53)
TNM stage:	
I (reference)	1.00
II - IV	13.02 (1.19, 142.66)

After adjusting for age and stage, diagnostic year was not predictive of outcome during this short time period (ie, 1990-97) (p=0.680).

Most cases (96%) had surgery as part of their primary course of care, 24% had radiotherapy, and 41% had chemotherapy, whereas 2% received none of these primary treatments. Compared with USA hospital cases circa 1990, more cases in this hospital series had chemotherapy and fewer had radiotherapy.³² Of the USA cases, 95% had surgery, 40% had radiotherapy, 29% had chemotherapy, and about 1% had none of these primary treatments. From Table 66, it is evident that the key predictors of primary treatment mode in the South Australian case series were:

- For none of these treatments being provided: no predictors were suggested.
- For surgery: early TNM stage.
- For radiotherapy: histological type, with seminomas being more likely to receive this primary treatment than other histological types in aggregate.
- For chemotherapy: residence in a country region as opposed to Adelaide; a later stage; and histological type, with seminomas being relatively unlikely to receive this treatment.

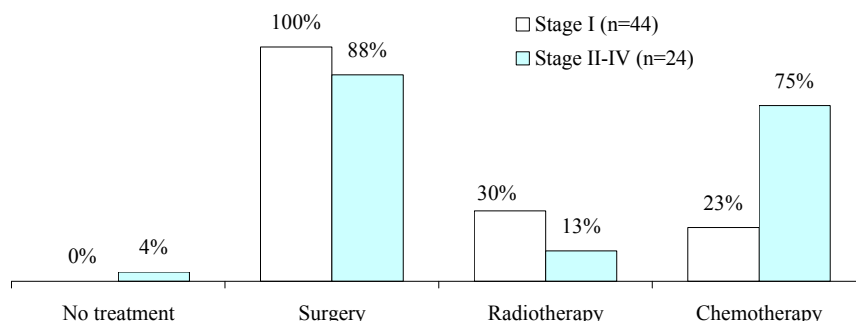
Table 66: Percentage of testicular cancer cases by treatment mode as part of the primary course of care; SA hospital-based registries, circa 1990-97*

Category	No treatment	% receiving any			% receiving combination and single therapies						
		surg. (s)	radio. (r)	chemo. (c)	src	sr	sc	rc	s	r	c
All (n=69)	1.5%	95.6%	23.5%	41.2%	0.0%	22.1%	38.2%	1.5%	35.3%	0.0%	1.5%
By age (yrs.):											
Under 35 (n=37)	0.0%	97.3%	16.2%	48.6%	0.0%	13.5%	45.9%	2.7%	37.8%	0.0%	0.0%
35+ (n=32)	3.2%	93.5%	32.3%	32.3%	0.0%	32.3%	29.0%	0.0%	32.3%	0.0%	3.2%
P value	0.456	0.588	0.120	0.171	1.00	0.063	0.153	1.000	0.632	1.000	0.456
By residence:											
Adel - mid/lower SES (n=25)	0.0%	100.0%	16.0%	36.0%	0.0%	16.0%	36.0%	0.0%	48.0%	0.0%	0.0%
Adel - mid/upper SES (n=30)	3.4%	96.6%	31.0%	34.5%	0.0%	31.0%	34.5%	0.0%	31.0%	0.0%	0.0%
P value	1.000	1.000	0.198	0.907	1.000	0.198	0.907	1.000	0.202	1.000	1.000
Adelaide (n=55)	1.9%	98.1%	24.1%	35.2%	0.0%	24.1%	35.2%	0.0%	38.9%	0.0%	0.0%
Country SA (n=14)	0.0%	85.7%	21.4%	64.3%	0.0%	14.3%	50.0%	7.1%	21.4%	0.0%	7.1%
P value	1.000	0.105	1.000	0.049	1.000	0.719	0.309	0.206	0.348	1.000	0.206
By TNM stage:											
I (n=44)	0.0%	100.0%	30.2%	23.3%	0.0%	30.2%	23.3%	0.0%	46.5%	0.0%	0.0%
II - IV (n=24)	4.2%	87.5%	12.5%	75.0%	0.0%	8.3%	66.7%	4.2%	12.5%	0.0%	4.2%
UK (n=1)	(0.0%)	(100.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(100.0%)	(0.0%)	(0.0%)
P value	0.358	0.042	0.103	<0.001	1.000	0.039	<0.001	0.358	0.005	1.000	0.358
By differentiation:											
Well - mod (n=9)	0.0%	100.0%	44.4%	22.2%	0.0%	44.4%	22.2%	0.0%	33.3%	0.0%	0.0%
Poor/undiff. (n=9)	0.0%	100.0%	11.1%	55.6%	0.0%	11.1%	55.6%	0.0%	33.3%	0.0%	0.0%
UK (n=51)	(2.0%)	(94.0%)	(22.0%)	(42.0%)	(0.0%)	(20.0%)	(38.0%)	(2.0%)	(36.0%)	(0.0%)	(2.0%)
P value	1.000	1.000	0.294	0.335	1.000	0.294	0.335	1.000	1.000	1.000	1.000
By histological type:											
Seminomas (n=30)	0.0%	100.0%	51.7%	17.2%	0.0%	51.7%	17.2%	0.0%	31.0%	0.0%	0.0%
Other germ cell (n=33)	3.0%	93.9%	0.0%	57.6%	0.0%	0.0%	54.5%	0.0%	39.4%	0.0%	3.0%
Other (n=6)	0.0%	83.3%	16.7%	66.7%	0.0%	0.0%	50.0%	16.7%	33.3%	0.0%	0.0%
P value	0.584	0.158	<0.001	0.002	1.000	<0.001	0.009	0.005	0.785	1.000	0.584

* Treatment details complete for 99% of cases. Derivation of P values (see text) (data in brackets excluded).

Stage-specific trends in treatment are shown in Figure 68.

Figure 68: % testicular cancers by TNM stage and treatment mode as part of the primary course of care; SA hospital-based registries, circa 1990-97



Virtually all surgical cases (98%) had an orchidectomy. The most common chemotherapy agent was PEB, with carboplatinum and etoposide being used on some occasions.

Penis and other male organs (ICD-02: C60, C63)

1. Population-based data

Cancers of this site had a five-year survival of 76%, with an equivalent survival at 10 years, but a lower figure of 59% at 15 years. Neither age at diagnosis nor diagnostic period was predictive of survival in a univariate context (Table 67). Age was predictive, however, in a multivariate context, as indicated by proportional hazards regression. Relative risks of case fatality were found to vary as shown:

<i>Predictors</i>	<i>Relative risk (95% confidence limits)</i>
Age at diagnosis (yrs.):	
Under 55 (reference)	1.00
55-64	0.37 (0.02, 8.03)
65-74	2.76 (0.42, 18.25)
75+	5.91 (1.00, 35.17)
Diagnostic period:	
1977-83 (reference)	1.00
1984-90	2.08 (0.59, 7.29)
1991-98	0.92 (0.23, 3.60)

Survival estimates were imprecise for these cancers, due to the small numbers of cases available for analysis. The estimated five-year survival of 76% for 1977-98 tended to be higher than the corresponding figures of 72% for Europe in 1985-89,²⁹ and 66% for the USA (SEER data) in 1989-95.²⁸

Table 67: Case survivals (\pm SE) by period from diagnosis, age at diagnosis, and diagnostic year; SA Cancer Registry, 1977-98*

Cancer site: penis and other male genital organs

Category		Period from diagnosis (yrs.)															P value**
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
All cases (n=111)	100%	88.7% \pm 3.6	79.3% \pm 4.8	79.3% \pm 5.2	79.3% \pm 5.6	75.6% \pm 6.2	75.6% \pm 6.5	75.6% \pm 6.9	75.6% \pm 7.5	75.6% \pm 8.1	75.6% \pm 8.8	75.1% \pm 9.6	69.0% \pm 10.3	64.8% \pm 10.9	58.8% \pm 11.5	58.8% \pm 12.1	-
By age (yrs.):																	
Under 55 (n=22)	100%	95.7% \pm 4.6	87.0% \pm 6.4	87.0% \pm 7.7	87.0% \pm 7.8	87.0% \pm 7.8	87.0% \pm 7.8	87.0% \pm 7.9	87.0% \pm 7.9	87.0% \pm 9.9	87.0% \pm 9.9	82.4% \pm 10.0	82.4% \pm 10.1	82.4% \pm 10.2	82.4% \pm 10.3	82.4% \pm 10.3	p=0.403
55-64 (n=27)	100%	97.3% \pm 3.9	91.5% \pm 5.6	91.5% \pm 7.0	91.5% \pm 8.9	83.7% \pm 9.1	83.7% \pm 10.2	83.7% \pm 10.4	83.7% \pm 10.6	83.7% \pm 10.9	83.7% \pm 13.9	65.8% \pm 15.6	56.7% \pm 17.0	45.7% \pm 17.9	28.6% \pm 18.5	28.6% \pm 19.3	
65-74 (n=32)	100%	80.0% \pm 7.8	80.0% \pm 8.6	80.0% \pm 9.1	80.0% \pm 9.5	77.6% \pm 11.7	77.6% \pm 12.4	77.6% \pm 13.3	77.6% \pm 16.2	77.6% \pm 18.1	77.6% \pm 19.8	-	-	-	-	-	
75+ (n=30)	100%	83.8% \pm 9.1	48.5% \pm 12.2	48.5% \pm 13.9	48.5% \pm 15.7	48.5% \pm 17.8	-	-	-	-	-	-	-	-	-	-	
By diagnostic year:																	
1977 - 83 (n=38)	100%	95.8% \pm 4.5	83.0% \pm 7.2	83.0% \pm 8.1	83.0% \pm 8.4	75.3% \pm 9.4	75.3% \pm 10.0	75.3% \pm 10.6	75.3% \pm 11.1	75.3% \pm 11.8	75.3% \pm 12.3	71.2% \pm 12.8	65.8% \pm 13.2	59.7% \pm 13.4	52.9% \pm 13.4	52.9% \pm 14.1	p=0.161
1984 - 90 (n=30)	100%	70.5% \pm 9.1	70.5% \pm 9.8	70.5% \pm 10.4	70.5% \pm 11.2	70.5% \pm 12.0	70.5% \pm 12.6	70.5% \pm 13.4	70.5% \pm 14.2	70.5% \pm 15.0	70.5% \pm 16.3	-	-	-	-	-	
1991 - 98 (n=43)	100%	95.7% \pm 4.5	81.3% \pm 8.6	81.3% \pm 8.9	81.3% \pm 10.5	75.0% \pm 10.9	-	-	-	-	-	-	-	-	-	-	
By age and year:																	
Under 55 yrs.																	
1977 - 83 (n=12)	100%	100% \pm 8.0	84.4% \pm 10.9	84.4% \pm 11.0	84.4% \pm 11.0	84.4% \pm 11.0	84.4% \pm 11.1	84.4% \pm 11.1	84.4% \pm 11.2	84.4% \pm 13.1	84.4% \pm 13.2	78.8% \pm 13.3	78.8% \pm 13.4	78.8% \pm 13.6	78.8% \pm 13.7	78.8% \pm 13.9	p=0.477
1984 - 90 (n=4)	100%	75.1% \pm 21.7	75.1% \pm 21.7	75.1% \pm 21.7	75.1% \pm 21.8	75.1% \pm 21.8	75.1% \pm 21.8	75.1% \pm 21.9	75.1% \pm 21.9	75.1% \pm 21.9	75.1% \pm 22.0	-	-	-	-	-	
1991 - 98 (n=6)	100%	100%	100%	100%	100%	100%	-	-	-	-	-	-	-	-	-	-	
55 - 64 yrs.																	
1977 - 83 (n=8)	100%	100% \pm 12.1	80.6% \pm 16.1	80.6% \pm 16.5	80.6% \pm 16.5	70.2% \pm 16.8	70.2% \pm 19.2	70.2% \pm 19.7	70.2% \pm 20.2	70.2% \pm 20.8	70.2% \pm 22.1	62.6% \pm 22.9	50.3% \pm 23.0	34.8% \pm 21.3	18.1% \pm 17.0	18.1% \pm 17.7	p=0.115
1984 - 90 (n=8)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	-	-	-	-	
1991 - 98 (n=11)	100%	90.4% \pm 10.1	90.4% \pm 10.2	90.4% \pm 10.3	90.4% \pm 10.3	90.4% \pm 19.6	-	-	-	-	-	-	-	-	-	-	
65 - 74 yrs.																	
1977 - 83 (n=10)	100%	83.8% \pm 13.2	83.8% \pm 13.9	83.8% \pm 14.7	83.8% \pm 15.5	78.4% \pm 20.2	78.4% \pm 21.6	78.4% \pm 23.2	78.4% \pm 25.5	78.4% \pm 27.1	78.4% \pm 29.6	-	-	-	-	-	p=0.501
1984 - 90 (n=9)	100%	57.9% \pm 17.2	57.9% \pm 18.0	57.9% \pm 18.9	57.9% \pm 19.9	57.9% \pm 21.1	57.9% \pm 22.4	57.9% \pm 23.9	57.9% \pm 24.3	57.9% \pm 26.1	-	-	-	-	-	-	
1991 - 98 (n=13)	100%	94.5% \pm 8.2	86.2% \pm 13.2	86.2% \pm 13.6	86.2% \pm 14.2	86.2% \pm 14.8	-	-	-	-	-	-	-	-	-	-	
75+ yrs.																	
1977 - 83 (n=8)	100%	97.7% \pm 13.1	62.8% \pm 22.2	62.8% \pm 25.0	62.8% \pm 28.3	62.8% \pm 31.2	-	-	-	-	-	-	-	-	-	-	p=0.360
1984 - 90 (n=9)	100%	44.0% \pm 19.0	44.0% \pm 20.7	44.0% \pm 24.1	44.0% \pm 24.9	44.0% \pm 29.3	-	-	-	-	-	-	-	-	-	-	
1991 - 98 (n=13)	100%	99.6% \pm 9.5	36.7% \pm 19.2	36.7% \pm 21.6	36.7% \pm 24.6	36.7% \pm 28.8	-	-	-	-	-	-	-	-	-	-	

* Survival from the primary cancer (see text). ** P value derived from Charles Brown test, or equivalent for multiple samples (see text).

2. Hospital-based data

Contributed by:

- the Urology Department, Royal Adelaide Hospital.
- the Urology Unit, Department of Surgery, Flinders Medical Centre.

Only three cases were recorded by the hospital registries for the period circa 1990-97, precluding meaningful analyses of survival and treatment. All were treated surgically without accompanying radiotherapy or systemic therapy, as their primary course of care. All were alive at the date of censoring.

Bladder (ICD-02: C67)

1. Population-based data

Analyses for this site were restricted to the 1982-98 diagnostic period due to earlier changes in disease classification. The data show a five-year survival of 59%, with survivals of 52% and 48% at 10 and 15 years respectively. The five-year survival for females was 54%, which was lower than the corresponding 61% for male cases (Table 68) (Figure 69). Age also was a key predictor of outcome, with the five-year survival ranging from 78% for cases under 55 years at diagnosis to 47% for those aged 75 years or more (Figure 70).

Figure 69: Case survivals from invasive cancers of the bladder in 1982-98 by sex in South Australia*

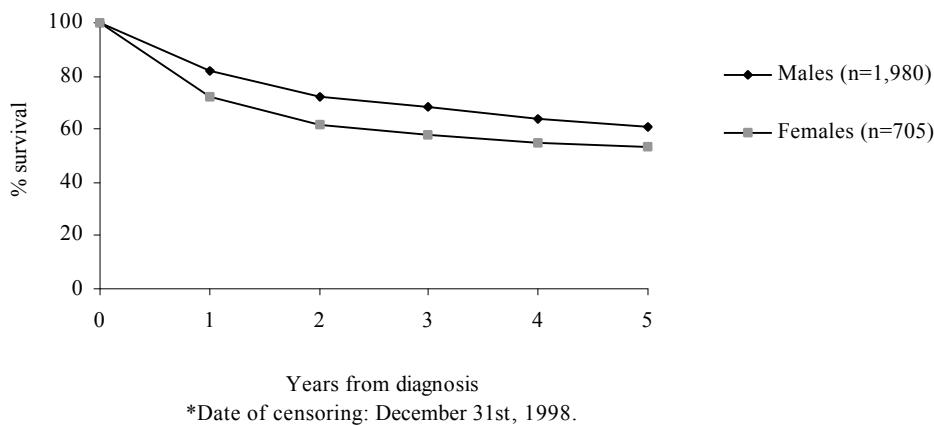


Figure 70: Case survivals from invasive cancers of the bladder in 1982-98 by age at diagnosis in South Australia*

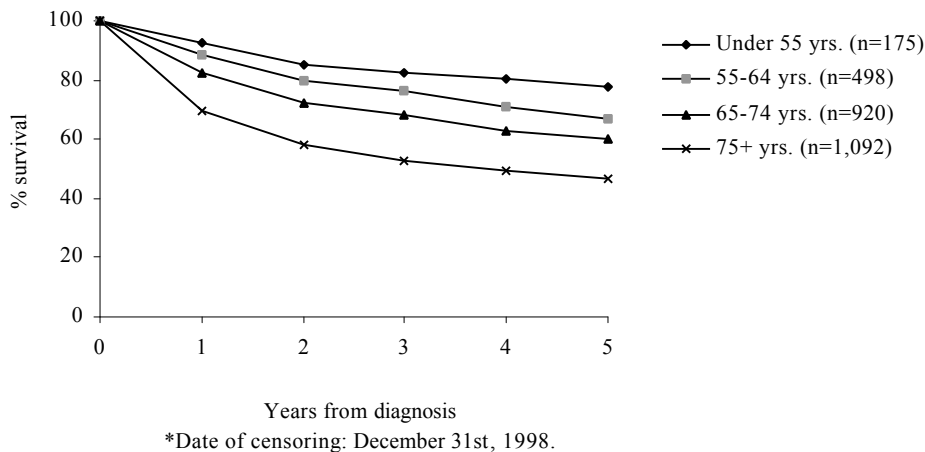


Table 68: Case survivals (\pm SE) by period from diagnosis, sex, age at diagnosis, and diagnostic year; SA Cancer Registry, 1982-98*

Cancer site: bladder (invasive)

Category		Period from diagnosis (yrs.)															P value**
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
All cases (n=2,685)	100%	79.4% \pm 0.9	69.5% \pm 1.1	65.6% \pm 1.2	61.6% \pm 1.3	59.0% \pm 1.4	58.0% \pm 1.5	55.4% \pm 1.6	53.8% \pm 1.7	53.5% \pm 1.8	51.8% \pm 1.9	51.4% \pm 2.1	50.8% \pm 2.3	49.5% \pm 2.5	49.5% \pm 2.7	47.9% \pm 3.3	-
By sex:																	
Males (n=1,980)	100%	82.0% \pm 1.0	72.2% \pm 1.2	68.4% \pm 1.4	64.0% \pm 1.5	61.1% \pm 1.6	60.7% \pm 1.7	57.7% \pm 1.9	56.7% \pm 2.0	56.7% \pm 2.2	55.4% \pm 2.3	54.9% \pm 2.5	54.9% \pm 2.8	53.9% \pm 3.1	53.9% \pm 3.4	52.1% \pm 4.1	p<0.001
Females (n=705)	100%	72.1% \pm 1.9	61.9% \pm 2.1	57.6% \pm 2.3	54.8% \pm 2.4	53.5% \pm 2.6	51.0% \pm 2.7	49.3% \pm 2.9	46.3% \pm 3.0	45.1% \pm 3.2	42.7% \pm 3.4	42.7% \pm 3.6	40.0% \pm 3.9	38.6% \pm 4.2	38.6% \pm 4.5	37.6% \pm 5.3	
By age (yrs.):																	
Under 55 (n=175)	100%	92.6% \pm 2.1	85.2% \pm 2.9	82.1% \pm 3.2	80.3% \pm 3.3	77.6% \pm 3.6	77.2% \pm 3.7	76.8% \pm 3.8	75.4% \pm 3.9	75.4% \pm 4.0	75.3% \pm 4.1	74.5% \pm 4.4	71.3% \pm 5.0	69.7% \pm 5.4	69.7% \pm 5.5	67.6% \pm 6.5	p<0.001
55-64 (n=498)	100%	88.7% \pm 1.5	79.6% \pm 2.0	76.5% \pm 2.2	70.7% \pm 2.3	66.8% \pm 2.5	64.5% \pm 2.6	62.6% \pm 2.8	62.0% \pm 2.9	60.9% \pm 3.0	57.5% \pm 3.2	57.4% \pm 3.4	57.2% \pm 3.5	57.2% \pm 3.8	57.2% \pm 4.1	48.3% \pm 5.1	
65-74 (n=920)	100%	82.6% \pm 1.4	72.6% \pm 1.7	68.5% \pm 1.8	63.0% \pm 2.0	60.3% \pm 2.1	58.6% \pm 2.3	53.3% \pm 2.4	50.3% \pm 2.6	50.1% \pm 2.8	48.6% \pm 3.0	-	-	-	-	-	
75+ (n=1,092)	100%	69.6% \pm 1.6	57.9% \pm 1.9	53.0% \pm 2.1	49.3% \pm 2.3	46.8% \pm 2.6	-	-	-	-	-	-	-	-	-	-	
By diagnostic year:																	
1982 - 83 (n=275)	100%	78.1% \pm 2.8	72.4% \pm 3.2	70.1% \pm 3.5	67.4% \pm 3.8	65.7% \pm 4.0	65.7% \pm 4.2	62.1% \pm 4.5	57.4% \pm 4.6	56.7% \pm 4.8	54.5% \pm 5.0	52.5% \pm 5.2	51.0% \pm 5.4	49.8% \pm 5.6	49.8% \pm 5.8	46.1% \pm 5.9	p=0.080
1984 - 90 (n=1,091)	100%	79.8% \pm 1.4	71.7% \pm 1.6	67.9% \pm 1.8	63.7% \pm 1.9	60.4% \pm 2.0	58.9% \pm 2.1	56.7% \pm 2.2	55.7% \pm 2.3	55.5% \pm 2.4	53.9% \pm 2.5	-	-	-	-	-	
1991 - 98 (n=1,319)	100%	79.3% \pm 1.3	66.5% \pm 1.6	61.9% \pm 1.8	57.5% \pm 2.0	56.0% \pm 2.2	-	-	-	-	-	-	-	-	-	-	
By age and year:																	
Under 55 yrs.																	
1982 - 83 (n=24)	100%	87.9% \pm 6.8	80.0% \pm 8.4	80.0% \pm 8.4	80.0% \pm 8.5	80.0% \pm 8.5	80.0% \pm 8.6	78.5% \pm 9.2	70.4% \pm 10.2	70.4% \pm 10.2	67.2% \pm 10.6	67.2% \pm 10.7	64.1% \pm 11.1	64.1% \pm 11.2	64.1% \pm 11.3	61.9% \pm 11.6	p=0.826
1984 - 90 (n=81)	100%	90.5% \pm 3.3	84.6% \pm 4.1	82.5% \pm 4.4	79.1% \pm 4.7	77.0% \pm 4.9	76.2% \pm 5.0	76.2% \pm 5.0	76.2% \pm 5.1	76.2% \pm 5.1	76.2% \pm 5.2	-	-	-	-	-	
1991 - 98 (n=70)	100%	97.1% \pm 2.2	87.6% \pm 4.6	80.8% \pm 5.8	81.1% \pm 5.8	72.9% \pm 7.8	-	-	-	-	-	-	-	-	-	-	
55 - 64 yrs.																	
1982 - 83 (n=62)	100%	81.9% \pm 5.1	79.8% \pm 5.5	79.4% \pm 5.7	75.7% \pm 6.1	75.3% \pm 6.4	75.3% \pm 6.6	71.4% \pm 7.0	67.5% \pm 7.3	67.3% \pm 7.5	65.2% \pm 7.8	63.1% \pm 8.0	63.1% \pm 8.3	63.1% \pm 8.6	63.1% \pm 8.8	51.7% \pm 8.9	p=0.727
1984 - 90 (n=206)	100%	89.0% \pm 2.3	80.3% \pm 3.0	74.9% \pm 3.3	69.4% \pm 3.5	65.9% \pm 3.7	63.9% \pm 3.8	61.9% \pm 3.9	61.9% \pm 4.0	60.6% \pm 4.1	56.7% \pm 4.2	-	-	-	-	-	
1991 - 98 (n=230)	100%	90.3% \pm 2.1	78.6% \pm 3.0	74.6% \pm 3.4	70.5% \pm 3.7	63.8% \pm 4.2	-	-	-	-	-	-	-	-	-	-	
65 - 74 yrs.																	
1982 - 83 (n=93)	100%	84.6% \pm 4.1	76.2% \pm 5.1	73.3% \pm 5.5	72.7% \pm 5.9	69.5% \pm 6.3	69.5% \pm 6.6	61.2% \pm 7.0	55.6% \pm 7.3	55.6% \pm 7.6	49.3% \pm 7.8	-	-	-	-	-	p=0.393
1984 - 90 (n=380)	100%	82.3% \pm 2.1	73.3% \pm 2.5	70.5% \pm 2.7	64.3% \pm 2.9	60.8% \pm 3.1	57.7% \pm 3.2	53.3% \pm 3.3	51.1% \pm 3.4	50.7% \pm 3.6	50.7% \pm 3.8	-	-	-	-	-	
1991 - 98 (n=447)	100%	82.5% \pm 2.0	70.8% \pm 2.5	64.7% \pm 2.8	58.7% \pm 3.2	57.7% \pm 3.4	-	-	-	-	-	-	-	-	-	-	
75+ yrs.																	
1982 - 83 (n=96)	100%	65.8% \pm 5.7	59.8% \pm 6.5	54.2% \pm 7.1	46.5% \pm 7.6	41.7% \pm 8.0	-	-	-	-	-	-	-	-	-	-	p=0.307
1984 - 90 (n=424)	100%	70.3% \pm 2.6	61.9% \pm 3.0	56.6% \pm 3.3	54.6% \pm 3.6	50.2% \pm 3.9	-	-	-	-	-	-	-	-	-	-	
1991 - 98 (n=572)	100%	69.7% \pm 2.3	53.8% \pm 2.7	49.5% \pm 3.1	44.7% \pm 3.4	44.7% \pm 3.8	-	-	-	-	-	-	-	-	-	-	

* Survival from the primary cancer (see text). ** P value derived from Charles Brown test, or equivalent for multiple samples (see text).

Comparisons with case survivals for other populations are confounded by the variable inclusion of "in situ" and papillary non-invasive tumours. For this reason, the USA (SEER data) has published five-year survivals for "in situ" and invasive bladder tumours in aggregate.²⁸ In 1989-95, the five-year figure for the USA was 81%, which was similar, when pre-invasive lesions were included, to the corresponding 79% for South Australia in 1991-98.

A tendency was evident in South Australia for survivals from invasive cancers to be lower for the more recent diagnostic periods (Table 68). This largely was explained by older ages at diagnosis. Multivariate proportional hazards regression analysis indicated that relative risks of case fatality were as follows:

<i>Predictors</i>	<i>Relative risk (95% confidence limits)</i>
Sex:	
Male (reference)	1.00
Female	1.30 (1.13, 1.49)
Age at diagnosis (yrs.):	
Under 55 (reference)	1.00
55-64	1.51 (1.05, 2.15)
65-74	1.96 (1.40, 2.76)
75-84	3.06 (2.18, 4.30)
85+	4.70 (3.27, 6.76)
Histological type:	
Transitional cell carcinoma (reference)	1.00
Papillary transitional cell carc.	0.42 (0.37, 0.49)
Adenocarcinoma	0.82 (0.47, 1.43)
Epithelial neoplasms (nos)	1.72 (1.15, 2.56)
Squamous cell carcinoma	2.42 (1.74, 3.35)
Other (leiomyosarcomas, carcinosarcomas, etc.)	1.93 (1.00, 3.75)
Diagnostic period:	
1982-83 (reference)	1.00
1984-90	0.89 (0.73, 1.10)
1991-98	0.92 (0.74, 1.14)

The higher survivals for males than females contrast with the reverse trend generally observed for other cancer sites. Similar findings for the bladder have applied for other populations where females have been found to present at a later stage.²⁸ This may be because haematuria is less conspicuous among females, and sometimes attributed to menstrual bleeding, leading to delays in diagnosis. Data from New South Wales indicate, however, that females still have poorer outcomes after adjusting for extent of spread of the cancer at initial presentation.³⁰

2. Hospital-based data

Contributed by:

- the Urology Department, Royal Adelaide Hospital.
- the Urology Unit, Department of Surgery, Flinders Medical Centre.

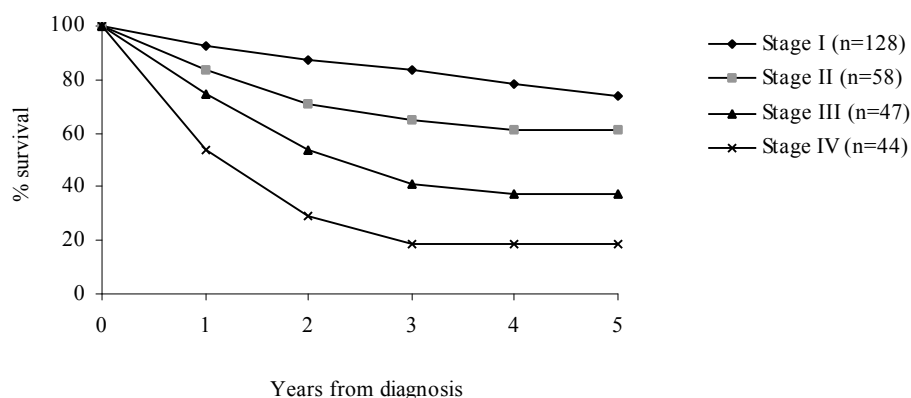
There were 294 cases with invasive bladder cancer registered by the hospital registries for the diagnostic period circa 1990-97. Their five-year survival of 56% was similar to the figure of 59% for all invasive bladder cases in the State in 1982-98. It was anticipated that referral of the more complex cases to teaching hospitals would have led to lower survivals at these centres. Table 69 shows that lower survivals applied to: females; old cases; residents of country regions; more advanced TNM stages; poorer differentiated tumours; and transitional cell carcinomas as opposed to papillary transitional cell carcinomas. Trends in survival are shown by stage in Figure 71.

Table 69: Case survivals (\pm SE) from invasive bladder cancers; SA hospital-based registries, circa 1990-97*

Category		Period from diagnosis (yrs.)										P value
		1	2	3	4	5	6	7	8	9	10	
All (n=294)	100%	81.6% \pm 2.3	69.3% \pm 2.8	62.4% \pm 3.1	58.2% \pm 3.3	56.1% \pm 3.4	53.0% \pm 3.6	51.7% \pm 3.8	51.7% \pm 3.8	38.8% \pm 11.5	-	-
By sex:												
Males (n=226)	100%	84.7% \pm 2.5	73.1% \pm 3.1	65.8% \pm 3.5	61.8% \pm 3.7	59.1% \pm 3.9	55.0% \pm 4.3	53.3% \pm 4.5	53.3% \pm 4.5	40.0% \pm 12.0	-	p=0.032
Females (n=68)	100%	71.8% \pm 5.5	57.2% \pm 6.2	51.8% \pm 6.3	46.7% \pm 6.7	46.7% \pm 6.7	46.7% \pm 6.7	46.7% \pm 6.7	46.7% \pm 6.7	-	-	
By age (yrs.):												
Under 55 (n=10)	100%	100% \pm 0	80.0% \pm 12.6	60.0% \pm 15.5	60.0% \pm 15.5	60.0% \pm 15.5	60.0% \pm 15.5	60.0% \pm 15.5	60.0% \pm 15.5	60.0% \pm 15.5	-	p=0.005
55-64 (n=48)	100%	89.2% \pm 4.5	79.9% \pm 6.0	79.9% \pm 6.0	79.9% \pm 6.0	68.5% \pm 8.0	68.5% \pm 8.0	68.5% \pm 8.0	68.5% \pm 8.0	-	-	
65-74 (n=97)	100%	85.3% \pm 3.6	76.3% \pm 4.4	69.2% \pm 5.0	63.9% \pm 5.5	63.9% \pm 5.5	58.0% \pm 6.4	54.8% \pm 6.8	54.8% \pm 6.8	-	-	
75-84 (n=108)	100%	79.2% \pm 4.1	62.1% \pm 5.1	54.8% \pm 5.4	48.1% \pm 5.7	48.1% \pm 5.7	45.4% \pm 6.0	45.4% \pm 6.0	45.4% \pm 6.0	-	-	
85+ (n=31)	100%	59.6% \pm 9.0	49.2% \pm 10.0	36.9% \pm 10.7	36.9% \pm 10.7	36.9% \pm 10.7	36.9% \pm 10.7	-	-	-	-	
By residence:												
Adel - mid/lower SES (n=151)	100%	84.4% \pm 3.0	76.6% \pm 3.6	70.9% \pm 4.0	65.2% \pm 4.4	62.6% \pm 4.6	58.5% \pm 5.1	58.5% \pm 5.1	58.5% \pm 5.1	58.5% \pm 5.1	-	p=0.083
Adel - mid/upper SES (n=89)	100%	78.4% \pm 4.5	63.7% \pm 5.4	55.4% \pm 5.9	51.3% \pm 6.1	51.3% \pm 6.1	51.3% \pm 6.1	51.3% \pm 6.1	51.3% \pm 6.1	-	-	
Adelaide (n=240)	100%	82.3% \pm 2.5	72.0% \pm 3.1	65.3% \pm 3.4	60.2% \pm 3.6	58.5% \pm 3.7	55.7% \pm 4.0	55.7% \pm 4.0	55.7% \pm 4.0	55.7% \pm 4.0	-	p=0.035
Country SA (n=54)	100%	78.8% \pm 5.7	58.0% \pm 7.0	50.2% \pm 7.4	50.2% \pm 7.4	46.4% \pm 7.8	41.7% \pm 8.3	35.8% \pm 9.0	35.8% \pm 9.0	-	-	
By TNM stage:												
I (n=128)	100%	92.8% \pm 2.3	87.6% \pm 3.0	83.5% \pm 3.5	78.5% \pm 4.1	74.2% \pm 4.6	67.5% \pm 5.6	67.5% \pm 5.6	67.5% \pm 5.6	67.5% \pm 5.6	-	p<0.001
II (n=58)	100%	83.8% \pm 5.0	71.0% \pm 6.4	64.9% \pm 7.2	61.5% \pm 7.6	61.5% \pm 7.6	61.5% \pm 7.6	61.5% \pm 7.6	61.5% \pm 7.6	-	-	
III (n=47)	100%	74.7% \pm 6.6	53.7% \pm 8.3	41.3% \pm 9.0	37.2% \pm 9.0	37.2% \pm 9.0	37.2% \pm 9.0	37.2% \pm 9.0	-	-	-	
IV (n=44)	100%	53.6% \pm 7.6	29.0% \pm 7.1	18.5% \pm 6.2	18.5% \pm 6.2	18.5% \pm 6.2	18.5% \pm 6.2	18.5% \pm 7.2	9.2% \pm 7.2	-	-	
UK (n=17)	(100%)	(82.4%) (\pm 9.2)	(68.6%) (\pm 11.7)	(58.8%) (\pm 13.6)	(44.1%) (\pm 16.3)	(44.1%) (\pm 16.3)	(-)	(-)	(-)	(-)	-	
By differentiation:												
Well (n=18)	100%	88.9% \pm 7.4	83.0% \pm 9.0	83.0% \pm 9.0	74.7% \pm 11.3	65.3% \pm 13.2	65.3% \pm 13.2	65.3% \pm 13.2	65.3% \pm 13.2	-	-	p<0.001
Moderate (n=102)	100%	89.7% \pm 3.1	80.5% \pm 4.1	75.1% \pm 4.7	73.5% \pm 4.8	71.3% \pm 5.2	68.4% \pm 5.7	68.4% \pm 5.7	68.4% \pm 5.7	51.3% \pm 15.4	-	
Poor/undiff. (n=150)	100%	76.9% \pm 3.5	60.1% \pm 4.3	54.8% \pm 4.5	48.8% \pm 4.8	47.5% \pm 4.8	45.1% \pm 5.1	42.7% \pm 5.4	42.7% \pm 5.4	-	-	
UK (n=24)	(100%)	(70.8%) (\pm 9.3)	(66.4%) (\pm 9.7)	(40.9%) (\pm 10.8)	(40.9%) (\pm 10.8)	(40.9%) (\pm 10.8)	(-)	(-)	(-)	(-)	-	
By histological type:												
Transit. cell carc. (n=163)	100%	79.6% \pm 3.2	64.0% \pm 4.0	57.0% \pm 4.2	53.6% \pm 4.4	52.4% \pm 4.5	50.8% \pm 4.6	50.8% \pm 4.6	50.8% \pm 4.6	50.8% \pm 4.6	-	p=0.017
Papillary tr. cell (n=121)	100%	87.0% \pm 3.1	78.2% \pm 4.0	72.0% \pm 4.5	66.3% \pm 5.0	63.0% \pm 5.3	62.9% \pm 5.3	59.8% \pm 5.9	59.8% \pm 5.9	-	-	
Other (n=6)	100%	60.0% \pm 21.9	-	-	-	-	-	-	-	-	-	
UK (n=4)	(100%)	(25.0%) (\pm 21.7)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	-	

* P values derived from Cox proportional hazards regression (data in brackets excluded).

Figure 71: Case survivals from invasive bladder cancers circa 1990-97 by TNM stage; SA hospital-based registries*



*Date of censoring: December 31st, 1998.

Multiple proportional hazards regression confirmed that the key predictors of case fatality were female sex, older age at diagnosis, advanced TNM stage, a poorly differentiated lesion, and a transitional cell as compared with a papillary transitional cell carcinoma. After adjusting for these characteristics, diagnostic year was not predictive during this limited time period ($p=0.534$). Relative risks of case fatality varied as follows:

Predictors	Relative risk (95% confidence limits)
Age at diagnosis (yrs.):	
Under 75 (reference)	1.00
75-84	1.88 (1.24, 2.85)
85+	3.14 (1.69, 5.82)
Sex:	
Male (reference)	1.00
Female	1.62 (1.06, 2.46)
TNM stage:	
I (reference)	1.00
II	1.86 (1.01, 3.42)
III	3.92 (2.12, 7.24)
IV	8.62 (4.79, 15.51)
Differentiation:	
Well-moderate (reference)	1.00
Poor/undiff.	9.24 (5.29, 16.13)
Histological type:	
Papillary transitional cell etc. (reference)	1.00
Transitional cell carcinoma	1.76 (1.09, 2.84)

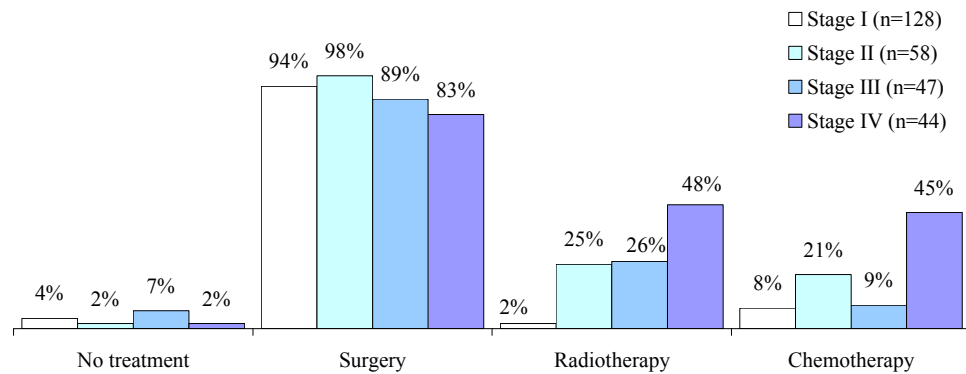
Overall, 93% of bladder cases had surgery as a primary treatment, 17% had radiotherapy, and 16% had chemotherapy, whereas 4% had none of these primary treatments. USA hospital data for the period circa 1990 indicated a similar pattern of care, although fewer cases reportedly received radiotherapy.³² Specifically, 92% of USA cases had surgery, 9% had radiotherapy, and 15% had chemotherapy, whereas about 5% received none of these primary treatments.

It is evident from Table 70 that the main predictors of primary treatment mode in the South Australian series were:

- For none of these treatments being provided: no predictors were suggested.
- For surgery: an earlier TNM stage.
- For radiotherapy: an advanced stage; a poorer differentiated lesion; and histological type, with papillary transitional cell carcinomas receiving this therapy less frequently.
- For chemotherapy: younger age at diagnosis; an advanced stage; a poorer differentiated lesion; and histological type, with transitional cell carcinomas tending to receive this therapy more frequently than papillary transitional cell carcinomas or other lesions.

Stage-specific trends in treatment are shown in Figure 72.

Figure 72: % invasive bladder cancers by TNM stage and treatment mode as part of the primary course of care; SA hospital-based registries, circa 1990-97



The proportions of surgical cases receiving specific types of surgery as part of their primary course of care varied as follows: partial cystectomy - 84%; complete cystectomy - 13%; fulguration - 11%; nodal dissection - 8%; and other procedures - 25%. Partial cystectomies comprised a higher proportion of all cystectomies for the earlier than later TNM stages, with the percentage reducing from 92% for stage I and 94% for stage II to 68% for stage III and 75% for stage IV. By comparison, nodal dissections were a less frequent component of surgery for earlier-stage than advanced surgical cases ($p < 0.001$).

The most common chemotherapy agent used for bladder cases was MVAC, followed by MVC, which commonly were applied to metastatic disease. On other occasions, intravesical BCG and other agents were used.

Table 70: Percentage of invasive bladder cancer cases by treatment mode as part of the primary course of care; SA hospital-based registries, circa 1990-97*

Category	No treatment	% receiving any				% receiving combination and single therapies						
		surg. (s)	radio. (r)	chemo. (c)	horm. (h)	srch	sr	sch	rch	s	r	ch
All (n=294)	3.9%	92.6%	17.4%	16.0%	0.4%	4.3%	10.3%	10.3%	1.1%	67.7%	1.8%	0.7%
By sex:												
Males (n=226)	4.2%	91.7%	18.1%	16.7%	0.5%	5.6%	9.3%	9.3%	1.4%	67.6%	1.9%	0.9%
Females n=68)	3.0%	95.5%	15.2%	13.6%	0.0%	0.0%	13.6%	13.6%	0.0%	68.2%	1.5%	0.0%
P value	1.000	0.425	0.586	0.556	1.000	0.075	0.306	0.306	1.000	0.929	1.000	1.000
By age (yrs.):												
Under 55 (n=10)	0.0%	90.0%	30.0%	40.0%	0.0%	10.0%	10.0%	20.0%	10.0%	50.0%	0.0%	0.0%
55-64 (n=48)	4.3%	93.6%	14.9%	21.3%	0.0%	8.5%	4.3%	10.6%	2.1%	70.2%	0.0%	0.0%
65-74 (n=97)	6.5%	90.3%	16.1%	18.3%	1.1%	4.3%	9.7%	14.0%	0.0%	62.4%	2.2%	1.1%
75-84 (n=108)	1.9%	94.2%	20.4%	10.7%	0.0%	1.9%	15.5%	7.8%	0.0%	68.9%	2.9%	1.0%
85+ (n=31)	3.4%	93.1%	10.3%	10.3%	0.0%	3.4%	3.4%	3.4%	3.4%	82.8%	0.0%	0.0%
P value	0.447	0.600	0.883	0.011	0.629	0.076	0.306	0.084	0.383	0.128	0.537	0.834
By residence:												
Adel - mid/lower SES (n=151)	5.4%	93.2%	14.3%	12.9%	0.7%	2.0%	10.9%	10.9%	0.7%	69.4%	0.7%	0.0%
Adel - mid/upper SES (n=89)	3.6%	91.6%	24.1%	19.3%	0.0%	7.2%	13.3%	9.6%	1.2%	61.4%	2.4%	1.2%
P value	0.750	0.650	0.062	0.198	1.000	0.074	0.592	0.767	1.000	0.220	0.296	0.361
Adelaide (n=240)	4.8%	92.6%	17.8%	15.2%	0.4%	3.9%	11.7%	10.4%	0.9%	66.5%	1.3%	0.4%
Country SA (n=54)	0.0%	92.3%	15.4%	19.2%	0.0%	5.8%	3.8%	9.6%	1.9%	73.1%	3.8%	1.9%
P value	0.226	1.000	0.675	0.614	1.000	0.468	0.091	0.861	0.459	0.361	0.230	0.335
By TNM stage:												
I (n=128)	4.1%	94.3%	2.4%	8.1%	0.8%	0.0%	2.4%	7.3%	0.0%	84.6%	0.0%	1.6%
II (n=58)	1.8%	98.2%	24.6%	21.1%	0.0%	5.3%	19.3%	15.8%	0.0%	57.9%	0.0%	0.0%
III (n=47)	6.5%	89.1%	26.1%	8.7%	0.0%	2.2%	19.6%	4.3%	2.2%	63.0%	2.2%	0.0%
IV (n=44)	2.4%	83.3%	47.6%	45.2%	0.0%	19.0%	14.3%	21.4%	4.8%	28.6%	9.5%	0.0%
UK (n=17)	(7.1%)	(92.9%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(92.9%)	(0.0%)	(0.0%)
P value	0.912	0.039	<0.001	<0.001	0.319	<0.001	<0.001	0.075	0.019	<0.001	0.001	0.158
By differentiation:												
Well (n=18)	11.1%	88.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	88.9%	0.0%	0.0%
Moderate (n=102)	2.0%	98.0%	10.2%	13.3%	0.0%	2.0%	8.2%	11.2%	0.0%	76.5%	0.0%	0.0%
Poor/undiff. (n=150)	2.7%	91.2%	23.1%	20.4%	0.7%	6.1%	12.2%	12.2%	1.4%	60.5%	3.4%	1.4%
UK (n=24)	(15.8%)	(78.9%)	(26.3%)	(10.5%)	(0.0%)	(5.3%)	(15.8%)	(0.0%)	(5.3%)	(57.9%)	(0.0%)	(0.0%)
P value	0.446	0.154	0.001	0.025	0.385	0.070	0.103	0.325	0.218	0.001	0.050	0.218
By histological type:												
Transit. cell carc. (n=163)	3.3%	92.2%	25.5%	21.6%	0.0%	7.2%	14.4%	11.8%	2.0%	58.8%	2.0%	0.7%
Papillary tr. cell (n=121)	3.3%	95.0%	5.8%	10.0%	0.8%	0.8%	4.2%	9.2%	0.0%	80.8%	0.8%	0.8%
Other (n=6)	0.0%	83.3%	50.0%	0.0%	0.0%	0.0%	33.3%	0.0%	0.0%	50.0%	16.7%	0.0%
UK (n=4)	(66.7%)	(33.3%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	33.3%	(0.0%)	(0.0%)
P value	0.902	0.408	<0.001	0.020	0.514	0.032	0.004	0.549	0.287	<0.001	0.017	0.963

* "ch" refers to chemotherapy and/or hormone therapy. Treatment details complete for 96% of cases. Derivation of P values (see text) (data in brackets excluded).

Kidney, pelvis and other unspecified urinary organs (ICD-02: C64-C66, C68)

1. Population-based data

Case survivals for this site varied from 52% at five years from diagnosis to 44% at 10 years and 42% at 15 years. Males and females had similar outcomes (Table 71). Age at diagnosis was predictive of outcome, with the five-year survival reducing from 65% for cases under 55 years to 36% for those aged 75 years or more (Figure 73). Case survivals were higher for the more recent diagnostic periods, such that the five-year figure increased from 44% in 1977-83 to 59% for 1991-98 (Figure 74).

