



## **Supporting Information**

### **Supplementary results**

**This appendix was part of the submitted manuscript and has been peer reviewed.  
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Appendix to: Koczwara B, Meng R, Miller M, et al. Late mortality in people with cancer: a population-based Australian study. *Med J Aust* 2021; doi: 10.5694/mja2.50879.

**Table 1. Top 10 causes of death among South Australian cancer survivors whose index cancer were diagnosed between 1990 and 1999, as of 31 December 2016, by sex (International Classification of Diseases (ICD)-10 codes in brackets)**

Cause of death*	Freq.	Percent	Cum.
<b>Overall</b>			
Ischaemic heart disease (I20–I25)	2393	15.7%	15.7%
Malignant neoplasm of prostate (C61)	1424	9.3%	25.0%
Cerebrovascular disease (I60–I69)	1175	7.7%	32.8%
Malignant neoplasm of breast (C50)	1118	7.3%	40.1%
Malignant neoplasm of lymphoid, hematopoietic and related tissue (C81–C96)	1078	7.07%	47.2%
Malignant neoplasm of colon, sigmoid, rectum and anus (C18–C21, C26.0)	843	5.5%	52.7%
Dementia and Alzheimer disease (F01, F03, G30)	803	5.3%	58.0%
Malignant neoplasm of trachea, bronchus and lung (C33, C34)	767	5.0%	63.0%
Chronic lower respiratory diseases (J40–J47)	579	3.8%	66.8%
Diabetes (E10–E14)	414	2.7%	69.5%
<b>Females</b>			
Malignant neoplasm of female breast (C50)	1112	17.1%	17.1%
Ischaemic heart disease (I20–I25)	940	14.5%	31.6%
Cerebrovascular disease (I60–I69)	546	8.4%	40.0%
Dementia and Alzheimer disease (F01, F03, G30)	466	7.2%	47.1%
Malignant neoplasm of lymphoid, haematopoietic and related tissue (C81–C96)	463	7.1%	54.3%
Malignant neoplasm of colon, sigmoid, rectum and anus (C18–C21, C26.0)	383	5.9%	60.2%
Malignant neoplasm of trachea, bronchus and lung (C33, C34)	248	3.8%	64.0%
Chronic lower respiratory diseases (J40–J47)	198	3.0%	67.0%
Diabetes (E10–E14)	160	2.5%	69.5%
Influenza and pneumonia (J10–J18)	157	2.4%	71.9%
<b>Males</b>			
Ischaemic heart disease (I20–I25)	1453	16.6%	16.6%
Malignant neoplasm of prostate (C61)	1424	16.3%	32.9%
Cerebrovascular disease (I60–I69)	629	7.2%	40.1%
Malignant neoplasm of lymphoid, haematopoietic and related tissue (C81–C96)	615	7.0%	47.1%
Malignant neoplasm of trachea, bronchus and lung (C33, C34)	519	5.9%	53.1%
Malignant neoplasm of colon, sigmoid, rectum and anus (C18–C21, C26.0)	460	5.3%	58.3%
Chronic lower respiratory diseases (J40–J47)	381	4.4%	62.7%
Dementia and Alzheimer disease (F01, F03, G30)	337	3.9%	66.5%
Diabetes (E10–E14)	254	2.9%	69.4%
Influenza and Pneumonia (J10–J18)	246	2.8%	72.3%

\* Causes listed are based on the WHO recommended tabulation of leading causes.

