Pancreatic cancer in Victoria

Optimal care pathway data summary report

VICTORIA State Government | Health and Human Services

To receive this publication in an accessible format phone (03) 9096 2136, using the National Relay Service 13 36 77 if required, or email cancerplanning@dhhs.vic.gov.au.

Authorised and published by the Victorian Government, 1 Treasury Place, Melbourne.

ISBN 978-1-76069-450-0 (pdf/online/MS word)

Available at www.health.vic.gov.au/cancer

(1805050 ‘cover’)

Contents

List of figures

List of tables

Foreword

The data presented in this report are a summary of the data analyses prepared for the Pancreatic Cancer Summit.

We were pleased and honoured to be able to co-chair the working group that was convened to help guide the analyses of statewide routine datasets to help inform our understanding of the current patterns of care delivered to Victorians diagnosed with pancreatic cancer. This has been instructive and has highlighted some key areas for further investigation and action that will hopefully improve the care and outcomes for Victorians afflicted with this disease.

We would like to underscore the importance of this type of work in bringing the clinical community together to really identify where, collectively, we can make meaningful change and improvement for our patients.

We are especially grateful for the time, effort and thoughtful contributions of our colleagues on the working group and to all who attended and were so active in their participation at the Pancreatic Cancer Summit. Special acknowledgement and thanks to Dr Luc te Marvelde and Ella Stuart, who so expertly undertook the data analyses and to the Tumour Summit project team for their support throughout the process.

We look forward to working collectively to make the most of the opportunities for improvement that this process has offered and, ultimately, seeing the outcomes of these efforts for our patients from across the state.

Dr Charles Pilgrim
Co-Chair

Prof. Chris Christophi
Co-Chair

Introduction

The data presented in this report are a summary of the data analyses prepared for the Pancreatic Cancer Summit held in November 2017. The Pancreatic Cancer Summit is part of the Victorian Tumour Summits, an initiative of the Victorian Integrated Cancer Services (ICS[1]) delivered in collaboration with the Department of Health and Human Services ('the department') and Cancer Council Victoria. The summits support the broader program of work implementing the optimal care pathways (OCP).

The Pancreatic Cancer Summit gathered 70 stakeholders from across Victoria to discuss variations in care and identify opportunities for improvement. Data presented focused on the diagnosis and treatment steps of the pancreatic cancer OCP. Stakeholders prioritised variations based on their potential impact on patient experience and outcomes. Clinical commentary and recommendations from the summit are included in this report.

More information

- Find out more about the Pancreatic Cancer Summit from the NEMICS website <www.nemics.org.au/page/Improving_cancer_care/VICS_and_other_ICS/Victorian_tumour_stream_network_summits/Pancreatic_Cancer_Summit/>.
- The pancreatic cancer OCP can be viewed and downloaded from the Cancer Council Australia website <www.cancer.org.au/OCP>.

Data sources

The Victorian Cancer Registry (VCR) is a population-based cancer registry that collects demographic and tumour details for all Victorian residents who are diagnosed with cancer. The department's Centre for Victorian Data Linkage (CVDL) perform an annual data linkage between the VCR and administrative datasets including the Victorian Admitted Episodes Dataset (VAED), the Victorian Radiotherapy Minimum Data Set (VRMDS) and the Victorian Death Index (VDI). Linking the VCR to the VAED provides information on cancer treatment, including surgery and intravenous chemotherapy (excluding oral chemotherapy), provided in an inpatient setting in Victorian public and private hospitals. Linking the VCR to the VRMDS provides information on admitted and non-admitted radiotherapy courses in Victorian public and private radiotherapy centres.

Additional un-linked data sources include the department's Clinical Performance Indicator Audit 2013–2015.

Patients

Victorian residents aged 18 years or older with a primary diagnosis of pancreatic cancer (C25) between 2011 and 2015 were identified using the VCR. Survival and treatment analyses were restricted to Victorians with pancreatic ductal adenocarcinoma (PDAC) tumours. As a proxy for cancer stage, patients were classified as having non-metastatic or metastatic cancer at diagnosis (see the glossary for further information) and treatment analyses were split by this variable.