Figure 73: Case survivals from cancers of the kidney, pelvis etc. in 1977-98 by age at diagnosis in South Australia*

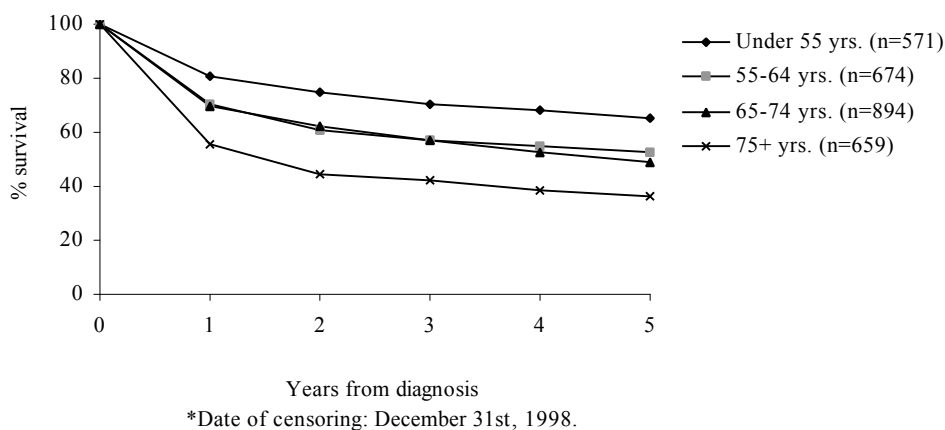
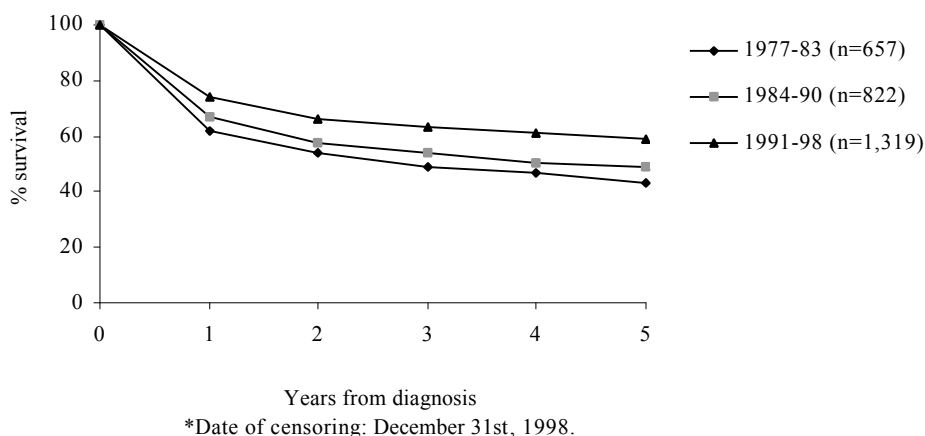


Figure 74: Case survivals from cancers of the kidney, pelvis etc. by diagnostic period in South Australia*



South Australian survivals from these cancers were similar to those reported for other Australian states,^{27,30,47} the USA (SEER data) and Europe.^{28,29}

Table 71: Case survivals (\pm SE) by period from diagnosis, sex, age at diagnosis, and diagnostic year; SA Cancer Registry, 1977-98*

Cancer site: kidney, pelvis etc.

Category		Period from diagnosis (yrs.)															P value**
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
All cases (n=2,798)	100%	69.0% \pm 0.9	60.7% \pm 1.0	57.1% \pm 1.1	54.0% \pm 1.1	51.7% \pm 1.2	49.0% \pm 1.3	47.3% \pm 1.3	46.6% \pm 1.4	44.5% \pm 1.5	44.3% \pm 1.5	43.7% \pm 1.6	43.7% \pm 1.7	43.1% \pm 1.8	42.3% \pm 2.0	42.3% \pm 2.0	-
By sex:																	
Males (n=1,751)	100%	69.7% \pm 1.2	61.4% \pm 1.3	58.0% \pm 1.4	54.8% \pm 1.5	52.5% \pm 1.6	49.6% \pm 1.6	47.1% \pm 1.7	46.5% \pm 1.8	44.5% \pm 1.9	43.8% \pm 2.0	42.7% \pm 2.2	42.7% \pm 2.3	42.0% \pm 2.4	41.0% \pm 2.6	41.0% \pm 2.8	p=0.530
Females (n=1,047)	100%	67.9% \pm 1.5	59.6% \pm 1.7	55.7% \pm 1.7	52.8% \pm 1.8	50.4% \pm 1.9	48.2% \pm 2.0	47.7% \pm 2.0	46.6% \pm 2.1	44.6% \pm 2.3	44.6% \pm 2.4	44.6% \pm 2.5	44.6% \pm 2.6	44.6% \pm 2.8	44.2% \pm 3.0	44.2% \pm 3.2	
By age (yrs.):																	
Under 55 (n=571)	100%	81.1% \pm 1.7	74.5% \pm 1.0	70.4% \pm 2.0	68.3% \pm 2.1	65.4% \pm 2.2	63.4% \pm 2.3	62.2% \pm 2.3	62.1% \pm 2.4	60.5% \pm 2.5	60.5% \pm 2.5	59.5% \pm 2.6	59.5% \pm 2.7	57.2% \pm 2.8	55.7% \pm 2.9	55.7% \pm 3.0	p<0.001
55-64 (n=674)	100%	70.2% \pm 1.8	61.0% \pm 2.0	57.0% \pm 2.0	54.5% \pm 2.1	52.3% \pm 2.2	48.8% \pm 2.2	46.3% \pm 2.3	44.6% \pm 2.4	41.7% \pm 2.5	41.3% \pm 2.5	39.3% \pm 2.6	39.3% \pm 2.7	36.3% \pm 2.9	34.2% \pm 3.1	34.2% \pm 3.4	
65-74 (n=894)	100%	69.7% \pm 1.6	61.9% \pm 1.8	57.3% \pm 1.9	52.3% \pm 2.0	49.2% \pm 2.1	46.6% \pm 2.3	43.8% \pm 2.4	42.1% \pm 2.6	39.3% \pm 2.8	37.1% \pm 2.9	-	-	-	-	-	
75+ (n=659)	100%	55.4% \pm 2.1	44.7% \pm 2.3	42.1% \pm 2.5	38.8% \pm 2.7	36.4% \pm 3.0	-	-	-	-	-	-	-	-	-	-	
By diagnostic year:																	
1977 - 83 (n=657)	100%	62.1% \pm 2.0	53.9% \pm 2.1	49.2% \pm 2.1	46.5% \pm 2.2	43.5% \pm 2.2	41.9% \pm 2.3	40.9% \pm 2.3	40.1% \pm 2.4	37.8% \pm 2.4	37.8% \pm 2.5	37.0% \pm 2.5	37.0% \pm 2.6	36.5% \pm 2.7	36.1% \pm 2.7	36.1% \pm 2.8	p<0.001
1984 - 90 (n=822)	100%	66.6% \pm 1.7	57.7% \pm 1.8	54.3% \pm 1.9	50.7% \pm 1.9	48.8% \pm 2.0	45.9% \pm 2.1	43.6% \pm 2.1	43.0% \pm 2.2	41.6% \pm 2.2	41.2% \pm 2.3	-	-	-	-	-	
1991 - 98 (n=1,319)	100%	74.3% \pm 1.3	66.5% \pm 1.5	63.6% \pm 1.6	61.1% \pm 1.8	59.2% \pm 2.0	-	-	-	-	-	-	-	-	-	-	
By age and year:																	
Under 55 yrs.																	
1977 - 83 (n=159)	100%	79.5% \pm 3.2	72.2% \pm 3.6	66.8% \pm 3.8	62.6% \pm 3.9	58.4% \pm 4.0	55.5% \pm 4.1	54.5% \pm 4.1	54.5% \pm 4.1	53.2% \pm 4.1	53.2% \pm 4.2	52.6% \pm 4.2	52.6% \pm 4.2	51.5% \pm 4.3	50.6% \pm 4.3	50.6% \pm 4.3	p<0.001
1984 - 90 (n=153)	100%	71.4% \pm 3.7	65.7% \pm 3.9	63.3% \pm 3.9	62.2% \pm 4.0	60.4% \pm 4.0	59.3% \pm 4.1	57.6% \pm 4.1	57.2% \pm 4.1	56.0% \pm 4.2	56.0% \pm 4.2	-	-	-	-	-	
1991 - 98 (n=259)	100%	88.3% \pm 2.1	81.6% \pm 2.6	77.5% \pm 3.0	76.9% \pm 3.0	74.9% \pm 3.3	-	-	-	-	-	-	-	-	-	-	
55 - 64 yrs.																	
1977 - 83 (n=167)	100%	58.3% \pm 3.9	53.0% \pm 4.0	47.5% \pm 4.0	45.8% \pm 4.1	44.7% \pm 4.1	41.6% \pm 4.1	39.7% \pm 4.2	38.6% \pm 4.2	35.3% \pm 4.2	35.3% \pm 4.2	32.8% \pm 4.2	32.8% \pm 4.3	27.7% \pm 4.2	26.3% \pm 4.2	26.3% \pm 4.2	p=0.003
1984 - 90 (n=239)	100%	69.4% \pm 3.0	59.6% \pm 3.3	56.9% \pm 3.3	53.3% \pm 3.4	50.1% \pm 3.5	47.3% \pm 3.5	44.5% \pm 3.5	42.5% \pm 3.5	40.3% \pm 3.6	40.1% \pm 3.6	-	-	-	-	-	
1991 - 98 (n=268)	100%	78.6% \pm 2.6	67.3% \pm 3.1	63.1% \pm 3.3	61.7% \pm 3.4	60.5% \pm 3.6	-	-	-	-	-	-	-	-	-	-	
65 - 74 yrs.																	
1977 - 83 (n=198)	100%	59.5% \pm 3.6	51.4% \pm 3.8	44.4% \pm 3.9	40.4% \pm 3.9	37.9% \pm 4.0	37.9% \pm 4.1	35.1% \pm 4.2	32.8% \pm 4.2	28.8% \pm 4.2	28.8% \pm 4.3	-	-	-	-	-	p<0.001
1984 - 90 (n=257)	100%	67.3% \pm 3.1	58.3% \pm 3.3	53.4% \pm 3.4	48.3% \pm 3.5	45.2% \pm 3.6	40.9% \pm 3.6	38.8% \pm 3.7	37.6% \pm 3.8	36.6% \pm 3.9	34.4% \pm 4.1	-	-	-	-	-	
1991 - 98 (n=439)	100%	76.0% \pm 2.2	69.3% \pm 2.5	66.6% \pm 2.7	61.3% \pm 3.1	58.1% \pm 3.4	-	-	-	-	-	-	-	-	-	-	
75+ yrs.																	
1977 - 83 (n=133)	100%	48.5% \pm 4.7	33.4% \pm 4.7	32.9% \pm 5.0	31.0% \pm 5.2	23.5% \pm 5.0	-	-	-	-	-	-	-	-	-	-	p=0.062
1984 - 90 (n=173)	100%	56.6% \pm 4.1	45.4% \pm 4.4	40.8% \pm 4.6	35.9% \pm 4.8	35.9% \pm 5.2	-	-	-	-	-	-	-	-	-	-	
1991 - 98 (n=353)	100%	57.6% \pm 2.9	49.2% \pm 3.3	46.8% \pm 3.6	44.5% \pm 4.1	42.5% \pm 4.8	-	-	-	-	-	-	-	-	-	-	

* Survival from the primary cancer (see text). ** P value derived from Charles Brown test, or equivalent for multiple samples (see text).

Multiple proportional hazards regression analysis showed a variation in relative risks of case fatality as follows:

<i>Predictors</i>	<i>Relative risk (95% confidence limits)</i>
Sex:	
Male (reference)	1.00
Female	1.04 (0.92, 1.17)
Age at diagnosis (yrs.):	
Under 55 (reference)	1.00
55-64	1.62 (1.34, 1.97)
65-74	1.67 (1.39, 2.02)
75+	2.66 (2.19, 3.24)
Sub-site:	
Kidney (reference)	1.00
Pelvis	0.65 (0.37, 1.13)
Ureter	0.45 (0.25, 0.81)
Other (urethra, etc.)	0.38 (0.19, 0.74)
Histological type:	
Adenocarcinoma (reference)	1.00
Transitional cell carcinoma	2.13 (1.24, 3.65)
Papillary transitional cell carcinoma	0.62 (0.34, 1.14)
Epithelial neoplasm (nos)	7.58 (4.56, 12.58)
Squamous cell carcinoma	4.03 (1.76, 9.24)
Wilm's tumour	0.72 (0.43, 1.23)
Other	1.33 (0.55, 3.21)
Diagnostic period:	
1977-83 (reference)	1.00
1984-90	0.85 (0.73, 0.99)
1991-98	0.65 (0.56, 0.76)

The reduction in case fatality for the more recent diagnostic periods has been attributed to earlier diagnosis, due in part to advances in ultrasonography and computer tomography. Renal cancers require surgical excision in most instances, there being little response to radiotherapy and chemotherapy.²³ More recently, research has been directed at immunotherapies in a bid for greater efficacy.⁶⁰ It is possible that much of the apparent gain in survival in South Australia, and elsewhere,^{28,30,37} is due to artificial lead-time and related effects. For 189 cases under 15 years of age at diagnosis (all Wilm's tumours), the five-year survival increased from 57% for 1977-83 to 87% for the 1984-98 diagnostic period ($p=0.051$).

2. Hospital-based data

Contributed by:

- the Urology Department, Royal Adelaide Hospital.
- the Urology Unit, Department of Surgery, Flinders Medical Centre.

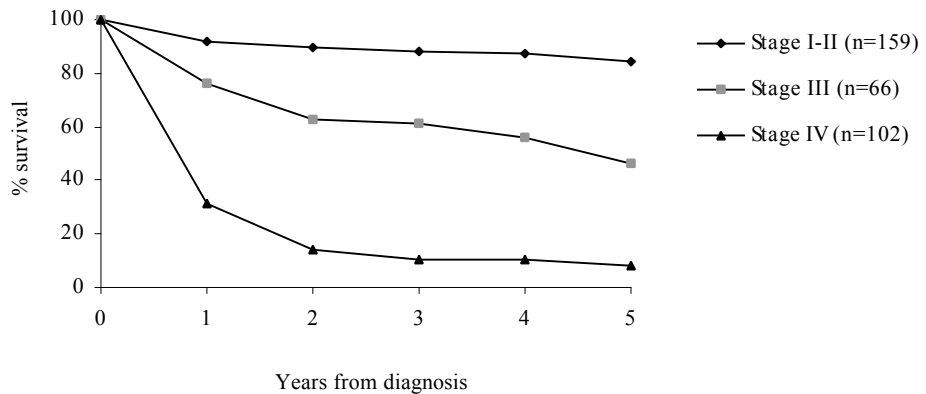
There were 333 cases recorded by the hospital registries for the diagnostic period circa 1990-97. Their five-year survival of 54% was similar to the 52% applying for all cases of cancer of the kidney and related organs in the State in 1977-98. Lower survivals related to: older age at diagnosis; a more advanced TNM stage; and a poorer tumour differentiation (Table 72) (Figure 75).

Table 72: Case survivals (\pm SE) from cancers of the kidney, pelvis etc.; SA hospital-based registries, circa 1990-97*

Category		Period from diagnosis (yrs.)										P value
		1	2	3	4	5	6	7	8	9	10	
All (n=333)	100%	70.5% \pm 2.6	61.6% \pm 2.8	59.6% \pm 2.8	58.1% \pm 2.9	54.1% \pm 3.1	51.7% \pm 3.4	50.2% \pm 3.6	50.2% \pm 3.6	18.8% \pm 14.5	-	-
By sex:												
Males (n=198)	100%	74.2% \pm 3.2	65.0% \pm 3.5	62.3% \pm 3.6	61.4% \pm 3.7	56.5% \pm 4.2	54.2% \pm 4.6	54.2% \pm 4.6	54.2% \pm 4.6	-	-	p=0.108
Females (n=135)	100%	65.1% \pm 4.2	56.6% \pm 4.4	55.7% \pm 4.5	53.3% \pm 4.6	50.5% \pm 4.8	48.0% \pm 5.1	45.2% \pm 5.6	45.2% \pm 5.6	16.9% \pm 13.1	-	
By age (yrs.):												
Under 55 (n=63)	100%	84.0% \pm 4.6	69.9% \pm 6.0	69.9% \pm 6.0	67.7% \pm 6.2	67.7% \pm 6.2	67.7% \pm 6.2	67.7% \pm 6.2	67.7% \pm 6.2	-	-	p=0.002
55-64 (n=67)	100%	71.3% \pm 5.6	64.8% \pm 5.9	60.9% \pm 6.2	60.9% \pm 6.2	57.1% \pm 6.9	51.9% \pm 8.0	51.9% \pm 8.0	51.9% \pm 8.0	-	-	
65-74 (n=109)	100%	74.2% \pm 4.3	66.1% \pm 4.7	63.6% \pm 4.8	62.0% \pm 5.0	56.9% \pm 5.4	56.9% \pm 5.4	51.7% \pm 6.9	51.7% \pm 6.9	51.7% \pm 6.9	-	
75+ (n=94)	100%	55.1% \pm 5.5	47.1% \pm 5.6	45.6% \pm 5.6	43.7% \pm 5.7	37.1% \pm 6.5	31.8% \pm 7.4	31.8% \pm 7.4	31.8% \pm 7.4	-	-	
By residence:												
Adel - mid/lower SES (n=154)	100%	68.6% \pm 3.8	61.5% \pm 4.0	59.8% \pm 4.1	58.6% \pm 4.2	53.0% \pm 4.6	50.7% \pm 5.0	47.7% \pm 5.5	47.7% \pm 5.5	-	-	p=0.374
Adel - mid/upper SES (n=100)	100%	74.3% \pm 4.5	68.3% \pm 4.9	64.3% \pm 5.1	60.9% \pm 5.4	58.6% \pm 5.6	58.6% \pm 5.6	58.6% \pm 5.6	58.6% \pm 5.6	-	-	
Adelaide (n=254)	100%	70.8% \pm 2.9	64.1% \pm 3.1	61.5% \pm 3.2	59.5% \pm 3.3	55.0% \pm 3.6	53.4% \pm 3.9	51.4% \pm 4.2	51.4% \pm 4.2	-	-	p=0.498
Country SA (n=79)	100%	69.6% \pm 5.3	53.6% \pm 5.9	53.6% \pm 5.9	53.6% \pm 5.9	51.0% \pm 6.1	46.8% \pm 6.9	46.8% \pm 6.9	46.8% \pm 6.9	46.8% \pm 6.9	-	
By TNM stage:												
I (n=36)	100%	97.1% \pm 2.9	91.1% \pm 4.9	87.3% \pm 6.0	87.3% \pm 6.0	87.3% \pm 6.0	87.3% \pm 6.0	87.3% \pm 6.0	87.3% \pm 6.0	87.3% \pm 6.0	-	p<0.001
II (n=123)	100%	90.6% \pm 2.7	88.7% \pm 3.0	88.7% \pm 3.0	87.4% \pm 3.2	83.5% \pm 4.1	77.0% \pm 5.8	77.0% \pm 5.8	77.0% \pm 5.8	-	-	
III (n=66)	100%	76.2% \pm 5.4	62.8% \pm 6.2	61.0% \pm 6.3	55.8% \pm 6.7	46.5% \pm 7.4	46.5% \pm 7.4	46.5% \pm 7.4	46.5% \pm 7.4	-	-	
IV (n=102)	100%	31.4% \pm 4.8	14.5% \pm 3.8	10.4% \pm 3.4	10.4% \pm 3.4	8.3% \pm 3.3	8.3% \pm 3.3	5.5% \pm 3.1	5.5% \pm 3.1	-	-	
UK (n=6)	(100%)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	
By differentiation:												
Well (n=29)	100%	96.6% \pm 3.4	89.1% \pm 5.9	89.1% \pm 5.9	89.1% \pm 5.9	84.2% \pm 7.4	84.2% \pm 7.4	84.2% \pm 7.4	84.2% \pm 7.4	-	-	p<0.001
Moderate (n=103)	100%	88.5% \pm 3.3	85.1% \pm 3.7	85.1% \pm 3.7	81.5% \pm 4.3	76.5% \pm 5.3	71.4% \pm 7.0	71.4% \pm 7.4	71.4% \pm 7.4	71.4% \pm 7.4	-	
Poor/undiff. (n=66)	100%	51.1% \pm 6.3	35.0% \pm 6.2	33.0% \pm 6.2	33.0% \pm 6.2	33.0% \pm 6.2	33.0% \pm 6.2	33.0% \pm 6.2	33.0% \pm 6.2	-	-	
UK (n=135)	(100%)	(60.8%) (\pm 4.3)	(50.8%) (\pm 4.5)	(46.9%) (\pm 4.5)	(45.6%) (\pm 4.6)	(41.6%) (\pm 4.7)	(39.4%) (\pm 5.0)	(37.1%) (\pm 5.2)	(37.1%) (\pm 5.2)	(-)	-	
By histological type:												
Adenocarcinoma (n=269)	100%	72.8% \pm 2.8	64.5% \pm 3.0	62.1% \pm 3.1	60.3% \pm 3.2	55.3% \pm 3.5	52.1% \pm 4.0	50.2% \pm 4.3	50.2% \pm 4.3	-	-	p=0.987
Transit. cell carc. (n=52)	100%	67.6% \pm 6.9	55.4% \pm 7.5	55.4% \pm 7.5	55.4% \pm 7.5	55.4% \pm 7.5	55.4% \pm 7.5	55.4% \pm 7.5	55.4% \pm 7.5	55.4% \pm 7.5	-	
Other (n=6)	100%	-	-	-	-	-	-	-	-	-	-	
UK (n=6)	(100%)	(50.0%) (\pm 20.4)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	

* P values derived from Cox proportional hazards regression (data in brackets excluded).

Figure 75: Case survivals from kidney cancers circa 1990-97 by TNM stage: SA hospital-based registries*



*Date of censoring: December 31st, 1998.

The stage-specific survivals compared favourably with the international experience.³¹

Multivariate proportional hazards regression indicated that the relative risk of case fatality varied as follows:

Predictors	Relative risk (95% confidence limits)
Age at diagnosis (yrs.):	
Under 75 (reference)	1.00
75+	1.75 (1.23, 2.49)
TNM stage:	
I (reference)	1.00
II	1.29 (0.43, 3.84)
III	4.21 (1.47, 12.08)
IV	14.31 (5.01, 40.86)
Differentiation:	
Well-moderate (reference)	1.00
Poor/undiff.	1.88 (1.11, 3.18)

Diagnostic year was not predictive of outcome during this limited time period (ie, 1990-97) (p=0.704), after adjusting for age, stage and differentiation.

Overall, 82% of this case series had surgery as a primary treatment, 7% had radiotherapy, 3% had chemotherapy, 3% had hormone therapy, and 11% had none of these primary treatments. Comparative USA hospital data for the period circa 1990 indicated that 80% of corresponding cases had surgery, 13% had radiotherapy, and 11% had systemic therapy, whereas 11% appeared not to have received any of these primary treatments.³²

Table 73 indicates that key predictors of primary treatment mode in the present hospital series were:

- For none of these treatments being provided: female sex; old age at diagnosis; an advanced TNM stage; and a poorly differentiated tumour.
- For surgery: not an advanced stage; and a better differentiated tumour.
- For radiotherapy: an advanced stage; a poorly differentiated lesion; and an Adelaide as opposed to a country place of residence.
- For chemotherapy: male sex; an advanced stage; a poorly differentiated tumour; and a histological type other than an adenocarcinoma.
- For hormone therapy: an advanced stage.

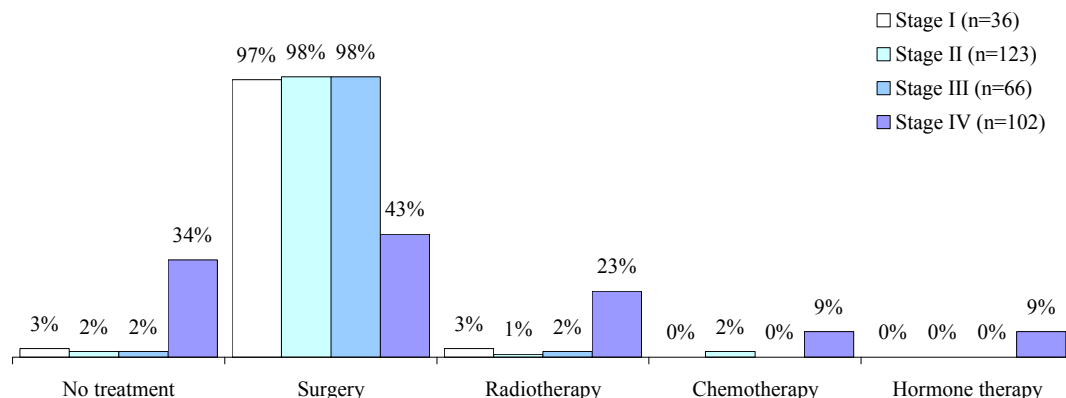
Table 73: Percentage of cases with cancers of the kidney, pelvis etc. by treatment mode as part of the primary course of care; SA hospital-based registries, circa 1990-97*

Category	No treatment	% receiving any				% receiving combination and single therapies						
		surg. (s)	radio. (r)	chemo. (c)	horm. (h)	srch	sr	sch	rch	s	r	ch
All (n=333)	11.2%	82.1%	7.4%	3.2%	2.6%	0.3%	2.2%	2.9%	0.6%	76.6%	4.2%	1.9%
By sex:												
Males (n=198)	8.0%	85.0%	7.0%	4.8%	3.2%	0.0%	2.7%	4.3%	1.1%	78.1%	3.2%	2.7%
Females (n=135)	16.0%	77.6%	8.0%	0.8%	1.6%	0.8%	1.6%	0.8%	0.0%	74.4%	5.6%	0.8%
P value	0.029	0.094	0.728	0.049	0.483	0.401	0.706	0.091	0.518	0.452	0.300	0.408
By age (yrs.):												
Under 55 (n=63)	6.3%	87.3%	6.3%	3.2%	3.2%	0.0%	1.6%	3.2%	1.6%	82.5%	3.2%	1.6%
55-64 (n=67)	9.8%	78.7%	13.1%	6.6%	3.3%	1.6%	3.3%	3.3%	1.6%	70.5%	6.6%	3.3%
65-74 (n=109)	6.9%	86.3%	6.9%	3.9%	2.0%	0.0%	2.0%	3.9%	0.0%	80.4%	4.9%	2.0%
75+ (n=94)	20.9%	75.6%	4.7%	0.0%	2.3%	0.0%	2.3%	1.2%	0.0%	72.1%	2.3%	1.2%
P value	0.008	0.159	0.303	0.118	0.650	0.471	0.949	0.472	0.127	0.358	0.562	0.640
By residence:												
Adel - mid/lower SES (n=154)	11.2%	81.1%	9.8%	2.8%	1.4%	0.0%	2.8%	2.8%	0.7%	75.5%	6.3%	0.7%
Adel - mid/upper SES (n=100)	10.5%	82.1%	8.4%	3.2%	2.1%	0.0%	3.2%	2.1%	1.1%	76.8%	4.2%	2.1%
P value	0.873	0.848	0.721	1.000	1.000	1.000	1.000	1.000	1.000	0.938	0.489	0.565
Adelaide (n=254)	10.9%	81.5%	9.2%	2.9%	1.7%	0.0%	2.9%	2.5%	0.8%	76.1%	5.5%	1.3%
Country SA (n=79)	12.2%	83.8%	1.4%	4.1%	5.4%	1.4%	0.0%	4.1%	0.0%	78.4%	0.0%	4.1%
P value	0.768	0.657	0.023	0.706	0.094	0.237	0.204	0.447	1.000	0.680	0.043	0.148
By TNM stage:												
I (n=36)	2.9%	97.1%	2.9%	0.0%	0.0%	0.0%	2.9%	0.0%	0.0%	94.3%	0.0%	0.0%
II (n=123)	1.7%	97.5%	0.8%	1.7%	0.0%	0.0%	0.0%	1.7%	0.0%	95.8%	0.8%	0.0%
III (n=66)	1.6%	98.4%	1.6%	0.0%	0.0%	0.0%	1.6%	0.0%	0.0%	96.9%	0.0%	0.0%
IV (n=102)	34.1%	43.2%	22.7%	9.1%	9.1%	1.1%	5.7%	8.0%	2.3%	28.4%	13.6%	6.8%
UK (n=6)	(20.0%)	(80.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(80.0%)	(0.0%)	(0.0%)
P value	<0.001	<0.001	<0.001	0.004	<0.001	0.195	0.045	0.009	0.066	<0.001	<0.001	0.001
By differentiation:												
Well (n=29)	0.0%	100.0%	0.0%	3.6%	0.0%	0.0%	0.0%	3.6%	0.0%	96.4%	0.0%	0.0%
Moderate (n=103)	3.0%	96.0%	0.0%	0.0%	1.0%	0.0%	0.0%	0.0%	0.0%	96.0%	0.0%	1.0%
Poor/undiff. (n=66)	8.1%	83.9%	17.7%	12.9%	0.0%	0.0%	11.3%	8.1%	3.2%	64.5%	3.2%	1.6%
UK (n=135)	(22.3%)	(65.3%)	(9.9%)	(0.8%)	(5.8%)	(0.8%)	(0.0%)	(2.5%)	(0.0%)	(62.0%)	(9.1%)	(3.3%)
P value	0.049	0.001	<0.001	0.003	0.733	1.000	<0.001	0.045	0.066	<0.001	0.066	0.499
By histological type:												
Adenocarcinoma (n=269)	11.6%	82.9%	6.4%	0.8%	3.2%	0.4%	2.4%	1.6%	0.0%	78.5%	3.6%	2.0%
Transit. cell carc. (n=52)	7.7%	84.6%	7.7%	13.5%	0.0%	0.0%	1.9%	9.6%	1.9%	73.1%	3.8%	1.9%
Other (n=6)	0.0%	66.7%	33.3%	16.7%	0.0%	0.0%	0.0%	0.0%	16.7%	66.7%	16.7%	0.0%
UK (n=6)	(66.7%)	(0.0%)	(33.3%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(33.3%)	(0.0%)
P value	0.495	0.543	0.039	<0.001	0.387	0.891	0.912	0.007	<0.001	0.572	0.261	0.941

* "ch" refers to chemotherapy and/or hormone therapy.
 Treatment details complete for 94% of cases.
 Derivation of P values (see text) (data in brackets excluded).

Stage-specific trends in treatment mode are displayed in Figure 76.

Figure 76: % kidney cancers by TNM stage and treatment mode as part of the primary course of care; SA hospital-based registries, circa 1990-97



The most common surgical procedure was complete removal of the kidney, which applied to 87% of surgical cases. Seven per cent of surgical cases had a partial removal, 4% had a nodal dissection, and 14% had another surgical procedure. Complete or partial removal of the kidney was more common among the less advanced surgical cases, applying to 100% for TNM stage I, 99% for stage II, 98% for stage III, and 68% for stage IV.

The chemotherapy agents used for these cancers included MVAC, methotrexate, cyclophosphamide and vinblastine. In general, chemotherapy would have applied more to transitional cell cancers of the renal pelvis and related cancers rather than to those sited in the kidney parenchyma. Meanwhile, progesterone and steroids were employed for hormone therapy.

Summarizing comments for the genitourinary organs (ICD-02: C51-C68)

Case survivals from gynaecological cancers were at least as high in South Australia as reported for other industrially developed populations,^{15,28,29} and generally higher than for Europe.²⁹ Recent gains were evident. Hospital-based registry data pointed to gains for most gynaecological sites, after adjusting for diagnostic stage, which raises the spectre of treatment benefits. Older women had higher case fatalities, presumably due to a greater frailty and comorbidity.

Temporal gains in case survivals also were suggested for cancers of the prostate and testis, but hospital-based registry data were not available for a sufficiently long period to test whether this was independent of stage. Nonetheless, treatment advances have been credited with the 71% reduction in age-standardized mortality from testicular cancer in South Australia between 1977-80 and 1997-99, which has occurred despite a 41% increase in incidence.⁴

Meanwhile, gains in case survival from kidney cancers have been attributed to earlier detection, due in part to advances in ultrasonography and computer tomography.^{2,4} Many of these gains are suspected, however, to reflect lead-time and related artificial effects.

Survivals calculated for prostate cases were not as high as recorded for the USA.²⁸ This is thought to be due to more active prostate-specific antigen and allied early-detection initiatives in the USA. The extent to which this reflects differences in numbers of deaths, as opposed to artificial lead-time and related influences, is not known. Meanwhile, survivals from testicular cancer appeared to be higher in South Australia than for Europe,²⁹ and equivalent to USA figures.²⁸

As for many cancers, those sited in the prostate, testis, penis, bladder and kidney were associated with comparatively low survivals among old cases. Again, increased frailty and comorbidity likely would have contributed to this trend. Notably, females had worse outcomes than males from bladder cancer, as observed in other populations.^{28,29,30}

G. Other sites (ICD-02: C69-C75)

Eye (ICD-02: C69)

Case survivals from eye cancers approximated 79% at five years from diagnosis, 69% at 10 years and 66% at 15 years. Sex, diagnostic age, and diagnostic period were not predictive of outcome (Table 74). The five-year survival equated with the corresponding figure for the USA (SEER data).²⁸ Among South Australian cases were 17 children under 15 years of age at diagnosis with retinoblastomas. Their five-year survival was 86%.

Multiple proportional hazards regression analysis of data for all ages suggested that the relative risk of case fatality was lower for the more recent diagnostic periods, after adjusting for sex, age at diagnosis, and histological type, although "statistical significance" was not achieved, as shown:

Table 74: Case survivals (\pm SE) by period from diagnosis, sex, age at diagnosis, and diagnostic year; SA Cancer Registry, 1977-98*

Cancer site: eye

Category		Period from diagnosis (yrs.)															P value**
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
All cases (n=310)	100%	98.6% \pm 1.2	95.5% \pm 1.8	91.8% \pm 2.4	84.9% \pm 2.9	78.9% \pm 3.3	78.9% \pm 3.5	77.3% \pm 3.7	73.1% \pm 4.1	72.7% \pm 4.3	69.4% \pm 4.6	69.4% \pm 4.8	69.4% \pm 5.0	67.0% \pm 5.5	67.0% \pm 5.8	65.5% \pm 6.3	-
By sex:																	
Males (n=180)	100%	99.5% \pm 1.4	95.8% \pm 2.5	90.6% \pm 3.3	86.3% \pm 3.9	80.1% \pm 4.5	80.1% \pm 4.7	80.1% \pm 5.0	76.1% \pm 5.7	76.1% \pm 6.0	75.8% \pm 6.4	75.8% \pm 6.8	75.8% \pm 7.0	75.8% \pm 7.5	75.8% \pm 7.8	75.8% \pm 9.2	p=0.130
Females (n=130)	100%	97.3% \pm 2.0	95.0% \pm 2.8	93.3% \pm 3.3	83.2% \pm 4.4	77.4% \pm 4.9	77.4% \pm 5.2	72.2% \pm 5.5	69.6% \pm 5.9	68.2% \pm 6.2	62.8% \pm 6.6	62.8% \pm 6.8	62.8% \pm 7.0	56.5% \pm 7.6	56.5% \pm 7.9	53.6% \pm 8.3	
By age (yrs.):																	
Under 55 (n=96)	100%	98.1% \pm 1.5	97.1% \pm 1.9	94.8% \pm 2.5	86.2% \pm 3.9	83.7% \pm 4.2	83.7% \pm 4.6	77.8% \pm 5.0	74.3% \pm 5.4	70.3% \pm 5.8	68.2% \pm 6.1	68.2% \pm 6.1	68.2% \pm 6.2	65.9% \pm 6.6	65.9% \pm 6.6	65.9% \pm 6.7	p=0.834
55-64 (n=70)	100%	96.5% \pm 2.6	96.0% \pm 3.0	92.2% \pm 4.0	88.2% \pm 4.9	82.2% \pm 5.7	82.2% \pm 6.0	80.8% \pm 6.3	77.6% \pm 6.8	76.6% \pm 7.2	70.0% \pm 8.0	70.0% \pm 8.4	70.0% \pm 8.6	64.9% \pm 9.3	64.9% \pm 10.0	62.2% \pm 10.3	
65-74 (n=86)	100%	99.1% \pm 2.1	88.3% \pm 4.5	82.0% \pm 5.5	76.7% \pm 6.2	72.8% \pm 6.9	72.8% \pm 7.3	72.8% \pm 7.6	65.6% \pm 8.5	65.6% \pm 8.9	65.6% \pm 9.8	-	-	-	-	-	
75+ (n=58)	100%	100%	100%	100%	91.6% \pm 11.4	78.6% \pm 14.0	-	-	-	-	-	-	-	-	-	-	
By diagnostic year:																	
1977 - 83 (n=75)	100%	96.6% \pm 2.6	93.0% \pm 3.7	89.4% \pm 4.5	82.7% \pm 5.4	74.2% \pm 6.1	74.2% \pm 6.3	71.6% \pm 6.6	67.1% \pm 6.9	65.6% \pm 7.1	62.4% \pm 7.3	62.4% \pm 7.5	62.4% \pm 7.7	58.9% \pm 7.9	58.9% \pm 8.1	56.9% \pm 8.3	p=0.385
1984 - 90 (n=89)	100%	96.7% \pm 2.5	94.5% \pm 3.4	92.2% \pm 4.0	83.5% \pm 5.1	78.1% \pm 5.6	78.1% \pm 5.8	78.1% \pm 6.1	74.1% \pm 6.5	71.7% \pm 6.7	71.7% \pm 7.1	-	-	-	-	-	
1991 - 98 (n=146)	100%	100%	97.6% \pm 2.8	92.6% \pm 4.0	87.6% \pm 4.9	83.7% \pm 5.7	-	-	-	-	-	-	-	-	-	-	
By age and year:																	
Under 55 yrs.																	
1977 - 83 (n=26)	100%	96.5% \pm 3.8	92.8% \pm 5.3	89.2% \pm 6.3	85.5% \pm 7.2	81.9% \pm 7.8	81.9% \pm 7.9	78.5% \pm 8.4	70.9% \pm 9.3	63.2% \pm 9.8	63.2% \pm 9.8	63.2% \pm 9.9	63.2% \pm 9.9	60.3% \pm 10.1	60.3% \pm 10.2	60.3% \pm 10.2	p=0.357
1984 - 90 (n=26)	100%	96.3% \pm 3.8	96.3% \pm 3.8	92.6% \pm 5.2	81.1% \pm 7.8	77.4% \pm 8.3	77.4% \pm 8.8	77.4% \pm 8.8	73.6% \pm 8.8	73.6% \pm 8.8	68.9% \pm 9.6	-	-	-	-	-	
1991 - 98 (n=44)	100%	100%	100%	100%	90.1% \pm 5.9	90.1% \pm 5.9	-	-	-	-	-	-	-	-	-	-	
55 - 64 yrs.																	
1977 - 83 (n=23)	100%	92.3% \pm 5.9	92.3% \pm 6.0	90.2% \pm 7.3	82.3% \pm 9.0	78.9% \pm 9.8	78.9% \pm 9.9	78.9% \pm 10.1	78.9% \pm 10.3	78.9% \pm 10.5	71.4% \pm 11.4	71.4% \pm 12.4	71.4% \pm 12.7	60.6% \pm 13.2	60.6% \pm 13.5	56.8% \pm 14.0	p=0.753
1984 - 90 (n=22)	100%	100%	100%	98.7% \pm 4.6	82.1% \pm 6.4	82.1% \pm 9.5	82.1% \pm 9.6	82.1% \pm 10.4	71.0% \pm 11.4	71.0% \pm 12.0	67.0% \pm 12.2	-	-	-	-	-	
1991 - 98 (n=25)	100%	96.4% \pm 4.5	91.8% \pm 7.0	86.7% \pm 8.9	86.7% \pm 9.1	86.7% \pm 9.2	-	-	-	-	-	-	-	-	-	-	
65 - 74 yrs.																	
1977 - 83 (n=17)	100%	96.7% \pm 5.9	93.3% \pm 8.3	83.5% \pm 11.2	73.1% \pm 13.1	55.1% \pm 14.2	55.1% \pm 14.5	50.2% \pm 15.2	39.2% \pm 14.7	39.2% \pm 15.5	39.2% \pm 16.3	-	-	-	-	-	p=0.200
1984 - 90 (n=28)	100%	99.2% \pm 3.6	90.9% \pm 7.0	86.0% \pm 8.5	77.0% \pm 10.0	77.0% \pm 10.4	77.0% \pm 10.8	77.0% \pm 11.3	77.0% \pm 12.4	77.0% \pm 13.1	77.0% \pm 14.4	-	-	-	-	-	
1991 - 98 (n=41)	100%	100%	83.0% \pm 7.8	77.3% \pm 9.2	77.3% \pm 9.5	77.3% \pm 11.7	-	-	-	-	-	-	-	-	-	-	
75+ yrs.																	
1977 - 83 (n=9)	100%	100%	91.7% \pm 16.3	91.7% \pm 16.3	91.7% \pm 22.4	70.4% \pm 26.2	-	-	-	-	-	-	-	-	-	-	p=0.762
1984 - 90 (n=13)	100%	84.1% \pm 12.8	83.4% \pm 15.4	83.4% \pm 17.1	80.4% \pm 20.6	64.5% \pm 22.6	-	-	-	-	-	-	-	-	-	-	
1991 - 98 (n=36)	100%	100%	100%	100%	92.5% \pm 17.7	89.5% \pm 22.6	-	-	-	-	-	-	-	-	-	-	

* Survival from the primary cancer (see text). ** P value derived from Charles Brown test, or equivalent for multiple samples (see text).

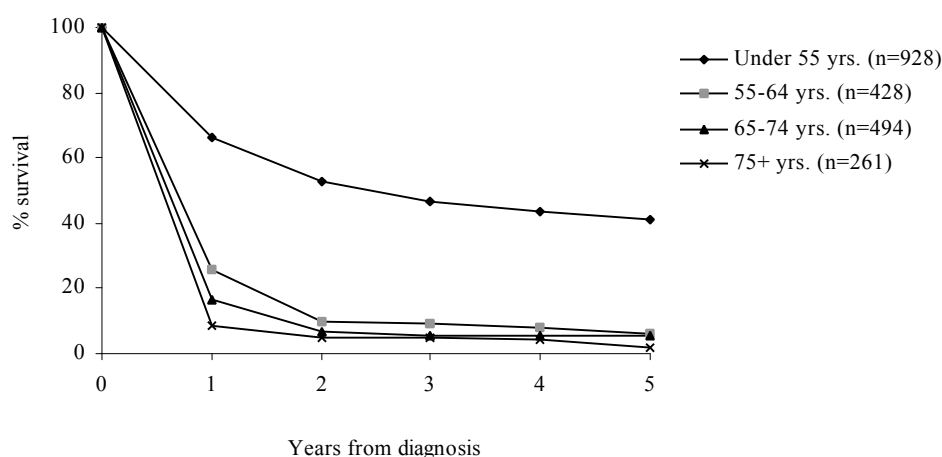
Predictors	Relative risk (95% confidence limits)
Sex:	
Male (reference)	1.00
Female	0.93 (0.56, 1.56)
Age at diagnosis (yrs.):	
Under 55 (reference)	1.00
55-64	0.53 (0.26, 1.07)
65-74	1.10 (0.58, 2.08)
75+	1.08 (0.45, 2.56)
Histological type:	
Melanoma (reference)	1.00
Retinoblastoma	0.30 (0.07, 1.30)
Squamous cell carcinoma	0.09 (0.01, 0.69)
Other	2.85 (0.98, 8.29)
Diagnostic period:	
1977-83 (reference)	1.00
1984-90	0.77 (0.42, 1.41)
1991-98	0.57 (0.27, 1.17)

Brain (ICD-02: C71)

1. Population-based data

Cases with brain cancer had low survivals of 23% at five years, 19% at 10 years, and 18% at 15 years from diagnosis. Males and females had similar outcomes (Table 75). There was a pronounced reduction in survival with increasing age at diagnosis, the five-year figure being 41% for cases under 55 years, but reducing to 2% for cases aged 75 years or more (Figure 77).

Figure 77: Case survivals from cancers of the brain in 1977-98 by age at diagnosis in South Australia*



*Date of censoring: December 31st, 1998.

South Australian survivals were similar to those for other Australian states,^{27,30,37} and Europe,²⁹ but a little lower than for the USA (SEER data).²⁸ Comparisons should be “guarded”, however, due to the potential for a differential inclusion of “non-malignant” lesions.

Table 75: Case survivals (\pm SE) by period from diagnosis, sex, age at diagnosis, and diagnostic year; SA Cancer Registry, 1977-98*

Cancer site: brain

Category		Period from diagnosis (yrs.)															P value **
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
All cases (n=2,111)	100%	39.7% \pm 1.1	28.2% \pm 1.0	25.3% \pm 1.0	23.9% \pm 1.0	22.6% \pm 1.0	22.2% \pm 1.0	21.4% \pm 1.0	20.4% \pm 1.1	20.1% \pm 1.1	19.4% \pm 1.1	19.4% \pm 1.1	19.1% \pm 1.1	18.3% \pm 1.2	18.3% \pm 1.2	18.0% \pm 1.3	-
By sex:																	
Males (n=1,192)	100%	40.1% \pm 1.5	27.3% \pm 1.4	24.0% \pm 1.3	22.6% \pm 1.3	21.7% \pm 1.3	21.1% \pm 1.4	20.8% \pm 1.4	19.8% \pm 1.4	19.5% \pm 1.4	18.5% \pm 1.5	18.5% \pm 1.5	17.9% \pm 1.5	17.3% \pm 1.6	17.3% \pm 1.6	17.2% \pm 1.7	p=0.360
Females (n=919)	100%	39.1% \pm 1.6	29.3% \pm 1.6	26.8% \pm 1.5	25.5% \pm 1.5	23.9% \pm 1.5	23.5% \pm 1.6	22.0% \pm 1.6	21.1% \pm 1.6	20.9% \pm 1.6	20.5% \pm 1.6	20.5% \pm 1.7	19.6% \pm 1.7	19.6% \pm 1.8	19.6% \pm 1.9	18.9% \pm 2.0	
By age (yrs.):																	
Under 55 (n=928)	100%	66.3% \pm 1.6	52.9% \pm 1.7	46.6% \pm 1.7	43.8% \pm 1.7	41.2% \pm 1.7	39.4% \pm 1.7	37.5% \pm 1.7	35.3% \pm 1.7	34.5% \pm 1.7	33.3% \pm 1.8	33.3% \pm 1.8	31.9% \pm 1.8	29.8% \pm 1.9	29.8% \pm 1.9	27.9% \pm 1.9	p<0.001
55-64 (n=428)	100%	25.8% \pm 2.1	9.8% \pm 1.5	9.1% \pm 1.5	7.7% \pm 1.4	6.4% \pm 1.3	6.4% \pm 1.3	5.9% \pm 1.3	5.9% \pm 1.3	5.1% \pm 1.3	4.2% \pm 1.3	4.2% \pm 1.3	2.9% \pm 1.2	2.9% \pm 1.3	2.9% \pm 1.3	2.9% \pm 1.3	
65-74 (n=494)	100%	16.5% \pm 1.7	6.8% \pm 1.2	5.7% \pm 1.2	5.5% \pm 1.2	5.5% \pm 1.2	5.5% \pm 1.3	5.5% \pm 1.3	5.1% \pm 1.3	4.9% \pm 1.4	3.4% \pm 1.3	-	-	-	-	-	
75+ (n=261)	100%	8.7% \pm 1.8	5.0% \pm 1.5	4.7% \pm 1.6	4.3% \pm 1.6	1.6% \pm 1.2	-	-	-	-	-	-	-	-	-	-	
By diagnostic year:																	
1977 - 83 (n=583)	100%	40.1% \pm 2.1	29.6% \pm 1.9	26.6% \pm 1.9	25.1% \pm 1.9	23.1% \pm 1.8	22.2% \pm 1.8	20.7% \pm 1.8	20.0% \pm 1.8	20.0% \pm 1.8	19.4% \pm 1.8	19.4% \pm 1.9	18.6% \pm 1.9	17.8% \pm 1.8	17.8% \pm 1.9	17.3% \pm 1.9	p=0.793
1984 - 90 (n=652)	100%	37.5% \pm 1.9	27.2% \pm 1.8	24.6% \pm 1.8	23.6% \pm 1.8	22.6% \pm 1.7	22.3% \pm 1.8	22.1% \pm 1.8	20.8% \pm 1.8	20.2% \pm 1.8	19.3% \pm 1.8	-	-	-	-	-	
1991 - 98 (n=876)	100%	41.0% \pm 1.7	27.8% \pm 1.7	24.6% \pm 1.6	23.0% \pm 1.7	22.1% \pm 1.7	-	-	-	-	-	-	-	-	-	-	
By age and year:																	
Under 55 yrs.																	
1977 - 83 (n=286)	100%	62.1% \pm 2.9	50.6% \pm 3.0	45.1% \pm 3.0	42.1% \pm 2.9	38.6% \pm 2.9	36.3% \pm 2.9	33.2% \pm 2.8	31.5% \pm 2.8	31.5% \pm 2.8	30.7% \pm 2.8	30.7% \pm 2.8	28.8% \pm 2.8	26.8% \pm 2.7	26.8% \pm 2.7	24.9% \pm 2.7	p=0.247
1984 - 90 (n=279)	100%	66.4% \pm 2.8	54.7% \pm 3.0	48.3% \pm 3.0	45.5% \pm 3.0	43.4% \pm 3.0	41.7% \pm 3.0	40.7% \pm 3.0	37.9% \pm 2.9	36.5% \pm 2.9	34.8% \pm 2.9	-	-	-	-	-	
1991 - 98 (n=363)	100%	69.8% \pm 2.5	52.9% \pm 2.8	46.2% \pm 2.9	43.6% \pm 2.9	41.4% \pm 3.0	-	-	-	-	-	-	-	-	-	-	
55 - 64 yrs.																	
1977 - 83 (n=135)	100%	24.7% \pm 3.7	9.1% \pm 2.5	8.5% \pm 2.5	7.0% \pm 2.3	6.4% \pm 2.2	6.4% \pm 2.2	6.4% \pm 2.3	6.4% \pm 2.3	6.4% \pm 2.2	4.4% \pm 1.9	4.4% \pm 2.0	2.8% \pm 1.6	2.8% \pm 1.6	2.8% \pm 1.7	2.8% \pm 1.8	p=0.612
1984 - 90 (n=126)	100%	24.1% \pm 3.8	8.1% \pm 2.5	7.4% \pm 2.4	7.4% \pm 2.4	5.1% \pm 2.0	5.1% \pm 2.0	4.4% \pm 1.9	4.4% \pm 1.9	3.5% \pm 1.8	3.5% \pm 1.8	-	-	-	-	-	
1991 - 98 (n=167)	100%	28.2% \pm 3.6	11.8% \pm 2.8	11.1% \pm 2.7	8.0% \pm 2.5	8.0% \pm 2.6	-	-	-	-	-	-	-	-	-	-	
65 - 74 yrs.																	
1977 - 83 (n=121)	100%	13.6% \pm 3.2	7.9% \pm 2.5	6.4% \pm 2.3	6.4% \pm 2.4	6.4% \pm 2.5	6.4% \pm 2.6	6.4% \pm 2.6	5.6% \pm 2.5	5.6% \pm 2.6	5.1% \pm 2.5	-	-	-	-	-	p=0.189
1984 - 90 (n=161)	100%	12.8% \pm 2.7	4.0% \pm 1.6	4.0% \pm 1.6	4.0% \pm 1.7	4.0% \pm 1.8	4.0% \pm 1.8	4.0% \pm 1.9	4.0% \pm 1.9	3.6% \pm 1.8	1.6% \pm 1.3	-	-	-	-	-	
1991 - 98 (n=212)	100%	21.1% \pm 2.9	8.3% \pm 2.2	6.1% \pm 2.0	5.2% \pm 2.0	5.2% \pm 2.0	-	-	-	-	-	-	-	-	-	-	
75+ yrs.																	
1977 - 83 (n=41)	100%	10.6% \pm 5.0	5.7% \pm 4.0	5.7% \pm 4.3	5.7% \pm 4.7	0.0% \pm 0.0	-	-	-	-	-	-	-	-	-	-	p=0.484
1984 - 90 (n=86)	100%	6.2% \pm 2.7	4.0% \pm 2.3	2.9% \pm 2.0	1.6% \pm 1.6	1.6% \pm 1.7	-	-	-	-	-	-	-	-	-	-	
1991 - 98 (n=134)	100%	9.8% \pm 2.7	5.3% \pm 2.4	5.3% \pm 2.6	5.3% \pm 2.8	2.3% \pm 2.8	-	-	-	-	-	-	-	-	-	-	

* Survival from the primary cancer (see text). ** P value derived from Charles Brown test, or equivalent for multiple samples (see text).