**Table 2. Leading causes of death among South Australian cancer survivors\***

Cause of death*	Freq.	Percent	Cum.
Ischaemic heart disease (I20–I25)	2393	15.70%	15.70%
Malignant neoplasm of prostate (C61)	1424	9.34%	25.04%
Cerebrovascular disease (I60–I69)	1175	7.71%	32.75%
Malignant neoplasm of female breast (C50)	1118	7.33%	40.08%
Malignant neoplasm of lymphoid, haematopoietic and related tissue (C81–C96)	1078	7.07%	47.16%
Malignant neoplasm of colon, sigmoid, rectum and anus (C18–C21, C26.0)	843	5.53%	52.69%
Dementia and Alzheimer disease (F01, F03, G30)	803	5.27%	57.95%
Malignant neoplasm of trachea, bronchus and lung (C33, C34)	767	5.03%	62.99%
Chronic lower respiratory diseases (J40–J47)	579	3.80%	66.78%
Diabetes (E10–E14)	414	2.72%	69.50%
Influenza and Pneumonia (J10–J18)	403	2.64%	72.14%
Diseases of the urinary system (N00–N39)	368	2.41%	74.56%
Malignant neoplasm of neoplasms of skin (C43, C44)	365	2.39%	76.95%
Heart failure and complications and ill-defined heart disease (I50–I51)	338	2.22%	79.17%
Malignant neoplasm of bladder (C67)	254	1.67%	80.84%
Malignant neoplasm of pancreas (C25)	196	1.29%	82.12%
Malignant neoplasm of kidney, except renal pelvis (C64)	191	1.25%	83.38%
Nonrheumatic valve disorders (I34–I38)	172	1.13%	84.50%
Benign neoplasms, in situ and uncertain behaviour (D00–D48)	161	1.06%	85.56%
Cardiac arrhythmias (I47–I49)	139	0.91%	86.47%
Septicaemia (A40–A41)	131	0.86%	87.33%
Hypertensive disease (I10–I15)	131	0.86%	88.19%
Malignant neoplasm of brain (C71)	123	0.81%	89.00%
Malignant neoplasm of stomach (C16)	115	0.75%	89.75%
Accidental falls (W00–W19)	114	0.75%	90.50%
Aortic aneurysm and dissection (I71)	113	0.74%	91.24%
Malignant neoplasm of uterus (C53C55)	108	0.71%	91.95%
Malignant neoplasm of ovary (C56)	108	0.71%	92.66%
Parkinson's disease (G20)	108	0.71%	93.37%
Malignant neoplasm of oesophagus (C15)	103	0.68%	94.04%
Malignant neoplasm of liver and intrahepatic bile ducts (C22)	89	0.58%	94.63%
Pulmonary oedema and other interstitial pulmonary disease (J80–J84)	84	0.55%	95.18%
Diseases of the musculoskeletal system and connective tissue (M00–M99)	80	0.52%	95.70%
Cirrhosis and other disease of liver (K70–K76)	79	0.52%	96.22%
Cardiomyopathy (I42)	75	0.49%	96.71%
Pulmonary heart disease and disease of pulmonary circulation (I26–I28)	65	0.43%	97.14%
Appendicitis, hernia and intestinal obstruction (K35–K46, K56)	65	0.43%	97.57%
Symptoms, signs and ill-defined conditions (R00–R99)	52	0.34%	97.91%
Malignant neoplasm of gallbladder and other parts of biliary tract (C23, C24)	43	0.28%	98.19%
Intentional self-harm [suicide] (X60–X84)	43	0.28%	98.47%
Malignant neoplasm of larynx (C32)	39	0.26%	98.73%
Land transport accidents (V01–V89)	34	0.22%	98.95%
Disorders of fluid, electrolyte and acid-based balance (dehydration) (E86–E87)	32	0.21%	99.16%
Chronic rheumatic heart disease (I05–I09)	19	0.12%	99.28%
Intestinal infectious disease (A00–A09)	15	0.10%	99.38%
Acute respiratory disease other than influenza and pneumonia (J00–J06, J20–J22)	12	0.08%	99.46%
Congenital malformations, deformations and chromosomal abnormalities (Q00–Q99)	12	0.08%	99.54%
Accidental threats to breathing (W75–W84)	12	0.08%	99.62%