[1] See the abbreviations for naming of eight Victorian ICS.

At a glance

Key findings

Pancreatic cancer in Victoria

- The age standardised incidence rates have increased between 2011 and 2015 from 6.8 cases to 7.4 cases per 100,000.
- This represents an increase in the real number of new cases from 745 in 2011 to 858 new cases in 2015.
- Sixty-one per cent of patients present with metastatic disease at or within four months of diagnosis.

Survival

- Median survival was 167 days.
- One-year relative survival increased from 27 per cent to 34 per cent between 2011 and 2015.

Multidisciplinary team meeting

- The statewide average for documented multidisciplinary meeting (MDM) discussion was 69 per cent in 2013–15, ranging from 36 to 96 per cent across ICS.
- Most ICS had documented MDM discussion rates below the department's target rate of 80 per cent.

Treatment

Non-metastatic patients

- There is no statewide data on whether non-metastatic patients have upfront resectable, borderline resectable or locally advanced unresectable pancreatic cancer, and this limits the ability to accurately discuss the appropriateness of treatment for these patients.
- Curative surgery:
  - Thirty-one per cent of patients underwent curative surgical treatment.
  - Overall, there were 1.5 per cent non-metastatic patients who were treated with neoadjuvant therapy proceeding to curative surgery.
  - Seventy-seven per cent of patients who had curative surgery went on to have adjuvant therapy.
  - Thirty, 90 and 365 day postoperative mortality was low by world standards at 2.1 per cent, 2.7 per cent and 19.7 per cent respectively.
- Palliative intravenous chemotherapy/radiotherapy:
  - Thirty-four per cent of patients were treated only with chemotherapy and/or radiotherapy.
  - When chemotherapy and/or radiotherapy were the only treatment received, 41 per cent of patients began treatment within the recommended four weeks of diagnosis.
- There were 35 per cent of patients identified as non-metastatic who did not proceed to surgery, intravenous chemotherapy or radiotherapy. Subsequent analysis demonstrated the majority of these patients were older and had more comorbid conditions.

Metastatic patients

- Fifty-one per cent of patients with metastatic disease (28 per cent of all patients) never received any anti-tumour treatment (surgery, intravenous chemotherapy or radiotherapy).
- The number of health services with low annual volume (one to three per year) of pancreatic resections has progressively decreased from 10 health services in 2014–15 to four in 2016–17.

Palliative care

- For 75 per cent of patients, their place of death was a Victorian hospital.
- Twelve per cent of patients received intravenous chemotherapy within 30 days of death.

Recommended actions

Multidisciplinary meeting discussions

- All newly diagnosed pancreatic cancer patients should be presented in an MDM, including patients with metastatic disease.
- Differentiation of patients with locally advanced unresectable (but non-metastatic) disease from borderline resectable and upfront resectable disease needs to be characterised and captured to truly understand the appropriateness of treatment for non-metastatic pancreatic cancer patients between ICS and across the state. This data should be captured as part of MDM discussions.

Systemic therapy

- All patients who have curative surgery should be treated with adjuvant therapy, or have a valid reason documented outlining why this was not the case.
- Neoadjuvant therapy must be considered for patients identified as borderline resectable.

Palliative care

- A specialist palliative care team should be involved earlier following diagnosis and during active treatment.
- Palliative care involvement should be progressive and delivered concurrently with palliative chemotherapy.

Demographics

- Between 2011 and 2015, 3,964 Victorians were diagnosed with a form of pancreatic cancer (Table 1).
- The median age at diagnosis was 73 years old, ranging from 72 to 74 years across ICS.
- Pancreatic cancer was slightly more common in males, representing 50–56 per cent of cases within each ICS.
- A quarter of Victorians with pancreatic cancer were in the most disadvantaged socioeconomic status (SES) quintile, although this varied between ICS (10–41 per cent).
- There were more Victorians with pancreatic cancer who were born in a non-English-speaking country within the metropolitan ICS compared with regional ICS.
- Over half of Victorians with pancreatic cancer had a Charlson Comorbidity Index (CCI) of zero, suggesting no other comorbidities prior to their cancer diagnosis.