A total of 199 malignant brain tumours was diagnosed in South Australian children under 15 years of age in 1977-98. Their five-year survival was comparatively high at 62%. One hundred children had astrocytomas, where the five-year case survival was 52%. Also, there were 59 neuroblastomas of variable sites, where the five-year case survival was 48%. Neither for all childhood brain cancers in aggregate, nor for individual histological types, was age at diagnosis, sex or diagnostic period predictive of survival ($p>0.050$).

While diagnostic period was not predictive of outcome for brain cancers in the univariate analysis for all ages combined, it was predictive in a multiple proportional hazards regressions analysis after adjusting for sex, age at diagnosis, and histological type. Relative risks of case fatality were found to vary, with a decreased relative risk for 1991-98, as shown:

<i>Predictors</i>	<i>Relative risk (95% confidence limits)</i>
Sex:	
Male (reference)	1.00
Female	0.96 (0.87, 1.06)
Age at diagnosis (yrs.):	
Under 55 (reference)	1.00
55-64	2.37 (2.06, 2.71)
65-74	3.28 (2.87, 3.75)
75+	5.10 (4.30, 6.05)
Histological type:	
Astrocytoma (reference)	1.00
Ependymoma	0.52 (0.31, 0.85)
Glioblastoma	1.93 (1.72, 2.18)
Oligodendroglioma	0.50 (0.35, 0.71)
Medulloblastoma	0.64 (0.43, 0.94)
Other glioma	1.11 (0.96, 1.29)
Microglioma	0.88 (0.62, 1.23)
Other	0.61 (0.26, 1.43)
Diagnostic period:	
1977-83 (reference)	1.00
1984-90	0.97 (0.85, 1.09)
1991-98	0.82 (0.72, 0.92)

2. Hospital-based data

Contributed by:

- the Department of Neurosurgery, Royal Adelaide Hospital.

A total of 1,035 malignant brain tumours was recorded on the registry database for this department for the 1977-98 diagnostic period. The five-year survival of 19% was a little lower than the 23% reported for all brain tumours in South Australia for 1977-98. This is attributed to: the exclusion of childhood cases; and the high-risk profile of adult cases on the hospital registry by age and case complexity. The 10-year survival for the hospital cases of 15% also was slightly lower than the corresponding 19% for all State cases. Lower survivals applied for older than younger cases, whereas other outcome predictors were histological type, with especially low case survivals applying to astrocytomas in general, and high-grade astrocytomas in particular (Table 76). Sub-site also was predictive, with the lowest survivals pertaining to the corpus callosum, basal ganglia and parietal lobe than to other locations.

Notably, the difference in case survivals for astrocytomas by tumour grade was pronounced, as shown in Figure 78. For high-grade lesions, the case survival was 50% at six months from diagnosis, reducing to 26% at one year, 13% at two years, and 8% at five years. This is consistent with the international experience.³¹

Table 76: Case survivals (\pm SE) from brain cancers; Royal Adelaide Hospital Department of Neurosurgery Registry, 1977-98*

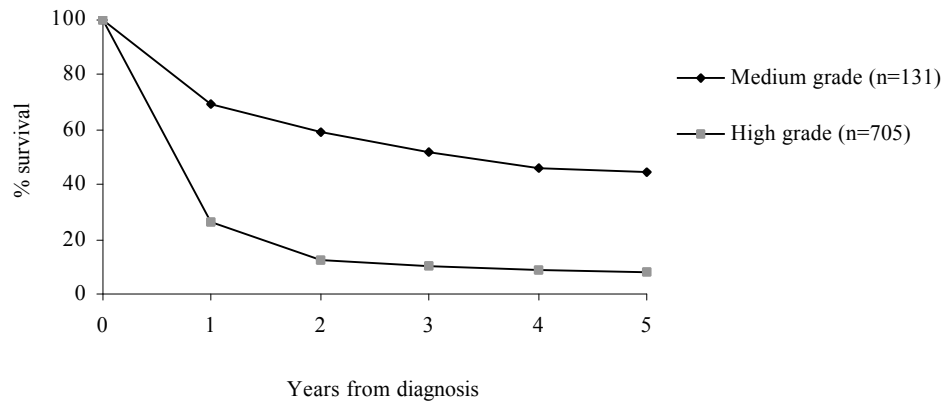
Category		Period from diagnosis (yrs.)										P value	
		0.5	1	2	3	4	5	6	7	8	9		10
All (n=1,035)	100%	57.3% \pm 1.5	38.3% \pm 1.5	26.7% \pm 1.4	22.8% \pm 1.3	21.1% \pm 1.3	19.4% \pm 1.3	18.3% \pm 1.3	17.0% \pm 1.3	15.8% \pm 1.3	15.0% \pm 1.3	14.6% \pm 1.2	-
By sex:													
Males (n=597)	100%	59.7% \pm 2.0	37.9% \pm 2.0	23.6% \pm 1.8	19.6% \pm 1.7	18.1% \pm 1.7	16.8% \pm 1.6	15.6% \pm 1.6	14.8% \pm 1.6	13.8% \pm 1.6	12.9% \pm 1.5	12.6% \pm 1.5	p=0.199
Females (n=438)	100%	55.3% \pm 2.4	38.8% \pm 2.4	30.8% \pm 2.3	26.8% \pm 2.2	25.0% \pm 2.1	22.9% \pm 2.1	21.8% \pm 2.1	19.9% \pm 2.0	18.5% \pm 2.0	17.7% \pm 2.0	17.1% \pm 2.0	
By age (yrs.):													
Under 55 (n=448)	100%	79.8% \pm 1.9	63.1% \pm 2.3	51.2% \pm 2.4	43.6% \pm 2.4	40.3% \pm 2.4	36.8% \pm 2.4	34.3% \pm 2.3	31.3% \pm 2.3	29.4% \pm 2.3	27.9% \pm 2.3	27.1% \pm 2.3	p<0.001
55-64 (n=238)	100%	48.7% \pm 3.3	26.2% \pm 2.9	10.2% \pm 2.0	8.7% \pm 1.9	8.1% \pm 1.9	7.5% \pm 1.8	7.5% \pm 1.8	7.5% \pm 1.8	7.5% \pm 1.8	6.5% \pm 1.8	6.5% \pm 1.8	
65-74 (n=276)	100%	37.4% \pm 3.0	14.5% \pm 2.2	5.7% \pm 1.5	4.7% \pm 1.4	4.7% \pm 1.4	4.7% \pm 1.4	4.7% \pm 1.4	4.7% \pm 1.4	4.1% \pm 1.4	4.1% \pm 1.4	4.1% \pm 1.4	
75+ (n=73)	100%	18.8% \pm 4.7	8.7% \pm 3.4	2.2% \pm 2.0	2.2% \pm 2.0	2.2% \pm 2.0	-	-	-	-	-	-	
By residence:													
Adel - mid/lower SES (n=344)	100%	56.3% \pm 2.7	35.5% \pm 2.6	23.9% \pm 2.3	20.7% \pm 2.2	18.6% \pm 2.2	16.8% \pm 2.1	15.3% \pm 2.0	14.9% \pm 2.0	13.2% \pm 2.0	12.3% \pm 1.9	12.3% \pm 1.9	p=0.374
Adel - mid/upper SES (n=420)	100%	57.5% \pm 2.4	38.1% \pm 2.4	27.0% \pm 2.2	23.2% \pm 2.1	21.5% \pm 2.1	19.7% \pm 2.0	18.7% \pm 2.0	17.0% \pm 2.0	16.6% \pm 2.0	16.2% \pm 2.0	15.6% \pm 2.0	
Adelaide (n=764)	100%	56.9% \pm 1.8	36.9% \pm 1.8	26.6% \pm 1.6	22.0% \pm 1.5	20.2% \pm 1.5	18.4% \pm 1.5	17.2% \pm 1.4	16.0% \pm 1.4	15.1% \pm 1.4	14.4% \pm 1.4	14.1% \pm 1.4	p=0.266
Country SA (n=271)	100%	56.4% \pm 3.0	42.2% \pm 3.1	30.0% \pm 2.9	24.9% \pm 2.7	24.0% \pm 2.7	22.5% \pm 2.7	21.5% \pm 2.6	19.9% \pm 2.6	18.0% \pm 2.6	16.7% \pm 2.6	15.9% \pm 2.5	
By histological type:													
Astrocytoma (n=862)	100%	54.9% \pm 1.7	33.9% \pm 1.6	21.3% \pm 1.4	17.7% \pm 1.3	16.2% \pm 1.3	14.9% \pm 1.3	13.7% \pm 1.2	12.9% \pm 1.2	12.2% \pm 1.2	11.8% \pm 1.2	11.8% \pm 1.2	p<0.001
By tumour grade													
- Medium (n=131)	(100%)	(76.2%) \pm 3.7	(69.1%) \pm 4.1	(59.3%) \pm 4.4	(51.5%) \pm 4.5	(46.2%) \pm 4.5	(44.3%) \pm 4.5	(44.3%) \pm 4.5	(43.1%) \pm 4.6	(41.6%) \pm 4.6	(38.5%) \pm 4.8	(38.5%) \pm 4.8	
- High (n=705)	(100%)	(50.1%) \pm 1.9	(26.2%) \pm 1.7	(12.7%) \pm 1.3	(10.0%) \pm 1.2	(9.1%) \pm 1.1	(8.1%) \pm 1.1	(7.2%) \pm 1.0	(6.5%) \pm 1.0	(5.9%) \pm 1.0	(5.9%) \pm 1.0	(5.9%) \pm 1.0	
- UK (n=26)	(100%)	(79.6%) \pm 8.2	(67.0%) \pm 9.6	(62.5%) \pm 9.9	(57.7%) \pm 10.3	(57.7%) \pm 10.3	(52.5%) \pm 10.6	(36.7%) \pm 10.6	(36.7%) \pm 10.6	(36.7%) \pm 10.6	(36.7%) \pm 10.6	(36.7%) \pm 10.6	
Oligodendroglioma (n=22)	100%	89.2% \pm 7.3	76.8% \pm 9.1	76.8% \pm 9.1	76.8% \pm 9.1	76.8% \pm 9.1	71.6% \pm 9.8	66.5% \pm 10.4	66.5% \pm 10.4	48.4% \pm 11.7	48.4% \pm 11.7	48.4% \pm 11.7	
Ependymoma (n=16)	100%	87.5% \pm 8.3	87.5% \pm 8.3	87.5% \pm 8.3	79.5% \pm 10.7	79.5% \pm 10.7	79.5% \pm 10.7	79.5% \pm 10.7	79.5% \pm 10.7	79.5% \pm 10.7	66.3% \pm 15.0	-	
Medulloblastoma (n=11)	100%	100% \pm 12.6	100% \pm 12.6	100% \pm 12.6	80.0% \pm 12.6	80.0% \pm 12.6	60.0% \pm 15.5	60.0% \pm 15.5	50.0% \pm 15.8	50.0% \pm 15.8	50.0% \pm 15.5	40.0% \pm 15.8	
Mixed glioma (n=10)	100%	80.0% \pm 12.6	80.0% \pm 12.6	80.0% \pm 12.6	80.0% \pm 12.6	64.0% \pm 17.5	64.0% \pm 17.5	64.0% \pm 17.5	-	-	-	-	
Glioma (not spec.) (n=62)	100%	60.8% \pm 6.2	44.3% \pm 6.4	35.3% \pm 6.2	29.5% \pm 6.0	27.5% \pm 6.0	27.5% \pm 6.0	27.5% \pm 6.0	27.5% \pm 6.0	21.3% \pm 5.6	18.6% \pm 5.5	18.6% \pm 5.5	
Microglioma (n=24)	100%	62.5% \pm 9.9	58.3% \pm 10.1	41.7% \pm 10.1	37.0% \pm 10.0	32.4% \pm 10.1	24.3% \pm 10.1	24.3% \pm 10.1	-	-	-	-	
Other (n=10)	100%	90.0% \pm 9.5	80.0% \pm 12.6	80.0% \pm 12.6	68.6% \pm 15.1	68.6% \pm 15.1	57.1% \pm 16.4	57.1% \pm 16.4	57.1% \pm 16.4	57.1% \pm 16.4	57.1% \pm 16.4	57.1% \pm 16.4	
UK (n=18)	(100%)	(30.6%) \pm 11.2	(18.3%) \pm 9.5	(12.2%) \pm 8.1	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	

Table 76 (cont.): Case survivals (\pm SE) from brain cancers; Royal Adelaide Hospital Department of Neurosurgery Registry, 1977-98*

Category		Period from diagnosis (yrs.)										P value		
		0.5	1	2	3	4	5	6	7	8	9		10	
By sub-site:														
Frontal lobe (n=223)	100%	65.0% \pm 3.2	50.5% \pm 3.4	36.2% \pm 3.3	30.0% \pm 3.2	28.4% \pm 3.2	26.6% \pm 3.1	25.5% \pm 3.1	22.2% \pm 3.0	20.7% \pm 3.0	18.3% \pm 3.0	17.3% \pm 3.0	p<0.001	
Parietal lobe (n=201)	100%	49.1% \pm 3.6	23.3% \pm 3.1	10.7% \pm 2.3	9.5% \pm 2.2	9.5% \pm 2.2	9.5% \pm 2.2	7.4% \pm 2.0	7.4% \pm 2.0	4.4% \pm 1.8	4.4% \pm 1.8	4.4% \pm 1.8		
Occipital lobe (n=34)	100%	65.6% \pm 8.5	44.2% \pm 9.2	24.5% \pm 8.3	15.3% \pm 7.4	10.2% \pm 6.5	10.2% \pm 6.5	10.2% \pm 6.5	10.2% \pm 6.5	10.2% \pm 6.5	10.2% \pm 6.5	10.2% \pm 6.5		
Temporal lobe (n=179)	100%	55.0% \pm 3.7	34.9% \pm 3.6	22.3% \pm 3.1	18.4% \pm 3.0	16.4% \pm 2.9	13.0% \pm 2.6	12.2% \pm 2.6	11.2% \pm 2.6	11.2% \pm 2.6	11.2% \pm 2.6	11.2% \pm 2.6		
Corpus callosum (n=43)	100%	38.0% \pm 7.8	24.4% \pm 7.0	13.6% \pm 5.6	6.8% \pm 4.4	3.4% \pm 4.4	3.4% \pm 4.4	-	-	-	-	-		
Basal ganglia (n=37)	100%	54.1% \pm 8.2	29.7% \pm 7.5	18.9% \pm 6.4	12.6% \pm 5.6	9.5% \pm 5.0	9.5% \pm 5.0	9.5% \pm 5.0	9.5% \pm 5.0	6.3% \pm 4.2	6.3% \pm 4.2	6.3% \pm 4.2		
Brain stem (n=67)	100%	81.9% \pm 4.7	78.8% \pm 5.0	67.8% \pm 5.8	62.7% \pm 6.1	62.7% \pm 6.1	59.2% \pm 6.2	57.4% \pm 6.3	55.5% \pm 6.4	51.3% \pm 6.5	47.0% \pm 6.7	44.4% \pm 6.8		
Multiple locations (n=168)	100%	52.8% \pm 3.9	30.9% \pm 3.6	22.1% \pm 3.3	20.2% \pm 3.2	18.9% \pm 3.1	16.7% \pm 3.0	16.7% \pm 3.0	15.8% \pm 3.0	15.8% \pm 3.0	15.8% \pm 3.0	15.8% \pm 3.0		
Other (n=83)	100%	59.0% \pm 5.4	39.7% \pm 5.4	35.9% \pm 5.3	31.0% \pm 5.1	27.2% \pm 4.9	25.9% \pm 4.8	22.9% \pm 4.8	21.3% \pm 4.7	21.3% \pm 4.7	21.3% \pm 4.7	21.3% \pm 4.7		
By diagnostic year:														
1977-83 (n=304)	100%	55.4% \pm 2.9	39.9% \pm 2.8	29.3% \pm 2.6	25.5% \pm 2.5	23.7% \pm 2.5	21.3% \pm 2.4	19.5% \pm 2.3	17.0% \pm 2.2	16.2% \pm 2.2	15.8% \pm 2.2	15.5% \pm 2.1	** p=0.701	
1984-90 (n=331)	100%	56.7% \pm 2.7	37.2% \pm 2.7	26.0% \pm 2.4	23.5% \pm 2.4	22.3% \pm 2.3	20.7% \pm 2.3	19.8% \pm 2.2	19.4% \pm 2.2	17.5% \pm 2.1	16.2% \pm 2.1	16.2% \pm 2.1		
1991-98 (n=400)	100%	58.0% \pm 2.5	37.9% \pm 2.5	25.2% \pm 2.3	19.4% \pm 2.1	17.4% \pm 2.1	16.5% \pm 2.1	15.8% \pm 2.1	14.6% \pm 2.3	-	-	-		

* P values derived from Cox proportional hazards regression (data in brackets excluded). **Confounded by age (see text).

Figure 78: Case survivals from malignant astrocytomas by tumour grade; Royal Adelaide Hospital Department of Neurosurgery Registry, 1977-98*



*Date of censoring: December 31st, 1998.

A multivariate proportional hazards regression analysis indicated that there was not a significant difference in outcome between the 1984-90 and 1991-98 diagnostic periods, after adjusting for age at diagnosis, histological type and location of lesion ($p=0.822$). The risk of case fatality was reduced for 1984-98, however, when compared with the 1977-83 baseline ($p=0.035$). The key predictors of case fatality, and their respective relative risks, were as follows:

Predictors	Relative risk (95% confidence limits)
Age at diagnosis (yrs.):	
Under 55 (reference)	1.00
55-64	2.54 (2.11, 3.04)
65-74	3.64 (3.04, 4.35)
75+	4.92 (3.72, 6.50)
Histological type:	
Other (reference)	1.00
Glioma (not spec.)	1.37 (0.94, 1.99)
Astrocytoma	1.90 (1.47, 2.46)
Sub-site:	
Other (reference)	1.00
Multiple locations	1.40 (1.14, 1.71)
Parietal lobe	1.67 (1.38, 2.02)
Corpus callosum	1.83 (1.30, 2.59)
Basal ganglia	2.28 (1.61, 3.25)
Diagnostic period:	
1977-83 (reference)	1.00
1984-98	0.85 (0.73, 0.99)

While similar trends were indicated for most descriptors by the univariate and multivariate analyses, a reduced case fatality for the more recent diagnostic years was not observed in the univariate context (Table 76), due to confounding by age. Older cases fared worse than younger cases, and the mean age at diagnosis increased from 52 years in 1977-83 to 54 years in 1984-90 and 56 years in 1991-98 ($p=0.005$). After age adjustment, a favourable temporal trend in survival became evident.

Of the 1,035 cases, 94% received some form of primary treatment. Most (92%) had either a biopsy or decompression (or both), and 54% had radiotherapy. Only 2% were recorded as having radiotherapy, but without accompanying surgery. Of the surgical cases, 28% had a biopsy only, 22% had both a biopsy and radiotherapy, 15% had decompression, and 35% had both decompression and radiotherapy. The proportion of surgical cases receiving radiotherapy increased from 44% in 1977-83 to 58% in 1984-90 and 65% in 1991-98 ($p < 0.001$) (Figure 79).

The older the surgical case at diagnosis, the greater was the chance that only a biopsy would be performed, and the smaller was the chance that both decompression and radiotherapy would apply (Table 77). Surgical cases also were treated differently by histological type, with decompression therapy tending to be more common for ependymomas, oligodendrogliomas, medulloblastomas, and mixed gliomas than for astrocytomas and microgliomas (primary CNS lymphomas).

Surgical cases also were treated differently by lesion sub-site (Table 77), with lesions located in the parietal lobe, corpus callosum, basal ganglia or in multiple locations being less likely to receive both decompression and radiotherapy than lesions located in the frontal, occipital or temporal lobe, or elsewhere in the brain stem.

Figure 79: % surgical cases with brain cancer by diagnostic period and treatment mode; Royal Adelaide Hospital Department of Neurosurgery Registry, 1977-98

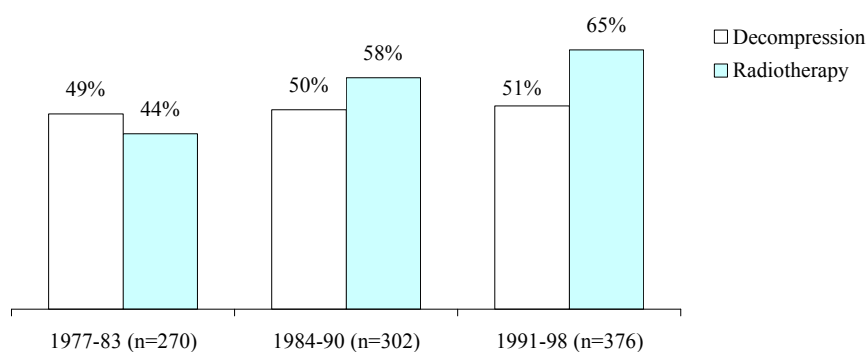


Table 77: Percentage of brain-cancer surgical cases by treatment mode as part of the primary course of care; Royal Adelaide Hospital Department of Neurosurgery Registry, 1977-98*

Category	Treatment			
	Biopsy	Biopsy and radiotherapy	Decompression	Decompression and radiotherapy
All (n=948)	28.1%	21.6%	15.4%	34.9%
By age (yrs.):				
Under 55 (n=410)	15.6%	20.2%	19.8%	44.4%
55-64 (n=225)	29.8%	22.2%	10.7%	37.3%
65-74 (n=254)	39.8%	22.4%	14.2%	23.6%
75+ (n=59)	57.6%	25.4%	8.5%	8.5%
P value	<0.001	0.330	0.005	<0.001
By histological type:				
Astrocytoma (n=825)	28.5%	23.0%	14.2%	34.3%
Oligodendroglioma (n=20)	5.0%	5.0%	35.0%	55.0%
Ependymoma (n=14)	0.0%	0.0%	35.7%	64.3%
Medulloblastoma (n=11)	0.0%	0.0%	0.0%	100.0%
Mixed glioma (n=9)	11.1%	11.1%	33.3%	44.4%
Microglioma (n=24)	41.7%	37.5%	12.5%	8.3%
Other and UK (n=45)	(42.2%)	(8.9%)	(24.4%)	(24.4%)
P value	0.002	0.011	0.007	<0.001
By sub-site:				
Frontal lobe (n=209)	27.3%	15.3%	15.8%	41.6%
Parietal lobe (n=186)	29.6%	26.3%	15.6%	28.5%
Occipital lobe (n=31)	16.1%	19.4%	9.7%	54.8%
Temporal lobe (n=169)	21.3%	16.6%	21.3%	40.8%
Corpus callosum (n=41)	58.5%	24.4%	2.4%	14.6%
Basal ganglia (n=32)	53.1%	34.4%	3.1%	9.4%
Brain stem (n=61)	13.1%	14.8%	31.1%	41.0%
Multiple locations (n=155)	27.7%	30.3%	7.7%	34.2%
Other (n=64)	32.8%	20.3%	18.8%	28.1%
P value	<0.001	0.005	<0.001	<0.001
By diagnostic year:				
1977-83 (n=270)	38.9%	12.2%	17.4%	31.5%
1984-90 (n=302)	26.8%	22.8%	15.6%	34.8%
1991-98 (n=376)	21.3%	27.4%	13.8%	37.5%
P value	<0.001	<0.001	0.214	0.115

* Derivation of P values (see text) (data in brackets excluded).

Cranial nerves and other parts of the central nervous system (ICD-02: C70, C72)

Only 99 cases presented with cancers of these sites. Case survivals were 60% at five years from diagnosis, 53% at 10 years, and 50% at 15 years. There was little difference in outcome by sex (Table 78). While age was predictive, both in a univariate and multivariate proportional hazards regression analysis, diagnostic period was not statistically significant. Relative risks of case fatality were found to vary in the proportional hazards regression model, as follows:

<i>Predictors</i>	<i>Relative risk (95% confidence limits)</i>
Sex:	
Male (reference)	1.00
Female	0.73 (0.35, 1.51)
Age at diagnosis (yrs.):	
Under 55 (reference)	1.00
55-64	2.97 (1.19, 7.39)
65-74	1.14 (0.44, 2.96)
75+	8.32 (2.52, 27.54)
Sub-site:	
Spinal cord (reference)	1.00
Cranial nerves	1.92 (0.69, 5.35)
Cerebral meninges	1.75 (0.78, 3.94)
Diagnostic period:	
1977-83 (reference)	1.00
1984-90	1.48 (0.63, 3.47)
1991-98	0.49 (0.19, 1.29)

Notably, there is some suggestion from these data of a reduction in case fatality by diagnostic period ($p=0.089$).

Case survivals from these tumours were similar in South Australia to those for the USA (SEER data).²⁸ Due to their rareness, survivals have not been published for most populations.

Table 78: Case survivals (\pm SE) by period from diagnosis, sex, age at diagnosis, and diagnostic year; SA Cancer Registry, 1977-98***Cancer site: cranial nerves and other parts of the central nervous system**

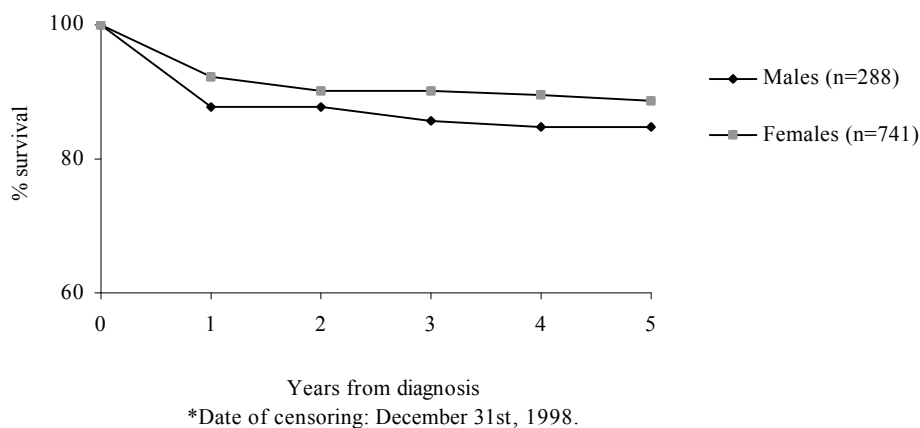
Category		Period from diagnosis (yrs.)															P value**
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
All cases (n=99)	100%	83.4% \pm 4.0	81.1% \pm 4.4	75.9% \pm 4.9	70.0% \pm 5.4	60.1% \pm 6.0	59.2% \pm 6.2	59.2% \pm 6.3	59.0% \pm 6.5	52.9% \pm 7.0	52.9% \pm 7.1	52.9% \pm 7.2	52.9% \pm 7.3	52.9% \pm 7.5	50.3% \pm 8.2	50.3% \pm 8.3	-
By sex:																	
Males (n=54)	100%	78.4% \pm 5.9	78.4% \pm 6.0	69.3% \pm 7.0	67.8% \pm 7.3	60.5% \pm 7.9	60.5% \pm 8.0	60.5% \pm 8.1	59.3% \pm 8.7	51.4% \pm 9.5	51.4% \pm 9.7	51.4% \pm 9.9	51.4% \pm 10.2	51.4% \pm 10.4	51.4% \pm 10.7	51.4% \pm 10.9	p=0.706
Females (n=45)	100%	89.5% \pm 5.0	82.9% \pm 6.4	82.9% \pm 6.5	72.4% \pm 8.1	59.2% \pm 9.3	56.3% \pm 9.6	56.3% \pm 9.7	56.3% \pm 9.9	54.2% \pm 10.3	54.2% \pm 10.5	54.2% \pm 10.6	54.2% \pm 10.7	54.2% \pm 10.9	43.1% \pm 12.0	43.1% \pm 12.2	
By age (yrs.):																	
Under 55 (n=59)	100%	91.4% \pm 3.8	89.7% \pm 4.1	87.9% \pm 4.5	81.4% \pm 5.5	69.6% \pm 6.9	69.6% \pm 6.9	69.6% \pm 6.9	66.7% \pm 7.4	66.7% \pm 7.5	66.7% \pm 7.5	66.7% \pm 7.5	66.7% \pm 7.6	66.7% \pm 8.5	66.7% \pm 8.5		p=0.029
55-64 (n=15)	100%	73.2% \pm 11.9	66.3% \pm 13.0	58.3% \pm 14.2	48.4% \pm 15.3	35.2% \pm 16.3	35.2% \pm 16.6	35.2% \pm 16.9	0.0% \pm 17.4	-	-	-	-	-	-	-	
65-74 (n=16)	100%	88.9% \pm 9.0	88.9% \pm 9.2	76.8% \pm 13.4	70.4% \pm 14.8	63.6% \pm 15.9	56.4% \pm 16.6	56.4% \pm 17.2	50.9% \pm 17.6	42.4% \pm 17.5	-	-	-	-	-	-	
75+ (n=9)	100%	32.9% \pm 17.5	18.4% \pm 16.2	0.0% \pm 0.0	-	-	-	-	-	-	-	-	-	-	-	-	
By diagnostic year:																	
1977 - 83 (n=25)	100%	85.5% \pm 7.5	85.5% \pm 7.6	79.9% \pm 9.0	68.3% \pm 10.2	65.0% \pm 10.6	65.0% \pm 10.8	65.0% \pm 10.9	65.0% \pm 11.1	64.2% \pm 11.4	64.2% \pm 11.5	64.2% \pm 11.7	64.2% \pm 11.9	64.2% \pm 12.1	59.4% \pm 12.4	59.4% \pm 12.6	p=0.368
1984 - 90 (n=28)	100%	79.6% \pm 7.9	69.7% \pm 9.1	69.7% \pm 9.2	64.4% \pm 9.8	46.2% \pm 10.1	43.1% \pm 10.1	43.1% \pm 10.3	43.1% \pm 10.5	36.9% \pm 10.3	36.9% \pm 10.5	-	-	-	-	-	
1991 - 98 (n=46)	100%	84.7% \pm 5.8	84.7% \pm 5.9	76.4% \pm 7.7	76.4% \pm 7.8	71.8% \pm 9.4	-	-	-	-	-	-	-	-	-	-	
By age and year:																	
Under 55 yrs.																	
1977 - 83 (n=17)	100%	94.3% \pm 5.7	94.3% \pm 5.7	94.3% \pm 5.7	83.0% \pm 9.3	77.3% \pm 10.4	77.3% \pm 10.4	77.3% \pm 10.5	72.1% \pm 11.3	72.1% \pm 11.3	72.1% \pm 11.4	72.1% \pm 11.4	72.1% \pm 11.5	72.1% \pm 12.1	72.1% \pm 12.1		p=0.114
1984 - 90 (n=15)	100%	86.8% \pm 8.8	80.2% \pm 10.4	80.2% \pm 10.4	73.8% \pm 11.5	47.1% \pm 13.0	47.1% \pm 13.0	47.1% \pm 13.1	47.1% \pm 13.1	47.1% \pm 13.1	-	-	-	-	-	-	
1991 - 98 (n=27)	100%	92.2% \pm 5.4	92.2% \pm 5.4	87.2% \pm 7.3	87.2% \pm 7.3	87.2% \pm 7.3	-	-	-	-	-	-	-	-	-	-	
55 - 64 yrs.																	
1977 - 83 (n=3)	100%	33.9% \pm 27.7	33.9% \pm 28.2	0.0% \pm 0.0	-	-	-	-	-	-	-	-	-	-	-	-	
1984 - 90 (n=3)	100%	100% \pm 27.9	68.3% \pm 27.9	68.3% \pm 28.3	35.2% \pm 28.7	35.2% \pm 29.2	35.2% \pm 29.7	35.2% \pm 30.3	35.2% \pm 30.9	0.0% \pm 0.0	-	-	-	-	-	-	p=0.609
1991 - 98 (n=9)	100%	77.2% \pm 14.7	77.2% \pm 14.8	77.2% \pm 15.0	77.2% \pm 15.2	48.6% \pm 28.8	-	-	-	-	-	-	-	-	-	-	
65 - 74 yrs.																	
1977 - 83 (n=4)	100%	100% \pm 31.7	100% \pm 33.4	83.5% \pm 24.1	58.0% \pm 29.0	58.0% \pm 30.2	58.0% \pm 31.7	58.0% \pm 33.4	58.0% \pm 35.3	58.0% \pm 37.4	58.0% \pm 39.6	-	-	-	-	-	
1984 - 90 (n=7)	100%	72.7% \pm 17.4	72.7% \pm 17.7	72.7% \pm 18.1	72.7% \pm 18.6	63.6% \pm 20.8	49.0% \pm 21.4	49.0% \pm 22.0	49.0% \pm 22.7	35.9% \pm 21.4	35.9% \pm 22.3	-	-	-	-	-	p=0.885
1991 - 98 (n=5)	100%	100% \pm 24.5	100% \pm 27.7	54.9% \pm 38.8	54.9% \pm 40.3	54.9% \pm 41.9	-	-	-	-	-	-	-	-	-	-	
75+ yrs.																	
1977 - 83 (n=1)	100%	0.0% \pm 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1984 - 90 (n=3)	100%	35.6% \pm 29.1	0.0% \pm 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	p=0.625
1991 - 98 (n=5)	100%	37.4% \pm 24.5	37.4% \pm 27.7	0.0% \pm 0.0	-	-	-	-	-	-	-	-	-	-	-	-	

* Survival from the primary cancer (see text). ** P value derived from Charles Brown test, or equivalent for multiple samples (see text).

Thyroid (ICD-02: C73)

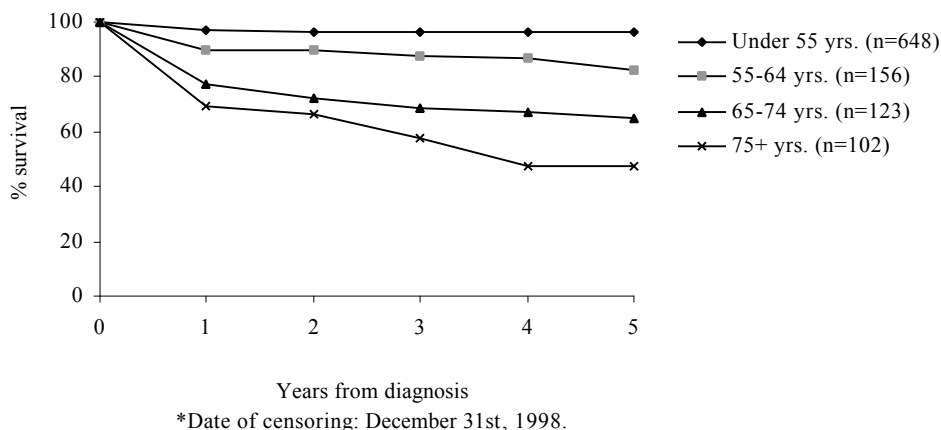
Case survivals for this site were 88% at five years, and 86% at 10 and 15 years after diagnosis, with females presenting higher survivals (Table 79) (Figure 80).

Figure 80: Case survivals from cancers of the thyroid gland in 1977-98 by sex in South Australia*



Age also was predictive of outcome, with five-year survivals reducing from 97% for cases under 55 years at diagnosis to 47% for those aged 75 years of more (Figure 81).

Figure 81: Case survivals from cancers of the thyroid gland in 1977-98 by age at diagnosis in South Australia*



Meanwhile, diagnostic period also was predictive, with the five-year survival increasing from 82% for 1977-83 to 93% for 1991-98 (Figure 82).

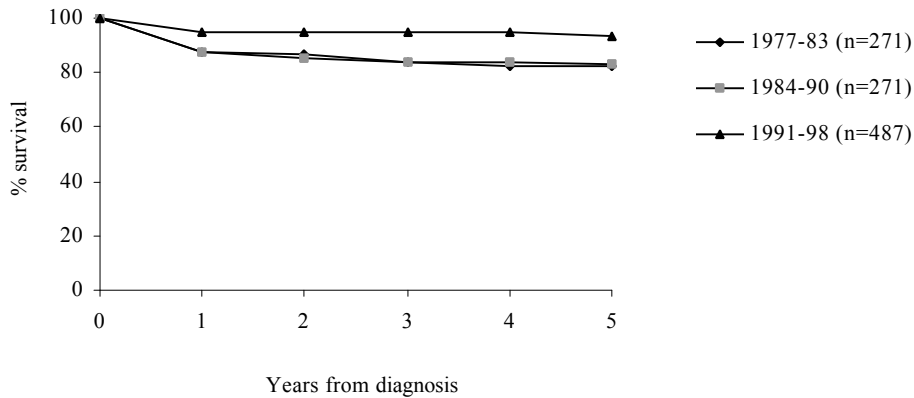
Table 79: Case survivals (\pm SE) by period from diagnosis, sex, age at diagnosis, and diagnostic year; SA Cancer Registry, 1977-98*

Cancer site: thyroid

Category		Period from diagnosis (yrs.)															P value**
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
All cases (n=1,029)	100%	90.9% \pm 1.0	90.2% \pm 1.1	88.9% \pm 1.2	88.4% \pm 1.3	87.8% \pm 1.4	87.7% \pm 1.5	87.7% \pm 1.5	87.7% \pm 1.6	87.1% \pm 1.8	85.9% \pm 1.9	85.9% \pm 2.0	85.9% \pm 2.1	85.9% \pm 2.2	85.9% \pm 2.3	85.9% \pm 2.5	-
By sex:																	
Males (n=288)	100%	87.9% \pm 2.1	87.9% \pm 2.2	85.6% \pm 2.6	84.7% \pm 2.8	84.7% \pm 2.9	84.7% \pm 3.1	84.7% \pm 3.2	84.7% \pm 3.4	84.7% \pm 4.0	81.8% \pm 4.4	81.8% \pm 4.6	81.8% \pm 4.8	81.8% \pm 5.5	81.8% \pm 5.3	81.8% \pm 6.0	p=0.043
Females (n=741)	100%	92.1% \pm 1.1	90.9% \pm 1.2	90.2% \pm 1.3	89.7% \pm 1.4	88.7% \pm 1.5	87.7% \pm 1.7	87.7% \pm 1.8	87.7% \pm 1.9	87.7% \pm 1.9	87.1% \pm 2.1	87.1% \pm 2.2	87.1% \pm 2.3	87.1% \pm 2.3	87.1% \pm 2.4	87.1% \pm 2.6	
By age (yrs.):																	
Under 55 (n=648)	100%	96.9% \pm 0.7	96.7% \pm 0.7	96.7% \pm 0.7	96.7% \pm 0.8	96.7% \pm 0.8	96.7% \pm 0.8	96.7% \pm 0.8	96.7% \pm 0.9	96.7% \pm 0.9	96.0% \pm 1.1	96.0% \pm 1.2	96.0% \pm 1.2	96.0% \pm 1.4	96.0% \pm 1.4	96.0% \pm 1.5	p<0.001
55-64 (n=156)	100%	89.5% \pm 2.6	89.5% \pm 2.7	87.4% \pm 3.1	86.6% \pm 3.3	82.0% \pm 3.8	78.8% \pm 4.2	78.8% \pm 4.4	78.8% \pm 4.6	71.7% \pm 5.5	68.3% \pm 5.8	68.3% \pm 6.3	68.3% \pm 6.5	68.3% \pm 7.1	-	-	
65-74 (n=123)	100%	77.3% \pm 4.1	72.6% \pm 4.5	68.3% \pm 5.0	67.0% \pm 5.3	65.3% \pm 5.6	60.5% \pm 6.0	60.5% \pm 6.5	60.5% \pm 6.8	55.9% \pm 7.4	49.5% \pm 7.9	-	-	-	-	-	
75+ (n=102)	100%	69.6% \pm 5.2	66.4% \pm 5.9	57.3% \pm 6.6	55.3% \pm 7.2	47.2% \pm 7.9	-	-	-	-	-	-	-	-	-	-	
By diagnostic year:																	
1977 - 83 (n=271)	100%	87.2% \pm 2.1	86.7% \pm 2.3	84.1% \pm 2.5	82.4% \pm 2.7	82.4% \pm 2.8	82.4% \pm 2.9	82.4% \pm 3.0	82.4% \pm 3.1	82.4% \pm 3.2	81.5% \pm 3.3	81.5% \pm 3.4	81.5% \pm 3.5	81.5% \pm 3.6	81.5% \pm 3.7	81.5% \pm 3.8	p<0.001
1984 - 90 (n=271)	100%	87.5% \pm 2.1	85.2% \pm 2.3	83.6% \pm 2.5	83.6% \pm 2.6	83.3% \pm 2.7	82.1% \pm 2.8	82.1% \pm 2.9	82.1% \pm 3.0	81.6% \pm 3.1	80.8% \pm 3.3	-	-	-	-	-	
1991 - 98 (n=487)	100%	95.2% \pm 1.1	95.2% \pm 1.2	95.2% \pm 1.4	95.2% \pm 1.6	93.2% \pm 2.0	-	-	-	-	-	-	-	-	-	-	
By age and year:																	
Under 55 yrs.																	
1977 - 83 (n=173)	100%	94.4% \pm 1.8	94.4% \pm 1.8	94.4% \pm 1.8	94.4% \pm 1.8	94.0% \pm 1.8	94.4% \pm 1.9	94.4% \pm 1.9	94.4% \pm 2.0	94.4% \pm 2.0	93.3% \pm 2.2	93.3% \pm 2.3	93.3% \pm 2.3	93.3% \pm 2.3	93.3% \pm 2.4	93.3% \pm 2.4	p=0.015
1984 - 90 (n=159)	100%	95.1% \pm 1.7	94.0% \pm 1.9	94.0% \pm 1.9	94.0% \pm 1.9	94.0% \pm 2.0	94.0% \pm 2.0	94.0% \pm 2.0	94.0% \pm 2.1	94.0% \pm 2.1	93.4% \pm 2.3	-	-	-	-	-	
1991 - 98 (n=316)	100%	99.4% \pm 0.5	99.4% \pm 0.5	99.4% \pm 0.5	99.4% \pm 0.5	99.4% \pm 0.5	-	-	-	-	-	-	-	-	-	-	
55 - 64 yrs.																	
1977 - 83 (n=30)	100%	77.5% \pm 7.8	77.5% \pm 7.9	76.0% \pm 8.4	71.1% \pm 8.8	71.1% \pm 9.2	71.1% \pm 9.3	71.1% \pm 9.9	71.1% \pm 10.1	71.1% \pm 10.5	48.1% \pm 10.7	48.1% \pm 10.8	48.1% \pm 11.0	48.1% \pm 11.2	48.1% \pm 11.2	48.1% \pm 11.6	p=0.153
1984 - 90 (n=50)	100%	88.7% \pm 4.6	87.5% \pm 5.0	82.2% \pm 5.8	82.2% \pm 5.9	77.7% \pm 6.5	72.3% \pm 7.0	72.3% \pm 7.1	72.3% \pm 7.3	68.4% \pm 7.7	68.4% \pm 7.8	-	-	-	-	-	
1991 - 98 (n=76)	100%	95.1% \pm 2.8	95.1% \pm 2.8	95.1% \pm 2.8	95.1% \pm 3.8	90.4% \pm 5.6	-	-	-	-	-	-	-	-	-	-	
65 - 74 yrs.																	
1977 - 83 (n=40)	100%	72.0% \pm 7.5	63.7% \pm 8.2	57.6% \pm 8.7	54.0% \pm 9.0	54.0% \pm 9.3	54.0% \pm 9.7	54.0% \pm 10.0	54.0% \pm 10.5	54.0% \pm 10.9	49.2% \pm 11.2	-	-	-	-	-	p=0.198
1984 - 90 (n=33)	100%	74.5% \pm 7.9	70.1% \pm 8.6	62.3% \pm 9.3	62.3% \pm 9.7	59.4% \pm 10.0	54.4% \pm 10.4	54.4% \pm 10.8	54.4% \pm 11.2	45.3% \pm 11.1	37.6% \pm 11.2	-	-	-	-	-	
1991 - 98 (n=50)	100%	83.1% \pm 5.8	83.1% \pm 6.5	83.1% \pm 6.6	83.1% \pm 6.8	77.9% \pm 10.2	-	-	-	-	-	-	-	-	-	-	
75+ yrs.																	
1977 - 83 (n=28)	100%	73.5% \pm 9.6	73.5% \pm 10.7	55.4% \pm 12.1	35.8% \pm 11.7	34.2% \pm 12.4	-	-	-	-	-	-	-	-	-	-	p=0.235
1984 - 90 (n=29)	100%	55.8% \pm 10.0	43.9% \pm 10.4	43.2% \pm 11.0	43.2% \pm 11.7	42.2% \pm 12.8	-	-	-	-	-	-	-	-	-	-	
1991 - 98 (n=45)	100%	76.2% \pm 7.5	76.2% \pm 8.6	76.2% \pm 10.4	76.2% \pm 12.9	62.4% \pm 16.1	-	-	-	-	-	-	-	-	-	-	

* Survival from the primary cancer (see text). ** P value derived from Charles Brown test, or equivalent for multiple samples (see text).

Figure 82: Case survivals from cancers of the thyroid gland by diagnostic period in South Australia*



*Date of censoring: December 31st, 1998.

Multivariate proportional hazards regression confirmed that diagnostic period was predictive of outcome, after adjusting for sex, age at diagnosis, and histological type. Relative risks of case fatality varied as follows:

<i>Predictors</i>	<i>Relative risk (95% confidence limits)</i>
Sex:	
Male (reference)	1.00
Female	0.59 (0.40, 0.88)
Age at diagnosis (yrs.):	
Under 55 (reference)	1.00
55-64	6.11 (3.20, 11.69)
65-74	15.46 (8.50, 28.14)
75+	18.81 (10.00, 35.39)
Histological type:	
Papillary and squamous cell (reference)	1.00
Follicular adenocarcinoma	1.30 (0.70, 2.41)
Papillary and follicular adenocarc.	0.81 (0.38, 1.71)
Papillary adenocarcinoma	1.78 (0.90, 3.49)
Other adenocarcinoma	1.24 (0.47, 3.27)
Epithelial neoplasm (nos)	14.84 (8.36, 26.38)
Other (incl. medullary carc.)	2.10 (0.96, 4.57)
Diagnostic period:	
1977-83 (reference)	1.00
1984-90	0.88 (0.58, 1.35)
1991-98	0.48 (0.29, 0.78)

Between 1977-88 and 1989-99, the mean age-sex standardized (World Population) mortality rate for thyroid cancers reduced by about one third in South Australia, which likely would reflect - at least in part - gains in case survival. During this period, there was no indication of a reduction in incidence.