Malnutrition and nutritional anaemias (D50–D53, E40–E64)	11	0.07%	99.69%
Cardiac arrest (I46)	11	0.07%	99.76%
Accidental poisoning (X40–X49)	9	0.06%	99.82%
Epilepsy and status epilepticus (G40, G41)	7	0.05%	99.87%
Mental and behavioural disorders due to psychoactive substance use (F10–F19)	6	0.04%	99.91%
Respiratory failure (J96)	4	0.03%	99.93%
Event of undetermined intent (Y10–Y34)	4	0.03%	99.96%
Human immunodeficiency virus (HIV) disease (B20–B24)	2	0.01%	99.97%
Tuberculosis (A15–A19)	1	0.01%	99.98%
Vaccine-preventable disease (A33–A37, A80, B01, B05, B06, B15, B16, B17, 0, B18.0, B18.1, B18.9, B19, B26)	1	0.01%	99.99%
Meningitis (A39, A87, G00–G03)	1	0.01%	99.99%
Assault [homicide (X85–Y09)	1	0.01%	100.0%
Total	15243	100.0%	

\* Patients survived five years after their index cancer diagnosis, with diagnosis period of 1990-1999, and censoring date of 31 December 2016. Causes listed are the top 20 leading causes of death for 2018, based on the WHO recommended tabulation of leading causes.

Out of a total of 17,268 deaths, the cause of death values were missing among 2025 cases (11.7%). These cases are classified as "Remainder (all the rest)" in the coding system, but are not reported in this table.

**Table 3. Standardised mortality ratios (SMR) and absolute excess risks (AER) for overall deaths and cardiovascular disease deaths, South Australia, 1995–2015**

Variable	Person-years	Death: overall				Death: cardiovascular disease*			
		Observed	Expected	SMR (95%CI)	AER	Observed	Expected	SMR (95%CI)	AER
Overall	344 768	16 950	13 722.94	1.24 (1.22–1.25)	9.4 (8.4–10.3)	4519	3175.43	1.42 (1.38–1.47)	3.9 (3.4–4.4)
Sex									
Male	160 265	9734	7249.11	1.34 (1.32–1.37)	15.5 (14.0–17.1)	2610	1542.12	1.69 (1.63–1.76)	6.7 (5.9–7.4)
Female	184 503	7216	6473.83	1.11 (1.09–1.14)	4.0 (2.8–5.2)	1909	1633.31	1.17 (1.12–1.22)	1.5 (0.9–2.1)
Age at diagnosis (years)									
0–14	4597	24	1.49	16.1 (10.8–24.1)	4.9 (2.7–7.0)	—	—	—	—
15–40	45 814	340	60.80	5.59 (5.03–6.22)	6.1 (5.2–7.0)	23	0.37	61.8 (41.1–93.1)	0.5 (0.3–0.7)
40–49	56 155	798	173.30	4.60 (4.30–4.94)	11.1 (10.0–12.2)	67	2.21	20.3 (23.9–38.5)	1.2 (0.9–1.4)
50–59	72 317	1810	520.50	3.48 (3.32–3.64)	17.8 (16.5–19.1)	206	15.70	13.1 (11.4–15.0)	2.6 (2.2–3.0)
60–69	93 707	5094	2045.39	2.49 (2.42–2.56)	32.5 (30.8–34.3)	1194	245.24	4.87 (4.60–5.15)	10.1 (9.3–10.9)
70–79	60 460	6631	6255.46	1.06 (1.03–1.09)	6.2 (2.7–9.7)	2123	1331.26	1.59 (1.53–1.66)	13.1 (11.2–15.0)
≥ 80	11 718	2253	4666.01	0.48 (0.46–0.50)	–206 (–217 to –195)	906	1580.67	0.57 (0.54–0.61)	–57.6 (–65.4 to –49.7)
Follow-up (years)									
6–9	9874	5610	746.19	7.52 (7.32–7.72)	493 (482–504)	1339	273.53	4.90 (4.64–5.16)	108 (100–115)
10–14	33 593	5689	2525.25	2.25 (2.20–2.31)	94.2 (89.3–99.1)	1603	1057.10	1.52 (1.44–1.59)	16.3 (13.3–19.2)
15–19	116 618	4006	4538.98	0.88 (0.86–0.91)	–4.6 (–6.1 to –3.0)	11120	1158.57	0.97 (0.91–1.03)	–0.3 (–1.1 to 0.5)
20–24	141 828	1505	4452.36	0.34 (0.32–0.36)	–20.8 (–21.8 to –19.7)	424	636.13	0.67 (0.61–0.73)	–1.5 (–1.9 to –1.0)
≥ 25	42 855	140	1460.16	0.10 (0.08–0.11)	–30.1 (–32.6 to –29.0)	33	50.09	0.66 (0.47–0.93)	–9.7 (–10.7 to –8.7)