Table 1: Pancreatic cancer patient demographics for Victoria and by ICS of residence (diagnosed 2011–2015)

ICS of residence	N	Age (median)	Male (%)	SES, most disadvantaged (%)	Non-English speaking country of birth (%)	CCI of zero (%)
NEMICS	969	74	50	10	36	57
SMICS	1064	74	50	21	36	58
WCMICS	698	72	54	34	54	54
BSWRICS	306	74	56	26	17	60
GRICS	255	74	55	36	12	62
HRICS	220	74	55	35	10	62*
LMICS	244	73	51	38	8	60
GICS	194	72	52	41	7	55
Victoria	*3964*	*73*	*52*	*25*	*32*	*58*

** The CCI is based on comorbidities coded in the VAED. Patients living in HRICS may attend hospitals in Albury (NSW) and these episodes are not captured in the VAED. Therefore, the CCI may be underestimated for patients living in HRICS.*

Tumour attributes

- In Victoria, 61 per cent of pancreatic cancer tumours were metastatic[2] at the time of diagnosis (Table 2).
- There was an 8 per cent difference between the lowest and highest proportion of metastatic tumours among ICS.
- PDAC accounted for the majority of pancreatic tumours diagnosed in Victoria (89 per cent).

Table 2: Pancreatic cancer tumour attributes for Victoria and by ICS of residence (diagnosed 2011–2015)

ICS of residence	Metastatic disease at diagnosis (%)	PDAC (%)
NEMICS	60	88
SMICS	61	89
WCMICS	62	90
BSWRICS	62	90
GRICS	58	89
HRICS	57*	88
LMICS	63	86
GICS	66	89
Victoria	*61*	*89*

** Metastatic disease at diagnosis is determined in part by episodes in the VAED within four months of diagnosis that contain metastatic cancer codes. Patients living in HRICS may attend hospitals in NSW (Albury) and these episodes are not captured in the VAED. Therefore, metastatic rates may be underestimated for patients living in HRICS.*

[2] See the glossary for the methodology of determining metastatic cancer.

Incidence

- The overall pancreatic cancer age-standardised incidence rate in Victoria between 2011 and 2015 was 6.9 cases per 100,000 (Table 3).
- The age-standardised incidence rates in individual ICS ranged from 6.7 cases per 100,000 in SMICS to 7.7 cases per 100,000 in GICS.
- The Victorian age-standardised incidence rate has increased between 2011 and 2015 from 6.8 cases to 7.4 cases per 100,000. This represents an increase in the real number of new cases of pancreatic cancer from 745 in 2011 to 858 new cases in 2015.

Table 3: Pancreatic cancer age-standardised incidence rate per 100,000 for Victoria and by ICS of residence (diagnosed 2011–2015)

ICS of residence	Age standardised incidence rate
NEMICS	6.9
SMICS	6.7
WCMICS	7.0
BSWRICS	7.0
GRICS	7.6
HRICS	6.8
LMICS	6.8
GICS	7.7
Victoria	*6.9*

Predictors of incidence

A multivariable analysis of pancreatic cancer showed that age, sex and SES were independent predictors of incidence, while ICS of residence was not a predictor of incidence (Table 4).