Case survivals for thyroid cancers vary considerably across populations. The five-year figure for South Australia was higher than for Europe,²⁹ but not as high as for the USA (SEER data).²⁸ Queensland had a similar survival,³⁷ whereas the five-year figures tended to be higher for Western Australia and New South Wales.^{27,30} These comparisons are complicated by a high prevalence of latent disease, where increased investigations can lead to artificial increases in both incidence and survival.⁵⁴ In this context, it is reassuring that gains in calculated case survivals in South Australia have been associated with temporal decreases in population-based mortality, suggesting that the reported survival gains have been real.

Modern treatments of thyroid cancer include the removal of suspicious nodules, and more extensive surgery for the more diffuse or widespread disease, followed by radioactive iodine.^{61,62} Metastatic lesions generally are treated by external radiotherapy or chemotherapy.

Other endocrine glands and related structures (ICD-02: C74, C75)

Cases with cancers of these sites had a five-year survival of 46%, and a survival of 41% at 10 years and 38% at 15 years. Sex was not predictive of outcome, nor was diagnostic period, whereas age at diagnosis tended to be predictive (Table 80). Proportional hazards regression analysis confirmed that only age at diagnosis was predictive of outcome in a multivariate context. The relative risks of case fatality were as shown:

<i>Predictors</i>	<i>Relative risk (95% confidence limits)</i>
Sex:	
Male (reference)	1.00
Female	1.06 (0.63, 1.79)
Age at diagnosis (yrs.):	
Under 55 (reference)	1.00
55-64	1.07 (0.54, 2.12)
65-74	2.30 (1.22, 4.32)
75+	2.26 (0.82, 6.23)
Sub-site:	
Other (reference)	1.00
Suprarenal gland	2.49 (1.39, 4.45)
Diagnostic period:	
1977-83 (reference)	1.00
1984-90	0.95 (0.55, 1.65)
1991-98	0.81 (0.45, 1.45)

Few international population-based survival data have been reported for these tumours, due to their low incidence. As a consequence, comparative data are not provided.

Table 80: Case survivals (±SE) by period from diagnosis, sex, age at diagnosis, and diagnostic year; SA Cancer Registry, 1977-98*

Cancer site: other endocrine gland

Category		Period from diagnosis (yrs.)															P value**
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
All cases (n=135)	100%	69.9% ± 4.0	56.9% ± 4.4	50.7% ± 4.6	47.8% ± 4.6	45.5% ± 4.7	45.2% ± 4.7	44.4% ± 4.8	42.5% ± 4.9	42.5% ± 4.9	40.8% ± 5.1	39.8% ± 5.2	39.8% ± 5.2	39.8% ± 5.3	39.8% ± 5.4	37.5% ± 5.6	–
By sex:																	
Males (n=76)	100%	69.9% ± 5.4	56.3% ± 6.0	52.5% ± 6.1	50.0% ± 6.2	45.5% ± 6.3	45.5% ± 6.4	44.6% ± 6.6	44.6% ± 6.7	44.6% ± 6.8	43.7% ± 7.1	40.6% ± 7.6	40.6% ± 7.7	40.6% ± 7.8	40.6% ± 8.0	37.2% ± 9.0	p=0.943
Females (n=59)	100%	69.8% ± 6.1	57.6% ± 6.7	48.5% ± 6.9	44.9% ± 6.9	44.9% ± 7.0	44.9% ± 7.0	43.9% ± 7.1	39.8% ± 7.1	39.8% ± 7.1	38.1% ± 7.2	38.1% ± 7.2	38.1% ± 7.3	38.1% ± 7.3	38.1% ± 7.4	38.1% ± 7.5	
By age (yrs.):																	
Under 55 (n=89)	100%	77.3% ± 4.5	64.1% ± 5.2	57.9% ± 5.4	55.3% ± 5.5	52.6% ± 5.6	52.6% ± 5.6	49.6% ± 5.7	48.0% ± 5.7	48.0% ± 5.7	48.0% ± 5.7	46.0% ± 5.9	46.0% ± 5.9	46.0% ± 5.9	46.0% ± 5.9	46.0% ± 5.9	p=0.099
55-64 (n=21)	100%	66.5% ± 10.6	51.1% ± 11.5	45.9% ± 11.7	40.7% ± 11.7	35.4% ± 11.5	35.4% ± 11.7	35.4% ± 11.9	29.7% ± 11.7	29.7% ± 11.9	29.7% ± 12.2	29.7% ± 12.4	29.7% ± 12.6	29.7% ± 12.9	29.7% ± 13.2	29.7% ± 13.6	
65-74 (n=17)	100%	48.6% ± 12.5	31.4% ± 11.8	26.0% ± 11.4	20.3% ± 10.6	20.3% ± 11.1	20.3% ± 11.6	20.3% ± 12.2	20.3% ± 12.8	20.3% ± 13.6	13.7% ± 12.1	–	–	–	–	–	
75+ (n=8)	100%	39.9% ± 18.2	39.9% ± 19.6	30.8% ± 18.8	30.8% ± 20.4	30.0% ± 22.0	–	–	–	–	–	–	–	–	–	–	
By diagnostic year:																	
1977 - 83 (n=46)	100%	74.4% ± 6.5	61.7% ± 7.3	51.0% ± 7.5	46.9% ± 7.5	42.7% ± 7.5	42.7% ± 7.6	42.7% ± 7.6	41.4% ± 7.6	41.4% ± 7.7	40.1% ± 7.7	40.1% ± 7.7	40.1% ± 7.8	40.1% ± 7.9	40.1% ± 7.9	39.2% ± 7.9	p=0.937
1984 - 90 (n=43)	100%	68.2% ± 7.2	57.1% ± 7.7	52.9% ± 7.9	51.2% ± 8.0	49.4% ± 8.1	49.4% ± 8.2	45.7% ± 8.2	43.9% ± 8.3	43.9% ± 8.4	42.1% ± 8.6	–	–	–	–	–	
1991 - 98 (n=46)	100%	66.8% ± 7.2	51.2% ± 8.1	48.7% ± 5.3	45.9% ± 8.6	45.9% ± 8.7	–	–	–	–	–	–	–	–	–	–	
By age and year:																	
Under 55 yrs.																	
1977 - 83 (n=36)	100%	75.1% ± 7.2	61.3% ± 8.1	50.2% ± 8.4	47.5% ± 8.4	44.7% ± 8.3	44.7% ± 8.3	42.1% ± 8.4	42.1% ± 8.3	42.1% ± 8.3	42.1% ± 8.3	42.1% ± 8.3	42.1% ± 8.4	42.1% ± 8.4	42.1% ± 8.4	42.1% ± 8.4	p=0.573
1984 - 90 (n=23)	100%	78.4% ± 8.6	69.8% ± 9.6	69.8% ± 9.6	69.8% ± 9.6	65.6% ± 10.0	65.6% ± 10.0	57.0% ± 10.4	57.0% ± 10.4	57.0% ± 10.5	57.0% ± 10.5	–	–	–	–	–	
1991 - 98 (n=30)	100%	74.1% ± 7.7	62.5% ± 9.6	57.7% ± 10.0	52.3% ± 10.4	52.3% ± 10.4	–	–	–	–	–	–	–	–	–	–	
55 - 64 yrs.																	
1977 - 83 (n=5)	100%	80.8% ± 18.1	61.3% ± 22.45	41.4% ± 22.7	41.4% ± 22.9	21.2% ± 19.0	21.2% ± 19.3	21.2% ± 19.6	21.2% ± 19.9	21.2% ± 20.3	21.2% ± 20.7	21.2% ± 21.2	21.2% ± 21.7	21.2% ± 22.3	21.2% ± 22.9	21.2% ± 23.6	p=0.893
1984 - 90 (n=10)	100%	70.7% ± 14.6	51.0% ± 16.1	51.0% ± 16.3	41.8% ± 16.2	41.8% ± 16.4	41.8% ± 16.7	41.8% ± 16.9	33.3% ± 16.1	33.3% ± 16.4	33.3% ± 16.7	–	–	–	–	–	
1991 - 98 (n=6)	100%	45.9% ± 21.4	45.9% ± 21.6	45.9% ± 21.9	45.9% ± 22.2	45.9% ± 22.5	–	–	–	–	–	–	–	–	–	–	
65 - 74 yrs.																	
1977 - 83 (n=3)	100%	68.7% ± 28.0	68.7% ± 28.9	68.7% ± 30.0	38.0% ± 31.0	38.0% ± 32.3	38.0% ± 33.7	38.0% ± 35.3	38.0% ± 37.1	38.0% ± 39.0	38.0% ± 41.3	–	–	–	–	–	p=0.935
1984 - 90 (n=9)	100%	34.4% ± 16.2	23.8% ± 14.8	12.3% ± 11.6	12.3% ± 12.1	12.3% ± 12.6	12.3% ± 13.2	12.3% ± 13.9	12.3% ± 14.6	12.3% ± 15.5	0.0% ± 0.0	–	–	–	–	–	
1991 - 98 (n=5)	100%	61.8% ± 22.6	21.3% ± 19.1	21.3% ± 19.8	21.3% ± 20.6	21.3% ± 21.4	–	–	–	–	–	–	–	–	–	–	
75+ yrs.																	
1977 - 83 (n=2)	100%	52.6% ± 37.2	52.6% ± 39.4	52.6% ± 41.9	52.6% ± 44.7	52.6% ± 48.0	–	–	–	–	–	–	–	–	–	–	p=0.201
1984 - 90 (n=1)	100%	100% ± 0.0	100% ± 0.0	0.0% ± 0.0	–	–	–	–	–	–	–	–	–	–	–	–	
1991 - 98 (n=5)	100%	21.5% ± 19.2	21.5% ± 20.9	21.5% ± 22.7	21.5% ± 24.9	21.5% ± 27.2	–	–	–	–	–	–	–	–	–	–	

* Survival from the primary cancer (see text). ** P value derived from Charles Brown test, or equivalent for multiple samples (see text).

Summarizing comments for other sites (ICD-02: C69-C75)

Apart from eye cancers, where age-specific numbers were too low for results to be reliable, case survivals for these sites tended to reduce with age at diagnosis. This accords with findings for most cancer sites. Further research is warranted to assess the respective contributions of variations in diagnostic stage, treatment, frailty and comorbidity.

Most of these sites showed temporal gains in case survival, although statistical significance ($p < 0.050$) was achieved only for the brain and thyroid. The effects of artificial influences from such factors as variations in lead time and length time require further investigation.⁹ Notably, evidence for survival gains persisted after adjusting for histological type, and in the instance of brain tumours, for tumour location. Meanwhile, evidence of a temporal reduction in age-sex standardized population mortality (see Chapter 1) for thyroid cancer was further evidence that the reported survival gains for this tumour were real.

Females had higher case survivals than males from thyroid cancer. This was associated with a higher incidence in females, which may have been affected by a greater detection of latent disease. USA data show similar trends, and a relatively high prevalence of localized cancers in females,^{9,28} which may reflect increased detection. At this time, it is uncertain whether the higher survivals from thyroid cancers in females than males are artificial, due to lead-time and related factors, or whether real elevations have applied.

**H. Lymphatic and haematopoietic tissue (ICD-02: M95903-M99403)
(selected codes – see “Methods”)**

Lymphomas (ICD-02: M95903-M97413) (selected codes – see “Methods”)

1. Population-based data

Cases with Hodgkin’s disease and non-Hodgkin’s lymphomas had an aggregated five-year survival of 57%, with corresponding figures at 10 and 15 years of 49% and 47% respectively. Males and females had similar survivals (Table 81). The older the age at diagnosis, the lower was the survival, the five-year figure being 74% for cases under 55 years, compared with 32% for cases aged 75 years or more (Figure 83). There was an increase in survival for the more recent diagnostic periods, such that the five-year figure increased from 54% in 1977-83 to 59% in 1991-98 (Figure 84).

Figure 83: Case survivals from lymphomas in 1977-98 by age at diagnosis in South Australia*

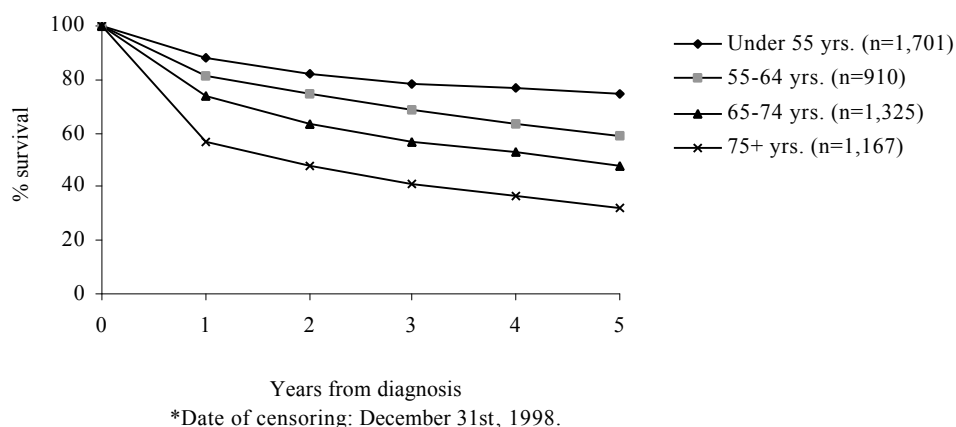
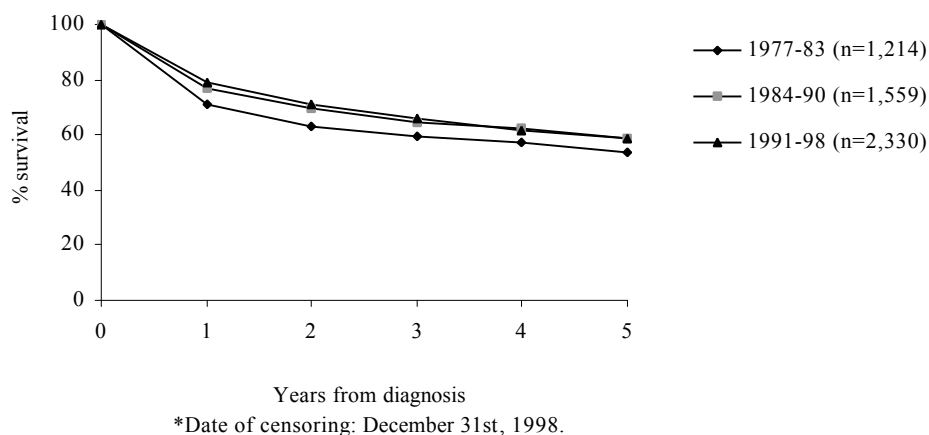


Figure 84: Case survivals from lymphomas by diagnostic period in South Australia*



South Australian five-year survivals during 1977-98 were 54% for non-Hodgkin’s lymphomas and 82% for Hodgkin’s disease.

Table 81: Case survivals (\pm SE) by period from diagnosis, sex, age at diagnosis, and diagnostic year; SA Cancer Registry, 1977-98*

Cancer site: lymphomas

Category		Period from diagnosis (yrs.)															P value**
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
All cases (n=5,103)	100%	76.5% \pm 0.6	68.7% \pm 0.7	64.0% \pm 0.8	60.9% \pm 0.8	57.4% \pm 0.9	55.4% \pm 0.9	53.3% \pm 1.0	51.2% \pm 1.0	50.2% \pm 1.1	49.2% \pm 1.1	49.0% \pm 1.2	47.9% \pm 1.2	47.3% \pm 1.3	47.2% \pm 1.4	46.9% \pm 1.4	-
By sex:																	
Males (n=2,717)	100%	77.4% \pm 0.9	69.0% \pm 1.0	64.1% \pm 1.1	61.6% \pm 1.1	58.3% \pm 1.2	56.3% \pm 1.3	53.7% \pm 1.3	52.3% \pm 1.4	51.6% \pm 1.5	50.6% \pm 1.5	50.3% \pm 1.6	49.5% \pm 1.7	49.1% \pm 1.8	48.9% \pm 1.9	48.8% \pm 2.0	p=0.220
Females (n=2,386)	100%	75.4% \pm 0.9	68.2% \pm 1.1	64.0% \pm 1.1	60.2% \pm 1.2	56.4% \pm 1.3	54.5% \pm 1.3	52.8% \pm 1.4	49.9% \pm 1.5	48.7% \pm 1.5	47.5% \pm 1.6	47.5% \pm 1.7	46.1% \pm 1.8	45.3% \pm 1.9	45.3% \pm 2.0	44.8% \pm 2.1	
By age (yrs.):																	
Under 55 (n=1,701)	100%	88.4% \pm 0.8	81.9% \pm 1.0	78.6% \pm 1.1	76.9% \pm 1.1	74.4% \pm 1.2	72.1% \pm 1.2	70.2% \pm 1.3	68.2% \pm 1.3	67.3% \pm 1.4	66.3% \pm 1.4	65.4% \pm 1.4	64.0% \pm 1.5	62.9% \pm 1.6	62.1% \pm 1.6	61.2% \pm 1.7	p<0.001
55-64 (n=910)	100%	81.6% \pm 1.3	74.3% \pm 1.5	69.0% \pm 1.7	63.7% \pm 1.8	58.9% \pm 1.9	55.1% \pm 2.0	52.2% \pm 2.1	49.1% \pm 2.1	47.7% \pm 2.2	45.6% \pm 2.3	44.5% \pm 2.4	42.5% \pm 2.5	40.7% \pm 2.6	38.8% \pm 2.8	36.9% \pm 3.0	
65-74 (n=1,325)	100%	73.6% \pm 1.3	63.2% \pm 1.5	57.0% \pm 1.6	52.9% \pm 1.7	47.9% \pm 1.7	44.8% \pm 1.8	40.5% \pm 1.9	37.4% \pm 2.0	34.3% \pm 2.1	31.1% \pm 2.2	-	-	-	-	-	
75+ (n=1,167)	100%	56.9% \pm 1.6	47.9% \pm 1.8	41.4% \pm 1.9	36.9% \pm 2.0	32.0% \pm 2.1	-	-	-	-	-	-	-	-	-	-	
By diagnostic year:																	
1977 - 83 (n=1,214)	100%	71.0% \pm 1.4	62.9% \pm 1.5	59.7% \pm 1.6	57.2% \pm 1.6	53.6% \pm 1.7	51.5% \pm 1.7	49.2% \pm 1.7	47.0% \pm 1.8	46.5% \pm 1.8	45.9% \pm 1.8	45.9% \pm 1.9	45.1% \pm 1.9	44.9% \pm 2.0	44.6% \pm 2.0	44.4% \pm 2.1	p<0.001
1984 - 90 (n=1,559)	100%	77.1% \pm 1.1	69.9% \pm 1.3	64.8% \pm 1.4	62.2% \pm 1.4	58.5% \pm 1.5	56.2% \pm 1.5	54.1% \pm 1.5	52.3% \pm 1.6	51.1% \pm 1.6	49.6% \pm 1.7	-	-	-	-	-	
1991 - 98 (n=2,330)	100%	79.1% \pm 0.9	71.0% \pm 1.1	65.8% \pm 1.2	61.4% \pm 1.4	58.6% \pm 1.5	-	-	-	-	-	-	-	-	-	-	
By age and year:																	
Under 55 yrs.																	
1977 - 83 (n=449)	100%	84.0% \pm 1.7	76.6% \pm 2.0	74.3% \pm 2.1	72.3% \pm 2.2	70.3% \pm 2.2	67.4% \pm 2.3	65.4% \pm 2.3	63.6% \pm 2.4	63.4% \pm 2.4	63.3% \pm 2.4	63.3% \pm 2.4	60.7% \pm 2.4	59.9% \pm 2.5	59.0% \pm 2.5	58.3% \pm 2.5	p=0.020
1984 - 90 (n=505)	100%	89.3% \pm 1.4	84.3% \pm 1.6	80.1% \pm 1.8	78.7% \pm 1.9	75.9% \pm 1.9	73.7% \pm 2.0	72.1% \pm 2.1	70.1% \pm 2.1	68.5% \pm 2.1	66.6% \pm 2.2	-	-	-	-	-	
1991 - 98 (n=747)	100%	90.7% \pm 1.1	83.5% \pm 1.5	80.3% \pm 1.7	78.6% \pm 1.8	75.7% \pm 2.0	-	-	-	-	-	-	-	-	-	-	
55 - 64 yrs.																	
1977 - 83 (n=233)	100%	77.4% \pm 2.8	69.1% \pm 3.2	63.9% \pm 3.3	58.5% \pm 3.4	50.7% \pm 3.5	47.4% \pm 3.6	43.1% \pm 3.6	39.1% \pm 3.5	38.5% \pm 3.6	35.8% \pm 3.6	35.8% \pm 3.6	35.1% \pm 3.7	34.0% \pm 3.7	32.2% \pm 3.8	31.0% \pm 3.8	p=0.004
1984 - 90 (n=291)	100%	81.0% \pm 2.4	74.2% \pm 2.7	69.1% \pm 2.9	64.7% \pm 3.0	60.5% \pm 3.1	56.3% \pm 3.2	53.8% \pm 3.2	51.8% \pm 3.3	49.9% \pm 3.3	48.5% \pm 3.4	-	-	-	-	-	
1991 - 98 (n=386)	100%	84.9% \pm 1.9	77.8% \pm 2.3	72.2% \pm 2.7	65.9% \pm 3.0	64.7% \pm 3.2	-	-	-	-	-	-	-	-	-	-	
65 - 74 yrs.																	
1977 - 83 (n=294)	100%	62.7% \pm 2.9	52.9% \pm 3.1	48.3% \pm 3.2	46.3% \pm 3.3	41.7% \pm 3.3	39.3% \pm 3.4	35.0% \pm 3.4	31.7% \pm 3.4	27.1% \pm 3.3	25.1% \pm 3.3	-	-	-	-	-	p<0.001
1984 - 90 (n=431)	100%	72.5% \pm 2.3	61.7% \pm 2.5	55.3% \pm 2.6	51.0% \pm 2.7	45.9% \pm 2.8	42.1% \pm 2.8	38.9% \pm 2.8	36.4% \pm 2.9	34.8% \pm 2.9	31.2% \pm 3.0	-	-	-	-	-	
1991 - 98 (n=600)	100%	80.1% \pm 1.8	69.8% \pm 2.2	62.8% \pm 2.4	57.3% \pm 2.7	52.8% \pm 3.0	-	-	-	-	-	-	-	-	-	-	
75+ yrs.																	
1977 - 83 (n=238)	100%	48.1% \pm 3.5	38.8% \pm 3.7	34.5% \pm 3.8	30.9% \pm 3.9	26.9% \pm 4.0	-	-	-	-	-	-	-	-	-	-	p=0.040
1984 - 90 (n=332)	100%	59.6% \pm 3.0	51.5% \pm 3.2	44.7% \pm 3.4	42.4% \pm 3.6	36.5% \pm 3.6	-	-	-	-	-	-	-	-	-	-	
1991 - 98 (n=597)	100%	59.0% \pm 2.3	49.4% \pm 2.5	41.9% \pm 2.8	34.6% \pm 3.0	30.2% \pm 3.3	-	-	-	-	-	-	-	-	-	-	

* Survival from the primary cancer (see text). ** P value derived from Charles Brown test, or equivalent for multiple samples (see text).

Case outcomes for non-Hodgkin's lymphomas were found in the proportional hazards regression analysis to be determined by age at diagnosis, grade (Working Formulation), and diagnostic period. For Hodgkin's disease, age and diagnostic period were the key predictors. The relative risks of case fatality were found to vary as shown:

A. *Non-Hodgkin's lymphomas*

<i>Predictors</i>	<i>Relative risk (95% confidence limits)</i>
Sex:	
Male (reference)	1.00
Female	0.98 (0.90, 1.08)
Age at diagnosis (yrs.):	
Under 55 (reference)	1.00
55-64	1.51 (1.31, 1.75)
65-74	2.15 (1.89, 2.45)
75+	3.23 (2.82, 3.69)
Grade (Working Formulation):	
Low (reference)	1.00
Medium	1.60 (1.44, 1.79)
High	2.24 (1.92, 2.61)
Diagnostic period:	
1977-83 (reference)	1.00
1984-90	0.76 (0.68, 0.85)
1991-98	0.72 (0.64, 0.81)

B. *Hodgkin's disease*

<i>Predictors</i>	<i>Relative risk (95% confidence limits)</i>
Sex:	
Male (reference)	1.00
Female	0.73 (0.48, 1.09)
Age at diagnosis (yrs.):	
Under 55 (reference)	1.00
55-64	3.79 (2.23, 6.42)
65-74	4.72 (2.77, 8.05)
75+	11.01 (5.84, 20.76)
Histological type:	
Mixed cellularity (reference)	1.00
Lymphocytic depletion	1.76 (0.90, 3.45)
Histiocytic/lymphocytic predominance	0.53 (0.25, 1.13)
Nodular sclerosis	0.92 (0.58, 1.43)
Diagnostic period:	
1977-83 (reference)	1.00
1984-90	0.64 (0.40, 1.02)
1991-98	0.53 (0.32, 0.89)

The reductions in case fatalities for the more recent diagnostic periods have been attributed principally to advances in chemotherapy.²³ In common with many populations, South Australians have experienced an increase in age-sex standardized (World Population) lymphoma incidence, amounting to 38% between 1977-80 and 1997-99. Meanwhile, mortality rates have not risen, due to compensating gains in case survival.

South Australian case survivals from lymphomas (in aggregate) were similar to the survivals reported for other Australian states,^{27,30,37} and the USA (SEER data),²⁸ but they tended to be higher than corresponding European figures.²⁹ Meanwhile, South Australian children aged under 15 years of age at diagnosis had a 74% five-year survival for all lymphomas in aggregate during 1977-98, with a progressive increase occurring across the more recent diagnostic years ($p=0.023$).

2. Hospital-based data

Contributed by:

- the Department of Haematology-Oncology, Queen Elizabeth Hospital.
- the Department of Haematology and Oncology, Flinders Medical Centre.
- the Haematology Unit, Institute of Medical and Veterinary Science.
- the Clinical Haematology Bone Marrow Transplant Unit, Institute of Medical and Veterinary Science.
- the Royal Adelaide Hospital Cancer Centre.

A. Non-Hodgkin's lymphomas

The five-year case survival for the 1,519 NH lymphomas recorded on the hospital registries for 1987-98 was 53%, which was similar to the corresponding 54% for the State as a whole in 1977-98. Meanwhile, the 10-year survival for the hospital series was 42%. Again, lower survivals were anticipated for these specialist centres, due to the selective referral and admission of the more complex cases. The main predictors of lower survivals in the hospital series were: older age at diagnosis; higher grade (Working Formulation); a more advanced Ann Arbor stage; bulk disease; B symptoms (weight loss, unexplained fever, night sweats); elevated levels of lactate dehydrogenase; and involvement of the central nervous system, lung, liver, mediastinum, marrow, lymph nodes or spleen (Table 82). Females tended to have lower survivals than males ($p=0.056$). Trends in case survivals by Ann Arbor stage are shown in Figure 85.

Figure 85: Case survivals from non-Hodgkin's lymphomas by Ann Arbor stage; SA hospital-based registries, 1987-98*

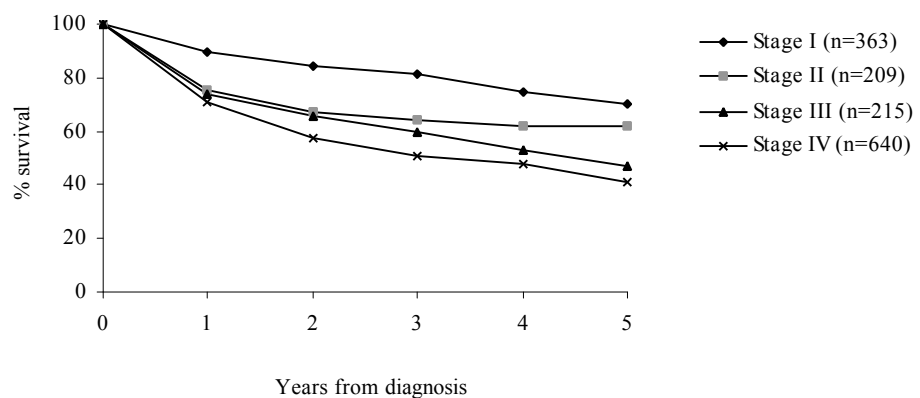


Table 82: Case survivals (\pm SE) from NH lymphomas; SA hospital-based registries, 1987-98*

Category		Period from diagnosis (yrs.)										P value
		1	2	3	4	5	6	7	8	9	10	
All (n=1,519)	100%	76.6% \pm 1.1	66.8% \pm 1.3	61.9% \pm 1.4	57.6% \pm 1.4	52.9% \pm 1.5	49.7% \pm 1.6	47.7% \pm 1.7	45.2% \pm 1.8	43.8% \pm 1.8	41.6% \pm 2.1	-
By sex:												
Males (n=790)	100%	78.5% \pm 1.5	68.9% \pm 1.7	64.2% \pm 1.8	60.0% \pm 2.0	55.2% \pm 2.1	51.8% \pm 2.2	50.6% \pm 2.2	47.5% \pm 2.4	46.6% \pm 2.6	43.3% \pm 3.0	p=0.056
Females (n=729)	100%	74.6% \pm 1.7	64.3% \pm 1.9	59.3% \pm 2.0	55.0% \pm 2.1	50.4% \pm 2.2	47.5% \pm 2.3	44.4% \pm 2.4	42.7% \pm 2.5	40.8% \pm 2.6	39.6% \pm 2.8	
By age (yrs.):												
Under 40 (n=153)	100%	84.9% \pm 3.0	72.8% \pm 3.8	71.9% \pm 3.9	69.0% \pm 4.0	64.9% \pm 4.4	63.5% \pm 4.6	60.2% \pm 4.9	60.2% \pm 4.9	57.8% \pm 5.2	57.8% \pm 5.2	p<0.001
40-54 (n=294)	100%	87.6% \pm 2.0	79.5% \pm 2.5	73.7% \pm 2.8	72.0% \pm 2.9	67.3% \pm 3.2	64.8% \pm 3.4	61.7% \pm 3.7	59.1% \pm 4.0	59.1% \pm 4.0	51.2% \pm 5.5	
55-64 (n=268)	100%	83.1% \pm 2.4	75.0% \pm 2.8	70.4% \pm 3.0	67.2% \pm 3.2	62.8% \pm 3.5	59.2% \pm 3.7	58.1% \pm 3.8	55.3% \pm 4.1	55.3% \pm 4.1	55.3% \pm 4.1	
65-74 (n=427)	100%	74.4% \pm 2.2	62.2% \pm 2.5	57.3% \pm 2.6	52.2% \pm 2.7	47.8% \pm 2.9	43.6% \pm 3.0	42.0% \pm 3.1	40.8% \pm 3.2	39.5% \pm 3.4	37.2% \pm 3.9	
75+ (n=377)	100%	62.2% \pm 2.6	53.5% \pm 2.7	47.3% \pm 2.9	40.3% \pm 3.0	34.1% \pm 3.1	31.2% \pm 3.2	29.2% \pm 3.2	23.8% \pm 3.6	18.8% \pm 4.3	18.8% \pm 4.3	
By residence:												
Adel - mid/lower SES (n=709)	100%	75.4% \pm 1.7	66.1% \pm 1.9	60.7% \pm 2.0	56.2% \pm 2.1	51.7% \pm 2.2	49.2% \pm 2.3	47.9% \pm 2.4	44.7% \pm 2.6	44.7% \pm 2.6	41.1% \pm 3.1	p=0.749
Adel - mid/upper SES (n=439)	100%	76.5% \pm 2.1	65.5% \pm 2.4	61.4% \pm 2.5	57.6% \pm 2.6	54.9% \pm 2.7	50.5% \pm 2.9	48.6% \pm 3.0	45.3% \pm 3.2	42.0% \pm 3.5	40.3% \pm 3.8	
Adelaide (n=1,148)	100%	75.8% \pm 1.3	65.8% \pm 1.5	61.0% \pm 1.6	56.7% \pm 1.6	53.0% \pm 1.7	49.7% \pm 1.8	48.2% \pm 1.9	44.9% \pm 2.0	43.5% \pm 2.1	40.7% \pm 2.4	p=0.264
Country SA (n=371)	100%	79.0% \pm 2.2	69.8% \pm 2.5	64.8% \pm 2.7	60.3% \pm 2.9	52.6% \pm 3.2	49.6% \pm 3.3	46.1% \pm 3.5	46.1% \pm 3.5	44.7% \pm 3.7	44.7% \pm 3.7	
By grade (Working Formulation):												
Low (n=338)	100%	90.7% \pm 1.6	84.6% \pm 2.1	78.3% \pm 2.5	71.3% \pm 2.8	62.7% \pm 3.3	60.0% \pm 3.4	54.8% \pm 3.8	51.2% \pm 4.1	49.8% \pm 4.2	45.2% \pm 4.9	p<0.001
Intermediate (n=887)	100%	72.8% \pm 1.5	61.2% \pm 1.7	56.2% \pm 1.8	52.4% \pm 1.9	48.6% \pm 2.0	44.9% \pm 2.1	43.3% \pm 2.1	41.8% \pm 2.2	39.9% \pm 2.4	37.9% \pm 2.6	
High (n=133)	100	61.9% \pm 4.3	49.3% \pm 4.4	44.9% \pm 4.4	40.4% \pm 4.5	37.8% \pm 4.6	35.2% \pm 4.6	35.2% \pm 4.6	35.2% \pm 4.6	35.2% \pm 4.6	35.2% \pm 4.6	
UK (n=161)	(100%)	(80.7%) (\pm 3.2)	(75.8%) (\pm 3.6)	(75.8%) (\pm 3.6)	(75.8%) (\pm 3.6)	(72.7%) (\pm 4.1)	(72.7%) (\pm 4.1)	(72.7%) (\pm 4.1)	(60.4%) (\pm 7.4)	(60.4%) (\pm 7.4)	(60.4%) (\pm 7.4)	
By Ann Arbor stage:												
I (n=363)	100%	89.9% \pm 1.6	84.0% \pm 2.0	81.0% \pm 2.2	74.8% \pm 2.6	70.1% \pm 2.9	68.9% \pm 2.9	68.9% \pm 2.9	68.9% \pm 2.9	65.2% \pm 3.5	65.2% \pm 3.5	p<0.001
II (n=209)	100%	75.1% \pm 3.1	66.9% \pm 3.4	64.4% \pm 3.5	62.1% \pm 3.6	62.1% \pm 3.6	62.1% \pm 3.6	59.3% \pm 4.0	59.3% \pm 4.0	56.3% \pm 4.7	51.6% \pm 6.3	
III (n=215))	100%	73.9% \pm 3.1	66.0% \pm 3.4	59.4% \pm 3.7	53.0% \pm 3.9	47.1% \pm 4.2	43.4% \pm 4.3	41.9% \pm 4.4	38.1% \pm 4.8	38.1% \pm 4.8	38.1% \pm 4.8	
IV (n=640)	100%	71.2% \pm 1.9	57.7% \pm 2.1	51.1% \pm 2.2	47.5% \pm 2.2	41.3% \pm 2.4	35.7% \pm 2.5	32.0% \pm 2.6	30.1% \pm 2.7	29.3% \pm 2.7	27.1% \pm 2.9	
UK (n=92)	(100%)	(71.2%) (\pm 4.9)	(61.9%) (\pm 5.4)	(59.7%) (\pm 5.6)	(59.7%) (\pm 5.6)	(56.5%) (\pm 6.1)	(53.2%) (\pm 6.6)	(53.2%) (\pm 6.6)	(30.4%) (\pm 10.6)	(30.4%) (\pm 10.6)	(22.8%) (\pm 10.3)	

Table 82 (cont.): Case survivals (\pm SE) from NH lymphomas; SA hospital-based registries, 1987-98*

Category		Period from diagnosis (yrs.)										P value	
		1	2	3	4	5	6	7	8	9	10		
By bulk disease:													
No (n=1,107)	100%	82.2% \pm 1.2	73.8% \pm 1.4	68.9% \pm 1.5	64.2% \pm 1.6	58.3% \pm 1.8	55.5% \pm 1.9	53.5% \pm 2.0	50.4% \pm 2.1	48.3% \pm 2.3	47.5% \pm 2.4	p<0.001	
Yes (n=256)	100%	59.2% \pm 3.2	43.7% \pm 3.2	38.3% \pm 3.2	34.3% \pm 3.2	32.5% \pm 3.2	28.3% \pm 3.2	26.6% \pm 3.3	25.5% \pm 3.3	25.5% \pm 3.3	22.6% \pm 3.5		
UK (n=156)	(100%)	(65.4%) (\pm 4.0)	(54.7%) (\pm 4.4)	(51.4%) (\pm 4.5)	(50.0%) (\pm 4.6)	(48.5%) (\pm 4.7)	(46.8%) (\pm 4.8)	(46.8%) (\pm 4.8)	(43.6%) (\pm 5.4)	(43.6%) (\pm 5.4)	(38.2%) (\pm 7.0)		
By B symptoms:													
No (n=918)	100%	83.8% \pm 1.3	75.3% \pm 1.5	69.5% \pm 1.7	64.5% \pm 1.8	59.7% \pm 1.9	56.5% \pm 2.0	53.7% \pm 2.2	51.0% \pm 2.3	49.2% \pm 2.5	46.3% \pm 2.8	p<0.001	
Yes (n=458)	100%	63.0% \pm 2.3	49.7% \pm 2.5	46.0% \pm 2.5	42.8% \pm 2.6	38.2% \pm 2.6	35.1% \pm 2.7	33.9% \pm 2.7	32.3% \pm 2.8	31.3% \pm 2.9	31.3% \pm 2.9		
UK (n=143)	(100%)	(73.9%) (\pm 3.8)	(67.4%) (\pm 4.2)	(64.6%) (\pm 4.5)	(61.4%) (\pm 4.8)	(57.3%) (\pm 5.3)	(54.9%) (\pm 5.6)	(54.9%) (\pm 5.6)	(51.2%) (\pm 6.3)	(51.2%) (\pm 6.3)	(44.8%) (\pm 8.1)		
By cell markers:													
T cell (n=112)	100%	76.6% \pm 4.1	68.4% \pm 4.6	63.7% \pm 4.8	59.8% \pm 5.0	58.2% \pm 5.2	56.0% \pm 5.4	56.0% \pm 5.4	52.0% \pm 6.3	52.0% \pm 6.3	52.0% \pm 6.3	p=0.367	
B cell (n=521)	100%	78.8% \pm 1.9	68.5% \pm 2.2	61.4% \pm 2.4	56.8% \pm 2.5	52.3% \pm 2.7	49.0% \pm 2.8	47.8% \pm 2.9	44.1% \pm 3.1	44.1% \pm 3.1	40.7% \pm 3.7		
Other or UK (n=886)	(100%)	(75.4%) (\pm 1.5)	(65.6%) (\pm 1.7)	(61.9%) (\pm 1.7)	(57.8%) (\pm 1.8)	(52.5%) (\pm 2.0)	(49.3%) (\pm 2.1)	(46.5%) (\pm 2.2)	(45.1%) (\pm 2.3)	(42.7%) (\pm 2.4)	(40.9%) (\pm 2.6)		
By CNS involvement:													
No (n=1,474)	100%	77.3% \pm 1.1	67.5% \pm 1.3	62.6% \pm 1.4	58.2% \pm 1.4	53.5% \pm 1.5	50.3% \pm 1.6	48.1% \pm 1.7	46.4% \pm 1.8	44.9% \pm 1.9	43.1% \pm 2.1	p<0.001	
Yes (n=20)	100%	35.0% \pm 10.7	25.0% \pm 9.7	25.0% \pm 9.7	25.0% \pm 9.7	16.7% \pm 9.4	8.3% \pm 7.5	8.3% \pm 7.5	8.3% \pm 7.5	8.3% \pm 7.5	8.3% \pm 7.5		
UK (n=25)	(100%)	(70.3%) (\pm 9.5)	(59.4%) (\pm 10.7)	(53.5%) (\pm 11.1)	(53.5%) (\pm 11.1)	(45.9%) (\pm 11.9)	(45.9%) (\pm 11.9)	(45.9%) (\pm 11.9)	(27.5%) (\pm 12.3)	(27.5%) (\pm 12.3)	(-)		
By lung involvement:													
No (n=1,401)	100%	78.0% \pm 1.1	68.5% \pm 1.3	63.7% \pm 1.4	59.3% \pm 1.5	54.7% \pm 1.6	51.5% \pm 1.7	49.3% \pm 1.7	47.2% \pm 1.8	45.7% \pm 1.9	43.8% \pm 2.1	p<0.001	
Yes (n=91)	100%	57.8% \pm 5.3	43.8% \pm 5.5	37.3% \pm 5.5	33.3% \pm 5.6	26.4% \pm 5.7	23.1% \pm 5.9	23.1% \pm 5.9	23.1% \pm 5.9	23.1% \pm 5.9	23.1% \pm 5.9		
UK (n=27)	(100%)	(67.8%) (\pm 9.4)	(57.3%) (\pm 10.5)	(51.6%) (\pm 10.9)	(51.6%) (\pm 10.9)	(44.2%) (\pm 11.6)	(44.2%) (\pm 11.6)	(44.2%) (\pm 11.6)	(26.5%) (\pm 11.9)	(26.5%) (\pm 11.9)	(-)		
By liver involvement:													
No (n=1,387)	100%	77.9% \pm 1.2	68.8% \pm 1.3	63.8% \pm 1.4	59.3% \pm 1.5	54.8% \pm 1.6	51.7% \pm 1.7	49.4% \pm 1.7	47.6% \pm 1.8	46.1% \pm 1.9	44.2% \pm 2.1	p<0.001	
Yes (n=108)	100%	60.7% \pm 4.9	41.8% \pm 5.1	39.0% \pm 5.1	35.6% \pm 5.2	29.3% \pm 5.4	25.0% \pm 5.4	25.0% \pm 5.4	21.4% \pm 5.7	21.4% \pm 5.7	21.4% \pm 5.7		
UK (n=24)	(100%)	(73.7%) (\pm 9.3)	(62.4%) (\pm 10.8)	(56.1%) (\pm 11.3)	(56.1%) (\pm 11.3)	(48.1%) (\pm 12.2)	(48.1%) (\pm 12.2)	(48.1%) (\pm 12.2)	(28.9%) (\pm 12.8)	(28.9%) (\pm 12.8)	(-)		

Table 82 (cont.): Case survivals (\pm SE) from NH lymphomas; SA hospital-based registries, 1987-98*

Category	Period from diagnosis (yrs.)										P value	
	1	2	3	4	5	6	7	8	9	10		
By mediastinum involvement:												
No (n=1,290)	100%	77.4% \pm 1.2	68.6% \pm 1.4	63.6% \pm 1.5	59.1% \pm 1.5	54.4% \pm 1.6	51.6% \pm 1.7	49.2% \pm 1.8	46.9% \pm 1.9	45.2% \pm 2.0	44.6% \pm 2.1	p<0.005
Yes (n=208)	100%	72.1% \pm 3.2	56.1% \pm 3.7	52.3% \pm 3.8	48.5% \pm 4.0	43.6% \pm 4.3	37.8% \pm 4.6	37.8% \pm 4.6	37.8% \pm 4.6	37.8% \pm 4.6	29.4% \pm 6.3	
UK (n=21)	(100%)	(70.4%) (\pm 10.2)	(59.5%) (\pm 11.1)	(53.6%) (\pm 11.5)	(53.6%) (\pm 11.5)	(45.9%) (\pm 12.1)	(45.9%) (\pm 12.1)	(27.6%) (\pm 12.4)	(27.6%) (\pm 12.4)	(-)		
By marrow involvement:												
No (n=1,057)	100%	76.2% \pm 1.3	67.9% \pm 1.5	64.2% \pm 1.6	59.8% \pm 1.7	56.0% \pm 1.8	53.7% \pm 1.8	52.0% \pm 1.9	50.5% \pm 2.0	49.0% \pm 2.1	48.1% \pm 2.2	p<0.005
Yes (n=440)	100%	78.0% \pm 2.1	64.3% \pm 2.5	56.5% \pm 2.7	52.4% \pm 2.7	45.3% \pm 3.0	39.6% \pm 3.1	36.3% \pm 3.3	33.2% \pm 3.5	32.1% \pm 3.5	28.4% \pm 4.0	
UK (n=22)	(100%)	(70.4%) (\pm 10.2)	(57.6%) (\pm 11.7)	(50.4%) (\pm 12.3)	(50.4%) (\pm 12.3)	(40.3%) (\pm 13.3)	(40.3%) (\pm 13.3)	(20.2%) (\pm 12.1)	(20.2%) (\pm 12.1)	(-)		
By nodal involvement:												
No (n=480)	100%	77.0% \pm 2.0	67.0% \pm 2.3	64.5% \pm 2.3	61.1% \pm 2.4	57.3% \pm 2.6	55.2% \pm 2.7	55.2% \pm 2.7	52.8% \pm 2.9	50.6% \pm 3.2	49.1% \pm 3.4	p=0.051
Yes (n=1,016)	100%	76.5% \pm 1.4	66.8% \pm 1.6	60.7% \pm 1.7	55.9% \pm 1.8	50.8% \pm 1.9	47.0% \pm 2.0	43.9% \pm 2.1	42.1% \pm 2.2	41.0% \pm 2.3	39.2% \pm 2.5	
UK (n=23)	(100%)	(73.2%) (\pm 9.4)	(62.0%) (\pm 10.8)	(55.8%) (\pm 11.4)	(55.8%) (\pm 11.4)	(47.8%) (\pm 12.2)	(47.8%) (\pm 12.2)	(28.7%) (\pm 12.8)	(28.7%) (\pm 12.8)	(-)		
By spleen involvement:												
No (n=1,230)	100%	78.6% \pm 1.2	70.2% \pm 1.4	65.5% \pm 1.5	61.3% \pm 1.6	57.1% \pm 1.7	53.8% \pm 1.8	52.0% \pm 1.8	49.9% \pm 1.9	48.7% \pm 2.0	47.2% \pm 2.2	p<0.001
Yes (n=267)	100%	67.3% \pm 3.0	50.8% \pm 3.3	45.4% \pm 3.4	40.3% \pm 3.4	33.6% \pm 3.5	31.0% \pm 3.5	27.7% \pm 3.6	26.3% \pm 3.7	24.6% \pm 3.9	22.1% \pm 4.2	
UK (n=22)	(100%)	(76.6%) (\pm 9.2)	(64.8%) (\pm 10.9)	(58.3%) (\pm 11.6)	(58.3%) (\pm 11.6)	(50.0%) (\pm 12.6)	(50.0%) (\pm 12.6)	(30.0%) (\pm 13.3)	(30.0%) (\pm 13.3)	(-)		
By other site involvement:												
No (n=822)	100%	79.6% \pm 1.5	69.9% \pm 1.7	64.3% \pm 1.8	59.1% \pm 1.9	53.6% \pm 2.1	49.4% \pm 2.2	46.5% \pm 2.3	43.5% \pm 2.4	41.5% \pm 2.6	39.5% \pm 2.8	p=0.424
Yes (n=677)	100%	73.0% \pm 1.8	63.0% \pm 2.0	59.2% \pm 2.1	56.0% \pm 2.1	52.5% \pm 2.3	50.5% \pm 2.3	49.6% \pm 2.4	49.0% \pm 2.4	48.2% \pm 2.5	45.8% \pm 2.9	
UK (n=20)	(100%)	(78.5%) (\pm 9.6)	(64.2%) (\pm 12.0)	(55.1%) (\pm 13.4)	(55.1%) (\pm 13.4)	(55.1%) (\pm 13.4)	(36.7%) (\pm 17.4)	(36.7%) (\pm 17.4)	(-)	(-)	(-)	
By lactate dehydrogenase:												
Under 236 IU (n=533)	100%	90.0% \pm 1.3	82.4% \pm 1.7	77.3% \pm 2.0	72.4% \pm 2.2	68.2% \pm 2.4	64.7% \pm 2.6	62.2% \pm 2.8	56.9% \pm 3.3	56.9% \pm 3.3	52.2% \pm 4.4	p<0.001
236 IU+ (n=375)	100%	56.1% \pm 2.6	42.7% \pm 2.7	39.2% \pm 2.7	36.1% \pm 2.7	33.1% \pm 2.7	30.9% \pm 2.8	29.4% \pm 2.8	28.3% \pm 2.9	27.0% \pm 3.1	27.0% \pm 3.1	
UK (n=611)	(100%)	(77.6%) (\pm 1.7)	(68.2%) (\pm 2.0)	(62.6%) (\pm 2.2)	(58.1%) (\pm 2.3)	(51.7%) (\pm 2.5)	(48.2%) (\pm 2.6)	(46.3%) (\pm 2.7)	(44.4%) (\pm 2.8)	(42.9%) (\pm 2.9)	(40.7%) (\pm 3.1)	
By diagnostic year:												
1987-91 (n=564)	100%	73.5% \pm 1.9	64.8% \pm 2.0	59.2% \pm 2.1	55.3% \pm 2.2	50.8% \pm 2.2	47.5% \pm 2.2	45.7% \pm 2.2	43.4% \pm 2.2	42.0% \pm 2.3	39.9% \pm 2.4	p=0.110
1992-98 (n=955)	100%	78.6% \pm 1.4	68.0% \pm 1.6	63.8% \pm 1.8	59.0% \pm 1.9	54.2% \pm 2.2	51.8% \pm 2.4	-	-	-	-	

* P values derived from Cox proportional hazards regression (data in brackets excluded).