Variable	Person-years	Death: overall				Death: cardiovascular disease*			
		Observed	Expected	SMR (95%CI)	AER	Observed	Expected	SMR (95%CI)	AER
First cancer site									
Breast	71 515	2689	2068.89	1.30 (1.25–1.35)	8.7 (6.8–10.5)	583	466.43	1.25 (1.15–1.36)	1.6 (0.7–2.5)
Prostate	49 828	435	3593.14	1.21 (1.18–1.25)	15.5 (12.1–18.9)	1219	784.77	1.55 (1.47–1.64)	8.7 (7.0–10.5)
Skin	64 488	1748	1729.53	1.01 (0.96–1.06)	0.3 (–1.5 to 2.1)	552	382.98	1.44 (1.33–1.57)	2.6 (1.7–3.5)
Gastrointestinal	50 377	2994	3027.40	0.99 (0.95–1.03)	–0.7 (–3.6 to 2.3)	932	731.01	1.27 (1.20–1.36)	4.0 (2.4–5.6)
Lymphoma/other haematological	25 929	1571	840.89	1.87 (1.78–1.96)	28.2 (24.5–31.8)	289	176.60	1.64(1.46–1.84)	4.3 (2.7–6.0)
Head & neck	19 313	955	718.29	1.33 (1.25–1.42)	12.3 (8.2–16.3)	279	196.31	1.42 (1.26–1.60)	4.3 (2.1–6.5)
Renal/testicular/bladder	19 867	924	693.17	1.33 (1.25–1.42)	11.6 (7.7–15.5))	254	162.58	1.56 (1.38–1.77)	4.6 (2.6–6.6)
Lung	5603	442	182.71	2.42 (2.20–2.66)	46.3 (37.8–54.7)	90	27.50	3.27 (2.66–4.02)	11.2 (7.4–14.9)
Gynaecological	19 485	619	508.35	1.22 (1.13–1.32)	5.7 (2.4–9.0)	178	156.75	1.14 (0.98–1.32)	1.1 (–0.7 to 2.9)
Other/unknown	18 363	643	360.57	1.78 (1.65–1.93)	15.4 (12.0–18.7)	143	90.50	1.58 (1.34–1.86)	2.9 (1.2–4.5)

AER = absolute excess risk per 1,000 person-years (estimated by subtracting the expected number of deaths from the number observed, dividing by the number of person years at risk, and multiplying by 1000); SMR = standardised mortality ratio.

\* Cardiovascular disease group includes case with ICD-10 codes of I10-I15 (hypertensive disease), I20-I25 (ischaemic heart disease), I26-I28 (Pulmonary heart disease and disease of pulmonary circulation), I34-I38 (nonrheumatic valve disorders), I42 (cardiomyopathy), I46 (cardiac arrest), I47-I49 (cardiac arrhythmias), I50-I51 (heart failure and complications and ill-defined heart disease), I60-I69 (cerebrovascular disease), I70 (atherosclerosis) and I71 (aortic aneurysm and dissection).