Table 4: Predictors of pancreatic cancer incidence in Victoria (diagnosed 2011–2015)

Variable	Level	Incidence rate ratio [95% CI]	P-value
Age	0-59	1	<0.001
	60-64	9.29 [8.18 - 10.55]	
	65-69	15.16 [13.50 - 17.01]	
	70-74	20.47 [18.24 - 22.97]	
	75-79	28.27 [25.24 - 31.67]	
	80-84	34.57 [30.79 - 38.81]	
	85 or over	46.81 [41.99 - 52.19]	
Sex	Female	1	<0.001
	Male	1.29 [1.21 - 1.37]	
ICS of residence	NEMICS	1	0.466
	SMICS	0.95 [0.87 - 1.04]	
	WCMICS	0.93 [0.84 - 1.02]	
	BSWRICS	0.97 [0.85 - 1.10]	
	GRICS	1.06 [0.92 - 1.22]	
	HRICS	0.95 [0.82 - 1.11]	
	LMICS	0.89 [0.77 - 1.03]	
	GICS	1.02 [0.87 - 1.20]	
SES	1 - most disadvantaged	1	0.031
	2	1.00 [0.91 - 1.10]	
	3	0.92 [0.84 - 1.02]	
	4	0.88 [0.79 - 0.97]	
	5 - least disadvantaged.	0.90 [0.81 - 1.00]	

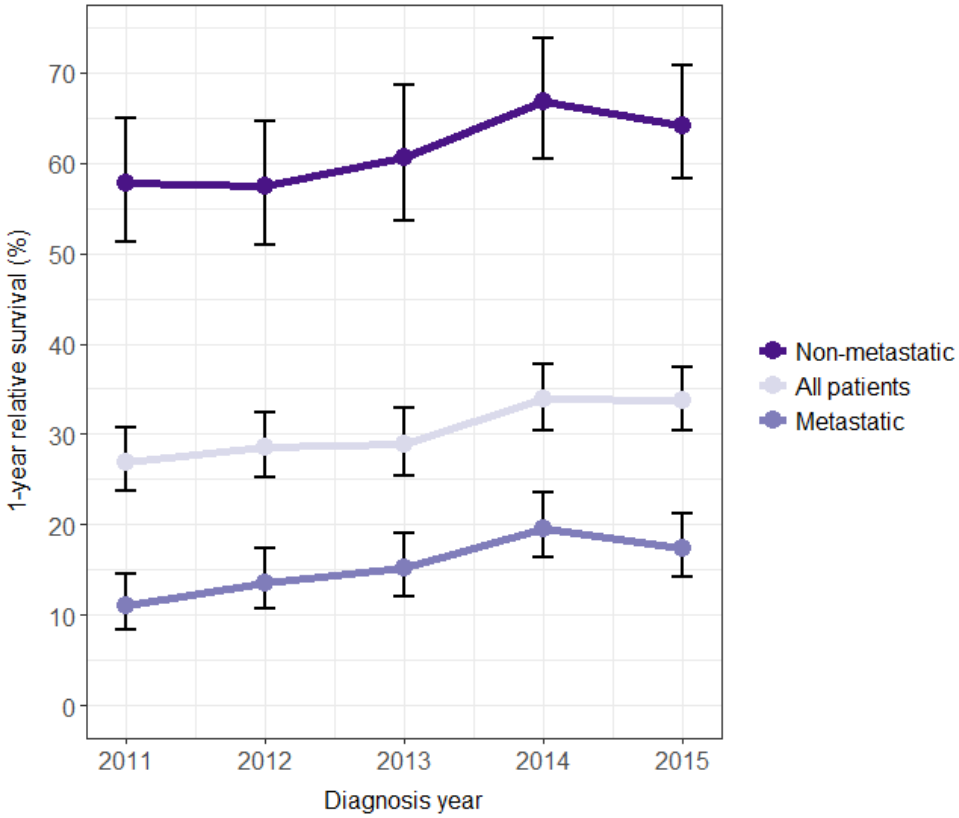
Incidence rate ratios from a multivariable negative binomial model.

Survival[3]

Relative survival

- The overall one-year relative survival for pancreatic cancer patients diagnosed between 2011 and 2015 was 31 per cent (Figure 1).
- This overall survival varied significantly based on known metastatic disease at diagnosis compared with non-metastatic disease.
- One-year relative survival increased from 27 per cent in 2011 to 34 per cent in 2015.