A multivariate proportional hazards regression analysis indicated that the key predictors of case fatality were age, stage, grade, B symptoms, bulk disease, level of lactate dehydrogenase, and involvement of the central nervous system, lung and possibly, liver. Relative risks were found to vary as follows:

<i>Predictors</i>	<i>Relative risk (95% confidence limits)</i>
Age at diagnosis (yrs.):	
Under 55 (reference)	1.00
55-64	1.27 (0.95, 1.71)
65-74	2.27 (1.76, 2.91)
75+	3.97 (3.09, 5.11)
Ann Arbor stage:	
I (reference)	1.00
II	1.63 (1.16, 2.28)
III	2.30 (1.67, 3.17)
IV	2.31 (1.75, 3.05)
Grade (Working Formulation):	
Low (reference)	1.00
Medium	1.55 (1.22, 1.98)
High	1.66 (1.18, 2.35)
B symptoms:	
No (reference)	1.00
Yes	1.25 (1.03, 1.51)
Bulk disease:	
No (reference)	1.00
Yes	1.77 (1.44, 2.16)
Lactate dehydrogenase:	
Low (reference)	1.00
High (236 IU +)	1.97 (1.55, 2.51)
CNS involvement:	
No (reference)	1.00
Yes	3.07 (1.81, 5.21)
Lung involvement:	
No (reference)	1.00
Yes	1.50 (1.11, 2.03)
Liver involvement:	
No (reference)	1.00
Yes	1.30 (0.95, 1.77)
Diagnostic period:	
1987-91 (reference)	1.00
1992-98	1.01 (0.84, 1.21)

While diagnostic period was not predictive of outcome, this could have been due to a disproportionate inclusion of progressively more complex cases in the more recent periods, including cases with significant comorbid conditions. Notably, cases treated on an outpatient basis were less likely to have been recorded on the hospital-based registries. In most hospitals, there has been a trend towards outpatient as opposed to inpatient care for cases where this former option is feasible.

Overall, 12% of cases had surgery as part of their primary course of treatment, whereas 19% had radiotherapy, 76% had chemotherapy, and 13% received none of these primary treatments. USA hospital-registry data circa 1990 pointed to a slightly higher proportion receiving radiotherapy (26%), but a lower proportion having chemotherapy (57%).³²

Further details of the primary treatment of the present South Australian case series are provided in Table 83. Key predictors of individual modes of treatment were as follows:

- For none of these treatments being provided: male sex; older age at diagnosis; low-grade disease; absence of bulk disease; no B symptoms (weight loss, unexplained fever, night sweats); no mediastinum involvement; no nodal involvement; and a low level of lactate dehydrogenase.
- For surgery: a low Ann Arbor stage; B-cell as opposed to T-cell markers; and "other" site involvement; but not involvement of the liver, mediastinum, marrow or lymph nodes. Surgery also tended to be more common for cases with a low level of lactate dehydrogenase.
- For radiotherapy: intermediate or high-grade disease; a low stage; absence of bulk disease; no B symptoms; and CNS or "other" site involvement, but not involvement of the liver, mediastinum, marrow, lymph nodes or spleen.
- For chemotherapy: younger age at diagnosis; residence in a country area as opposed to Adelaide; higher-grade disease; an Ann Arbor stage of II or higher; bulk disease; B symptoms; a high level of lactate dehydrogenase; and involvement of the mediastinum, marrow, lymph nodes or spleen.

Table 83: Percentage of NH lymphoma cases by treatment mode as part of the primary course of care; SA hospital-based registries, 1987-98*

Category	No treatment	% receiving any			% receiving combination and single therapies						
		surg. (s)	radio. (r)	chemo. (c)	src	sr	sc	rc	s	r	c
All (n=1,519)	12.7%	11.8%	19.0%	75.9%	0.9%	0.8%	4.9%	11.9%	5.1%	5.4%	58.2%
By sex:											
Males (n=790)	15.3%	10.9%	17.5%	76.0%	0.9%	0.7%	5.2%	12.0%	4.1%	3.9%	57.9%
Females (n=729)	9.9%	12.8%	20.8%	75.8%	0.9%	1.0%	4.6%	11.8%	6.2%	7.1%	58.5%
P value	0.002	0.280	0.113	0.916	0.900	0.476	0.627	0.886	0.071	0.007	0.811
By age (yrs.):											
Under 40 (n=153)	4.7%	8.8%	24.3%	87.8%	0.7%	1.4%	6.1%	16.9%	0.7%	5.4%	64.2%
40-54 (n=294)	8.8%	11.7%	19.3%	83.2%	2.6%	0.4%	5.8%	11.7%	2.9%	4.7%	63.1%
55-64 (n=268)	8.6%	12.5%	20.3%	81.3%	0.4%	0.8%	5.9%	15.2%	5.5%	3.9%	59.8%
65-74 (n=427)	12.9%	11.4%	16.7%	76.5%	0.8%	0.3%	4.6%	11.1%	5.8%	4.6%	60.0%
75+ (n=377)	21.6%	13.1%	18.3%	61.2%	0.3%	1.6%	3.6%	8.5%	7.7%	7.9%	48.9%
P value	<0.001	0.308	0.143	<0.001	0.050	0.348	0.097	0.008	<0.001	0.092	<0.001
By residence:											
Adel - mid/lower SES (n=709)	13.2%	12.3%	18.8%	76.2%	0.9%	1.2%	5.0%	12.6%	5.3%	4.2%	57.8%
Adel - mid/upper SES (n=439)	11.6%	10.6%	19.6%	75.1%	1.0%	0.0%	4.8%	10.1%	4.8%	8.5%	59.2%
P value	0.416	0.376	0.748	0.666	1.000	0.024	0.909	0.195	0.734	0.001	0.620
Adelaide (n=1,148)	12.9%	12.4%	18.5%	74.6%	0.9%	0.7%	5.3%	10.5%	5.4%	6.3%	57.9%
Country SA (n=371)	12.1%	10.1%	20.7%	79.8%	0.9%	1.2%	3.7%	16.1%	4.3%	2.6%	59.1%
P value	0.694	0.252	0.352	0.049	1.000	0.498	0.241	0.005	0.427	0.008	0.692
By grade (Working Formulation):											
Low (n=338)	19.7%	11.6%	11.6%	67.2%	0.6%	0.6%	2.8%	5.3%	7.5%	5.0%	58.4%
Intermediate (n=887)	7.2%	12.1%	22.1%	81.3%	0.8%	1.2%	5.7%	14.3%	4.5%	5.9%	60.5%
High (n=133)	8.7%	11.8%	20.5%	87.4%	3.1%	0.0%	5.5%	16.5%	3.1%	0.8%	62.2%
UK (n=161)	(33.6%)	(10.5%)	(16.1%)	(53.1%)	(0.0%)	(0.0%)	(4.9%)	(8.4%)	(5.6%)	(7.7%)	(39.9%)
P value	<0.001	0.859	<0.001	<0.001	0.070	0.992	0.077	<0.001	0.022	0.338	0.414
By Ann Arbor stage:											
I (n=363)	13.6%	24.0%	35.3%	55.2%	1.4%	3.2%	6.4%	15.6%	13.0%	15.0%	31.8%
II (n=209)	6.0%	9.5%	19.1%	87.4%	1.0%	0.5%	5.0%	14.6%	3.0%	3.0%	66.8%
III (n=215)	9.2%	7.2%	10.6%	87.0%	0.5%	0.0%	4.3%	8.7%	2.4%	1.4%	73.4%
IV (n=640)	12.6%	7.6%	13.6%	82.9%	0.8%	0.0%	4.4%	10.7%	2.3%	2.1%	67.0%
UK (n=92)	(35.9%)	(9.0%)	(11.5%)	(53.8%)	(0.0%)	(0.0%)	(3.8%)	(6.4%)	(5.1%)	(5.1%)	(43.6%)
P value	0.700	<0.001	<0.001	<0.001	0.383	<0.001	0.220	0.021	<0.001	<0.001	<0.001
By bulk disease:											
No (n=1,107)	13.5%	12.0%	22.0%	73.3%	1.0%	0.9%	4.3%	13.5%	5.8%	6.6%	54.5%
Yes (n=256)	8.4%	10.0%	13.1%	86.5%	0.8%	0.8%	6.0%	9.6%	2.4%	2.0%	70.1%
UK (n=156)	(14.7%)	(14.0%)	(7.4%)	(76.5%)	(0.0%)	(0.7%)	(8.1%)	(3.7%)	(5.1%)	(2.9%)	(64.7%)
P value	0.027	0.370	0.002	<0.001	1.000	1.000	0.249	0.093	0.028	0.005	<0.001
B symptoms:											
No (n=918)	13.3%	12.8%	22.5%	72.3%	1.0%	1.3%	4.6%	13.0%	5.9%	7.2%	53.7%
Yes (n=458)	8.8%	10.4%	11.1%	86.9%	0.7%	0.0%	6.1%	9.7%	3.6%	0.7%	70.4%
UK (n=143)	(23.0%)	(9.8%)	(23.0%)	(61.5%)	(0.8%)	(0.8%)	(3.3%)	(11.5%)	(4.9%)	(9.8%)	(45.9%)
P value	0.018	0.207	<0.001	<0.001	0.760	0.020	0.231	0.081	0.072	<0.001	<0.001
By cell markers:											
T cell (n=112)	9.4%	4.7%	25.5%	84.9%	0.0%	0.0%	2.8%	21.7%	1.9%	3.8%	60.4%
B cell (n=521)	11.1%	11.7%	22.0%	79.1%	1.0%	0.8%	6.8%	14.2%	3.1%	6.0%	57.1%
Other or UK (n=886)	(14.1%)	(12.8%)	(16.5%)	(72.9%)	(0.9%)	(0.9%)	(4.1%)	(9.3%)	(6.7%)	(5.3%)	(58.5%)
P value	0.619	0.033	0.435	0.172	0.592	1.000	0.123	0.052	0.750	0.375	0.534
By CNS involvement:											
No (n=1,474)	12.5%	12.0%	18.8%	75.9%	0.9%	0.9%	4.9%	11.6%	5.3%	5.4%	58.5%
Yes (n=20)	10.5%	0.0%	47.4%	84.2%	0.0%	0.0%	0.0%	42.1%	0.0%	5.3%	42.1%
UK (n=25)	(28.6%)	(9.5%)	(9.5%)	(66.7%)	(0.0%)	(0.0%)	(9.5%)	(4.8%)	(0.0%)	(4.8%)	(52.4%)
P value	1.000	0.154	0.005	0.589	1.000	1.000	1.000	<0.001	0.620	1.000	0.151

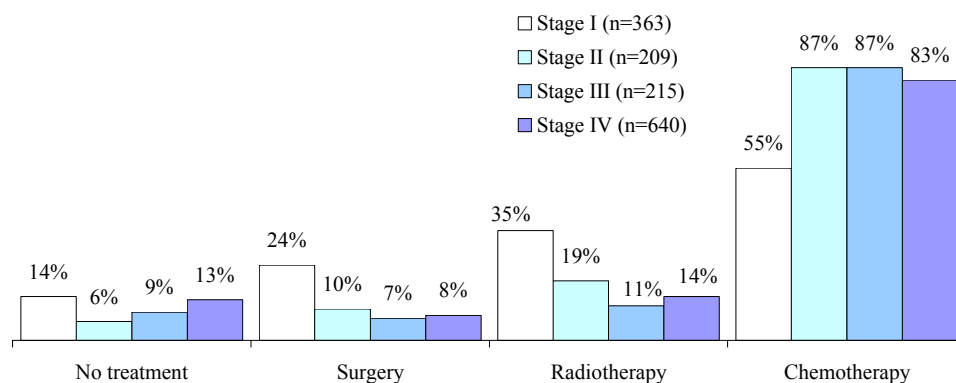
Table 83 (cont.): Percentage of NH lymphoma cases by treatment mode as part of the primary course of care; SA hospital-based registries, 1987-98*

Category	No treatment	% receiving any			% receiving combination and single therapies						
		surg. (s)	radio. (r)	chemo. (c)	src	sr	sc	rc	s	r	c
By lung involvement:											
No (n=1,401)	12.3%	12.3%	19.6%	75.6%	0.9%	0.9%	5.0%	12.0%	5.5%	5.8%	57.7%
Yes (n=91)	15.1%	5.8%	12.8%	83.7%	1.2%	0.0%	3.5%	11.6%	1.2%	0.0%	67.4%
UK (n=27)	(30.4%)	(8.7%)	(8.7%)	(65.2%)	(0.0%)	(0.0%)	(8.7%)	(4.3%)	(0.0%)	(4.3%)	(52.2%)
P value	0.436	0.073	0.119	0.086	0.559	1.000	0.795	0.911	0.126	0.012	0.075
By liver involvement:											
No (n=1,387)	12.3%	12.5%	20.4%	75.6%	1.0%	0.9%	5.2%	12.7%	5.4%	5.8%	56.7%
Yes (n=108)	13.5%	3.8%	3.8%	82.7%	0.0%	0.0%	1.0%	2.9%	2.9%	1.0%	78.8%
UK (n=24)	(35.0%)	(5.0%)	(10.0%)	(60.0%)	(0.0%)	(0.0%)	(5.0%)	(5.0%)	(0.0%)	(5.0%)	(50.0%)
P value	0.734	0.008	<0.001	0.102	0.616	1.000	0.052	0.003	0.267	0.037	<0.001
By mediastinum involvement:											
No (n=1,290)	13.8%	12.9%	20.0%	73.1%	1.0%	1.0%	5.0%	11.8%	6.0%	6.2%	55.3%
Yes (n=208)	4.1%	5.6%	14.2%	94.9%	0.5%	0.0%	4.6%	13.2%	0.5%	0.5%	76.6%
UK (n=21)	(35.3%)	(5.9%)	(5.9%)	(58.8%)	(0.0%)	(0.0%)	(5.9%)	(0.0%)	(0.0%)	(5.9%)	(52.9%)
P value	<0.001	0.003	0.056	<0.001	1.000	0.391	0.805	0.586	0.001	0.001	<0.001
By marrow involvement:											
No (n=1,057)	11.8%	13.8%	21.9%	73.8%	1.1%	1.2%	5.1%	12.9%	6.5%	6.7%	54.7%
Yes (n=440)	13.9%	7.2%	12.2%	81.5%	0.5%	0.0%	4.6%	9.4%	2.2%	2.4%	67.1%
UK (n=22)	(35.3%)	(5.9%)	(17.6%)	(58.8%)	(0.0%)	(0.0%)	(5.9%)	(11.8%)	(0.0%)	(5.9%)	(41.2%)
P value	0.282	<0.001	<0.001	0.002	0.367	0.023	0.681	0.057	<0.001	0.001	<0.001
By nodal involvement:											
No (n=480)	16.4%	17.5%	30.1%	63.3%	1.8%	2.4%	5.1%	16.2%	8.2%	9.7%	40.3%
Yes (n=1,016)	10.6%	9.3%	13.9%	82.0%	0.5%	0.1%	4.9%	9.9%	3.8%	3.4%	66.7%
UK (n=23)	(31.6%)	(5.3%)	(15.8%)	(63.2%)	(0.0%)	(0.0%)	(5.3%)	(10.5%)	(0.0%)	(5.3%)	(47.4%)
P value	0.002	<0.001	<0.001	<0.001	0.032	<0.001	0.850	<0.001	<0.001	<0.001	<0.001
By spleen involvement:											
No (n=1,230)	12.5%	12.3%	21.6%	74.7%	0.9%	1.0%	4.9%	13.1%	5.4%	6.4%	55.7%
Yes (n=267)	12.5%	10.5%	8.2%	82.5%	0.8%	0.0%	5.4%	6.6%	4.3%	0.8%	69.6%
UK (n=22)	(33.3%)	(0.0%)	(11.1%)	(61.1%)	(0.0%)	(0.0%)	(0.0%)	(5.6%)	(0.0%)	(5.6%)	(55.6%)
P value	0.998	0.426	<0.001	0.008	1.000	0.139	0.714	0.004	0.460	<0.001	<0.001
By other site involvement:											
No (n=822)	13.9%	9.3%	13.7%	77.0%	0.8%	0.1%	3.5%	8.8%	4.9%	4.0%	63.9%
Yes (n=677)	10.7%	15.1%	25.9%	74.9%	1.1%	1.7%	6.7%	15.9%	5.6%	7.2%	51.2%
UK (n=20)	(35.3%)	(5.9%)	(11.8%)	(58.8%)	(0.0%)	(0.0%)	(5.9%)	(5.9%)	(0.0%)	(5.9%)	(47.1%)
P value	0.068	<0.001	<0.001	0.341	0.483	<0.001	0.006	<0.001	0.586	0.010	<0.001
By lactate dehydrogenase:											
Under 236 IU (n=533)	15.4%	14.4%	20.6%	70.0%	1.2%	1.0%	4.2%	12.8%	8.0%	5.6%	51.8%
236 IU+ (n=375)	10.0%	6.0%	16.6%	87.4%	1.1%	0.0%	3.4%	14.3%	1.4%	1.1%	68.6%
UK (n=611)	(12.1%)	(13.1%)	(19.2%)	(74.0%)	(0.5%)	(1.2%)	(6.5%)	(9.7%)	(4.9%)	(7.8%)	(57.4%)
P value	0.022	<0.001	0.140	<0.001	1.000	0.081	0.567	0.532	<0.001	<0.001	<0.001
By diagnostic year:											
1987-91 (n=564)	12.3%	11.8%	17.5%	74.8%	0.4%	0.9%	5.0%	9.8%	5.5%	6.4%	59.7%
1992-98 (n=955)	12.9%	11.8%	20.0%	76.6%	1.2%	0.8%	4.9%	13.2%	4.9%	4.8%	57.3%
P value	0.737	0.980	0.245	0.441	0.148	0.772	0.958	0.053	0.609	0.181	0.368

* Treatment details complete for 95% of cases.
Derivation of P values (see text) (data in brackets excluded).

Stage-specific treatment modes are shown in Figure 86.

Figure 86: % non-Hodgkin's lymphoma cases by Ann Arbor stage and treatment mode as part of the primary course of care; SA hospital-based registries, 1987-98



In a previous analysis of 1987-95 data, the most common chemotherapy treatments of these cases were found to involve CHOP or CHOP-BLEO (46%), chlorambucil (\pm prednisolone) (23%), MACOP-B (5%), CMOPP (4%), and COP (4%), whereas other agents less frequently used included CVP (V=vinblastine), cyclophosphamide, M3, and M-BACOD. Data for more recent years also indicated that the most common chemotherapy treatments involved CHOP or CHOP-BLEO (45%). For the initial treatment, the most common regimen included CHOP or CHOP-BLEO (56%), whereas other regimens frequently involved chlorambucil (\pm prednisolone) (21%), and COP (8%). For subsequent treatments, lower proportions involved CHOP or CHOP-BLEO (21%), chlorambucil (\pm prednisolone) (10%), and COP (2%), with other agents such as DHAP being used more frequently than for initial treatments.

Further analyses of the chemotherapy data would be appropriate by grade of lymphoma. It would be anticipated, for example, that CHOP may be a more common choice for intermediate-grade lymphomas, whereas chlorambucil and prednisolone would be largely restricted to low-grade cases. Apart from this, the agent used in first-line therapy often would determine the agent to be used subsequently. Accordingly, the patterns of agents used, and also their associations with transplantation, could be explored.

B. Hodgkin's disease

The 212 cases of Hodgkin's disease registered on the hospital registries for 1987-98 had a five-year survival of 86% and 10-year survival of 81%. The corresponding five-year survival was 82% for the State as a whole in 1977-98. The main predictors of lower survivals in the hospital series were: older age at diagnosis; a more advanced Ann Arbor stage; and elevated levels of lactate dehydrogenase (Table 84). Histology type also was an outcome predictor, with nodular sclerosis being associated with higher than normative case survivals. While spleen involvement tended to relate to a lower survival ($p=0.063$), a reverse association was suggested for mediastinum involvement ($p=0.018$). Stage-specific survival trends are shown in Figure 87.

Table 84: Case survivals (\pm SE) from Hodgkin's disease; SA hospital-based registries, 1987-98*

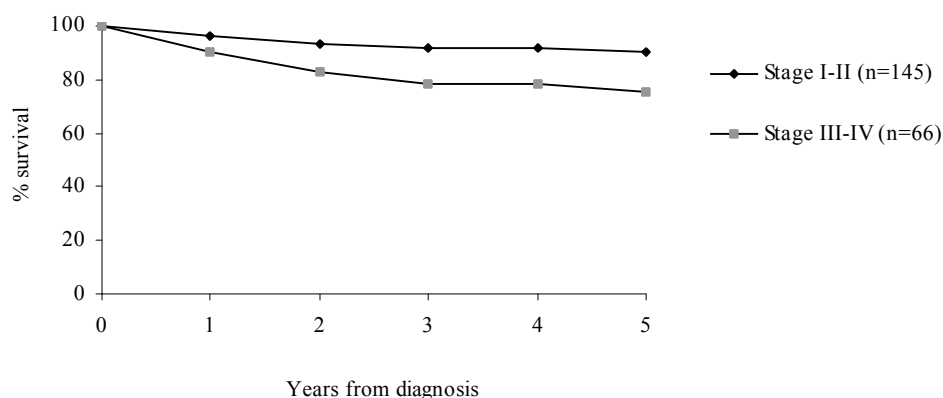
Category		Period from diagnosis (yrs.)										P value
		1	2	3	4	5	6	7	8	9	10	
All (n=212)	100%	94.5% \pm 1.6	90.0% \pm 2.2	88.0% \pm 2.4	88.0% \pm 2.4	86.2% \pm 2.7	86.2% \pm 2.7	86.2% \pm 2.7	83.3% \pm 3.3	81.3% \pm 3.3	81.3% \pm 3.3	-
By sex:												
Males (n=113)	100%	95.1% \pm 2.1	88.6% \pm 3.2	86.1% \pm 3.6	86.1% \pm 3.6	84.4% \pm 3.9	84.4% \pm 3.9	84.4% \pm 3.9	78.8% \pm 5.3	75.0% \pm 6.2	75.0% \pm 6.2	p=0.257
Females (n=99)	100%	93.7% \pm 2.5	91.5% \pm 2.9	90.1% \pm 3.2	90.1% \pm 3.2	88.2% \pm 3.6	88.2% \pm 3.6	88.2% \pm 3.6	88.2% \pm 3.6	88.2% \pm 3.6	88.2% \pm 3.6	
By age (yrs.):												
Under 40 (n=129)	100%	99.2% \pm 0.8	96.5% \pm 1.7	95.4% \pm 2.0	95.4% \pm 2.0	93.8% \pm 2.5	93.8% \pm 2.5	93.8% \pm 2.5	93.8% \pm 2.5	90.6% \pm 4.0	90.6% \pm 4.0	p<0.001
40-54 (n=33)	100%	100% \pm 3.6	96.3% \pm 3.6	96.3% \pm 3.6	96.3% \pm 3.6	90.6% \pm 6.5	90.6% \pm 6.5	83.1% \pm 9.4	83.1% \pm 9.4	83.1% \pm 9.4	83.1% \pm 9.4	
55-64 (n=20)	100%	88.2% \pm 7.8	75.5% \pm 10.7	68.6% \pm 11.7	68.6% \pm 11.7	68.6% \pm 11.7	68.6% \pm 11.7	68.6% \pm 11.7	57.2% \pm 14.3	57.2% \pm 14.3	57.2% \pm 14.3	
65-74 (n=20)	100%	71.3% \pm 10.9	65.3% \pm 11.5	58.8% \pm 12.1	58.8% \pm 12.1	58.8% \pm 12.1	58.8% \pm 12.1	58.8% \pm 12.1	-	-	-	
75+ (n=10)	100%	66.7% \pm 15.7	53.3% \pm 17.3	53.3% \pm 17.3	53.3% \pm 17.3	-	-	-	-	-	-	
By residence:												
Adel - mid/lower SES (n=100)	100%	95.8% \pm 2.1	93.4% \pm 2.6	93.4% \pm 2.6	93.4% \pm 2.6	91.4% \pm 3.2	91.4% \pm 3.2	91.4% \pm 3.2	91.4% \pm 3.2	87.0% \pm 5.2	87.0% \pm 5.2	p=0.221
Adel - mid/upper SES (n=62)	100%	96.5% \pm 2.4	88.8% \pm 4.3	82.2% \pm 5.4	82.2% \pm 5.4	82.2% \pm 5.4	82.2% \pm 5.4	82.2% \pm 5.4	82.2% \pm 5.4	82.2% \pm 5.4	82.2% \pm 5.4	
Adelaide (n=162)	100%	96.0% \pm 1.6	91.6% \pm 2.3	89.1% \pm 2.7	89.1% \pm 2.7	87.9% \pm 2.9	87.9% \pm 2.9	87.9% \pm 2.9	87.9% \pm 2.9	85.2% \pm 3.9	85.2% \pm 3.9	p=0.118
Country SA (n=50)	100%	89.3% \pm 4.5	84.6% \pm 5.4	84.6% \pm 5.4	84.6% \pm 5.4	80.8% \pm 6.4	80.8% \pm 6.4	80.8% \pm 6.4	69.2% \pm 9.3	69.2% \pm 9.3	69.2% \pm 9.3	
By Ann Arbor stage:												
I (n=43)	100%	100% \pm 2.5	97.4% \pm 3.8	94.5% \pm 3.8	94.5% \pm 3.8	94.5% \pm 3.8	94.5% \pm 3.8	94.5% \pm 3.8	81.0% \pm 9.4	69.4% \pm 13.4	69.4% \pm 13.4	p=0.003
II (n=102)	100%	94.8% \pm 2.3	91.1% \pm 3.0	91.1% \pm 3.0	91.1% \pm 3.0	89.0% \pm 3.6	89.0% \pm 3.6	89.0% \pm 3.6	89.0% \pm 3.6	89.0% \pm 3.6	89.0% \pm 3.6	
III (n=34)	100%	93.8% \pm 4.3	93.8% \pm 4.3	93.8% \pm 4.3	93.8% \pm 4.3	93.8% \pm 4.3	93.8% \pm 4.3	93.8% \pm 4.3	93.8% \pm 4.3	93.8% \pm 4.3	93.8% \pm 4.3	
IV (n=32)	100%	86.9% \pm 6.1	71.5% \pm 8.7	62.2% \pm 9.7	62.2% \pm 9.7	56.0% \pm 10.6	56.0% \pm 10.6	56.0% \pm 10.6	56.0% \pm 10.6	56.0% \pm 10.6	56.0% \pm 10.6	
UK (n=1)	(100%)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	
By histological type:												
Lymphocytic (n=9)	100%	100% \pm 15.2	83.3% \pm 15.2	83.3% \pm 15.2	-	-	-	-	-	-	-	p=0.050
Nodular sclerosis (n=104)	100%	96.9% \pm 1.7	94.6% \pm 2.3	93.2% \pm 2.3	93.2% \pm 2.3	91.1% \pm 3.4	91.1% \pm 3.4	91.1% \pm 3.4	91.1% \pm 3.4	91.1% \pm 3.4	91.1% \pm 3.4	
Mixed cellularity (n=81)	100%	91.9% \pm 3.2	86.1% \pm 4.1	84.6% \pm 4.3	84.6% \pm 4.3	82.6% \pm 4.6	82.6% \pm 4.6	82.6% \pm 4.6	75.4% \pm 6.4	69.1% \pm 8.4	69.1% \pm 8.4	
Lymphocytic depletion (n=4)	100%	-	-	-	-	-	-	-	-	-	-	
UK (n=14)	(100%)	(84.6%) \pm 10.0	(76.9%) \pm 11.7	(65.9%) \pm 14.3	(65.9%) \pm 14.3	(65.9%) \pm 14.3	(65.9%) \pm 14.3	(65.9%) \pm 14.3	(65.9%) \pm 14.3	(65.9%) \pm 14.3	(65.9%) \pm 14.3	

Table 84 (cont.): Case survivals (\pm SE) from Hodgkin's disease; SA hospital-based registries, 1987-98*

Category	Period from diagnosis (yrs.)										P value
	1	2	3	4	5	6	7	8	9	10	
By bulk disease:											
No (n=159)	100%	93.9% \pm 2.0	90.1% \pm 2.5	87.3% \pm 2.9	87.3% \pm 2.9	85.8% \pm 3.2	85.8% \pm 3.2	83.6% \pm 3.8	80.5% \pm 4.8	80.5% \pm 4.8	p=0.715
Yes (n=39)	100%	97.4% \pm 2.5	89.2% \pm 5.1	89.2% \pm 5.1	89.2% \pm 5.1	86.2% \pm 5.8	86.2% \pm 5.8	86.2% \pm 5.8	86.2% \pm 5.8	86.2% \pm 5.8	
UK (n=14)	(100%)	(92.3%) (\pm 7.4)	(92.3%) (\pm 7.4)	(92.3%) (\pm 7.4)	(92.3%) (\pm 7.4)	(92.3%) (\pm 7.4)	(92.3%) (\pm 7.4)	(73.8%) (\pm 17.5)	(73.8%) (\pm 17.5)	(-)	
By B symptoms:											
No (n=101)	100%	97.8% \pm 1.5	94.4% \pm 2.4	91.7% \pm 3.0	91.7% \pm 3.0	91.7% \pm 3.0	91.7% \pm 3.0	85.6% \pm 5.0	81.7% \pm 6.1	81.7% \pm 6.1	p=0.120
Yes (n=75)	100%	91.4% \pm 3.4	84.7% \pm 4.5	82.8% \pm 4.8	82.8% \pm 4.8	77.7% \pm 5.7	77.7% \pm 5.7	77.7% \pm 5.7	77.7% \pm 5.7	77.7% \pm 5.7	
UK (n=36)	(100%)	(91.2%) (\pm 4.8)	(88.2%) (\pm 5.6)	(88.2%) (\pm 5.6)	(88.2%) (\pm 5.6)	(88.2%) (\pm 5.6)	(88.2%) (\pm 5.6)	(88.2%) (\pm 5.6)	(88.2%) (\pm 5.6)	(88.2%) (\pm 5.6)	
By mediastinum involvement:											
No (n=87)	100%	91.4% \pm 3.1	83.2% \pm 4.3	81.8% \pm 4.4	81.8% \pm 4.4	81.8% \pm 4.4	81.8% \pm 4.4	75.7% \pm 5.8	71.5% \pm 6.8	71.5% \pm 6.8	p=0.018
Yes (n=125)	100%	96.6% \pm 1.7	94.8% \pm 2.1	92.3% \pm 2.6	92.3% \pm 2.6	89.0% \pm 3.4	89.0% \pm 3.4	89.0% \pm 3.4	89.0% \pm 3.4	89.0% \pm 3.4	
By nodal involvement:											
No (n=22)	100%	100% \pm 7.5	88.8% \pm 9.5	82.0% \pm 9.5	82.0% \pm 9.5	82.0% \pm 9.5	82.0% \pm 9.5	82.0% \pm 9.5	82.0% \pm 9.5	82.0% \pm 9.5	p=0.819
Yes (n=190)	100%	93.8% \pm 1.8	90.1% \pm 2.3	88.7% \pm 2.5	88.7% \pm 2.5	86.6% \pm 2.8	86.6% \pm 2.8	83.6% \pm 3.4	81.4% \pm 4.0	81.4% \pm 4.0	
By spleen involvement:											
No (n=182)	100%	95.3% \pm 1.6	92.0% \pm 2.1	90.5% \pm 2.4	90.5% \pm 2.4	88.4% \pm 2.7	88.4% \pm 2.7	84.9% \pm 3.6	82.4% \pm 4.2	82.4% \pm 4.2	p=0.063
Yes (n=30)	100%	89.6% \pm 5.7	77.6% \pm 8.2	72.4% \pm 9.1	72.4% \pm 9.1	72.4% \pm 9.1	72.4% \pm 9.1	72.4% \pm 9.1	72.4% \pm 9.1	72.4% \pm 9.1	
By lactate dehydrogenase:											
Under 236 IU (n=84)	100%	96.2% \pm 2.1	93.5% \pm 2.8	91.9% \pm 3.2	91.9% \pm 3.2	89.5% \pm 3.9	89.5% \pm 3.9	89.5% \pm 3.9	89.5% \pm 3.9	89.5% \pm 3.9	p=0.040
236 IU+ (n=31)	100%	93.2% \pm 4.6	85.8% \pm 6.6	76.4% \pm 8.6	76.4% \pm 8.6	70.9% \pm 9.6	70.9% \pm 9.6	70.9% \pm 9.6	70.9% \pm 9.6	70.9% \pm 9.6	
UK (n=97)	(100%)	(93.3%) (\pm 2.6)	(88.1%) (\pm 3.6)	(88.1%) (\pm 3.6)	(88.1%) (\pm 3.6)	(88.1%) (\pm 3.6)	(88.1%) (\pm 3.6)	(83.1%) (\pm 4.8)	(79.8%) (\pm 5.7)	(79.8%) (\pm 5.7)	
By diagnostic year:											
1987-91 (n=76)	100%	97.3% \pm 1.9	91.8% \pm 3.2	89.1% \pm 3.7	89.1% \pm 3.7	89.1% \pm 3.7	89.1% \pm 3.7	86.1% \pm 4.1	84.0% \pm 4.5	84.0% \pm 4.5	p=0.323
1992-98 (n=136)	100%	92.8% \pm 2.3	89.1% \pm 2.9	87.8% \pm 3.1	87.8% \pm 3.1	82.6% \pm 4.6	82.6% \pm 4.6	-	-	-	

* P values derived from Cox proportional hazards regression (data in brackets excluded).

Figure 87: Case survivals from Hodgkin's disease by Ann Arbor stage; SA hospital-based registries, 1987-98*



*Date of censoring: December 31st, 1998.

A multivariate proportional hazards regression analysis indicated that the key prognostic indicators were age at diagnosis, Ann Arbor stage, and level of lactate dehydrogenase. Corresponding relative risks of case fatality were:

Predictors	Relative risk (95% confidence limits)
Age at diagnosis (yrs.):	
Under 55 (reference)	1.00
55-64	4.64 (1.59, 13.60)
65-74	8.43 (2.85, 25.00)
75+	17.53 (4.46, 68.86)
Ann Arbor stage:	
I-III (reference)	1.00
IV	3.71 (1.52, 9.06)
Lactate dehydrogenase:	
Low (reference)	1.00
High (236 IU+)	2.43 (0.77, 7.72)

Although level of lactate dehydrogenase was not a significant predictor ($p=0.131$), its relative risk was high and the association was plausible. While case fatality tended to be elevated in 1992-98 when compared with 1987-91 ($p=0.027$), this likely was due to an increased complexity of the cases being referred and admitted to these specialist centres. Again it should be noted that cases treated on an outpatient basis were less likely to have been recorded on the hospital-based registries. In most hospitals, there has been a trend towards outpatient care for cases where this is feasible.

Overall, only 5% of cases had a surgical intervention as part of their primary course of care, whereas 47% had radiotherapy and 74% had chemotherapy. Four per cent had none of these primary treatments. USA hospital registries indicated that a similar proportion of cases circa 1990 had radiotherapy (50%), but fewer had chemotherapy (50%).³²

Further details of the primary treatments of the South Australian cases are provided in Table 85. Key predictors of individual modes of care were as follows:

- For none of these treatments being provided: female sex and (possibly) a high level of lactate dehydrogenase.

Table 85: Percentage of Hodgkin's disease cases by treatment mode as part of the primary course of care; SA hospital-based registries, 1987-98*

Category	No treatment	% receiving any			% receiving combination and single therapies						
		surg. (s)	radio. (r)	chemo. (c)	src	sr	sc	rc	s	r	c
All (n=212)	3.5%	4.5%	46.8%	73.6%	1.0%	2.0%	0.5%	23.9%	1.0%	19.9%	48.3%
By sex:											
Males (n=113)	1.0%	3.8%	42.9%	81.0%	0.0%	1.9%	1.0%	25.7%	1.0%	15.2%	54.3%
Females (n=99)	6.3%	5.2%	51.0%	65.6%	2.1%	2.1%	0.0%	21.9%	1.0%	25.0%	41.7%
P value	0.056	0.739	0.245	0.014	0.227	1.000	1.000	0.524	1.000	0.083	0.074
By age (yrs.):											
Under 40 (n=129)	2.4%	6.5%	51.6%	76.6%	1.6%	3.2%	0.0%	30.6%	1.6%	16.1%	44.4%
40-54 (n=33)	3.2%	0.0%	41.9%	67.7%	0.0%	0.0%	0.0%	12.9%	0.0%	29.0%	54.8%
55-64 (n=20)	5.0%	5.0%	40.0%	70.0%	0.0%	0.0%	5.0%	15.0%	0.0%	25.0%	50.0%
65-74 (n=20)	0.0%	0.0%	35.3%	76.5%	0.0%	0.0%	0.0%	11.8%	0.0%	23.5%	64.7%
75+ (n=10)	22.2%	0.0%	33.3%	55.6%	0.0%	0.0%	0.0%	11.1%	0.0%	22.2%	44.4%
P value	0.172	0.101	0.068	0.235	0.281	0.125	0.202	0.005	0.281	0.136	0.175
By residence:											
Adel - mid/lower SES (n=100)	5.4%	6.5%	51.6%	71.0%	2.2%	4.3%	0.0%	25.8%	0.0%	19.4%	43.0%
Adel - mid/upper SES (n=62)	3.3%	3.3%	45.0%	71.7%	0.0%	0.0%	1.7%	21.7%	1.7%	23.3%	48.3%
P value	0.705	0.482	0.424	0.926	0.520	0.155	0.392	0.559	0.392	0.555	0.518
Adelaide (n=162)	4.6%	5.2%	49.0%	71.2%	1.3%	2.6%	0.7%	24.2%	0.7%	20.9%	45.1%
Country SA (n=50)	0.0%	2.1%	39.6%	81.3%	0.0%	0.0%	0.0%	22.9%	2.1%	16.7%	58.3%
P value	0.201	0.689	0.253	0.170	1.000	0.574	1.000	0.858	0.421	0.520	0.109
By Ann Arbor stage:											
I (n=43)	7.1%	9.5%	66.7%	35.7%	0.0%	4.8%	0.0%	14.3%	4.8%	47.6%	21.4%
II (n=102)	1.1%	3.2%	51.6%	76.8%	1.1%	1.1%	1.1%	28.4%	0.0%	21.1%	46.3%
III (n=34)	3.2%	3.2%	32.3%	93.5%	0.0%	3.2%	0.0%	29.0%	0.0%	0.0%	64.5%
IV (n=32)	6.3%	3.1%	21.9%	93.8%	3.1%	0.0%	0.0%	18.8%	0.0%	0.0%	71.9%
UK (n=1)	(0.0%)	(0.0%)	(0.0%)	(100.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(100.0%)
P value	0.848	0.184	<0.001	<0.001	0.335	0.279	0.846	0.503	0.038	<0.001	<0.001
By histological type:											
Lymphocytic (n=9)	0.0%	22.2%	66.7%	55.6%	0.0%	22.2%	0.0%	22.2%	0.0%	22.2%	33.3%
Nodular sclerosis (n=104)	2.0%	3.0%	49.5%	76.8%	2.0%	1.0%	0.0%	26.3%	0.0%	20.2%	48.5%
Mixed cellularity (n=81)	3.9%	5.3%	44.7%	71.1%	0.0%	1.3%	1.3%	22.4%	2.6%	21.1%	47.4%
Lymphocytic depletion (n=4)	0.0%	0.0%	25.0%	75.0%	0.0%	0.0%	0.0%	0.0%	0.0%	25.0%	75.0%
UK (n=14)	(15.4%)	(0.0%)	(30.8%)	(76.9%)	(0.0%)	(0.0%)	(0.0%)	(23.1%)	(0.0%)	(7.7%)	(53.8%)
P value	0.802	0.075	0.472	0.520	0.611	<0.001	0.687	0.644	0.395	0.994	0.580
By bulk disease:											
No (n=159)	3.3%	5.3%	48.0%	68.7%	1.3%	2.7%	0.7%	19.3%	0.7%	24.7%	47.3%
Yes (n=39)	2.6%	2.6%	42.1%	94.7%	0.0%	0.0%	0.0%	42.1%	2.6%	0.0%	52.6%
UK (n=14)	(7.7%)	(0.0%)	(46.2%)	(69.2%)	(0.0%)	(0.0%)	(0.0%)	(23.1%)	(0.0%)	(23.1%)	(46.2%)
P value	1.000	0.689	0.515	0.001	1.000	0.584	1.000	0.003	0.364	<0.001	0.559
By B symptoms:											
No (n=101)	3.1%	4.2%	55.2%	63.5%	1.0%	1.0%	0.0%	22.9%	2.1%	30.2%	39.6%
Yes (n=75)	5.6%	2.8%	33.8%	91.5%	1.4%	0.0%	1.4%	29.6%	0.0%	2.8%	59.2%
UK (n=36)	(0.0%)	(8.8%)	(50.0%)	(64.7%)	(0.0%)	(8.8%)	(0.0%)	(14.7%)	(0.0%)	(26.5%)	(50.0%)
P value	0.460	1.000	0.006	<0.001	1.000	1.000	0.425	0.330	0.508	<0.001	0.012
By mediastinum involvement:											
No (n=87)	4.9%	7.4%	48.1%	59.3%	1.2%	3.7%	0.0%	13.6%	2.5%	29.6%	44.4%
Yes (n=125)	2.5%	2.5%	45.8%	83.3%	0.8%	0.8%	0.8%	30.8%	0.0%	13.3%	50.8%
P value	0.443	0.161	0.747	<0.001	1.000	0.305	1.000	0.005	0.161	0.005	0.374

Table 85 (cont.): Percentage of Hodgkin's disease cases by treatment mode as part of the primary course of care; SA hospital-based registries, 1987-98*

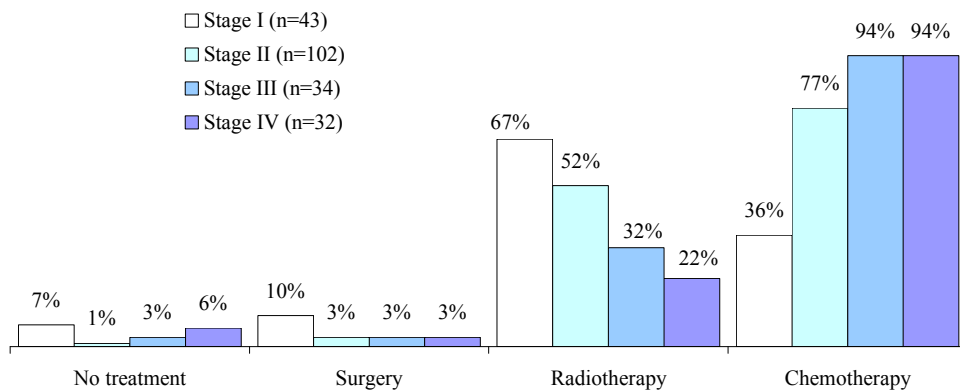
Category	No treatment	% receiving any			% receiving combination and single therapies							
		surg. (s)	radio. (r)	chemo. (c)	src	sr	sc	rc	s	r	c	
By nodal involvement:												
No (n=22)	4.8%	0.0%	38.1%	85.7%	0.0%	0.0%	0.0%	28.6%	0.0%	9.5%	57.1%	
Yes (n=190)	3.3%	5.0%	47.8%	72.2%	1.1%	2.2%	0.6%	23.3%	1.1%	21.1%	47.2%	
P value	0.544	0.602	0.400	0.184	1.000	1.000	1.000	0.594	1.000	0.261	0.389	
By spleen involvement:												
No (n=182)	3.5%	4.7%	50.6%	70.3%	1.2%	1.7%	0.6%	24.4%	1.2%	23.3%	44.2%	
Yes (n=30)	3.4%	3.4%	24.1%	93.1%	0.0%	3.4%	0.0%	20.7%	0.0%	0.0%	72.4%	
P value	1.000	1.000	0.008	0.010	1.000	0.467	1.000	0.663	1.000	0.004	0.005	
By lactate dehydrogenase:												
Under 236 IU (n=84)	1.3%	6.4%	51.3%	73.1%	1.3%	1.3%	1.3%	26.9%	2.6%	21.8%	43.6%	
236 IU+ (n=31)	10.0%	0.0%	36.7%	86.7%	0.0%	0.0%	0.0%	33.3%	0.0%	3.3%	53.3%	
UK (n=97)	(3.2%)	(4.3%)	(46.2%)	(69.9%)	(1.1%)	(3.2%)	(0.0%)	(18.3%)	(0.0%)	(23.7%)	(50.5%)	
P value	0.064	0.319	0.173	0.134	1.000	1.000	1.000	0.510	1.000	0.021	0.363	
By diagnostic year:												
1987-91 (n=76)	4.1%	1.4%	50.0%	71.6%	0.0%	1.4%	0.0%	25.7%	0.0%	23.0%	45.9%	
1992-98 (n=136)	3.1%	6.3%	44.9%	74.8%	1.6%	2.4%	0.8%	22.8%	1.6%	18.1%	49.6%	
P value	0.710	0.159	0.483	0.622	0.532	1.000	1.000	0.649	0.532	0.405	0.616	

* Treatment details complete for 95% of cases.
Derivation of P values (see text) (data in brackets excluded).

- For surgery: possibly histological type (p=0.075).
- For radiotherapy: younger age; a lower Ann Arbor stage; no B symptoms (weight loss, unexplained fever, night sweats); and no involvement of the spleen.
- For chemotherapy: male sex; a more advanced stage; bulk disease; B symptoms; and involvement of the mediastinum or spleen.

Stage-specific treatment modes are displayed in Figure 88.

Figure 88: % Hodgkin's disease cases by Ann Arbor stage and treatment mode as part of the primary course of care; SA hospital-based registries, 1987-98



USA data circa 1990 also showed that advanced stage was associated with an increased use of chemotherapy and a reduced use of radiotherapy.³²

The most common chemotherapy treatments, as indicated by a prior analysis of 1987-95 data for the South Australian series, were with MOPP (48%), ABVD (17%), and (less so) high-dose cyclophosphamide (10%), alternating MOPP and ABVD (8%), and CHLVPP (7%). For the more recent years, the most common treatments were with ABVD (57%) and (less so) MOPP (14%).

Multiple myeloma and immunoproliferative neoplasms (ICD-02: M97323, M97313, M97613, M98303) (selected codes – see “Methods”)

1. Population-based data

These cancers experienced a progressive reduction in case survival from 33% at five years from diagnosis to 16% at 10 years and 12% at 15 years. Outcomes were similar for males and females (Table 86). As seen for other populations,^{28-30,37} five-year survival reduced with age at diagnosis, with survivals of 51% and 22% applying for cases under 55 years and those aged 75 years or more, respectively (Figure 89). Gains in survival for the more recent diagnostic periods were not apparent.

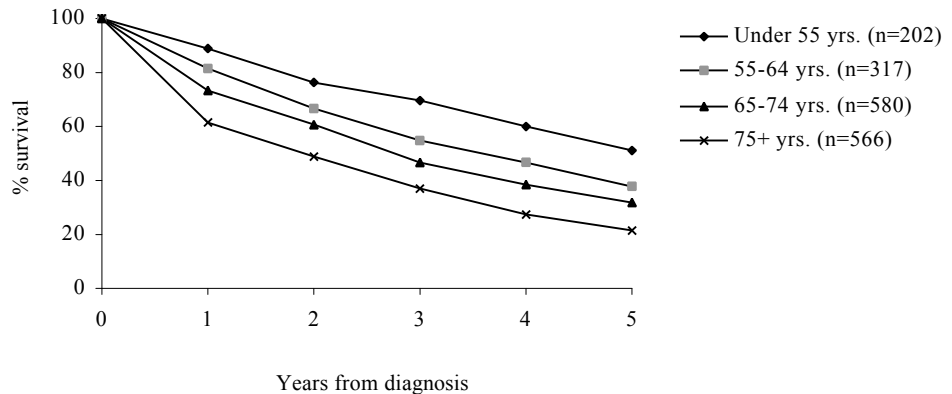
Table 86: Case survivals (\pm SE) by period from diagnosis, sex, age at diagnosis, and diagnostic year; SA Cancer Registry, 1977-98*

Cancer site: multiple myeloma and immunoproliferative neoplasms

Category		Period from diagnosis (yrs.)															P value**
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
All cases (n=1,665)	100%	73.1% \pm 1.2	60.4% \pm 1.4	48.5% \pm 1.4	40.1% \pm 1.5	33.3% \pm 1.5	26.9% \pm 1.5	23.1% \pm 1.5	19.3% \pm 1.5	17.2% \pm 1.5	16.3% \pm 1.5	15.0% \pm 1.6	14.3% \pm 1.7	14.3% \pm 1.8	12.9% \pm 1.8	12.2% \pm 1.9	-
By sex:																	
Males (n=902)	100%	74.2% \pm 1.6	61.4% \pm 1.9	47.7% \pm 2.0	39.0% \pm 2.0	32.0% \pm 2.0	25.4% \pm 2.0	21.7% \pm 2.0	18.9% \pm 2.0	18.0% \pm 2.0	17.4% \pm 2.1	15.4% \pm 2.2	15.4% \pm 2.3	15.4% \pm 2.5	12.0% \pm 2.6	11.7% \pm 2.8	p=0.711
Females (n=763)	100%	71.7% \pm 1.7	59.2% \pm 2.0	49.4% \pm 2.1	41.3% \pm 2.2	34.8% \pm 2.2	28.5% \pm 2.2	24.6% \pm 2.2	19.7% \pm 2.2	16.2% \pm 2.1	14.9% \pm 2.2	14.5% \pm 2.3	12.7% \pm 2.3	12.7% \pm 2.5	12.7% \pm 2.6	12.3% \pm 2.6	
By age (yrs.):																	
Under 55 (n=202)	100%	89.1% \pm 2.3	76.3% \pm 3.1	69.3% \pm 3.5	60.0% \pm 3.9	51.0% \pm 4.1	43.7% \pm 4.2	37.4% \pm 4.3	31.7% \pm 4.2	27.6% \pm 4.2	27.6% \pm 4.2	26.8% \pm 4.3	26.8% \pm 4.3	26.8% \pm 4.4	20.1% \pm 4.5	18.3% \pm 4.6	p<0.001
55-64 (n=317)	100%	81.3% \pm 2.3	66.5% \pm 2.8	54.9% \pm 3.0	46.4% \pm 3.1	37.6% \pm 3.1	30.3% \pm 3.0	26.2% \pm 2.9	20.6% \pm 2.8	18.0% \pm 2.7	16.2% \pm 2.7	13.8% \pm 2.8	13.8% \pm 2.8	13.8% \pm 2.9	12.1% \pm 3.1	9.2% \pm 3.1	
65-74 (n=580)	100%	73.7% \pm 2.0	60.9% \pm 2.2	46.5% \pm 2.4	38.2% \pm 2.4	32.2% \pm 2.4	24.3% \pm 2.4	20.0% \pm 2.3	18.7% \pm 2.4	16.8% \pm 2.5	14.9% \pm 2.6	-	-	-	-	-	
75+ (n=566)	100%	61.2% \pm 2.3	49.0% \pm 2.5	37.0% \pm 2.6	27.7% \pm 2.6	21.7% \pm 2.6	-	-	-	-	-	-	-	-	-	-	
By diagnostic year:																	
1977 - 83 (n=372)	100%	74.0% \pm 2.5	59.7% \pm 2.8	45.9% \pm 2.9	38.7% \pm 2.9	32.2% \pm 2.8	25.3% \pm 2.7	20.7% \pm 2.6	18.7% \pm 2.5	16.8% \pm 2.5	16.4% \pm 2.5	15.5% \pm 2.5	15.0% \pm 2.6	15.0% \pm 2.7	14.1% \pm 2.7	13.9% \pm 2.7	p=0.711
1984 - 90 (n=532)	100%	72.7% \pm 2.1	59.3% \pm 2.3	48.9% \pm 2.4	39.0% \pm 2.4	32.7% \pm 2.4	26.7% \pm 2.3	22.9% \pm 2.2	18.4% \pm 2.1	16.3% \pm 2.1	15.0% \pm 2.1	-	-	-	-	-	
1991 - 98 (n=761)	100%	72.8% \pm 1.8	61.7% \pm 2.1	49.8% \pm 2.3	42.5% \pm 2.5	34.7% \pm 2.7	-	-	-	-	-	-	-	-	-	-	
By age and year:																	
Under 55 yrs.																	
1977 - 83 (n=56)	100%	86.1% \pm 4.7	72.1% \pm 6.1	59.8% \pm 6.7	52.8% \pm 6.8	47.6% \pm 6.8	40.5% \pm 6.7	33.4% \pm 6.5	29.9% \pm 6.3	26.4% \pm 6.1	26.4% \pm 6.2	26.4% \pm 6.2	26.4% \pm 6.3	26.4% \pm 6.2	19.8% \pm 5.7	18.0% \pm 5.5	p=0.678
1984 - 90 (n=48)	100%	92.0% \pm 4.0	77.6% \pm 6.1	73.7% \pm 6.5	61.4% \pm 7.2	51.0% \pm 7.4	47.0% \pm 7.4	40.8% \pm 7.3	32.4% \pm 6.9	27.8% \pm 6.7	27.8% \pm 6.9	-	-	-	-	-	
1991 - 98 (n=98)	100%	89.5% \pm 3.2	78.5% \pm 4.5	73.9% \pm 5.0	65.2% \pm 6.1	52.3% \pm 7.6	-	-	-	-	-	-	-	-	-	-	
55 - 64 yrs.																	
1977 - 83 (n=81)	100%	85.0% \pm 4.1	71.0% \pm 5.3	55.3% \pm 5.8	47.1% \pm 5.8	39.9% \pm 5.3	28.5% \pm 5.3	23.5% \pm 5.1	19.8% \pm 4.8	17.3% \pm 4.6	14.8% \pm 4.4	10.7% \pm 3.9	10.7% \pm 4.0	10.7% \pm 4.1	10.0% \pm 3.9	8.7% \pm 3.8	p=0.992
1984 - 90 (n=128)	100%	81.4% \pm 3.5	64.8% \pm 4.4	54.3% \pm 4.6	46.9% \pm 4.6	36.8% \pm 4.5	31.5% \pm 4.4	26.8% \pm 4.2	20.3% \pm 3.8	17.7% \pm 3.7	16.7% \pm 3.8	-	-	-	-	-	
1991 - 98 (n=108)	100%	78.1% \pm 4.2	65.1% \pm 5.0	56.1% \pm 5.5	44.7% \pm 6.0	36.5% \pm 6.3	-	-	-	-	-	-	-	-	-	-	
65 - 74 yrs.																	
1977 - 83 (n=127)	100%	69.9% \pm 4.3	53.0% \pm 4.7	38.4% \pm 4.7	32.7% \pm 4.6	28.5% \pm 4.5	21.9% \pm 4.2	16.7% \pm 3.9	15.4% \pm 3.9	12.8% \pm 3.7	12.4% \pm 3.8	-	-	-	-	-	p=0.072
1984 - 90 (n=173)	100%	71.9% \pm 3.0	58.2% \pm 4.0	46.9% \pm 4.1	34.1% \pm 4.0	28.6% \pm 3.8	20.6% \pm 3.5	17.1% \pm 3.3	17.1% \pm 3.4	16.2% \pm 3.5	13.4% \pm 3.4	-	-	-	-	-	
1991 - 98 (n=280)	100%	76.6% \pm 2.8	66.9% \pm 3.2	50.2% \pm 3.6	45.3% \pm 3.7	37.2% \pm 4.2	-	-	-	-	-	-	-	-	-	-	
75+ yrs.																	
1977 - 83 (n=108)	100%	63.3% \pm 5.2	50.9% \pm 5.8	37.8% \pm 5.9	28.2% \pm 5.7	15.9% \pm 4.8	-	-	-	-	-	-	-	-	-	-	p=0.863
1984 - 90 (n=183)	100%	61.6% \pm 4.0	50.4% \pm 4.3	38.2% \pm 4.4	28.9% \pm 4.2	26.0% \pm 4.3	-	-	-	-	-	-	-	-	-	-	
1991 - 98 (n=275)	100%	60.1% \pm 3.3	47.2% \pm 3.8	35.6% \pm 4.0	26.5% \pm 4.2	20.6% \pm 4.4	-	-	-	-	-	-	-	-	-	-	

* Survival from the primary cancer (see text). ** P value derived from Charles Brown test, or equivalent for multiple samples (see text).

Figure 89: Case survivals from multiple myeloma and immunoproliferative neoplasms in 1977-98 by age at diagnosis in South Australia*



*Date of censoring: December 31st, 1998.

Proportional hazards regression analysis confirmed that diagnostic period was not predictive of outcome after adjusting for sex, age at diagnosis, and histological type, with the following relative risks of case fatality presenting:

Predictors	Relative risk (95% confidence limits)
Sex:	
Male (reference)	1.00
Female	0.86 (0.75, 0.97)
Age at diagnosis (yrs.):	
Under 55 (reference)	1.00
55-64	1.38 (1.08, 1.76)
65-74	1.61 (1.28, 2.02)
75+	2.32 (1.85, 2.92)
Histological type:	
Multiple myeloma etc. (reference)	1.00
Plasma cell leukaemia	6.66 (2.75, 16.14)
Solitary myeloma	0.24 (0.12, 0.49)
Waldenstrom's macroglobulinaemia	0.27 (0.19, 0.39)
Diagnostic period:	
1977-83 (reference)	1.00
1984-90	1.01 (0.86, 1.18)
1991-98	1.00 (0.84, 1.18)

Notably, females had a lower risk of case fatality than males in this multivariate context.

Case survivals for South Australia were similar to, or slightly higher than, those reported for other populations.^{28-30,37}

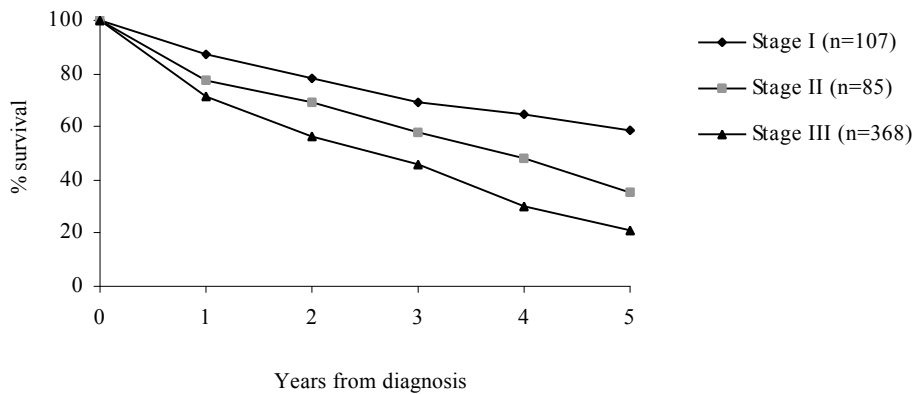
2. Hospital-based data

Contributed by:

- the Department of Haematology-Oncology, Queen Elizabeth Hospital.
- the Department of Haematology and Oncology, Flinders Medical Centre.
- the Haematology Unit, Institute of Medical and Veterinary Science.
- the Clinical Haematology Bone Marrow Transplant Unit, Institute of Medical and Veterinary Science.
- the Royal Adelaide Hospital Cancer Centre.

There were 652 cases with these cancers registered by the hospital registries for 1987-98. Their survivals of 34% and 19% at five and 10 years from diagnosis, respectively, were similar to the corresponding survivals of 33% and 16% for all South Australian cases with these cancers in 1977-98. Survivals were lower among older cases and those with: a country place of residence; an advanced Durie and Salmon stage; an elevated $\beta 2$ microglobulin serum level; an elevated creatinine level; a multiple myeloma as opposed to another immunoproliferative neoplasm; an elevated paraprotein level; and a positive reading for urinary Bence-Jones protein (Table 87). Trends by stage are shown in Figure 90.

Figure 90: Case survivals from multiple myeloma and immunoproliferative neoplasms by Durie and Salmon stage; SA hospital-based registries, 1987-98*



*Date of censoring: December 31st, 1998.

Table 87: Case survivals (± SE) from multiple myeloma and immunoproliferative neoplasms; SA hospital-based registries, 1987-98*

Category		Period from diagnosis (yrs.)										P value
		1	2	3	4	5	6	7	8	9	10	
All (n=652)	100%	77.6% ± 1.7	65.9% ± 2.0	55.4% ± 2.2	43.2% ± 2.3	34.2% ± 2.4	29.1% ± 2.4	25.6% ± 2.5	21.1% ± 2.6	20.4% ± 2.6	19.0% ± 2.7	-
By sex:												
Males (n=363)	100%	79.4% ± 2.2	67.6% ± 2.6	58.0% ± 2.9	43.1% ± 3.2	34.7% ± 3.3	30.1% ± 3.3	25.4% ± 3.4	22.9% ± 3.5	21.5% ± 3.6	21.5% ± 3.6	p=0.318
Females (n=289)	100%	75.4% ± 2.6	64.2% ± 3.0	52.3% ± 3.2	43.2% ± 3.4	33.5% ± 3.5	27.9% ± 3.5	25.7% ± 3.5	19.0% ± 3.7	19.0% ± 3.7	14.3% ± 5.0	
By age (yrs.):												
Under 55 (n=109)	100%	92.2% ± 2.6	84.7% ± 3.7	79.7% ± 4.2	65.3% ± 5.6	59.2% ± 6.1	52.2% ± 6.5	49.5% ± 6.7	49.5% ± 6.7	49.5% ± 6.7	49.5% ± 6.7	p<0.001
55-64 (n=136)	100%	78.4% ± 3.6	66.0% ± 4.2	56.0% ± 4.5	44.9% ± 4.7	33.3% ± 4.7	29.3% ± 4.7	23.2% ± 4.6	17.3% ± 4.5	15.2% ± 4.5	15.2% ± 4.5	
65-74 (n=217)	100%	75.7% ± 3.0	63.8% ± 3.5	49.7% ± 3.8	38.7% ± 4.0	29.4% ± 4.0	23.5% ± 3.9	20.8% ± 3.9	14.5% ± 4.1	14.5% ± 4.1	14.5% ± 4.1	
75+ (n=190)	100%	70.8% ± 3.4	57.7% ± 3.9	47.0% ± 4.3	33.1% ± 4.5	25.4% ± 4.6	21.0% ± 4.8	21.0% ± 4.8	21.0% ± 4.8	21.0% ± 4.8	-	
By residence:												
Adel - mid/lower SES (n=311)	100%	78.1% ± 2.4	65.7% ± 2.9	56.8% ± 3.1	44.3% ± 3.3	35.6% ± 3.4	29.5% ± 3.4	25.4% ± 3.5	18.6% ± 3.7	18.6% ± 3.7	15.5% ± 4.2	p=0.203
Adel - mid/upper SES (n=193)	100%	79.4% ± 3.0	74.5% ± 3.4	59.1% ± 4.1	49.9% ± 4.5	41.4% ± 4.9	33.2% ± 5.1	29.5% ± 5.2	29.5% ± 5.2	29.5% ± 5.2	29.5% ± 5.2	
Adelaide (n=504)	100%	78.6% ± 1.9	68.4% ± 2.2	57.7% ± 2.5	46.3% ± 2.7	37.7% ± 2.8	30.9% ± 2.9	26.9% ± 2.9	22.7% ± 3.0	22.7% ± 3.0	20.7% ± 3.4	p=0.020
Country SA (n=148)	100%	74.3% ± 3.7	57.7% ± 4.3	48.0% ± 4.5	33.7% ± 4.5	23.3% ± 4.4	23.3% ± 4.4	21.4% ± 4.4	15.6% ± 4.8	12.5% ± 4.7	12.5% ± 4.7	
By Durie and Salmon stage:												
I (n=107)	100%	87.2% ± 3.3	78.3% ± 4.2	69.4% ± 4.9	65.0% ± 5.2	58.8% ± 5.8	51.6% ± 6.4	48.7% ± 6.7	38.3% ± 7.5	38.3% ± 7.5	28.7% ± 10.0	p<0.001
II (n=85)	100%	77.8% ± 4.6	69.0% ± 5.3	57.7% ± 5.9	48.2% ± 6.3	35.6% ± 6.8	35.6% ± 6.8	35.6% ± 6.8	22.9% ± 8.7	22.9% ± 8.7	22.9% ± 8.7	
III (n=368)	100%	71.7% ± 2.4	56.5% ± 2.8	45.7% ± 2.9	29.8% ± 3.0	21.4% ± 2.8	15.8% ± 2.7	12.0% ± 2.6	12.0% ± 2.6	10.5% ± 2.7	10.5% ± 2.7	
UK (n=92)	(100%)	(89.8%) (± 3.2)	(85.7%) (± 3.9)	(74.9%) (± 5.1)	(64.0%) (± 6.0)	(53.5%) (± 6.6)	(48.9%) (± 6.8)	(42.9%) (± 7.2)	(35.1%) (± 7.7)	(35.1%) (± 7.7)	(35.1%) (± 7.7)	
By b2 microglobulin serum level (mg/L):												
Under 3.0 (n=112)	100%	90.8% ± 2.8	86.3% ± 3.4	74.3% ± 4.6	67.6% ± 5.1	57.1% ± 5.8	50.7% ± 6.3	50.7% ± 6.3	47.5% ± 6.6	44.1% ± 7.0	37.8% ± 8.3	p<0.001
3.0+ (n=281)	100%	74.1% ± 2.7	59.5% ± 3.1	49.0% ± 3.3	32.4% ± 3.4	23.1% ± 3.2	17.6% ± 3.2	14.1% ± 3.1	10.4% ± 3.2	10.4% ± 3.2	10.4% ± 3.2	
UK (n=259)	(100%)	(75.7%) (± 2.8)	(64.0%) (± 3.2)	(54.2%) (± 3.5)	(44.6%) (± 3.8)	(36.5%) (± 3.9)	(32.3%) (± 4.0)	(27.0%) (± 4.2)	(19.8%) (± 4.3)	(19.8%) (± 4.3)	(19.8%) (± 4.3)	
By creatinine level (micromols/L):												
Under 120 (n=298)	100%	85.2% ± 2.1	75.0% ± 2.6	64.1% ± 3.1	52.3% ± 3.4	38.8% ± 3.7	33.3% ± 3.8	29.9% ± 3.9	21.8% ± 4.0	20.2% ± 4.0	16.9% ± 4.5	p<0.001
120+ (n=157)	100%	60.3% ± 4.1	46.0% ± 4.4	37.7% ± 4.4	21.3% ± 4.0	21.3% ± 4.0	14.3% ± 3.9	14.3% ± 3.9	14.3% ± 3.9	14.3% ± 3.9	14.3% ± 3.9	
UK (n=197)	(100%)	(79.1%) (± 3.0)	(66.7%) (± 3.6)	(55.2%) (± 4.0)	(46.9%) (± 4.3)	(37.2%) (± 4.5)	(33.7%) (± 4.5)	(27.8%) (± 4.6)	(25.9%) (± 4.6)	(25.9%) (± 4.6)	(25.9%) (± 4.6)	
By ionized calcium (micromols/L):												
Under 1.2 (median) (n=106)	100%	76.2% ± 4.3	64.2% ± 5.0	52.3% ± 5.6	44.5% ± 6.0	30.5% ± 6.7	27.5% ± 6.7	27.5% ± 6.7	20.6% ± 7.8	20.6% ± 7.8	20.6% ± 7.8	p=0.783
1.2+ (n=173)	100%	72.2% ± 3.5	63.5% ± 3.8	53.8% ± 4.1	38.2% ± 4.3	31.6% ± 4.3	24.8% ± 4.3	21.8% ± 4.3	17.8% ± 4.4	17.8% ± 4.4	17.8% ± 4.4	
UK (n=373)	(100%)	(80.5%) (± 2.1)	(67.3%) (± 2.6)	(57.0%) (± 2.9)	(45.7%) (± 3.1)	(36.3%) (± 3.2)	(31.6%) (± 3.2)	(27.4%) (± 3.3)	(23.1%) (± 3.4)	(22.0%) (± 3.4)	(19.8%) (± 3.7)	

Table 87: Case survivals (± SE) from multiple myeloma and immunoproliferative neoplasms; SA hospital-based registries, 1987-98*

Category		Period from diagnosis (yrs.)										P value	
		1	2	3	4	5	6	7	8	9	10		
By tumour type:													
Multiple myeloma (n=581)	100%	75.9% ± 1.8	63.4% ± 2.1	51.7% ± 2.3	38.5% ± 2.4	28.9% ± 2.4	23.7% ± 2.4	20.5% ± 2.4	17.4% ± 2.5	16.5% ± 2.5	14.7% ± 2.8	p<0.001	
Other (n=71)	100%	91.3% ± 3.4	85.2% ± 4.3	83.3% ± 4.6	79.3% ± 5.2	79.3% ± 5.2	73.1% ± 6.4	67.9% ± 7.8	52.2% ± 10.0	52.2% ± 10.0	52.2% ± 10.0		
By paraprotein level (gms/L):													
Under 26 (n=196)	100%	80.8% ± 2.9	68.9% ± 3.6	58.2% ± 4.0	49.8% ± 4.3	44.1% ± 4.5	40.2% ± 4.6	38.6% ± 4.7	36.4% ± 4.9	36.4% ± 4.9	31.9% ± 6.1	p=0.001	
26+ (n=209)	100%	74.5% ± 3.1	64.3% ± 3.5	51.7% ± 3.8	34.0% ± 4.0	24.7% ± 3.9	20.6% ± 3.9	17.0% ± 4.0	13.2% ± 3.9	8.8% ± 4.4	8.8% ± 4.4		
UK (n=247)	(100%)	(77.8%) (± 2.7)	(64.9%) (± 3.2)	(56.5%) (± 3.5)	(46.2%) (± 3.7)	(34.8%) (± 3.9)	(28.0%) (± 3.9)	(23.3%) (± 3.9)	(16.5%) (± 4.0)	(16.5%) (± 4.0)	(16.5%) (± 4.0)		
By paraprotein type:													
A (n=124)	100%	80.7% ± 3.6	68.6% ± 4.4	54.4% ± 5.0	38.5% ± 5.4	34.4% ± 5.5	29.7% ± 5.7	24.5% ± 5.8	16.3% ± 5.4	16.3% ± 5.4	12.2% ± 5.4	p=0.289	
G (n=375)	100%	75.3% ± 2.3	63.2% ± 2.7	52.9% ± 2.9	41.2% ± 3.1	32.7% ± 3.1	27.4% ± 3.1	24.0% ± 3.1	21.8% ± 3.2	20.3% ± 3.3	20.3% ± 3.3		
Other (n=84)	100%	81.2% ± 4.4	71.1% ± 5.3	62.5% ± 5.9	56.5% ± 6.2	47.0% ± 6.8	38.0% ± 7.2	38.0% ± 7.2	31.6% ± 8.3	31.6% ± 8.3	31.6% ± 8.3		
Not detected (n=21)	100%	80.2% ± 8.9	67.3% ± 11.2	60.6% ± 11.9	40.4% ± 14.1	-	-	-	-	-	-		
UK (n=48)	(100%)	(80.1%) (± 6.0)	(69.9%) (± 7.1)	(63.8%) (± 7.6)	(49.6%) (± 8.7)	(26.7%) (± 8.3)	(26.7%) (± 8.3)	(22.2%) (± 8.0)	(16.7%) (± 7.7)	(16.7%) (± 7.7)	(16.7%) (± 7.7)		
By lamda light chains:													
Negative (n=295)	100%	79.7% ± 2.4	66.3% ± 3.0	54.9% ± 3.3	42.4% ± 3.6	35.4% ± 3.7	30.2% ± 3.8	27.4% ± 3.9	22.5% ± 4.1	20.7% ± 4.2	17.2% ± 4.7	p=0.939	
Positive (n=158)	100%	74.2% ± 3.6	66.0% ± 3.9	58.7% ± 4.2	43.9% ± 4.6	33.2% ± 4.7	27.4% ± 4.7	25.7% ± 4.7	19.1% ± 4.8	19.1% ± 4.8	19.1% ± 4.8		
UK (n=199)	(100%)	(77.2%) (± 3.1)	(65.1%) (± 3.6)	(53.2%) (± 3.9)	(43.8%) (± 4.1)	(33.7%) (± 4.2)	(29.2%) (± 4.2)	(23.6%) (± 4.3)	(21.6%) (± 4.3)	(21.6%) (± 4.3)	(21.6%) (± 4.3)		
By kappa light chains:													
Negative (n=190)	100%	78.7% ± 3.0	66.0% ± 3.6	59.9% ± 3.8	43.4% ± 4.2	31.6% ± 4.3	26.1% ± 4.4	24.5% ± 4.4	19.8% ± 4.6	19.8% ± 4.6	19.8% ± 4.6	p=0.745	
Positive (n=257)	100%	79.9% ± 2.6	67.0% ± 3.2	53.9% ± 3.6	43.4% ± 3.8	37.5% ± 3.9	31.1% ± 4.0	28.4% ± 4.1	22.0% ± 4.2	20.2% ± 4.3	16.8% ± 4.7		
UK (n=205)	(100%)	(76.4%) (± 3.1)	(64.4%) (± 3.6)	(52.5%) (± 3.9)	(43.0%) (± 4.1)	(32.6%) (± 4.2)	(29.2%) (± 4.2)	(23.6%) (± 4.3)	(21.6%) (± 4.3)	(21.6%) (± 4.3)	(21.6%) (± 4.3)		
By Bence-Jones protein:													
Negative (n=236)	100%	79.4% ± 2.7	69.1% ± 3.1	58.6% ± 3.5	51.2% ± 3.7	43.2% ± 4.0	39.7% ± 4.1	35.2% ± 4.4	25.8% ± 4.8	25.8% ± 4.8	21.5% ± 5.6	p=0.002	
Positive (n=210)	100%	75.4% ± 3.1	63.0% ± 3.6	52.6% ± 4.0	31.0% ± 4.1	22.1% ± 3.8	14.8% ± 3.6	14.8% ± 3.6	12.9% ± 3.6	10.3% ± 3.7	10.3% ± 3.7		
UK (n=206)	(100%)	(77.5%) (± 3.0)	(64.9%) (± 3.6)	(54.3%) (± 3.9)	(45.5%) (± 4.1)	(35.3%) (± 4.3)	(30.8%) (± 4.3)	(25.1%) (± 4.4)	(23.2%) (± 4.4)	(23.2%) (± 4.4)	(23.2%) (± 4.4)		
By diagnostic year:													
1987-91 (n=276)	100%	78.9% ± 2.5	67.2% ± 2.9	57.1% ± 3.1	45.4% ± 3.2	35.9% ± 3.2	30.3% ± 3.1	26.3% ± 3.0	21.7% ± 3.0	21.0% ± 3.0	19.6% ± 3.1	p=0.385	
1992-98 (n=376)	100%	76.6% ± 2.3	64.9% ± 2.7	54.0% ± 3.0	41.1% ± 3.4	32.8% ± 3.9	28.7% ± 4.3	-	-	-	-		

* P values derived from Cox proportional hazards regression (data in brackets excluded).

Multiple proportional hazards regression analysis indicated that the key predictors of case outcome were age at diagnosis, place of residence, Durie and Salmon stage, β_2 microglobulin serum level, creatinine level, and histological type. After adjusting for these factors, diagnostic period was not predictive ($p=0.302$). Relative risks of case fatality were found to vary as shown:

<i>Predictors</i>	<i>Relative risk (95% confidence limits)</i>
Age at diagnosis (yrs.):	
Under 55 (reference)	1.00
55-64	2.14 (1.44, 3.20)
65-74	2.47 (1.68, 3.61)
75+	3.02 (2.02, 4.51)
Residence:	
Adelaide (reference)	1.00
Country SA	1.38 (1.09, 1.76)
Durie and Salmon stage:	
I (reference)	1.00
II	1.43 (0.93, 2.21)
III	2.21 (1.56, 3.13)
β_2 microglobulin level (mg/L):	
Under 3.0 (reference)	1.00
3.0+	1.47 (1.01, 2.15)
Creatinine level (micromols/L):	
Under 120 (reference)	1.00
120+	1.55 (1.18, 2.03)
Tumour type:	
Not a multiple myeloma (reference)	1.00
Multiple myeloma	2.26 (1.40, 3.68)
Diagnostic period:	
1987-91 (reference)	1.00
1992-98	1.12 (0.90, 1.40)

Overall, 5% of cases had a surgical intervention as part of their primary course of care, whereas 29% had radiotherapy, 76% had chemotherapy, and 16% received none of these primary treatments. USA hospital-registry data circa 1990 showed a similar treatment profile, although with a higher proportion of cases receiving radiotherapy (38%) and a slightly lower proportion having chemotherapy (69%).³²

Further treatment details for the South Australian series are presented in Table 88. Key predictors of individual modes of primary treatment were as follows:

- For none of these treatments being provided: older age at diagnosis; residence in Adelaide as opposed to a country region; a less advanced Durie and Salmon stage; (possibly) a low β_2 microglobulin level; diagnosis of an immunoproliferative neoplasm other than a multiple myeloma; a low paraprotein level; and (possibly) a negative reading for urinary Bence-Jones protein.
- For surgery: younger age at diagnosis; a low β_2 microglobulin level; a low creatinine level; and a 1992-98 as opposed to a 1987-91 diagnosis.

Table 88: Percentage of cases with multiple myeloma and immunoproliferative neoplasms by treatment mode as part of the primary course of care; SA hospital-based registries, 1987-98*

Category	No treatment	% receiving any			% receiving combination and single therapies						
		surg. (s)	radio. (r)	chemo. (c)	src	sr	sc	rc	s	r	c
All (n=652)	16.3%	4.5%	28.5%	76.3%	2.1%	1.1%	1.1%	19.2%	0.2%	6.1%	53.9%
By sex:											
Males (n=363)	16.8%	3.8%	25.8%	75.4%	1.4%	0.6%	1.4%	16.8%	0.3%	7.0%	55.7%
Females (n=289)	15.6%	5.4%	31.9%	77.5%	2.9%	1.8%	0.7%	22.1%	0.0%	5.1%	51.8%
P value	0.679	0.320	0.095	0.527	0.210	0.251	0.471	0.096	1.000	0.330	0.340
By age (yrs.):											
Under 55 (n=109)	7.0%	11.0%	37.0%	80.0%	4.0%	2.0%	4.0%	21.0%	1.0%	10.0%	51.0%
55-64 (n=136)	7.8%	7.8%	35.7%	88.4%	5.4%	0.8%	1.6%	26.4%	0.0%	3.1%	55.0%
65-74 (n=217)	15.3%	2.9%	28.7%	76.1%	1.0%	1.4%	0.5%	19.1%	0.0%	7.2%	55.5%
75+ (n=190)	28.4%	0.5%	18.6%	66.1%	0.0%	0.5%	0.0%	13.1%	0.0%	4.9%	53.0%
P value	<0.001	<0.001	<0.001	<0.001	0.001	0.403	0.004	0.012	0.130	0.396	0.904
By residence:											
Adel - mid/lower SES (n=311)	19.3%	3.7%	24.3%	73.7%	1.3%	0.7%	1.7%	16.0%	0.0%	6.3%	54.7%
Adel - mid/upper SES (n=193)	17.6%	3.8%	30.2%	73.6%	2.2%	1.1%	0.0%	19.8%	0.5%	7.1%	51.6%
P value	0.632	0.920	0.156	0.992	0.483	0.635	0.162	0.289	0.378	0.729	0.520
Adelaide (n=504)	18.7%	3.7%	26.6%	73.7%	1.7%	0.8%	1.0%	17.4%	0.2%	6.6%	53.5%
Country SA (n=148)	7.9%	7.2%	35.3%	85.6%	3.6%	2.2%	1.4%	25.2%	0.0%	4.3%	55.4%
P value	0.002	0.083	0.045	0.003	0.179	0.190	0.657	0.041	1.000	0.314	0.697
By Durie and Salmon stage:											
I (n=107)	31.4%	3.9%	19.6%	53.9%	0.0%	2.9%	0.0%	5.9%	1.0%	10.8%	48.0%
II (n=85)	21.4%	1.2%	19.0%	77.4%	1.2%	0.0%	0.0%	16.7%	0.0%	1.2%	59.5%
III (n=368)	9.1%	5.4%	34.9%	84.9%	3.4%	0.3%	1.7%	25.6%	0.0%	5.7%	54.3%
UK (n=92)	(22.9%)	(4.8%)	(21.7%)	(66.3%)	(0.0%)	(3.6%)	(1.2%)	(10.8%)	(0.0%)	(7.2%)	(54.2%)
P value	<0.001	0.219	<0.001	<0.001	0.034	0.032	0.080	<0.001	0.096	0.356	0.583
By b2 microglobulin serum level (mg/L):											
Under 3.0 (n=112)	21.0%	8.6%	40.0%	58.1%	3.8%	3.8%	1.0%	15.2%	0.0%	17.1%	38.1%
3.0+ (n=281)	13.5%	3.3%	24.1%	84.3%	2.2%	0.0%	1.1%	19.7%	0.0%	2.2%	61.3%
UK (n=259)	(17.4%)	(4.1%)	(28.5%)	(75.2%)	(1.2%)	(1.2%)	(1.2%)	(20.2%)	(0.4%)	(5.8%)	(52.5%)
P value	0.073	0.054	0.002	<0.001	0.473	0.006	1.000	0.316	1.000	<0.001	<0.001
By creatinine level (micromols/L):											
Under 120 (n=298)	16.3%	6.0%	31.4%	73.5%	3.5%	1.1%	1.4%	17.7%	0.0%	9.2%	50.9%
120+ (n=157)	19.2%	0.6%	22.4%	78.2%	0.0%	0.0%	0.6%	19.9%	0.0%	2.6%	57.7%
UK (n=197)	(13.7%)	(5.5%)	(29.1%)	(79.1%)	(1.6%)	(2.2%)	(1.1%)	(20.9%)	(0.5%)	(4.4%)	(55.5%)
P value	0.430	0.007	0.045	0.275	0.017	0.556	0.660	0.569	1.000	0.008	0.171
By ionized calcium (micromols/L):											
Under 1.2 (median) (n=106)	11.0%	8.0%	35.0%	80.0%	4.0%	1.0%	3.0%	22.0%	0.0%	8.0%	51.0%
1.2+ (n=173)	12.5%	4.8%	36.3%	81.5%	3.6%	0.0%	1.2%	26.8%	0.0%	6.0%	50.0%
UK (n=373)	(19.5%)	(3.4%)	(22.9%)	(72.8%)	(0.8%)	(1.7%)	(0.6%)	(14.7%)	(0.3%)	(5.7%)	(56.7%)
P value	0.714	0.279	0.829	0.755	1.000	0.373	0.365	0.382	1.000	0.517	0.874
By tumour type:											
Multiple myeloma (n=581)	14.8%	4.3%	28.6%	79.3%	2.3%	0.7%	1.1%	20.5%	0.2%	5.0%	55.4%
Other (n=71)	29.5%	6.6%	27.9%	49.2%	0.0%	4.9%	1.6%	6.6%	0.0%	16.4%	41.0%
P value	0.003	0.344	0.908	<0.001	0.628	0.024	0.517	0.008	1.000	0.002	0.032

Table 88 (cont.): Percentage of cases with multiple myeloma and immunoproliferative neoplasms by treatment mode as part of the primary course of care: SA hospital-based registries, 1987-98*

Category	No treatment	% receiving any			% receiving combination and single therapies						
		surg. (s)	radio. (r)	chemo. (c)	src	sr	sc	rc	s	r	c
By paraprotein level (gms/L):											
Under 26 (n=196)	25.0%	3.2%	21.3%	68.6%	1.1%	1.1%	1.1%	13.8%	0.0%	5.3%	52.7%
26+ (n=209)	10.3%	4.4%	29.9%	86.8%	3.4%	0.0%	1.0%	23.5%	0.0%	2.9%	58.8%
UK (n=247)	(14.4%)	(5.7%)	(33.2%)	(73.4%)	(1.7%)	(2.2%)	(1.3%)	(19.7%)	(0.4%)	(9.6%)	(50.7%)
P value	<0.001	0.529	0.051	<0.001	0.178	0.229	1.000	0.014	1.000	0.235	0.219
By paraprotein type:											
A (n=124)	13.4%	4.2%	31.1%	83.2%	1.7%	0.8%	1.7%	26.1%	0.0%	2.5%	53.8%
G (n=375)	17.9%	3.3%	26.9%	76.1%	1.9%	0.8%	0.5%	19.0%	0.0%	5.2%	54.7%
Other (n=84)	19.5%	7.8%	22.1%	72.7%	3.9%	0.0%	2.6%	11.7%	1.3%	6.5%	54.5%
Not detected (n=21)	15.8%	5.3%	52.6%	47.4%	0.0%	5.3%	0.0%	15.8%	0.0%	31.6%	31.6%
UK (n=48)	(4.8%)	(9.5%)	(35.7%)	(78.6%)	(2.4%)	(4.8%)	(2.4%)	(16.7%)	(0.0%)	(11.9%)	(57.1%)
P value	0.660	0.348	0.050	0.006	0.616	0.174	0.340	0.089	0.088	<0.001	0.272
By lamda light chains:											
Negative (n=295)	17.9%	5.0%	28.3%	75.3%	2.2%	1.1%	1.8%	19.4%	0.0%	5.7%	52.0%
Positive (n=158)	17.3%	2.6%	23.1%	76.9%	2.6%	0.0%	0.0%	14.7%	0.0%	5.8%	59.6%
UK (n=199)	(12.9%)	(5.4%)	(33.3%)	(77.4%)	(1.6%)	(2.2%)	(1.1%)	(22.6%)	(0.5%)	(7.0%)	(52.2%)
P value	0.872	0.218	0.235	0.699	0.751	0.556	0.165	0.227	1.000	0.988	0.125
By kappa light chains:											
Negative (n=190)	16.2%	4.9%	26.5%	77.3%	3.8%	0.5%	0.5%	16.2%	0.0%	5.9%	56.8%
Positive (n=257)	18.6%	4.0%	25.9%	75.3%	1.6%	0.8%	1.6%	18.2%	0.0%	5.3%	53.8%
UK (n=205)	(13.2%)	(4.8%)	(33.9%)	(76.7%)	(1.1%)	(2.1%)	(1.1%)	(23.3%)	(0.5%)	(7.4%)	(51.3%)
P value	0.516	0.682	0.893	0.630	0.218	1.000	0.398	0.587	1.000	0.759	0.547
By Bence-Jones protein:											
Negative (n=236)	21.4%	3.5%	27.1%	69.4%	0.4%	1.3%	1.7%	17.5%	0.0%	7.9%	49.8%
Positive (n=210)	14.1%	5.0%	25.5%	83.0%	4.5%	0.0%	0.5%	18.0%	0.0%	3.0%	60.0%
UK (n=206)	(12.6%)	(5.2%)	(33.3%)	(77.6%)	(1.6%)	(2.1%)	(1.0%)	(22.4%)	(0.5%)	(7.3%)	(52.6%)
P value	0.065	0.438	0.712	0.001	0.007	0.252	0.378	0.885	1.000	0.029	0.034
By diagnostic year:											
1987-91 (n=276)	18.6%	2.2%	20.4%	78.1%	0.7%	0.4%	0.7%	16.7%	0.4%	2.6%	59.9%
1992-98 (n=376)	14.6%	6.3%	34.7%	75.0%	3.1%	1.7%	1.4%	21.0%	0.0%	8.8%	49.4%
P value	0.108	0.017	<0.001	0.373	0.040	0.146	0.705	0.178	0.433	0.001	0.010

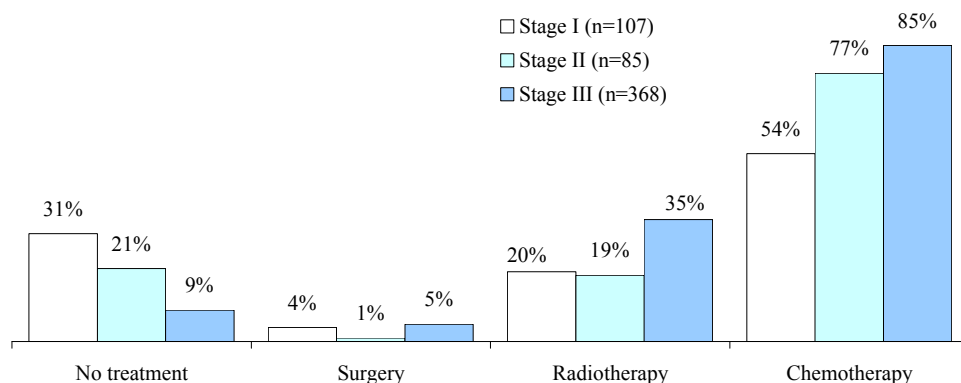
* Treatment details complete for 95% of cases.
Derivation of P values (see text) (data in brackets excluded).

- For radiotherapy: younger age at diagnosis; residence in a country region as opposed to Adelaide; an advanced stage; a low $\beta 2$ microglobulin level; a low creatinine level; an elevated paraprotein level; and diagnosis in 1992-98 as opposed to 1987-91. Paraprotein type also tended to be predictive
- For chemotherapy: a younger age at diagnosis (under 65 years); residence in a country region as opposed to Adelaide; a more advanced stage; an elevated $\beta 2$ microglobulin level; a diagnosis of multiple myeloma as opposed to another immunoproliferative cancer; an elevated paraprotein level; and a positive reading for urinary Bence-Jones protein. Paraprotein type also was predictive.

The greater likelihood of radiotherapy and chemotherapy, as primary treatments, for cases resident in the country, as opposed to Adelaide, may reflect a greater complexity of their conditions. This, in turn, may explain their lower survivals.

Treatment mode is shown by stage in Figure 91.

Figure 91: % multiple myelomas and immunoproliferative neoplasms by Durie and Salmon stage and treatment mode as part of the primary course of care; SA hospital-based registries, 1987-98



A prior analysis of chemotherapy treatments for the 1987-95 diagnostic period indicated that 51% were with M&P and 20% were with VAMP. Other agents used less frequently included VAD, M-2, chlorambucil (\pm prednisolone), cyclophosphamide, and COMP. M&P has remained the most common agent in more recent years, especially for the initial treatment where 56% of “chemotherapy” cases have received this agent. Meanwhile, VAD also has become a common initial treatment, with 37% of “chemotherapy” cases being exposed to this agent at the advent of their care. Multiple agents have been common during the initial course of care, with 38% of all agents comprising M&P, 26% comprising VAD, and 10% comprising high-dose cyclophosphamide.

Leukaemias (ICD-02: M98003-M99403) (selected codes – see “Methods”)

1. Population-based data

Survivals for leukaemia cases in aggregate reduced from 47% at five years from diagnosis to 37% at 10 years and 34% at 15 years. Outcomes did not vary by sex (Table 89). There was a marked reduction in five-year survival with increasing age at diagnosis from 52% for cases under 55 years to 32% for those aged 75 years or more (Figure 92). Diagnostic period was predictive of outcome, with the five-year survival approximating 40% for cases diagnosed in 1977-83, as compared with corresponding survivals of 49% for 1984-90 and 50% for 1991-98 (Figure 93).

Figure 92: Case survivals from leukaemias in 1977-98 by age at diagnosis in South Australia*

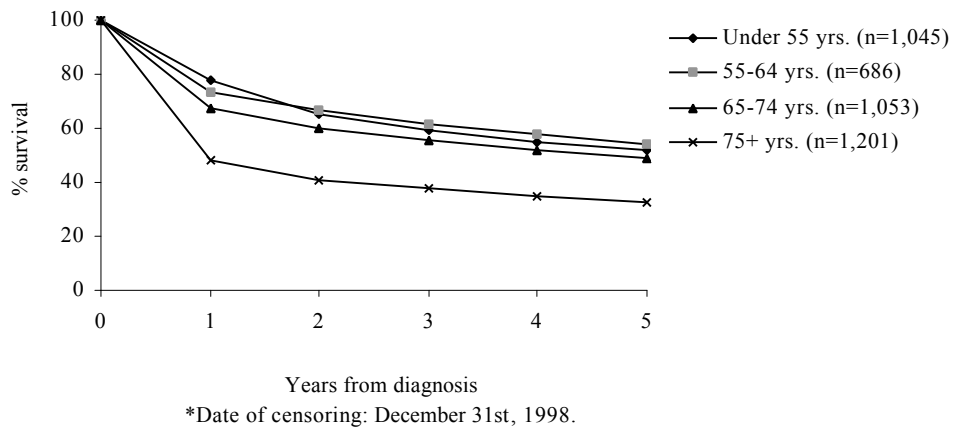
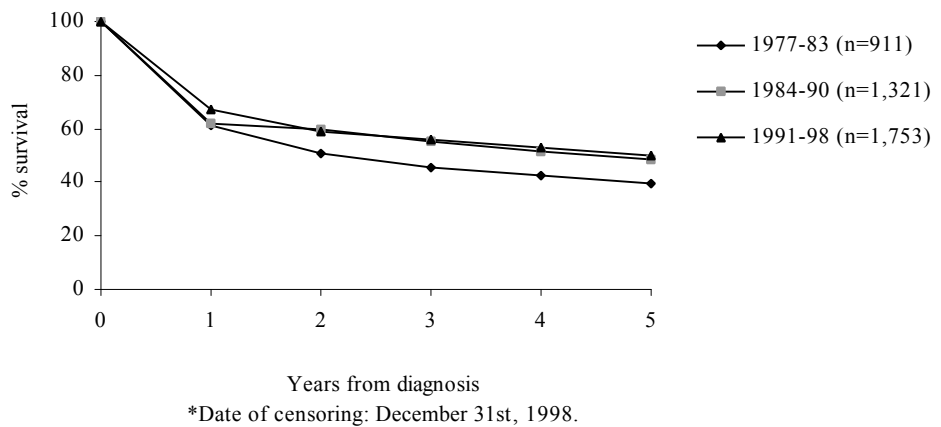


Figure 93: Case survivals from leukaemias by diagnostic period in South Australia*



Five-year survivals for 1977-98 were 50% for acute lymphatic leukaemias, 78% for chronic lymphatic leukaemias, 11% for acute myeloid leukaemias, 37% for chronic myeloid leukaemias, and 47% for other and unspecified cases. Childhood cases aged under 15 years at diagnosis had a relatively high 62% five-year survival for all leukaemias in aggregate, ranging from 54% for the 1977-83 diagnostic period to 67% for 1984-98 (p=0.013). For lymphoid leukaemias, the corresponding survivals were 61% and 72% respectively.