Figure 1: One-year relative survival of Victorians with pancreatic cancer over time (diagnosed 2011–2015)



Relative survival is the ratio of survival observed in those with cancer to the survival in the general Victorian population, thereby adjusting the survival estimate for other causes of death. Relative survival was calculated using the period approach and Ederer II method. Bars represent 95 per cent CI.

Clinical commentary

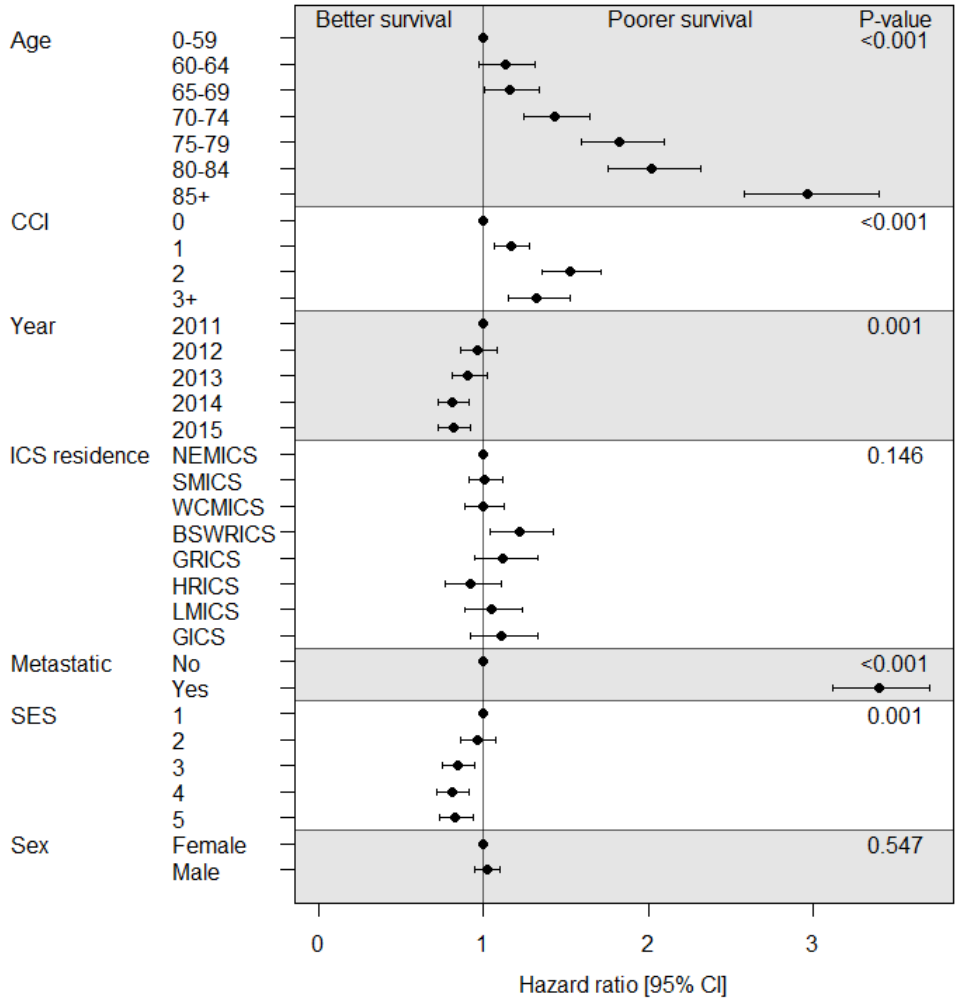
There has been a slight but real increase in one-year survival for pancreatic cancer. Pancreatic cancer is an aggressive cancer, so even a marginal increase is a pleasing result. The reason for this increase remains unclear and although more effective systemic therapies are now available, their use during this period was limited and is unlikely to explain the trend.

[3] The 'Survival' section includes analyses restricted to PDAC and excludes cancer diagnoses notified to the VCR by death certificate only (DCO).

Overall survival

- Median survival was 167 days (95 per cent CI, 157–179 days) (Figure 2).
- Analyses showed that survival is better for Victorians with pancreatic cancer who:
  - are younger
  - have no comorbidities
  - are diagnosed in recent years
  - do not have metastatic disease at diagnosis
  - have higher SES.