Table 89: Case survivals (\pm SE) by period from diagnosis, sex, age at diagnosis, and diagnostic year; SA Cancer Registry, 1977-98*

Cancer site: leukaemias

Category		Period from diagnosis (yrs.)															P value**
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
All cases (n=3,985)	100%	65.8% \pm 0.8	57.3% \pm 0.9	53.1% \pm 0.9	49.6% \pm 1.0	47.0% \pm 1.0	44.1% \pm 1.0	42.3% \pm 1.1	40.8% \pm 1.1	39.0% \pm 1.2	36.8% \pm 1.2	35.2% \pm 1.3	34.0% \pm 1.4	34.0% \pm 1.5	33.5% \pm 1.6	33.5% \pm 1.7	-
By sex:																	
Males (n=2,308)	100%	66.5% \pm 1.1	57.6% \pm 1.2	53.3% \pm 1.2	49.6% \pm 1.3	46.8% \pm 1.3	43.6% \pm 1.4	41.8% \pm 1.4	39.9% \pm 1.5	38.1% \pm 1.6	36.2% \pm 1.6	34.3% \pm 1.7	32.2% \pm 1.8	32.2% \pm 1.9	31.0% \pm 2.0	31.0% \pm 2.2	p=0.669
Females (n=1,677)	100%	64.7% \pm 1.2	56.9% \pm 1.3	52.8% \pm 1.4	49.7% \pm 1.5	47.2% \pm 1.5	44.7% \pm 1.6	43.3% \pm 1.6	42.0% \pm 1.7	40.3% \pm 1.8	37.6% \pm 1.9	36.4% \pm 2.0	36.4% \pm 2.1	36.4% \pm 2.3	37.1% \pm 2.4	37.1% \pm 2.6	
By age (yrs.):																	
Under 55 (n=1,045)	100%	77.9% \pm 1.3	65.3% \pm 1.5	59.2% \pm 1.6	54.6% \pm 1.6	51.8% \pm 1.7	48.3% \pm 1.7	46.0% \pm 1.7	43.9% \pm 1.8	41.9% \pm 1.8	39.8% \pm 1.8	39.2% \pm 1.9	38.2% \pm 1.9	38.2% \pm 1.9	36.6% \pm 2.0	36.6% \pm 2.0	p<0.001
55-64 (n=686)	100%	73.4% \pm 1.7	66.3% \pm 1.9	61.2% \pm 2.0	57.7% \pm 2.1	54.0% \pm 2.2	50.2% \pm 2.3	47.4% \pm 2.3	45.3% \pm 2.4	43.2% \pm 2.5	39.7% \pm 2.6	35.8% \pm 2.8	33.9% \pm 2.9	33.9% \pm 3.1	31.5% \pm 3.3	31.5% \pm 3.4	
65-74 (n=1,053)	100%	67.2% \pm 1.5	60.0% \pm 1.7	55.7% \pm 1.7	52.1% \pm 1.8	48.7% \pm 1.9	45.7% \pm 2.0	43.7% \pm 2.1	41.7% \pm 2.2	39.4% \pm 2.4	37.1% \pm 2.5	-	-	-	-	-	
75+ (n=1,201)	100%	48.5% \pm 1.6	40.4% \pm 1.7	37.6% \pm 1.8	34.5% \pm 1.9	32.3% \pm 2.0	-	-	-	-	-	-	-	-	-	-	
1977-83 (n=911)	100%	61.1% \pm 1.7	51.0% \pm 1.8	45.6% \pm 1.8	42.3% \pm 1.9	39.8% \pm 1.9	36.1% \pm 1.9	33.5% \pm 1.9	31.9% \pm 1.9	30.3% \pm 1.9	28.5% \pm 1.9	27.5% \pm 2.0	26.8% \pm 2.0	26.8% \pm 2.0	26.3% \pm 2.0	26.3% \pm 2.1	
1984-90 (n=1,321)	100%	67.2% \pm 1.4	59.4% \pm 1.5	55.0% \pm 1.5	51.4% \pm 1.6	48.7% \pm 1.6	45.9% \pm 1.7	44.5% \pm 1.7	43.3% \pm 1.8	41.6% \pm 1.8	39.3% \pm 1.9	-	-	-	-	-	
1991-98 (n=1,753)	100%	67.2% \pm 1.2	59.2% \pm 1.3	56.1% \pm 1.4	52.8% \pm 1.6	50.2% \pm 1.7	-	-	-	-	-	-	-	-	-	-	
By age and year:																	
Under 55 yrs.																	
1977-83 (n=278)	100%	75.4% \pm 2.6	63.2% \pm 2.9	55.4% \pm 3.0	50.1% \pm 3.0	47.3% \pm 3.0	42.0% \pm 3.0	37.7% \pm 2.9	35.3% \pm 2.9	32.4% \pm 2.9	29.6% \pm 2.8	29.0% \pm 2.8	28.7% \pm 2.8	28.7% \pm 2.8	27.7% \pm 2.8	27.7% \pm 2.8	p=0.002
1984-90 (n=331)	100%	75.7% \pm 2.4	62.2% \pm 2.7	57.4% \pm 2.7	52.1% \pm 2.8	49.4% \pm 2.8	46.8% \pm 2.8	46.0% \pm 2.8	44.6% \pm 2.8	43.7% \pm 2.8	43.0% \pm 2.8	-	-	-	-	-	
1991-98 (n=436)	100%	81.4% \pm 1.9	69.5% \pm 2.4	63.7% \pm 2.6	60.9% \pm 2.7	58.3% \pm 2.8	-	-	-	-	-	-	-	-	-	-	
55 - 64 yrs.																	
1977-83 (n=153)	100%	66.9% \pm 3.9	55.1% \pm 4.1	47.7% \pm 4.2	46.4% \pm 4.3	44.4% \pm 4.3	40.9% \pm 4.3	35.9% \pm 4.2	35.2% \pm 4.3	33.7% \pm 4.3	31.5% \pm 4.3	29.9% \pm 4.3	29.1% \pm 4.3	29.1% \pm 4.4	26.7% \pm 4.4	26.7% \pm 4.4	p=0.011
1984-90 (n=230)	100%	76.2% \pm 2.9	70.9% \pm 3.1	65.2% \pm 3.3	60.7% \pm 3.4	56.6% \pm 3.6	52.8% \pm 3.6	51.0% \pm 3.7	48.6% \pm 3.7	46.2% \pm 3.8	42.0% \pm 3.9	-	-	-	-	-	
1991-98 (n=303)	100%	74.6% \pm 2.6	68.8% \pm 2.9	66.0% \pm 3.0	61.8% \pm 3.3	57.2% \pm 3.7	-	-	-	-	-	-	-	-	-	-	
65 - 74 yrs.																	
1977-83 (n=249)	100%	56.1% \pm 3.3	48.3% \pm 3.4	44.4% \pm 3.5	40.7% \pm 3.5	38.1% \pm 3.6	35.4% \pm 3.6	34.1% \pm 3.7	30.4% \pm 3.7	29.8% \pm 3.8	28.0% \pm 3.9	-	-	-	-	-	p<0.001
1984-90 (n=346)	100%	72.0% \pm 2.5	65.3% \pm 2.8	59.9% \pm 2.9	55.8% \pm 3.1	52.2% \pm 3.2	48.4% \pm 3.2	45.8% \pm 3.3	44.5% \pm 3.4	41.1% \pm 3.5	38.9% \pm 3.7	-	-	-	-	-	
1991-98 (n=458)	100%	69.6% \pm 2.3	62.5% \pm 2.5	59.1% \pm 2.7	56.0% \pm 2.9	52.0% \pm 3.2	-	-	-	-	-	-	-	-	-	-	
75+ yrs.																	
1977-83 (n=231)	100%	44.0% \pm 3.6	33.4% \pm 3.6	29.5% \pm 3.7	26.5% \pm 3.8	21.7% \pm 3.8	-	-	-	-	-	-	-	-	-	-	p<0.001
1984-90 (n=414)	100%	49.9% \pm 2.7	43.4% \pm 2.9	40.1% \pm 3.0	38.2% \pm 3.2	36.4% \pm 3.4	-	-	-	-	-	-	-	-	-	-	
1991-98 (n=556)	100%	49.3% \pm 2.3	41.1% \pm 2.5	39.2% \pm 2.7	34.7% \pm 3.0	34.0% \pm 3.3	-	-	-	-	-	-	-	-	-	-	

* Survival from the primary cancer (see text). ** P value derived from Charles Brown test, or equivalent for multiple samples (see text).

The relative risks of case fatality for all ages, and all leukaemia types, were found in the multiple proportional hazards regression analysis to vary by sex, age at diagnosis, histological type, and diagnostic period, as shown:

<i>Predictors</i>	<i>Relative risk (95% confidence limit)</i>
Sex:	
Male (reference)	1.00
Female	0.94 (0.86, 1.03)
Age at diagnosis (yrs.):	
Under 55 (reference)	1.00
55-64	1.88 (1.61, 2.18)
65-74	2.52 (2.19, 2.89)
75+	4.49 (3.92, 5.14)
Histological type:	
Chronic lymphatic (reference)	1.00
Acute lymphatic	5.48 (4.56, 6.59)
Chronic myeloid	4.75 (4.06, 5.56)
Acute myeloid	13.51 (11.89, 15.35)
Other and unspecified	2.58 (2.11, 3.14)
Diagnostic period:	
1977-83 (reference)	1.00
1984-90	0.75 (0.67, 0.83)
1991-98	0.65 (0.58, 0.72)

South Australian survivals tended to exceed the figures reported for Europe and the USA (SEER data).^{28,29} This applied in particular to chronic lymphatic leukaemias.

For childhood leukaemia cases, multivariate proportional hazards regression indicated that relative risks of case fatality varied as follows:

<i>Predictors</i>	<i>Relative risk (95% confidence limits)</i>
Sex:	
Male (reference)	1.00
Female	1.03 (0.72, 1.47)
Age at diagnosis (yrs.):	
3-5 (reference)	1.00
Under 3	2.04 (1.23, 3.38)
6-9	2.37 (1.37, 4.11)
10-14	2.43 (1.47, 4.02)
Diagnostic period:	
1977-83 (reference)	1.00
1984-90	0.62 (0.41, 0.94)
1991-98	0.55 (0.35, 0.86)

For all cases, and childhood cases specifically, case fatalities were found to have reduced for the more recent diagnostic periods. This is attributed in part to advances in chemotherapy, with associated bone-marrow transplantation.²³ Artificial increases also are likely, especially for chronic lymphatic leukaemias, through an increased disclosure of latent disease.²³

2. Hospital-based data

Contributed by:

- the Department of Haematology-Oncology, Queen Elizabeth Hospital.
- the Department of Haematology and Oncology, Flinders Medical Centre.
- the Haematology Unit, Institute of Medical and Veterinary Science.
- the Clinical Haematology Bone Marrow Transplant Unit, Institute of Medical and Veterinary Science.
- the Royal Adelaide Hospital Cancer Centre.

A. Acute lymphatic

The 129 cases recorded on the hospital registries with these leukaemias for the 1987-98 diagnostic period had a five-year survival of 36% and a 10-year survival of 33%. Few children were included, since they mostly were treated at a specialist paediatric hospital. Corresponding survivals for all adult cases in the State (aged 18 years and over) during 1977-98 were 27% at five years and 23% at 10 years from diagnosis.

The main predictor of survival in the present hospital series was age at diagnosis, with older cases having the worse outcomes (Table 90). While cases from the higher socioeconomic residential areas of Adelaide tended to have better outcomes than cases from other areas, this finding did not hold in a multivariate proportional hazards regression analysis after adjusting for age at diagnosis ($p>0.200$). The multivariate model pointed to a higher survival for the 1992-98 than 1987-91 diagnostic period, but this was not statistically significant after adjusting for age ($p=0.145$).

Overall, 92% of cases had chemotherapy as part of their primary course of care, whereas 30% had radiotherapy, none had surgery, and 9% had none of these primary treatments. Further treatment details are provided in Table 91. Key predictors of mode of primary treatment were as follows:

- For none of these treatments being provided: an older age at diagnosis; and a FAB III classification.
- For radiotherapy: being aged under 65 years at diagnosis; FAB classification, with a relatively high proportion of FAB II cases being so treated; and a diagnosis in 1992-98 rather than 1987-91.
- For chemotherapy: being aged under 65 years at diagnosis; and FAB classification, with a relatively low proportion of FAB III cases being so treated.

B. Chronic lymphatic

A total of 347 of these cases was registered by the hospital registries for 1987-98. The five-year survival of 82% was similar to the 78% for all cases of chronic lymphatic leukaemia diagnosed in South Australia in 1977-98. Survival reduced with period from diagnosis, with 55% of hospital cases surviving 10 years or more. Key predictors of lower survivals in this hospital series were older age at diagnosis, male sex, residence in a country area rather than in Adelaide, and a higher number of white blood cells at diagnosis (Table 92). Although not statistically significant, poorer survivals were suggested when the platelet count was low ($p=0.083$).

Table 90: Case survivals (\pm SE) from acute lymphatic leukaemias; SA hospital-based registries, 1987-98*

Category		Period from diagnosis (yrs.)										P value
		1	2	3	4	5	6	7	8	9	10	
All (n=129)	100%	56.5% \pm 4.6	42.5% \pm 4.7	37.4% \pm 4.6	36.3% \pm 4.6	36.3% \pm 4.6	35.0% \pm 4.6	35.0% \pm 4.6	32.8% \pm 4.8	32.8% \pm 4.8	32.8% \pm 4.8	-
By sex:												
Males (n=74)	100%	54.7% \pm 6.2	38.9% \pm 6.3	37.0% \pm 6.2	35.1% \pm 6.2	35.1% \pm 6.2	35.1% \pm 6.2	35.1% \pm 6.2	35.1% \pm 6.2	35.1% \pm 6.2	35.1% \pm 6.2	p=0.886
Females (n=55)	100%	58.5% \pm 6.8	46.4% \pm 7.0	37.6% \pm 6.9	37.6% \pm 6.9	37.6% \pm 6.9	34.5% \pm 7.0	34.5% \pm 7.0	34.5% \pm 7.0	34.5% \pm 7.0	-	
By age (yrs.):												
Under 40 (n=62)	100%	74.2% \pm 6.0	64.2% \pm 6.6	56.2% \pm 6.9	54.2% \pm 7.0	54.2% \pm 7.0	51.8% \pm 7.0	51.8% \pm 7.0	48.3% \pm 7.4	48.3% \pm 7.4	48.3% \pm 7.4	p<0.001
40-64 (n=34)	100%	58.1% \pm 8.6	29.3% \pm 8.1	25.1% \pm 7.9	25.1% \pm 7.9	25.1% \pm 7.9	25.1% \pm 7.9	25.1% \pm 7.9	-	-	-	
65+ (n=33)	100%	22.9% \pm 7.9	18.3% \pm 7.5	18.3% \pm 7.5	18.3% \pm 7.5	18.3% \pm 7.5	18.3% \pm 7.5	-	-	-	-	
By residence:												
Adel - mid/lower SES (n=69)	100%	52.6% \pm 6.2	38.3% \pm 6.1	34.8% \pm 6.0	34.8% \pm 6.0	34.8% \pm 6.0	32.1% \pm 6.1	32.1% \pm 6.1	26.8% \pm 7.1	26.8% \pm 7.1	26.8% \pm 7.1	p=0.067
Adel - mid/upper SES (n=36)	100%	67.7% \pm 8.6	56.0% \pm 9.4	47.4% \pm 9.7	47.4% \pm 9.7	47.4% \pm 9.7	47.4% \pm 9.7	47.4% \pm 9.7	47.4% \pm 9.7	47.4% \pm 9.7	47.4% \pm 9.7	
Adelaide (n=105)	100%	57.7% \pm 5.1	43.9% \pm 5.2	38.8% \pm 5.2	38.8% \pm 5.2	38.8% \pm 5.2	38.8% \pm 5.2	38.8% \pm 5.2	34.3% \pm 5.5	34.3% \pm 5.5	34.3% \pm 5.5	p=0.374
Country SA (n=24)	100%	51.3% \pm 10.7	35.9% \pm 10.6	30.8% \pm 10.2	25.6% \pm 9.7	25.6% \pm 9.7	25.6% \pm 9.7	25.6% \pm 9.7	25.6% \pm 9.7	25.6% \pm 9.7	25.6% \pm 9.7	
By FAB classification:												
I (n=24)	100%	54.2% \pm 10.2	41.7% \pm 10.1	41.7% \pm 10.1	41.7% \pm 10.1	41.7% \pm 10.1	41.7% \pm 10.1	41.7% \pm 10.1	41.7% \pm 10.1	41.7% \pm 10.1	-	p=0.169
II (n=71)	100%	64.0% \pm 6.1	43.3% \pm 6.4	37.9% \pm 6.3	36.1% \pm 6.3	36.1% \pm 6.3	33.9% \pm 6.3	33.9% \pm 6.3	31.1% \pm 6.3	31.1% \pm 6.3	31.1% \pm 6.3	
III (n=9)	100%	44.4% \pm 16.6	-	-	-	-	-	-	-	-	-	
Other or UK (n=25)	(100%)	(48.0%) \pm 10.6	(48.0%) \pm 10.6	(36.6%) \pm 10.7	(36.6%) \pm 10.7	(36.6%) \pm 10.7	(-)	(-)	(-)	(-)	(-)	
By white blood cell count (x10⁹/L):												
Under 7.7 (median) (n=27)	100%	61.6% \pm 9.6	48.4% \pm 10.1	44.0% \pm 10.1	44.0% \pm 10.1	44.0% \pm 10.1	36.7% \pm 10.8	36.7% \pm 10.8	36.7% \pm 10.8	36.7% \pm 10.8	36.7% \pm 10.8	p=0.118
7.7+ (n=29)	100%	65.7% \pm 9.4	40.0% \pm 10.0	31.1% \pm 9.6	31.1% \pm 9.6	31.1% \pm 9.6	31.1% \pm 9.6	31.1% \pm 9.6	20.8% \pm 10.6	20.8% \pm 10.6	20.8% \pm 10.6	
UK (n=73)	(100%)	(51.1%) \pm 6.2	(41.2%) \pm 6.2	(37.6%) \pm 6.1	(35.6%) \pm 6.1	(35.6%) \pm 6.1	(35.6%) \pm 6.1	(35.6%) \pm 6.1	(35.6%) \pm 6.1	(35.6%) \pm 6.1	(35.6%) \pm 6.1	
By diagnostic year:												
1987-91 (n=47)	100%	52.8% \pm 7.3	46.2% \pm 7.3	41.8% \pm 7.3	39.6% \pm 7.2	39.6% \pm 7.2	37.4% \pm 7.1	37.4% \pm 7.1	35.0% \pm 7.1	35.0% \pm 7.1	35.0% \pm 7.1	p=0.516
1992-98 (n=82)	100%	58.8% \pm 5.9	39.3% \pm 6.1	33.8% \pm 6.0	33.8% \pm 6.0	33.8% \pm 6.0	33.8% \pm 6.0	-	-	-	-	

* P values derived from Cox proportional hazards regression (data in brackets excluded).

Table 91: Percentage of acute lymphatic leukaemia cases by treatment mode as part of the primary course of care; SA hospital-based registries, 1987-98*

Category	No treatment	% receiving any			% receiving combination and single therapies						
		surg. (s)	radio. (r)	chemo. (c)	src	sr	sc	rc	s	r	c
All (n=129)	8.5%	0.0%	30.2%	91.5%	0.0%	0.0%	0.0%	30.2%	0.0%	0.0%	61.2%
By sex:											
Males (n=74)	5.4%	0.0%	25.7%	94.6%	0.0%	0.0%	0.0%	25.7%	0.0%	0.0%	68.9%
Females (n=55)	12.7%	0.0%	36.4%	87.3%	0.0%	0.0%	0.0%	36.4%	0.0%	0.0%	50.9%
P value	0.203	1.000	0.191	0.203	1.000	1.000	1.000	0.191	1.000	1.000	0.038
By age (yrs.):											
Under 40 (n=62)	1.6%	0.0%	37.1%	98.4%	0.0%	0.0%	0.0%	37.1%	0.0%	0.0%	61.3%
40-64 (n=34)	2.9%	0.0%	38.2%	97.1%	0.0%	0.0%	0.0%	38.2%	0.0%	0.0%	58.8%
65+ (n=33)	27.3%	0.0%	9.1%	72.7%	0.0%	0.0%	0.0%	9.1%	0.0%	0.0%	63.6%
P value	<0.001	1.000	0.015	<0.001	1.000	1.000	1.000	0.015	1.000	1.000	0.896
By residence:											
Adel - mid/lower SES (n=69)	7.2%	0.0%	24.6%	92.8%	0.0%	0.0%	0.0%	24.6%	0.0%	0.0%	68.1%
Adel - mid/upper SES (n=36)	5.6%	0.0%	38.9%	94.4%	0.0%	0.0%	0.0%	38.9%	0.0%	0.0%	55.6%
P value	0.742	1.000	0.129	1.000	1.000	1.000	1.000	0.129	1.000	1.000	0.204
Adelaide (n=105)	6.7%	0.0%	29.5%	93.3%	0.0%	0.0%	0.0%	29.5%	0.0%	0.0%	63.8%
Country SA (n=24)	16.7%	0.0%	33.3%	83.3%	0.0%	0.0%	0.0%	33.3%	0.0%	0.0%	50.0%
P value	0.122	1.000	0.714	0.114	1.000	1.000	1.000	0.714	1.000	1.000	0.210
By FAB classification:											
I (n=24)	4.2%	0.0%	8.3%	95.8%	0.0%	0.0%	0.0%	8.3%	0.0%	0.0%	87.5%
II (n=71)	5.6%	0.0%	40.8%	94.4%	0.0%	0.0%	0.0%	40.8%	0.0%	0.0%	53.5%
III (n=9)	44.4%	0.0%	0.0%	55.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	55.6%
Other or UK (n=25)	(8.0%)	(0.0%)	(32.0%)	(92.0%)	(0.0%)	(0.0%)	(0.0%)	(32.0%)	(0.0%)	(0.0%)	(60.0%)
P value	<0.001	1.000	0.001	<0.001	1.000	1.000	1.000	0.001	1.000	1.000	0.012
By white blood cell count (x10⁹/L):											
Under 7.7 (median) (n=27)	7.4%	0.0%	40.7%	92.6%	0.0%	0.0%	0.0%	40.7%	0.0%	0.0%	51.9%
7.7+ (n=29)	10.3%	0.0%	44.8%	89.7%	0.0%	0.0%	0.0%	44.8%	0.0%	0.0%	44.8%
UK (n=73)	(8.2%)	(0.0%)	(20.5%)	(91.8%)	(0.0%)	(0.0%)	(0.0%)	(20.5%)	(0.0%)	(0.0%)	(71.2%)
P value	1.000	1.000	0.757	1.000	1.000	1.000	1.000	0.757	1.000	1.000	0.599
By diagnostic year:											
1987-91 (n=47)	8.5%	0.0%	19.1%	91.5%	0.0%	0.0%	0.0%	19.1%	0.0%	0.0%	72.3%
1992-98 (n=82)	8.5%	0.0%	36.6%	91.5%	0.0%	0.0%	0.0%	36.6%	0.0%	0.0%	54.9%
P value	1.000	1.000	0.038	1.000	1.000	1.000	1.000	0.038	1.000	1.000	0.050

* Treatment details complete for 98% of cases.
Derivation of P values (see text) (data in brackets excluded).

Table 92: Case survivals (\pm SE) from chronic lymphatic leukaemias; SA hospital-based registries, 1987-98*

Category		Period from diagnosis (yrs.)										P value
		1	2	3	4	5	6	7	8	9	10	
All (n=347)	100%	95.8% \pm 1.1	92.9% \pm 1.4	88.3% \pm 1.9	84.9% \pm 2.2	81.7% \pm 2.4	78.1% \pm 2.7	72.9% \pm 3.1	71.0% \pm 3.3	62.4% \pm 4.2	55.1% \pm 5.1	-
By sex:												
Males (n=204)	100%	93.9% \pm 1.7	90.0% \pm 2.2	86.0% \pm 2.6	81.4% \pm 3.1	76.1% \pm 3.6	71.8% \pm 4.0	64.8% \pm 4.5	62.9% \pm 4.8	52.3% \pm 6.3	45.1% \pm 7.2	p<0.001
Females (n=143)	100%	98.5% \pm 1.0	97.0% \pm 1.5	91.7% \pm 2.5	89.6% \pm 2.9	89.6% \pm 2.9	86.9% \pm 3.4	83.8% \pm 3.9	81.9% \pm 4.2	74.6% \pm 5.6	67.1% \pm 7.2	
By age (yrs.):												
Under 55 (n=37)	100%	97.3% \pm 2.7	97.3% \pm 2.7	90.2% \pm 5.4	86.5% \pm 6.4	86.5% \pm 6.4	86.5% \pm 6.4	79.3% \pm 9.0	79.3% \pm 9.0	79.3% \pm 9.0	-	p=0.017
55-64 (n=87)	100%	98.8% \pm 1.2	96.3% \pm 2.1	93.4% \pm 2.8	88.8% \pm 3.8	88.8% \pm 3.8	81.6% \pm 4.9	75.5% \pm 5.7	72.8% \pm 6.1	72.8% \pm 6.1	72.8% \pm 6.1	
65-74 (n=125)	100%	97.5% \pm 1.4	95.7% \pm 1.9	90.5% \pm 2.9	87.0% \pm 3.4	84.3% \pm 3.8	78.1% \pm 4.6	78.1% \pm 4.6	75.5% \pm 5.1	63.1% \pm 7.1	57.8% \pm 8.3	
75+ (n=98)	100%	90.4% \pm 3.0	84.3% \pm 3.9	79.9% \pm 4.4	78.2% \pm 4.7	75.7% \pm 5.1	72.8% \pm 5.7	60.0% \pm 7.5	60.0% \pm 7.5	38.5% \pm 11.2	28.9% \pm 11.8	
By residence:												
Adel - mid/lower SES (n=186)	100%	96.2% \pm 1.4	93.7% \pm 1.8	89.5% \pm 2.4	87.9% \pm 2.7	86.0% \pm 2.9	84.9% \pm 3.1	76.7% \pm 4.0	76.7% \pm 4.0	67.3% \pm 5.7	62.8% \pm 6.8	p=0.274
Adel - mid/upper SES (n=92)	100%	97.8% \pm 1.6	93.0% \pm 2.8	85.8% \pm 4.0	82.4% \pm 4.5	78.0% \pm 5.2	73.4% \pm 5.9	73.4% \pm 5.9	69.9% \pm 6.5	62.1% \pm 7.8	57.7% \pm 8.4	
Adelaide (n=278)	100%	96.7% \pm 1.1	93.5% \pm 1.5	88.3% \pm 2.1	86.1% \pm 2.1	83.5% \pm 2.6	81.2% \pm 2.8	75.5% \pm 3.4	74.3% \pm 3.5	65.5% \pm 4.6	61.2% \pm 5.2	p=0.027
Country SA (n=69)	100%	91.9% \pm 3.5	90.2% \pm 3.8	88.2% \pm 4.2	79.6% \pm 5.6	74.6% \pm 6.3	65.7% \pm 7.3	62.3% \pm 7.7	56.6% \pm 8.8	50.3% \pm 9.8	26.8% \pm 13.5	
By white blood cell count (x10⁹/L):												
Under 21.8 (median) (n=73)	100%	98.6% \pm 1.4	96.9% \pm 2.2	95.0% \pm 2.9	95.0% \pm 2.9	92.1% \pm 4.0	85.9% \pm 5.6	82.8% \pm 6.2	82.8% \pm 6.2	70.9% \pm 12.2	70.9% \pm 12.2	p=0.003
21.8+ (n=76)	100%	93.0% \pm 3.0	91.6% \pm 3.3	86.1% \pm 4.4	82.1% \pm 5.0	77.7% \pm 5.6	68.7% \pm 7.0	46.4% \pm 8.4	46.4% \pm 8.4	46.4% \pm 8.4	46.4% \pm 8.4	
UK (n=198)	(100%)	(95.8%) \pm 1.4	(91.9%) \pm 2.0	(86.9%) \pm 2.6	(82.7%) \pm 3.0	(80.0%) \pm 3.2	(79.0%) \pm 3.4	(79.0%) \pm 3.4	(76.1%) \pm 3.8	(66.0%) \pm 5.1	(56.5%) \pm 6.2	
By haemoglobin level (gms/dL):												
Under 13.8 (median) (n=73)	100%	94.3% \pm 2.8	92.6% \pm 3.2	88.4% \pm 4.2	85.7% \pm 4.9	82.9% \pm 5.4	67.3% \pm 8.3	59.4% \pm 9.0	59.4% \pm 9.0	59.4% \pm 9.0	59.4% \pm 9.0	p=0.418
13.8+ (n=83)	100%	97.5% \pm 1.7	96.2% \pm 2.1	93.1% \pm 3.0	91.4% \pm 3.4	87.4% \pm 3.4	85.1% \pm 4.7	69.7% \pm 6.9	69.7% \pm 6.9	48.8% \pm 11.2	48.8% \pm 11.2	
UK (n=191)	(100%)	(95.7%) \pm 1.5	(91.6%) \pm 2.1	(86.4%) \pm 2.7	(81.9%) \pm 3.1	(79.1%) \pm 3.4	(78.1%) \pm 3.5	(78.1%) \pm 3.5	(75.1%) \pm 3.9	(68.1%) \pm 4.9	(58.0%) \pm 6.3	
By platelet count (x10⁹/L):												
Under 215 (median) (n=72)	100%	91.3% \pm 3.4	89.5% \pm 3.8	87.3% \pm 4.3	82.2% \pm 5.3	82.2% \pm 5.3	69.2% \pm 8.2	56.2% \pm 9.5	56.2% \pm 9.5	56.2% \pm 9.5	56.2% \pm 9.5	p=0.083
215+ (n=74)	100%	100%	100%	94.5% \pm 3.1	94.5% \pm 3.1	88.0% \pm 4.6	83.1% \pm 5.5	71.8% \pm 7.1	71.8% \pm 7.1	62.8% \pm 10.4	62.8% \pm 10.4	
UK (n=201)	(100%)	(95.9%) \pm 1.4	(91.5%) \pm 2.0	(86.6%) \pm 2.6	(82.4%) \pm 3.0	(79.7%) \pm 3.2	(78.7%) \pm 3.4	(77.7%) \pm 3.5	(74.8%) \pm 3.9	(64.9%) \pm 5.1	(55.6%) \pm 6.1	
By diagnostic year:												
1987-91 (n=169)	100%	94.5% \pm 1.8	91.9% \pm 2.2	88.5% \pm 2.6	84.3% \pm 3.0	82.1% \pm 3.1	79.1% \pm 3.4	73.7% \pm 3.7	71.7% \pm 3.9	63.0% \pm 4.6	55.7% \pm 5.4	p=0.838
1992-98 (n=178)	100%	97.1% \pm 1.3	93.8% \pm 1.9	87.6% \pm 2.9	85.6% \pm 3.1	80.5% \pm 4.1	74.8% \pm 5.5	-	-	-	-	

* P values derived from Cox proportional hazards regression (data in brackets excluded).

A multivariate proportional hazards regression analysis indicated that key predictors of case fatality included age at diagnosis, sex, place of residence, and white blood cell count. Diagnostic period was not predictive after adjusting for these factors ($p=0.923$). Relative risks were found to vary as shown:

<i>Predictors</i>	<i>Relative risk (95% confidence limits)</i>
Age at diagnosis (yrs.):	
Under 65 (reference)	1.00
65-74	1.44 (0.81, 2.55)
75+	2.87 (1.64, 5.03)
Sex:	
Male (reference)	1.00
Female	0.41 (0.24, 0.68)
Residence:	
Adelaide (reference)	1.00
Country SA	1.65 (0.99, 2.75)
White blood cell count ($\times 10^9/L$):	
Under 21.8 (median) (reference)	1.00
21.8+	2.63 (1.17, 5.92)
Diagnostic period:	
1987-91 (reference)	1.00
1992-98	1.03 (0.61, 1.74)

Poorer outcomes for males than females also were found in an earlier analysis.³ Males were more likely than females to receive a primary course of chemotherapy ($p<0.001$), which could reflect a greater severity of their conditions at diagnosis. Similarly, the tendency for poorer outcomes among country residents may be due to a greater severity of their conditions. Notably, more country than Adelaide cases received an initial course of chemotherapy ($p=0.006$).

Overall, 32% of cases received an initial course of care following diagnosis. Thirty-two per cent had chemotherapy, 2% had radiotherapy, and under 1% had a surgical intervention related in some way to the leukaemia as part of their primary treatment.

Further details of primary treatment are provided in Table 93. Key predictors of individual modes of treatments were as follows:

- For none of these treatments being provided: female sex; residence in Adelaide as opposed to a country region; and a low white blood cell count; a high haemoglobin level; and a high platelet count.
- For chemotherapy: male sex; residence in a country region; and a high white blood cell count; a low haemoglobin level; and a low platelet count.

Due to the small numbers of cases receiving radiotherapy and surgery, there was insufficient statistical power to reveal predictors of these interventions.

As observed in previous analyses,³ the most common chemotherapy agent used as part of the primary course of care was chlorambucil (\pm prednisolone). During 1987-98, 64% of "chemotherapy" treatments incorporated this agent as the initial therapy. Subsequent treatments, by comparison, tended more to involve other agents, with 33% comprising chlorambucil (\pm prednisolone). Other agents comprised CVP, C&P, and hydroxy urea, plus some additional varieties.

Table 93: Percentage of chronic lymphatic leukaemia cases by treatment mode as part of the primary course of care; SA hospital-based registries, 1987-98*

Category	No treatment	% receiving any			% receiving combination and single therapies						
		surg. (s)	radio. (r)	chemo. (c)	src	sr	sc	rc	s	r	c
All (n=347)	67.7%	0.6%	2.4%	31.7%	0.0%	0.0%	0.6%	1.8%	0.0%	0.6%	29.3%
By sex:											
Males (n=204)	60.2%	0.5%	2.6%	39.3%	0.0%	0.0%	0.5%	2.0%	0.0%	0.5%	36.7%
Females (n=143)	78.3%	0.7%	2.2%	21.0%	0.0%	0.0%	0.7%	1.4%	0.0%	0.7%	18.8%
P value	<0.001	1.000	1.000	<0.001	1.000	1.000	1.000	1.000	1.000	1.000	<0.001
By age (yrs.):											
Under 55 (n=37)	62.2%	0.0%	0.0%	37.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	37.8%
55-64 (n=87)	64.2%	0.0%	3.7%	35.8%	0.0%	0.0%	0.0%	3.7%	0.0%	0.0%	32.1%
65-74 (n=125)	71.1%	0.0%	0.8%	28.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	28.1%
75+ (n=98)	68.4%	2.1%	4.2%	30.5%	0.0%	0.0%	2.1%	3.2%	0.0%	1.1%	25.3%
P value	0.384	0.066	0.392	0.298	1.000	1.000	0.066	0.688	1.000	0.314	0.135
By residence:											
Adel - mid/lower SES (n=186)	74.7%	0.6%	1.7%	25.3%	0.0%	0.0%	0.6%	1.7%	0.0%	0.0%	23.0%
Adel - mid/upper SES (n=92)	65.2%	0.0%	4.3%	33.7%	0.0%	0.0%	0.0%	3.3%	0.0%	1.1%	30.4%
P value	0.103	1.000	0.239	0.147	1.000	1.000	1.000	0.420	1.000	0.346	0.185
Adelaide (n=278)	71.4%	0.4%	2.6%	28.2%	0.0%	0.0%	0.4%	2.3%	0.0%	0.4%	25.6%
Country SA (n=69)	52.9%	1.5%	1.5%	45.6%	0.0%	0.0%	1.5%	0.0%	0.0%	1.5%	44.1%
P value	0.004	0.366	1.000	0.006	1.000	1.000	0.366	0.606	1.000	0.366	0.003
By white blood cell count (x10⁹/L):											
Under 21.8 (median) (n=73)	85.1%	2.7%	1.4%	13.5%	0.0%	0.0%	2.7%	0.0%	0.0%	1.4%	10.8%
21.8+ (n=76)	44.7%	0.0%	6.6%	55.3%	0.0%	0.0%	0.0%	6.6%	0.0%	0.0%	48.7%
UK (n=198)	(70.1%)	(0.0%)	(1.1%)	(29.3%)	(0.0%)	(0.0%)	(0.0%)	(0.5%)	(0.0%)	(0.5%)	(28.8%)
P value	<0.001	0.242	0.210	<0.001	1.000	1.000	0.242	0.058	1.000	0.493	<0.001
By haemoglobin level (gms/dL):											
Under 13.8 (median) (n=73)	57.1%	2.9%	2.9%	41.4%	0.0%	0.0%	2.9%	1.4%	0.0%	1.4%	37.1%
13.8+ (n=83)	78.1%	0.0%	2.7%	21.9%	0.0%	0.0%	0.0%	2.7%	0.0%	0.0%	19.2%
UK (n=191)	(67.5%)	(0.0%)	(2.1%)	(31.9%)	(0.0%)	(0.0%)	(0.0%)	(1.6%)	(0.0%)	(0.5%)	(30.4%)
P value	0.007	0.238	1.000	0.012	1.000	1.000	0.238	1.000	1.000	0.490	0.017
By platelet count (x10⁹/L):											
Under 215 (median) (n=72)	54.4%	1.5%	2.9%	45.6%	0.0%	0.0%	1.5%	2.9%	0.0%	0.0%	41.2%
215+ (n=74)	80.6%	1.4%	1.4%	18.1%	0.0%	0.0%	1.4%	0.0%	0.0%	1.4%	16.7%
UK (n=201)	(67.5%)	(0.0%)	(2.6%)	(32.0%)	(0.0%)	(0.0%)	(0.0%)	(2.1%)	(0.0%)	(0.5%)	(29.9%)
P value	<0.001	1.000	0.612	<0.001	1.000	1.000	1.000	0.234	1.000	1.000	0.001
By diagnostic year:											
1987-91 (n=169)	65.3%	1.2%	3.0%	33.5%	0.0%	0.0%	1.2%	1.8%	0.0%	1.2%	30.5%
1992-98 (n=178)	70.1%	0.0%	1.8%	29.9%	0.0%	0.0%	0.0%	1.8%	0.0%	0.0%	28.1%
P value	0.349	0.498	0.723	0.481	1.000	1.000	0.498	1.000	1.000	0.498	0.631

* Treatment details complete for 93% of cases.

Derivation of P values (see text) (excluding data in brackets).

C. Acute myeloid

There were 541 acute myeloid leukaemias registered by the hospital registries for 1987-98. Their five-year case survival of 13% was similar to the corresponding 11% for all acute myeloid cases in South Australia in 1977-98. Meanwhile, the 10-year survival for the hospital cases was 10%.

Survivals tended to be lower for older cases and those with a larger number of cytogenic abnormalities and a high number of white blood cells (Table 94). FAB classification also was an outcome predictor, with comparatively high survivals being suggested for FAB III and (less so) FAB IV cases (ie, promyelocytic and myelomonocytic cases, respectively). Males tended to have worse outcomes than females ($p=0.062$).

Multiple proportional hazards regression analysis indicated that the key predictors of case fatality were age at diagnosis, FAB classification, the presence of cytogenic abnormalities, white blood cell count, and platelet count, with diagnostic period not being a significant predictor after adjusting for these factors ($p=0.921$). The corresponding relative risks were as follows:

<i>Predictor</i>	<i>Relative risk (95% confidence limits)</i>
Age at diagnosis (yrs.):	
Under 55 (reference)	1.00
55-64	1.55 (1.15, 2.09)
65-74	2.24 (1.70, 2.95)
75+	3.63 (2.72, 4.84)
FAB classification:	
I (reference)	1.00
II	0.69 (0.52, 0.93)
III	0.40 (0.24, 0.67)
IV	0.61 (0.43, 0.88)
V	1.13 (0.71, 1.80)
VI	1.07 (0.57, 2.01)
VII	2.40 (1.09, 5.28)
Cytogenic abnormalities:	
None (reference)	1.00
Some abnormal	1.81 (1.28, 2.56)
All abnormal	2.29 (1.45, 3.64)
White blood cell count ($\times 10^9/L$):	
Under 7.8 (median) (reference)	1.00
7.8+	2.08 (1.58, 2.74)
Platelet count ($\times 10^9/L$):	
Under 64 (median) (reference)	1.00
64+	0.77 (0.60, 1.00)
Diagnostic period:	
1987-91 (reference)	1.00
1992-98	1.01 (0.83, 1.24)

Predictably, a high platelet count was associated negatively with case fatality after adjusting for other factors in this model ($p=0.048$).

Table 94: Case survivals (\pm SE) from acute myeloid leukaemias; SA hospital-based registries, 1987-98*

Category		Period from diagnosis (yrs.)										P value
		1	2	3	4	5	6	7	8	9	10	
All (n=541)	100%	35.2% \pm 2.1	20.2% \pm 1.8	16.7% \pm 1.7	13.6% \pm 1.7	12.6% \pm 1.6	11.5% \pm 1.6	10.7% \pm 1.6	9.5% \pm 1.6	9.5% \pm 1.6	9.5% \pm 1.6	-
By sex:												
Males (n=309)	100%	34.2% \pm 2.8	17.6% \pm 2.3	12.7% \pm 2.1	10.7% \pm 2.0	10.1% \pm 2.0	8.5% \pm 1.9	7.2% \pm 1.8	7.2% \pm 1.8	7.2% \pm 1.8	7.2% \pm 1.8	p=0.062
Females (n=232)	100%	36.6% \pm 3.2	23.6% \pm 2.9	21.9% \pm 2.9	17.3% \pm 2.8	15.6% \pm 2.7	15.6% \pm 2.7	15.6% \pm 2.7	12.4% \pm 3.0	12.4% \pm 3.0	12.4% \pm 3.0	
By age (yrs.):												
Under 40 (n=83)	100%	65.1% \pm 5.3	42.1% \pm 5.7	37.3% \pm 5.7	28.6% \pm 5.5	26.7% \pm 5.5	24.5% \pm 5.5	24.5% \pm 5.5	21.0% \pm 5.7	21.0% \pm 5.7	21.0% \pm 5.7	p<0.001
40-54 (n=76)	100%	53.7% \pm 6.0	32.4% \pm 5.9	26.9% \pm 5.7	22.4% \pm 5.6	22.4% \pm 5.6	22.4% \pm 5.6	22.4% \pm 5.6	22.4% \pm 5.6	22.4% \pm 5.6	22.4% \pm 5.6	
55-64 (n=112)	100%	36.6% \pm 4.6	21.6% \pm 4.1	17.3% \pm 3.8	14.7% \pm 3.6	11.4% \pm 3.5	9.5% \pm 3.4	7.1% \pm 3.3	7.1% \pm 3.3	7.1% \pm 3.3	7.1% \pm 3.3	
65-74 (n=139)	100%	28.9% \pm 4.0	12.2% \pm 3.1	10.0% \pm 2.9	8.8% \pm 2.8	8.8% \pm 2.8	7.5% \pm 2.6	6.3% \pm 2.5	6.3% \pm 2.5	6.3% \pm 2.5	6.3% \pm 2.5	
75+ (n=131)	100%	10.2% \pm 2.8	6.0% \pm 2.2	3.6% \pm 1.8	2.4% \pm 1.6	2.4% \pm 1.6	2.4% \pm 1.6	2.4% \pm 1.6	0.0% \pm 0.0	-	-	
By residence:												
Adel - mid/lower SES (n=249)	100%	34.2% \pm 3.1	20.6% \pm 2.7	16.2% \pm 2.6	13.1% \pm 2.4	12.4% \pm 2.4	10.7% \pm 2.3	9.0% \pm 2.3	5.8% \pm 2.4	5.8% \pm 2.4	5.8% \pm 2.4	p=0.952
Adel - mid/upper SES (n=147)	100%	35.7% \pm 4.1	18.7% \pm 3.5	15.9% \pm 3.3	12.6% \pm 3.1	11.4% \pm 3.1	11.4% \pm 3.1	11.4% \pm 3.1	11.4% \pm 3.1	11.4% \pm 3.1	11.4% \pm 3.1	
Adelaide (n=396)	100%	34.4% \pm 2.5	19.9% \pm 2.2	16.1% \pm 2.0	12.9% \pm 1.9	12.0% \pm 1.9	10.9% \pm 1.9	9.7% \pm 1.8	8.0% \pm 1.9	8.0% \pm 1.9	8.0% \pm 1.9	p=0.462
Country SA (n=145)	100%	36.6% \pm 4.1	21.1% \pm 3.6	18.4% \pm 3.5	15.4% \pm 3.3	14.2% \pm 3.3	13.0% \pm 3.2	13.0% \pm 3.2	13.0% \pm 3.2	13.0% \pm 3.2	-	
By FAB classification:												
I (n=85)	100%	35.1% \pm 5.3	10.8% \pm 3.6	5.4% \pm 2.6	4.1% \pm 2.3	4.1% \pm 2.3	4.1% \pm 2.3	2.7% \pm 1.9	2.7% \pm 1.9	-	-	p<0.001
II (n=153)	100%	42.3% \pm 4.2	20.0% \pm 3.6	14.9% \pm 3.3	13.8% \pm 3.3	13.8% \pm 3.3	12.4% \pm 3.2	12.4% \pm 3.2	12.4% \pm 3.2	12.4% \pm 3.2	-	
III (n=40)	100%	61.9% \pm 7.8	56.2% \pm 8.0	56.2% \pm 8.0	47.9% \pm 8.7	42.6% \pm 9.3	42.6% \pm 9.3	42.6% \pm 9.3	42.6% \pm 9.3	42.6% \pm 9.3	-	
IV (n=78)	100%	43.0% \pm 5.7	34.2% \pm 5.6	29.0% \pm 5.5	23.5% \pm 5.3	21.6% \pm 5.1	19.4% \pm 5.1	19.4% \pm 5.1	13.0% \pm 5.1	13.0% \pm 5.1	13.0% \pm 5.1	
V (n=32)	100%	33.6% \pm 9.2	12.6% \pm 6.7	12.6% \pm 6.7	8.4% \pm 5.6	8.4% \pm 5.6	0.0% \pm 0.0	-	-	-	-	
VI (n=15)	100%	29.3% \pm 12.2	29.3% \pm 12.2	29.3% \pm 12.2	22.0% \pm 11.2	14.7% \pm 9.6	14.7% \pm 9.6	14.7% \pm 9.6	14.7% \pm 9.6	14.7% \pm 9.6	-	
VII (n=7)	100%	14.3% \pm 13.2	0.0% \pm 0.0	-	-	-	-	-	-	-	-	
Other or UK (n=131)	(100%)	(16.2%) \pm (3.3)	(8.7%) \pm (2.6)	(6.9%) \pm (2.3)	(4.7%) \pm (2.0)	(4.7%) \pm (2.0)	(4.7%) \pm (2.0)	(0.0%) \pm (0.0)	(0.0%) \pm (0.0)	(0.0%) \pm (0.0)	(0.0%) \pm (0.0)	

Table 94 (cont.): Case survivals (\pm SE) from acute myeloid leukaemias; SA hospital-based registries, 1987-98*

Category		Period from diagnosis (yrs.)										P value	
		1	2	3	4	5	6	7	8	9	10		
By cytogenic abnormalities:													
None (n=108)	100%	52.3%	27.8%	24.2%	17.4%	15.9%	15.9%	15.9%	13.6%	13.6%	13.6%		p=0.019
		\pm 4.9	\pm 4.6	\pm 4.4	\pm 4.1	\pm 4.0	\pm 4.0	\pm 4.0	\pm 4.0	\pm 4.0	\pm 4.0		
Some abnormal (n=74)	100%	29.6%	21.4%	17.5%	15.6%	12.5%	6.2%	6.2%	6.2%	6.2%	6.2%		
		\pm 5.5	\pm 5.1	\pm 4.8	\pm 4.7	\pm 4.7	\pm 3.9	\pm 3.9	\pm 3.9	\pm 3.9	\pm 3.9		
All abnormal (n=28)	100%	33.2%	8.3%	4.2%	4.2%	-	-	-	-	-	-		
		\pm 9.3	\pm 5.6	\pm 4.1	\pm 4.1	-	-	-	-	-	-		
UK (n=331)	(100%)	(30.9%)	(18.5%)	(15.2%)	(12.8%)	(12.2%)	(11.6%)	(10.2%)	(9.3%)	(9.3%)	(9.3%)		
		(\pm 2.6)	(\pm 2.3)	(\pm 2.2)	(\pm 2.1)	(\pm 2.1)	(\pm 2.0)	(\pm 2.0)	(\pm 2.0)	(\pm 2.0)	(\pm 2.0)		
By white blood cell count ($\times 10^9/L$):													
Under 7.8 (median) (n=157)	100%	40.1%	23.5%	19.4%	17.6%	15.5%	14.4%	13.1%	13.1%	13.1%	13.1%		p=0.004
		\pm 4.1	\pm 3.6	\pm 3.4	\pm 3.3	\pm 3.2	\pm 3.2	\pm 3.2	\pm 3.2	\pm 3.2	\pm 3.2		
7.8+ (n=157)	100%	29.3%	13.7%	11.0%	6.7%	6.7%	5.6%	5.6%	4.2%	4.2%	4.2%		
		\pm 3.7	\pm 3.0	\pm 2.8	\pm 2.4	\pm 2.4	\pm 2.2	\pm 2.2	\pm 2.1	\pm 2.1	\pm 2.1		
UK (n=227)	(100%)	(36.0%)	(22.4%)	(18.8%)	(15.3%)	(14.4%)	(13.5%)	(12.4%)	(10.8%)	(10.8%)	(10.8%)		
		(\pm 3.3)	(\pm 2.9)	(\pm 2.8)	(\pm 2.7)	(\pm 2.7)	(\pm 2.7)	(\pm 2.7)	(\pm 2.7)	(\pm 2.7)	(\pm 2.7)		
By haemoglobin level (gms/dL):													
Under 9.5 (median) (n=151)	100%	31.8%	17.8%	14.1%	12.2%	12.2%	12.2%	12.2%	12.2%	12.2%	12.2%		p=0.917
		\pm 3.9	\pm 3.4	\pm 3.1	\pm 3.0	\pm 3.0	\pm 3.0	\pm 3.0	\pm 3.0	\pm 3.0	\pm 3.0		
9.5+ (n=163)	100%	37.3%	19.3%	16.1%	12.4%	10.3%	8.1%	7.0%	5.6%	5.6%	5.6%		
		\pm 3.9	\pm 3.3	\pm 3.1	\pm 2.9	\pm 2.8	\pm 2.6	\pm 2.5	\pm 2.3	\pm 2.3	\pm 2.3		
UK (n=227)	(100%)	(36.0%)	(22.4%)	(18.8%)	(15.3%)	(14.4%)	(13.5%)	(12.4%)	(10.8%)	(10.8%)	(10.8%)		
		(\pm 3.3)	(\pm 2.9)	(\pm 2.8)	(\pm 2.7)	(\pm 2.7)	(\pm 2.7)	(\pm 2.7)	(\pm 2.7)	(\pm 2.7)	(\pm 2.7)		
By platelet count ($\times 10^9/L$):													
Under 64 (median) (n=156)	100%	32.2%	19.5%	14.1%	13.1%	13.1%	11.7%	11.7%	9.7%	9.7%	9.7%		p=0.456
		\pm 3.9	\pm 3.4	\pm 3.1	\pm 3.1	\pm 3.1	\pm 3.0	\pm 3.0	\pm 3.1	\pm 3.1	\pm 3.1		
64+ (n=156)	100%	37.6%	18.1%	16.4%	12.0%	10.1%	9.1%	8.0%	8.0%	8.0%	8.0%		
		\pm 4.0	\pm 3.3	\pm 3.2	\pm 2.9	\pm 2.7	\pm 2.6	\pm 2.5	\pm 2.5	\pm 2.5	\pm 2.5		
UK (n=229)	(100%)	(35.7%)	(22.1%)	(18.6%)	(15.1%)	(14.3%)	(13.4%)	(12.3%)	(10.7%)	(10.7%)	(10.7%)		
		(\pm 3.3)	(\pm 2.9)	(\pm 2.8)	(\pm 2.7)	(\pm 2.7)	(\pm 2.6)	(\pm 2.6)	(\pm 2.7)	(\pm 2.7)	(\pm 2.7)		
By diagnostic year:													
1987-91 (n=207)	100%	36.8%	22.5%	17.4%	13.8%	12.8%	11.7%	10.7%	9.6%	9.6%	9.6%		p=0.888
		\pm 3.4	\pm 3.0	\pm 2.7	\pm 2.5	\pm 2.4	\pm 2.3	\pm 2.2	\pm 2.1	\pm 2.1	\pm 2.1		
1992-98 (n=334)	100%	34.2%	18.5%	16.4%	13.8%	12.8%	11.6%	-	-	-	-		
		\pm 2.7	\pm 2.4	\pm 2.3	\pm 2.3	\pm 2.3	\pm 2.4	-	-	-	-		

* P values derived from Cox proportional hazards regression (data in brackets excluded).

Overall, 69% of cases received a primary course of treatment, with 69% having chemotherapy, 4% having radiotherapy, and 1% having a surgical intervention that was related in some way to their leukaemia. Further details are provided in Table 95. Key predictors of individual modes of primary treatment were as follows:

- For none of these treatments being provided: an older age at diagnosis.
- For surgery: a younger age at diagnosis.
- For radiotherapy: a younger age at diagnosis; a relatively high haemoglobin level; and a relatively high platelet count.
- For chemotherapy: a younger age at diagnosis.

A previous analysis of primary chemotherapy treatments for 1987-95 indicated that 40% were with DAT (\pm consolidation), whereas less frequent treatments involved "737", HIDAC 37, idarubicin, cytarabine, etoposide, and combinations of other agents. The use of DAT (\pm consolidation) has decreased markedly in the more recent diagnostic periods. A wide range of agents continues to be used in combination therapies, however, including idarubicin, Ara C, etoposide, Little ICE and occasionally Big ICE.

D. Chronic myeloid

The 153 leukaemias of this type recorded on the hospital registries for 1987-98 had a five-year case survival of 50%, which was higher than the corresponding 37% for all chronic myeloid cases in South Australia in 1977-98. Meanwhile, the 10-year survival of the hospital cases was 30%. The main predictor of a poor outcome was diagnostic age, with particularly low survivals applying to cases aged 65 years or more (Table 96). After adjusting for age in a proportional hazards regression model, diagnostic period was not predictive of outcome ($p=0.399$).

Eighty-nine per cent of cases received an initial primary course of care. Whereas 89% had chemotherapy, only 4% had radiotherapy, and 5% had a surgical intervention that was related in some way to their leukaemia. Further details are provided in Table 97.

Age was the main predictor of treatment mode, with an absence of initial primary treatment applying more to older cases aged 75 years or more. By comparison, younger cases were more likely to receive chemotherapy (and/or surgery).

A previous analysis showed that 76% of primary chemotherapy treatments for 1987-95 cases were with hydroxy urea, whereas 17% were with interferon. Hydroxy urea has remained the agent of choice since that time. For 1987-98 cases, 78% of initial chemotherapy treatments were with hydroxy urea, whereas alternative agents, such as interferon, were used more commonly in subsequent treatments.

Table 95: Percentage of acute myeloid leukaemia cases by treatment mode as part of the primary course of care; SA hospital-based registries, 1987-98*

Category	No treatment	% receiving any			% receiving combination and single therapies						
		surg. (s)	radio. (r)	chemo. (c)	src	sr	sc	rc	s	r	c
All (n=541)	30.7%	1.1%	3.8%	69.0%	0.4%	0.0%	0.8%	3.0%	0.0%	0.4%	64.8%
By sex:											
Males (n=309)	31.8%	0.7%	3.7%	67.9%	0.3%	0.0%	0.3%	3.0%	0.0%	0.3%	64.2%
Females (n=232)	29.2%	1.8%	4.0%	70.4%	0.4%	0.0%	1.3%	3.1%	0.0%	0.4%	65.5%
P value	0.527	0.410	0.857	0.546	1.000	1.000	0.320	0.954	1.000	1.000	0.762
By age (yrs.):											
Under 40 (n=83)	7.2%	3.6%	8.4%	92.8%	1.2%	0.0%	2.4%	7.2%	0.0%	0.0%	81.9%
40-54 (n=76)	10.8%	2.7%	5.4%	89.2%	0.0%	0.0%	2.7%	5.4%	0.0%	0.0%	81.1%
55-64 (n=112)	15.0%	0.9%	5.6%	83.2%	0.9%	0.0%	0.0%	2.8%	0.0%	1.9%	79.4%
65-74 (n=139)	34.1%	0.0%	1.5%	65.9%	0.0%	0.0%	0.0%	1.5%	0.0%	0.0%	64.4%
75+ (n=131)	67.5%	0.0%	0.8%	32.5%	0.0%	0.0%	0.0%	0.8%	0.0%	0.0%	31.7%
P value	<0.001	0.006	0.001	<0.001	0.192	1.000	0.014	0.003	1.000	0.619	<0.001
By residence:											
Adel - mid/lower SES (n=249)	34.0%	1.2%	3.7%	65.6%	0.4%	0.0%	0.8%	2.9%	0.0%	0.4%	61.5%
Adel - mid/upper SES (n=147)	30.1%	1.4%	6.3%	69.2%	0.0%	0.0%	1.4%	5.6%	0.0%	0.7%	62.2%
P value	0.424	1.000	0.240	0.460	1.000	1.000	0.628	0.180	1.000	1.000	0.882
Adelaide (n=396)	32.6%	1.3%	4.7%	66.9%	0.3%	0.0%	1.0%	3.9%	0.0%	0.5%	61.8%
Country SA (n=145)	25.4%	0.7%	1.4%	74.6%	0.7%	0.0%	0.0%	0.7%	0.0%	0.0%	73.2%
P value	0.115	1.000	0.092	0.093	0.457	1.000	0.577	0.082	1.000	1.000	0.016
By FAB classification:											
I (n=85)	24.7%	0.0%	1.2%	75.3%	0.0%	0.0%	0.0%	1.2%	0.0%	0.0%	74.1%
II (n=153)	23.5%	1.3%	5.4%	75.8%	0.0%	0.0%	1.3%	4.7%	0.0%	0.7%	69.8%
III (n=40)	5.3%	2.6%	5.3%	94.7%	0.0%	0.0%	2.6%	5.3%	0.0%	0.0%	86.8%
IV (n=78)	21.1%	2.6%	7.8%	76.6%	2.6%	0.0%	0.0%	3.9%	0.0%	1.3%	70.1%
V (n=32)	32.3%	0.0%	3.2%	67.7%	0.0%	0.0%	0.0%	3.2%	0.0%	0.0%	64.5%
VI (n=15)	20.0%	0.0%	0.0%	80.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	80.0%
VII (n=7)	28.6%	0.0%	0.0%	71.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	71.4%
Other or UK (n=131)	(56.7%)	(0.8%)	(1.6%)	(43.3%)	(0.0%)	(0.0%)	(0.8%)	(1.6%)	(0.0%)	(0.0%)	(40.9%)
P value	0.190	0.756	0.495	0.189	0.212	1.000	0.665	0.804	1.000	0.926	0.403
By cytogenic abnormalities:											
None (n=108)	20.4%	3.9%	8.7%	79.6%	1.9%	0.0%	1.9%	6.8%	0.0%	0.0%	68.9%
Some abnormal (n=74)	27.4%	2.7%	8.2%	72.6%	0.0%	0.0%	2.7%	8.2%	0.0%	0.0%	61.6%
All abnormal (n=28)	22.2%	0.0%	3.7%	74.1%	0.0%	0.0%	0.0%	0.0%	0.0%	3.7%	74.1%
UK (n=331)	(35.4%)	(0.0%)	(1.2%)	(64.3%)	(0.0%)	(0.0%)	(0.0%)	(0.9%)	(0.0%)	(0.3%)	(63.4%)
P value	0.457	0.334	0.512	0.312	0.182	1.000	0.820	0.511	1.000	0.097	0.822
By white blood cell count (x10⁹/L):											
Under 7.8 (median) (n=157)	29.8%	1.3%	5.3%	69.5%	0.0%	0.0%	1.3%	4.6%	0.0%	0.7%	63.6%
7.8+ (n=157)	30.9%	2.6%	7.2%	68.4%	1.3%	0.0%	1.3%	5.3%	0.0%	0.7%	60.5%
UK (n=227)	(31.1%)	(0.0%)	(0.5%)	(68.9%)	(0.0%)	(0.0%)	(0.0%)	(0.5%)	(0.0%)	(0.0%)	(68.5%)
P value	0.832	0.684	0.486	0.834	0.498	1.000	1.000	0.801	1.000	1.000	0.584
By haemoglobin level (gms/dL):											
Under 9.5 (median) (n=151)	31.8%	3.4%	3.4%	67.6%	0.7%	0.0%	2.7%	2.0%	0.0%	0.7%	62.2%
9.5+ (n=163)	21.0%	0.6%	9.0%	70.3%	0.6%	0.0%	0.0%	7.7%	0.0%	0.6%	61.9%
UK (n=227)	(31.1%)	(0.0%)	(0.5%)	(68.9%)	(0.0%)	(0.0%)	(0.0%)	(0.5%)	(0.0%)	(0.0%)	(68.5%)
P value	0.606	0.114	0.042	0.604	1.000	1.000	0.056	0.022	1.000	1.000	0.968
By platelet count (x10⁹/L):											
Under 64 (median) (n=156)	34.0%	2.0%	3.3%	66.0%	0.7%	0.0%	1.3%	2.7%	0.0%	0.0%	61.3%
64+ (n=156)	26.7%	2.0%	9.3%	72.0%	0.7%	0.0%	1.3%	7.3%	0.0%	1.3%	62.7%
UK (n=229)	(31.1%)	(0.0%)	(0.4%)	(68.9%)	(0.0%)	(0.0%)	(0.0%)	(0.4%)	(0.0%)	(0.0%)	(68.4%)
P value	0.167	1.000	0.033	0.261	1.000	1.000	1.000	0.064	1.000	0.498	0.812
By diagnostic year:											
1987-91 (n=207)	30.0%	0.0%	2.4%	69.6%	0.0%	0.0%	0.0%	1.9%	0.0%	0.5%	67.6%
1992-98 (n=334)	31.1%	1.9%	4.7%	68.6%	0.6%	0.0%	1.3%	3.8%	0.0%	0.3%	62.9%
P value	0.774	0.086	0.178	0.807	0.521	1.000	0.157	0.230	1.000	1.000	0.267

* Treatment details complete for 93% of cases.
Derivation of P values (see text) (data in brackets excluded).

Table 96: Case survivals (\pm SE) from chronic myeloid leukaemias; SA hospital-based registries, 1987-98*

Category		Period from diagnosis (yrs.)										P value
		1	2	3	4	5	6	7	8	9	10	
All (n=153)	100%	90.3% \pm 2.5	73.0% \pm 3.8	62.9% \pm 4.3	54.9% \pm 4.6	50.0% \pm 4.8	36.3% \pm 5.1	36.3% \pm 5.1	30.1% \pm 5.3	30.1% \pm 5.3	30.1% \pm 5.3	-
By sex:												
Males (n=83)	100%	88.3% \pm 3.7	76.8% \pm 5.0	67.0% \pm 5.7	63.1% \pm 6.0	56.4% \pm 6.5	39.1% \pm 7.1	39.1% \pm 7.1	32.6% \pm 7.1	32.6% \pm 7.2	32.6% \pm 7.2	p=0.430
Females (n=70)	100%	92.6% \pm 3.2	69.0% \pm 5.8	58.7% \pm 6.3	46.3% \pm 6.7	43.5% \pm 6.8	33.2% \pm 7.4	33.2% \pm 7.4	27.7% \pm 8.0	27.7% \pm 8.0	27.7% \pm 8.0	
By age (yrs.):												
Under 40 (n=29)	100%	96.6% \pm 3.4	71.6% \pm 8.5	64.5% \pm 9.0	64.5% \pm 9.0	49.6% \pm 10.2	49.6% \pm 10.2	49.6% \pm 10.2	35.4% \pm 11.2	35.4% \pm 11.2	35.4% \pm 11.2	p<0.001
40-54 (n=51)	100%	91.3% \pm 4.2	79.9% \pm 6.0	72.6% \pm 6.8	66.3% \pm 7.5	62.4% \pm 8.0	39.9% \pm 9.6	39.9% \pm 9.6	39.9% \pm 9.6	39.9% \pm 9.6	-	
55-64 (n=31)	100%	96.8% \pm 3.2	90.2% \pm 5.4	85.2% \pm 7.0	65.1% \pm 10.3	65.1% \pm 10.3	41.5% \pm 11.5	41.5% \pm 11.5	33.2% \pm 11.8	33.2% \pm 11.8	-	
65-74 (n=20)	100%	94.7% \pm 5.1	71.1% \pm 11.0	38.8% \pm 12.2	38.8% \pm 12.2	38.8% \pm 12.2	25.8% \pm 13.3	-	-	-	-	
75+ (n=22)	100%	63.9% \pm 11.2	25.9% \pm 12.0	17.2% \pm 10.7	-	-	-	-	-	-	-	
By residence:												
Adel - mid/lower SES (n=68)	100%	90.6% \pm 3.7	75.0% \pm 5.6	65.8% \pm 6.3	55.8% \pm 6.7	48.8% \pm 7.0	29.7% \pm 7.1	29.7% \pm 7.1	22.2% \pm 7.0	22.2% \pm 7.0	22.2% \pm 7.0	p=0.573
Adel - mid/upper SES (n=52)	100%	85.5% \pm 5.1	71.8% \pm 6.7	58.7% \pm 7.6	55.3% \pm 7.9	55.3% \pm 7.9	50.7% \pm 8.5	50.7% \pm 8.5	42.2% \pm 10.5	42.2% \pm 10.5	-	
Adelaide (n=120)	100%	88.4% \pm 3.0	73.6% \pm 4.3	63.0% \pm 4.8	55.2% \pm 5.2	50.6% \pm 5.4	36.7% \pm 5.8	36.7% \pm 5.8	28.6% \pm 6.1	28.6% \pm 6.1	28.6% \pm 6.1	p=0.956
Country SA (n=33)	100%	97.0% \pm 3.0	71.2% \pm 8.2	63.1% \pm 9.0	54.0% \pm 9.7	48.0% \pm 10.3	34.3% \pm 11.0	34.3% \pm 11.0	34.3% \pm 11.0	34.3% \pm 11.0	34.3% \pm 11.0	
By white blood cell count ($\times 10^9/L$):												
Under 94.7 (median) (n=47)	100%	95.4% \pm 3.2	74.9% \pm 6.9	72.2% \pm 7.1	61.1% \pm 7.9	58.1% \pm 8.1	43.9% \pm 8.7	43.9% \pm 8.7	43.9% \pm 8.7	43.9% \pm 8.7	43.9% \pm 8.7	p=0.934
94.7+ (n=49)	100%	89.4% \pm 4.5	77.8% \pm 6.2	75.4% \pm 6.5	75.4% \pm 6.5	62.9% \pm 8.6	47.3% \pm 10.2	47.3% \pm 10.2	31.5% \pm 11.4	31.5% \pm 11.4	31.5% \pm 11.4	
UK (n=57)	(100%)	(87.1%) \pm 4.5	(67.3%) \pm 6.6	(45.1%) \pm 7.3	(36.0%) \pm 7.5	(32.0%) \pm 7.6	(20.0%) \pm 7.3	(20.0%) \pm 7.3	(15.0%) \pm 7.0	(15.0%) \pm 7.0	(15.0%) \pm 7.0	
By haemoglobin level (gms/dL):												
Under 11.5 (median) (n=45)	100%	86.0% \pm 5.3	70.4% \pm 7.2	65.2% \pm 7.6	58.6% \pm 8.1	51.0% \pm 8.7	39.3% \pm 8.9	39.3% \pm 8.9	32.7% \pm 9.5	32.7% \pm 9.5	32.7% \pm 9.5	p=0.212
11.5+ (n=48)	100%	97.6% \pm 2.4	80.7% \pm 6.1	80.7% \pm 6.1	72.0% \pm 7.2	68.4% \pm 7.7	49.6% \pm 9.8	49.6% \pm 9.8	43.4% \pm 10.4	43.4% \pm 10.4	43.4% \pm 10.4	
UK (n=60)	(100%)	(87.8%) \pm 4.3	(69.1%) \pm 6.3	(47.9%) \pm 7.1	(38.9%) \pm 7.5	(34.6%) \pm 7.8	(21.6%) \pm 7.7	(21.6%) \pm 7.7	(16.2%) \pm 7.4	(16.2%) \pm 7.4	(16.2%) \pm 7.4	
By platelet count ($\times 10^9/L$):												
Under 305 (median) (n=44)	100%	87.7% \pm 5.2	71.2% \pm 7.4	62.0% \pm 8.1	47.4% \pm 8.9	47.4% \pm 8.9	47.4% \pm 8.9	47.4% \pm 8.9	37.9% \pm 11.1	37.9% \pm 11.1	37.9% \pm 11.1	p=0.257
305+ (n=45)	100%	95.3% \pm 3.2	80.3% \pm 6.3	80.3% \pm 6.3	77.1% \pm 6.8	66.4% \pm 8.2	42.3% \pm 9.5	42.3% \pm 9.5	37.0% \pm 9.6	37.0% \pm 9.6	37.0% \pm 9.6	
UK (n=64)	(100%)	(88.5%) \pm 4.1	(68.9%) \pm 6.1	(51.3%) \pm 6.8	(43.7%) \pm 7.1	(40.3%) \pm 7.3	(25.2%) \pm 7.7	(25.2%) \pm 7.7	(20.1%) \pm 7.6	(20.1%) \pm 7.6	(20.1%) \pm 7.6	
By diagnostic year:												
1987-91 (n=63)	100%	95.0% \pm 2.8	76.4% \pm 5.5	64.5% \pm 6.2	55.5% \pm 6.5	50.2% \pm 6.6	33.8% \pm 6.3	33.8% \pm 6.3	28.0% \pm 6.1	28.0% \pm 6.1	28.0% \pm 6.1	p=0.720
1992-98 (n=90)	100%	87.0% \pm 3.7	70.8% \pm 5.2	62.5% \pm 5.8	56.2% \pm 6.2	52.1% \pm 7.0	46.9% \pm 8.0	-	-	-	-	

* P values derived from Cox proportional hazards regression (data in brackets excluded).

Table 97: Percentage of chronic myeloid leukaemia cases by treatment mode as part of the primary course of care; SA hospital-based registries, 1987-98*

Category	No treatment	% receiving any			% receiving combination and single therapies						
		surg. (s)	radio. (r)	chemo. (c)	src	sr	sc	rc	s	r	c
All (n=153)	10.5%	4.6%	3.9%	88.8%	0.0%	0.0%	3.9%	3.9%	0.7%	0.0%	80.9%
By sex:											
Males (n=83)	11.0%	6.1%	4.9%	87.8%	0.0%	0.0%	4.9%	4.9%	1.2%	0.0%	78.0%
Females (n=70)	10.0%	2.9%	2.9%	90.0%	0.0%	0.0%	2.9%	2.9%	0.0%	0.0%	84.3%
P value	0.845	0.453	0.687	0.669	1.000	1.000	0.687	0.687	1.000	1.000	0.329
By age (yrs.):											
Under 40 (n=29)	6.9%	6.9%	3.4%	89.7%	0.0%	0.0%	3.4%	3.4%	3.4%	0.0%	82.8%
40-54 (n=51)	0.0%	9.8%	5.9%	100.0%	0.0%	0.0%	9.8%	5.9%	0.0%	0.0%	84.3%
55-64 (n=31)	9.7%	0.0%	6.5%	90.3%	0.0%	0.0%	0.0%	6.5%	0.0%	0.0%	83.9%
65-74 (n=20)	5.0%	0.0%	0.0%	95.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	95.0%
75+ (n=22)	47.6%	0.0%	0.0%	52.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	52.4%
P value	<0.001	0.037	0.396	<0.001	1.000	1.000	0.099	0.396	0.149	1.000	0.124
By residence:											
Adel - mid/lower SES (n=68)	8.8%	1.5%	1.5%	91.2%	0.0%	0.0%	1.5%	1.5%	0.0%	0.0%	88.2%
Adel - mid/upper SES (n=52)	17.6%	7.8%	7.8%	80.4%	0.0%	0.0%	5.9%	7.8%	2.0%	0.0%	66.7%
P value	0.151	0.163	0.163	0.088	1.00	1.000	0.312	0.163	0.429	1.000	0.004
Adelaide (n=120)	12.6%	4.2%	4.2%	86.6%	0.0%	0.0%	3.4%	4.2%	0.8%	0.0%	79.0%
Country SA (n=33)	3.0%	6.1%	3.0%	97.0%	0.0%	0.0%	6.1%	3.0%	0.0%	0.0%	87.9%
P value	0.196	0.646	1.000	0.122	1.000	1.000	0.611	1.000	1.000	1.000	0.250
By white blood cell count (x10⁹/L):											
Under 94.7 (median) (n=47)	10.9%	10.9%	4.3%	87.0%	0.0%	0.0%	8.7%	4.3%	2.2%	0.0%	73.9%
94.7+ (n=49)	4.1%	4.1%	6.1%	95.9%	0.0%	0.0%	4.1%	6.1%	0.0%	0.0%	85.7%
UK (n=57)	(15.8%)	(0.0%)	(1.8%)	(84.2%)	(0.0%)	(0.0%)	(0.0%)	(1.8%)	(0.0%)	(0.0%)	(82.5%)
P value	0.258	0.258	1.000	0.151	1.000	1.000	0.426	1.000	0.484	1.000	0.151
By haemoglobin level (gms/dL):											
Under 11.5 (median) (n=45)	8.9%	8.9%	6.7%	91.1%	0.0%	0.0%	8.9%	6.7%	0.0%	0.0%	75.6%
11.5+ (n=48)	6.7%	6.7%	4.4%	91.1%	0.0%	0.0%	4.4%	4.4%	2.2%	0.0%	82.2%
UK (n=60)	(14.5%)	(0.0%)	(1.6%)	(85.5%)	(0.0%)	(0.0%)	(0.0%)	(1.6%)	(0.0%)	(0.0%)	(83.9%)
P value	1.000	1.000	1.000	1.000	1.000	1.000	0.677	1.000	1.000	1.000	0.438
By platelet count (x10⁹/L):											
Under 305 (median) (n=44)	11.6%	11.6%	0.0%	86.0%	0.0%	0.0%	9.3%	0.0%	2.3%	0.0%	76.7%
305+ (n=45)	4.4%	4.4%	8.9%	95.6%	0.0%	0.0%	4.4%	8.9%	0.0%	0.0%	82.2%
UK (n=64)	(14.1%)	(0.0%)	(3.1%)	(85.9%)	(0.0%)	(0.0%)	(0.0%)	(3.1%)	(0.0%)	(0.0%)	(82.8%)
P value	0.261	0.261	0.117	0.152	1.000	1.000	0.429	0.117	0.489	1.000	0.524
By diagnostic year:											
1987-91 (n=63)	12.7%	1.6%	1.6%	87.3%	0.0%	0.0%	1.6%	1.6%	0.0%	0.0%	84.1%
1992-98 (n=90)	9.0%	6.7%	5.6%	89.9%	0.0%	0.0%	5.6%	5.6%	1.1%	0.0%	78.7%
P value	0.463	0.240	0.401	0.618	1.000	1.000	0.401	0.401	1.000	1.000	0.397

* Treatment details complete for 94% of cases.
Derivation of P values (see text) (data in brackets excluded).

E. Other leukaemias

The 105 "other" leukaemia cases recorded on the hospital registries for 1987-98 had a five-year survival of 61%, which was higher than the figure of 47% recorded for all corresponding cases in the State in 1977-98. Meanwhile, the 10-year survival for the hospital series was 49%. Lower survivals applied to older cases, females, and those with higher white blood cell counts (Table 98).

After adjusting for age, sex, and white blood cell count in a proportional hazards regression analysis, diagnostic period was not predictive of case fatality ($p=0.687$). Relative risks were found to vary as follows:

<i>Predictors</i>	<i>Relative risk (95% confidence limits)</i>
Age at diagnosis (yrs.):	
Under 65 (reference)	1.00
65+	2.21 (0.94, 5.17)
Sex:	
Male (reference)	1.00
Female	1.96 (0.95, 4.03)
White blood cell count ($\times 10^9/L$):	
Under 5.2 (median) (reference)	1.00
5.2+	3.67 (1.08, 12.48)
Diagnostic period:	
1987-91 (reference)	1.00
1992-98	1.16 (0.56, 2.41)

Notably, only white blood cell count was a statistically significant predictor of outcome in this multivariate model ($p=0.037$).

Over half the cases (56%) received no initial treatment for their leukaemias, whereas 7% had surgery, 3% had radiotherapy, and 40% had chemotherapy as part of their primary care (Table 99). The key predictors of individual treatment modes were as follows:

- For none of these treatments being provided: older age; female sex; a higher white blood cell count; and (possibly) a higher haemoglobin level.
- For surgery: a lower white blood cell count; and a diagnosis in 1987-91 rather than 1992-98.
- For chemotherapy: younger age; male sex; and a lower white blood cell count.

There were too few "radiotherapy" cases for sufficient statistical power to show trends by person or disease descriptors.

A previous analysis of primary chemotherapy treatments of 1987-95 cases indicated that 22% were with hydroxy urea, 17% were with interferon, and 13% were with V&P. Since then, 2-CDA has become a more common treatment option.

Table 98: Case survivals (\pm SE) from "other" leukaemias; SA hospital-based registries, 1987-98*

Category		Period from diagnosis (yrs.)										P value
		1	2	3	4	5	6	7	8	9	10	
All (n=105)	100%	84.0% \pm 3.7	76.8% \pm 4.4	69.5% \pm 5.1	67.3% \pm 5.3	60.5% \pm 6.1	52.8% \pm 6.7	52.8% \pm 6.7	49.3% \pm 7.2	49.3% \pm 7.2	49.3% \pm 7.2	-
By sex:												
Males (n=74)	100%	88.7% \pm 3.8	82.6% \pm 4.6	74.7% \pm 5.6	71.7% \pm 6.1	68.6% \pm 6.6	65.0% \pm 7.2	65.0% \pm 7.2	59.6% \pm 8.4	59.6% \pm 8.4	59.6% \pm 8.4	p=0.011
Females (n=31)	100%	72.3% \pm 8.4	61.5% \pm 10.0	55.9% \pm 10.6	55.9% \pm 10.6	39.9% \pm 12.2	24.0% \pm 11.4	24.0% \pm 11.4	24.0% \pm 11.4	-	-	
By age (yrs.):												
Under 65 (n=35)	100%	88.1% \pm 5.6	88.1% \pm 5.6	80.8% \pm 7.1	80.8% \pm 7.1	80.8% \pm 7.1	80.8% \pm 7.1	80.8% \pm 7.1	71.8% \pm 10.6	71.8% \pm 10.6	-	p=0.007
65+ (n=70)	100%	81.9% \pm 4.7	70.4% \pm 6.0	63.1% \pm 6.7	59.8% \pm 7.1	49.6% \pm 8.0	38.2% \pm 8.5	38.2% \pm 8.5	38.2% \pm 8.5	38.2% \pm 8.5	38.2% \pm 8.5	
By residence:												
Adel - mid/lower SES (n=43)	100%	82.6% \pm 6.0	73.9% \pm 7.2	63.9% \pm 8.2	58.6% \pm 9.1	53.2% \pm 9.7	41.9% \pm 10.5	41.9% \pm 10.5	41.9% \pm 10.5	41.9% \pm 10.5	-	p=0.684
Adel - mid/upper SES (n=38)	100%	78.2% \pm 6.8	75.1% \pm 7.2	71.3% \pm 7.8	71.3% \pm 7.8	64.8% \pm 9.4	58.3% \pm 10.5	58.3% \pm 10.5	50.0% \pm 11.8	50.0% \pm 11.8	50.0% \pm 11.8	
Adelaide (n=81)	100%	80.5% \pm 4.5	74.2% \pm 5.2	66.9% \pm 5.8	64.1% \pm 6.2	58.3% \pm 6.9	49.4% \pm 7.5	49.4% \pm 7.5	44.9% \pm 8.1	44.9% \pm 8.1	44.9% \pm 8.1	p=0.165
Country SA (n=24)	100%	95.7% \pm 4.3	85.3% \pm 7.9	78.2% \pm 9.9	78.2% \pm 9.9	68.4% \pm 12.6	68.4% \pm 12.6	68.4% \pm 12.6	68.4% \pm 12.6	68.4% \pm 12.6	68.4% \pm 12.6	
By white blood cell count (x10⁹/L):												
Under 5.2 (median) (n=24)	100%	87.5% \pm 6.8	87.5% \pm 6.8	87.5% \pm 6.8	87.5% \pm 6.8	79.5% \pm 9.8	79.5% \pm 9.8	79.5% \pm 9.8	79.5% \pm 9.8	79.5% \pm 9.8	79.5% \pm 9.8	p=0.042
5.2+ (n=24)	100%	72.5% \pm 9.6	65.2% \pm 11.1	22.8% \pm 17.6	22.8% \pm 17.6	22.8% \pm 17.6	22.8% \pm 17.6	22.8% \pm 17.6	22.8% \pm 17.6	22.8% \pm 17.6	22.8% \pm 17.6	
UK (n=57)	(100%)	(87.2%) (\pm 4.5)	(76.1%) (\pm 6.1)	(71.2%) (\pm 6.6)	(67.4%) (\pm 7.3)	(59.9%) (\pm 8.2)	(46.7%) (\pm 9.3)	(46.7%) (\pm 9.3)	(40.9%) (\pm 9.8)	(40.9%) (\pm 9.8)	(40.9%) (\pm 9.8)	
By haemoglobin level (gms/dL):												
Under 11.0 (median) (n=23)	100%	77.5% \pm 8.9	77.5% \pm 8.9	63.4% \pm 11.6	63.4% \pm 11.6	55.5% \pm 12.6	55.5% \pm 12.6	55.5% \pm 12.6	55.5% \pm 12.6	55.5% \pm 12.6	55.5% \pm 12.6	p=0.615
11.0+ (n=25)	100%	82.6% \pm 7.9	77.4% \pm 8.9	71.9% \pm 9.9	71.9% \pm 9.9	71.9% \pm 9.9	71.9% \pm 9.9	71.9% \pm 9.9	71.9% \pm 9.9	71.9% \pm 9.9	71.9% \pm 9.9	
UK (n=57)	(100%)	(87.2%) (\pm 4.5)	(76.1%) (\pm 6.1)	(71.2%) (\pm 6.6)	(67.4%) (\pm 7.3)	(59.9%) (\pm 8.2)	(46.7%) (\pm 9.3)	(46.7%) (\pm 9.3)	(40.9%) (\pm 9.8)	(40.9%) (\pm 9.8)	(40.9%) (\pm 9.8)	
By platelet count (x10⁹/L):												
Under 95 (median) (n=23)	100%	82.6% \pm 7.9	82.6% \pm 7.9	82.6% \pm 7.9	82.6% \pm 7.9	73.4% \pm 11.1	73.4% \pm 11.1	73.4% \pm 11.1	73.4% \pm 11.1	73.4% \pm 11.1	73.4% \pm 11.1	p=0.138
95+ (n=24)	100%	76.7% \pm 9.2	71.2% \pm 10.0	49.7% \pm 12.7	49.7% \pm 12.7	49.7% \pm 12.7	49.7% \pm 12.7	49.7% \pm 12.7	49.7% \pm 12.7	49.7% \pm 12.7	49.7% \pm 12.7	
UK (n=58)	(100%)	(87.5%) (\pm 4.4)	(76.6%) (\pm 6.0)	(71.8%) (\pm 6.5)	(68.2%) (\pm 7.1)	(61.0%) (\pm 8.0)	(48.5%) (\pm 9.1)	(48.5%) (\pm 9.1)	(43.1%) (\pm 9.5)	(43.1%) (\pm 9.5)	(43.1%) (\pm 9.5)	
By diagnostic year:												
1987-91 (n=44)	100%	81.5% \pm 5.9	76.5% \pm 6.5	71.3% \pm 7.1	68.4% \pm 7.3	59.9% \pm 7.9	53.9% \pm 8.2	53.9% \pm 8.2	50.3% \pm 8.4	50.3% \pm 8.4	50.3% \pm 8.4	p=0.932
1992-98 (n=61)	100%	86.1% \pm 4.6	76.5% \pm 6.1	67.2% \pm 7.4	67.2% \pm 7.4	67.2% \pm 7.4	50.4% \pm 15.6	-	-	-	-	

* P values derived from Cox proportional hazards regression (data in brackets excluded).

Table 99: Percentage of "other" leukaemia cases by treatment mode as part of the primary course of care; SA hospital-based registries, 1987-98*

Category	No treatment	% receiving any			% receiving combination and single therapies						
		surg. (s)	radio. (r)	chemo. (c)	src	sr	sc	rc	s	r	c
All (n=105)	55.9%	6.9%	2.9%	40.2%	2.0%	0.0%	2.0%	0.0%	2.9%	1.0%	36.3%
By sex:											
Males (n=74)	44.4%	9.7%	4.2%	50.0%	2.8%	0.0%	2.8%	0.0%	4.2%	1.4%	44.4%
Females (n=31)	83.3%	0.0%	0.0%	16.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	16.7%
P value	<0.001	0.102	0.553	0.002	1.000	1.000	1.000	1.000	0.553	1.000	0.008
By age (yrs.):											
Under 65 (n=35)	26.5%	11.8%	2.9%	61.8%	0.0%	0.0%	2.9%	0.0%	8.8%	2.9%	58.8%
65+ (n=70)	70.6%	4.4%	2.9%	29.4%	2.9%	0.0%	1.5%	0.0%	0.0%	0.0%	25.0%
P value	<0.001	0.218	1.000	0.002	0.551	1.000	1.000	1.000	0.035	0.333	<0.001
By residence:											
Adel - mid/lower SES (n=43)	57.5%	5.0%	0.0%	37.5%	0.0%	0.0%	0.0%	0.0%	5.0%	0.0%	37.5%
Adel - mid/upper SES (n=38)	52.6%	5.3%	2.6%	42.1%	0.0%	0.0%	2.6%	0.0%	2.6%	2.6%	39.5%
P value	0.666	1.000	0.487	0.678	1.000	1.000	0.337	1.000	1.000	0.487	0.858
Adelaide (n=81)	55.1%	5.1%	1.3%	39.7%	0.0%	0.0%	1.3%	0.0%	3.8%	1.3%	38.5%
Country SA (n=24)	58.3%	12.5%	8.3%	41.7%	8.3%	0.0%	4.2%	0.0%	0.0%	0.0%	29.2%
P value	0.782	0.351	0.137	0.867	0.054	1.000	0.417	1.000	1.000	0.577	0.408
By white blood cell count (x10⁹/L):											
Under 5.2 (median) (n=24)	21.7%	21.7%	8.7%	73.9%	8.7%	0.0%	8.7%	0.0%	4.3%	0.0%	56.5%
5.2+ (n=24)	65.2%	0.0%	4.3%	30.4%	0.0%	0.0%	0.0%	0.0%	0.0%	4.3%	30.4%
UK (n=57)	(66.1%)	(3.6%)	(0.0%)	(30.4%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(3.6%)	(0.0%)	(30.4%)
P value	0.003	0.049	1.000	0.003	0.489	1.000	0.489	1.000	1.000	1.000	0.074
By haemoglobin level (gms/dL):											
Under 11.0 (median) (n=23)	28.6%	19.0%	14.3%	61.9%	9.5%	0.0%	4.8%	0.0%	4.8%	4.8%	47.6%
11.0+ (n=25)	56.0%	4.0%	0.0%	44.0%	0.0%	0.0%	4.0%	0.0%	0.0%	0.0%	40.0%
UK (n=57)	(66.1%)	(3.6%)	(0.0%)	(30.4%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(3.6%)	(0.0%)	(30.4%)
P value	0.062	0.163	0.088	0.226	0.203	1.000	1.000	1.000	0.457	0.457	0.604
By platelet count (x10⁹/L):											
Under 95 (median) (n=23)	45.5%	13.6%	4.5%	54.5%	4.5%	0.0%	9.1%	0.0%	0.0%	0.0%	40.9%
95+ (n=24)	43.5%	4.3%	4.3%	47.8%	0.0%	0.0%	0.0%	0.0%	4.3%	4.3%	47.8%
UK (n=58)	(64.9%)	(5.3%)	(1.8%)	(31.6%)	(1.8%)	(0.0%)	(0.0%)	(0.0%)	(3.5%)	(0.0%)	(29.8%)
P value	0.894	0.346	1.000	0.652	0.489	1.000	0.233	1.000	1.000	1.000	0.641
By diagnostic year:											
1987-91 (n=44)	59.1%	15.9%	6.8%	31.8%	4.5%	0.0%	4.5%	0.0%	6.8%	2.3%	22.7%
1992-98 (n=61)	53.4%	0.0%	0.0%	46.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	46.6%
P value	0.570	0.002	0.077	0.133	0.184	1.000	0.184	1.000	0.077	0.431	0.013

* Treatment details complete for 90% of cases.
Derivation of P values (see text) (data in brackets excluded)

Summarizing comments for lymphatic and haematopoietic tissue (ICD-02: M95903-M99403) (selected codes – see “Methods”)

Case survivals from lymphomas in South Australia tended to be higher than reported for Europe,²⁹ although similar to survivals for the USA (SEER data) and other Australian states.^{27,28,30,37} Gains in survival have taken place in South Australia, mostly between the 1977-83 and 1984-98 diagnostic periods. Although hospital-based registry data likewise showed little evidence of further gains during 1987-98, it is possible that progressively more complex cases were admitted to these specialist hospitals in the more recent years, tending to obscure such gains.

Multiple myeloma and immunoproliferative neoplasms did not show survival gains for the more recent diagnostic periods, which accords with the international experience.²⁸ South Australian survivals appeared to equate with, or be a little higher than, corresponding figures for comparison populations.^{27-30,37}

Leukaemias did show survival gains for the more recently diagnosed cases. As for lymphomas, this was most evident between 1977-83 and 1984-98. Advances in chemotherapy, with associated bone-marrow transplantation, are held responsible for improved outcomes.²³ In addition, a greater ascertainment of chronic cases in general, and of chronic lymphatic leukaemias in particular, could have led to artificial increases in survival.

Cancers of the lymphatic and haematopoietic tissue, like most other cancers, showed poorer case survivals in the older age groups. This probably reflects increased levels of comorbidity and frailty, with a reduced capacity to withstand these diseases and the side-effects of treatment.

R E F E R E N C E S

1. South Australian Cancer Registry. Epidemiology of cancer in South Australia. Incidence, mortality and survival, 1977-1994. Incidence and mortality, 1994. Adelaide: Openbook Publishers, 1995.
2. South Australian Cancer Registry. Epidemiology of cancer in South Australia. Incidence, mortality and survival, 1977-1995. Incidence and mortality, 1995. Adelaide: Openbook Publishers, 1996.
3. South Australian Cancer Registry. Epidemiology of cancer in South Australia. Incidence, mortality and survival, 1977-1996. Incidence and mortality, 1996. Adelaide: Openbook Publishers, 1997.
4. South Australian Cancer Registry. Epidemiology of cancer in South Australia. Incidence, mortality and survival, 1977-1997. Incidence and mortality, 1997. Adelaide: Openbook Publishers, 1998.
5. South Australian Cancer Registry. Epidemiology of cancer in South Australia. Incidence, mortality and survival, 1977-1998. Incidence and mortality, 1998. Adelaide: Openbook Publishers, 1999.
6. Bonett A, Roder D, Esterman A. Epidemiology of cancer in South Australia. Incidence, mortality and survival, 1977-1989. Incidence and mortality, 1989. Adelaide: Lutheran Publishing House, 1991.
7. Bonett A, Roder D, Esterman A. Epidemiology of cancer in South Australia. Incidence, mortality and survival, 1977-1988. Incidence and mortality, 1988. Adelaide: Lutheran Publishing House, 1990.
8. South Australian Cancer Registry. South Australian hospital-based cancer registry network. Adelaide: South Australian Health Commission, 1994.
9. Ries LAG, Kosary CL, Hankey BF et al (eds). SEER Cancer Statistics Review, 1973-1994, National Cancer Institute. Bethesda, MD, 1997.
10. Higgins GD, Davy M, Roder D et al. Increased age and mortality associated with cervical carcinomas negative for human papilloma virus RNA. *Lancet* 1991; 338: 910-913.
11. Birrell S, Roder DM, Horsfall DJ et al. Medroxyprogesterone acetate therapy in advanced breast cancer: the predictive value of androgen receptor expression. *J Clin Oncol* 1995; 13: 1572-1577.
12. Schloeffel P, Hains D, Roder D et al. The use of State and hospital-based cancer-registry data to describe the epidemiological and clinical characteristics of laryngeal cancer in South Australia. *Med J Aust* 1989; 150: 252-255.
13. Hoffmann D, Moore J, Roder D. Trends in survival from colonic cancer; the impact of sub-specialization. *Aust NZ J Surg* 1997; 67: 842-845.
14. Australian Health Technology Advisory Committee (AHTAC). Colorectal cancer screening. Canberra: National Health and Medical Research Council, 1997.
15. Pettersson F, Creasman WT, Shepherd JH et al (eds). Annual report on the results of treatment in gynecological cancer. Twenty-second volume. Statements of results obtained in patients treated in 1987 to 1989, inclusive actuarial survival up to 1993. Stockholm: International Federation of Gynecology and Obstetrics, 1995.
16. Bonett A, Roder D, Esterman A. Cancer case-survival rates for South Australia: a comparison with US rates and a preliminary investigation of time trends. *Med J Aust* 1988; 148: 556-559.
17. Voutilainen ET, Dickman PW, Hakulinen T. SURV2: Relative Survival Analysis Program, version 2.02β. Helsinki: Finnish Cancer Registry, 1998.
18. Brown CC. The statistical comparison of relative survival rates. *Biometrics* 1984; 39: 941-948.

19. Hakulinen T, Tenkanen L, Abeywickrama K. Testing equality of relative survival patterns based on aggregated data. *Biometrics* 1987; 43: 313-325.
20. Hakulinen T, Abeywickrama KH. A computer program package for relative survival analysis. *Comp Progr Biomed* 1985; 19: 197-207.
21. SAS Institute Inc., SAS-STAT Software: Changes and Enhancements through Release 6.12. Cary, NC: SAS Institute Inc., 1997.
22. UICC International Union Against Cancer. TNM classification of malignant tumours. Fourth, fully revised edition. Berlin: Springer-Verlag, 1987.
23. DeVita VT, Hellman S, Rosenberg SA (eds). *Cancer: principles and practice of oncology*. 4th edit. Philadelphia: Lippincott, 1993.
24. Tobias JS, Williams CJ. *Cancer: a color atlas*. Philadelphia: Lippincott, 1991: 170-184.
25. Kottmeier HL (ed). *Annual report on the results of treatment in carcinoma of the uterus, vagina and ovary*. Stockholm: International Federation of Gynecology and Obstetrics, 1973.
26. Armitage P, Berry G. *Statistical methods in medical research*. Oxford: Blackwell Scientific Publications, 1987: 428-437.
27. Western Australian Cancer Registry. *Cancer survival in Western Australian residents, 1982-1997*. Perth: Health Department of Western Australia, 2000.
28. Ries LAG, Kosary CL, Hankey BF et al (eds). *SEER Cancer Statistics Review, 1973-1996*. National Cancer Institute. Bethesda, MD, 1999.
29. Berrino F, Capocaccia R, Estève J et al (eds). *Survival of cancer patients in Europe: the EURO CARE-2 study*. IARC Scientific Publications No. 151. Lyon: International Agency for Research on Cancer, 1999.
30. Supramaniam R, Smith D, Coates M, Armstrong B. *Survival from cancer in New South Wales in 1980 to 1995*. Sydney: NSW Central Cancer Registry, 1999.
31. Cameron RB (ed). *A LANGE clinical manual; practical oncology*. Connecticut: Appleton and Lange, 1994.
32. Steele GD, Winchester DP, Menck HR. *National cancer data base*. Atlanta: American Cancer Society and American College of Surgeons, 1992.
33. Hoffmann HT, Hynds Karnell L, Funk GF et al. The national cancer data base report on cancer of the head and neck. *Arch Otolaryngol Head Neck Surg* 1998; 124: 951-962.
34. Healy GB, Strong MS, Uchmakli A et al. Carcinoma of the palatine arch: the rationale of treatment selection. *Am J Surg* 1976; 132: 498-502.
35. Souhami L, Rabinowits M. Combined treatment in carcinoma of the nasopharynx. *Laryngoscopy* 1988; 98: 881-883.
36. Keane T. Carcinoma of the hypopharynx. *J Otolaryngol* 1982; 11: 227-231.
37. Baade P, Coory M, Ring I. *Cancer survival in Queensland, 1982 to 1995*. Brisbane: Health Information Centre, Queensland Health, 2000.
38. Young JL. Histologic patterns of esophageal cancer throughout the world. Symposium abstract. Abidjan: International Association of Cancer Registries Annual Meeting, 1997.
39. Schuller DE, Metch B, Stein DW et al. Preoperative chemotherapy in advanced resectable head and neck cancer. Final report of the Southwest Oncology Group. *Laryngoscope* 1988; 98: 1205-1211.
40. Hisamichi S. Screening for gastric cancer. *World J Surg* 1989; 13: 31-37.
41. Ransohoff DF, Lang CA. Screening for colorectal cancer. *New Engl J Med* 1991; 325: 37-41.
42. Winawer SJ, Schottenfeld D, Flehinger BJ. Colorectal cancer screening. *JNCI* 1991; 83: 243-245.

43. Morris JB, Stellato TA, Guy BB et al. A critical analysis of the largest reported mass fecal occult blood screening program in the United States. *Am J Surg* 1991; 161: 101-106.
44. Mandel JS, Bond JH, Church TR et al. Reducing mortality from colorectal cancer by screening for fecal occult blood. *N Engl J Med* 1993; 328: 1365-1371.
45. Kronborg O, Fenger C, Olson J et al. Randomised study of screening for colorectal cancer with faecal-occult blood test. *Lancet* 1996; 348: 1467-1471.
46. Hardcastle JD, Chamberlain JO, Robinson MHE et al. Randomised controlled trial of faecal-occult blood screening for colorectal cancer. *Lancet* 1996; 348: 1472-1477.
47. Steele GD, Jessup JM, Winchester DP et al. National cancer data base. Annual review of patient care, 1995. Atlanta: American Cancer Society, 1995.
48. Smith IE, Sappino P, Bondy P et al. Long-term survival five years or more after combination chemotherapy and radiotherapy for small cell lung carcinoma. *Eur J Cancer Clin Oncol* 1981; 17: 1249-1255.
49. Johnson BE, Grayson J, Makuch RW et al. Ten-year survival of patients with small cell lung cancer treated with combination chemotherapy with or without irradiation. *J Clin Oncol* 1990; 8: 396-401.
50. Fornasiero A, Daniele O, Ghiotto C et al. Chemotherapy of invasive thymoma. *J Clin Oncol* 1990; 8: 1419-1423.
51. Macchiarini P, Chella A, Ducci F et al. Neoadjuvant chemotherapy, surgery and postoperative radiation therapy for invasive thymoma. *Cancer* 1991; 68: 706-713.
52. Esterman A, MacHarper T, Rohrsheim R, Roder D. South Australia, health statistics chartbook. Adelaide: Government Printer, 1988.
53. Burton RC, Armstrong BK. Recent incidence trends imply a non-metastasizing form of invasive melanoma. *Melanoma Research* 1994; 4: 107-113.
54. Doll R, Fraumeni JF, Muir CS (eds). Trends in cancer incidence and mortality. New York: Cold Spring Harbor Laboratory Press, 1994.
55. Australian Health Ministers' Advisory Council, Cervical Cancer Screening Evaluation Steering Committee. Cervical cancer screening in Australia: options for change. Australian Institute of Health, Prevention Program Evaluation Series No. 2. Canberra: Australian Government Publishing Service, 1990.
56. Lu-Yao GL, Greenberg ER. Changes in prostate cancer incidence and treatment in the USA. *Lancet* 1994; 343: 251-254.
57. National Cancer Institute. Prostate cancer rates begin to fall. *J Natl Cancer Inst* 1996; 88: 1605.
58. Nguyen AM, Priest K, McCaul K, Roder D. South Australian health statistics chartbook, 1998-99 edition. A working document. Adelaide: Department of Human Services, 1999.
59. Horwich A, Dearnaley DP, Nicholls J et al. Effectiveness of carboplatin, etoposide and bleomycin combination chemotherapy in good prognosis testicular nonseminomatous germ cell tumors. *J Clin Oncol* 1991; 9: 62-69.
60. Roseburg SA. The immunotherapy and genetic therapy of cancer. *J Clin Oncol* 1992; 10: 180-199.
61. Kramer JB, Wells SA. Thyroid carcinoma. *Adv Surg* 1989; 22: 195-224.
62. Tennvall J, Biorklund A, Moller T et al. Prognostic features of papillary follicular and medullary carcinoma of the thyroid gland. *Acta Radiologica Oncol* 1985; 24: 17-24.

ABSTRACT

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CHAPTER 2a

CHAPTER 2b