Figure 2: Relative risk of death following pancreatic cancer diagnosis (diagnosed 2011–2015)

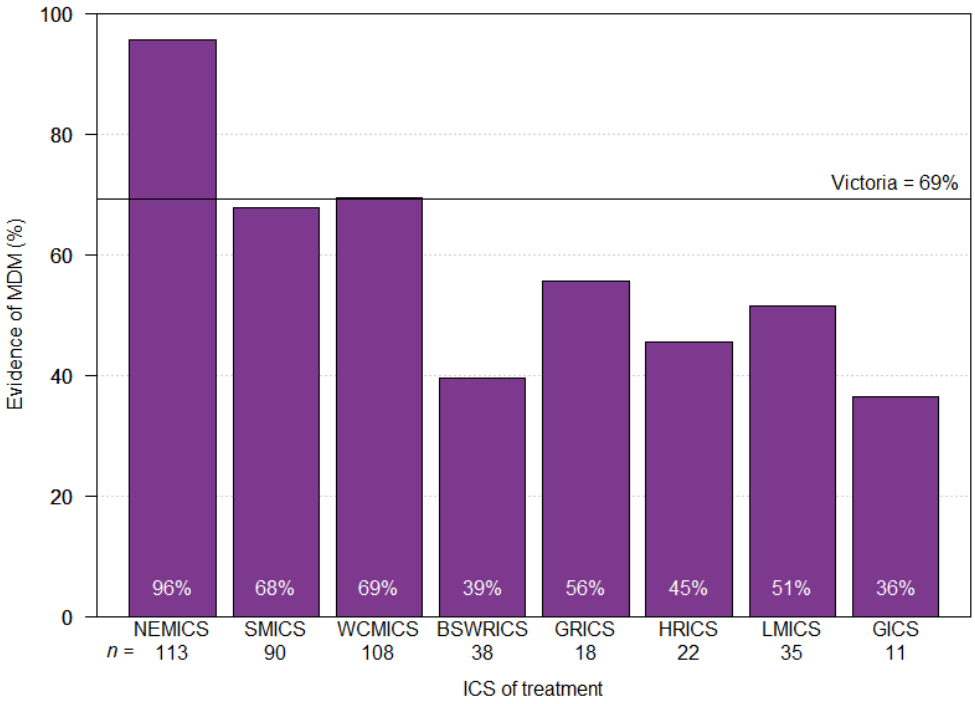


Relative risk expressed as hazard ratios from a multivariable Cox proportional hazard model. Bars represent 95 per cent CI.

Multidisciplinary meeting

- The statewide average for a documented MDM discussion was 69 per cent between 2013 and 2015, ranging from 36 to 96 per cent across ICS (Figure 3).
- For most regions, evidence of an MDM in newly diagnosed cases is lower than the department's target rate of 80 per cent.

Figure 3: Percentage of newly diagnosed pancreatic cancer cases with documented MDM recommendations, 2013–2015



Data limitations

There are currently no systems for routinely monitoring the occurrence of MDMs. For this analysis, a sample of cases who received treatment were audited within each ICS. The presence or absence of MDM treatment recommendations in the patient's medical history was used as a measure of whether an MDM had occurred.

Clinical commentary

There was variation in the documented evidence of MDM recommendations across ICS between 36 and 96 per cent. Pancreatic cancer presented with metastatic disease in 61 per cent of cases and it is possible that patients who were not discussed had metastatic cancer. However, the OCP recommends discussion of all cases (including metastatic) and, consistent with this, there was strong agreement at the Pancreatic Cancer Summit that all pancreatic cancer cases should be presented in an MDM. Discussion in an MDM ensures all treatment options are considered based on the needs of the individual patient, including identifying potential clinical trials and the role of palliative care.

It may be time to consider a pancreas-specific MDM in recognition of the subspecialisation we are seeing in the treatment of pancreatic cancer.

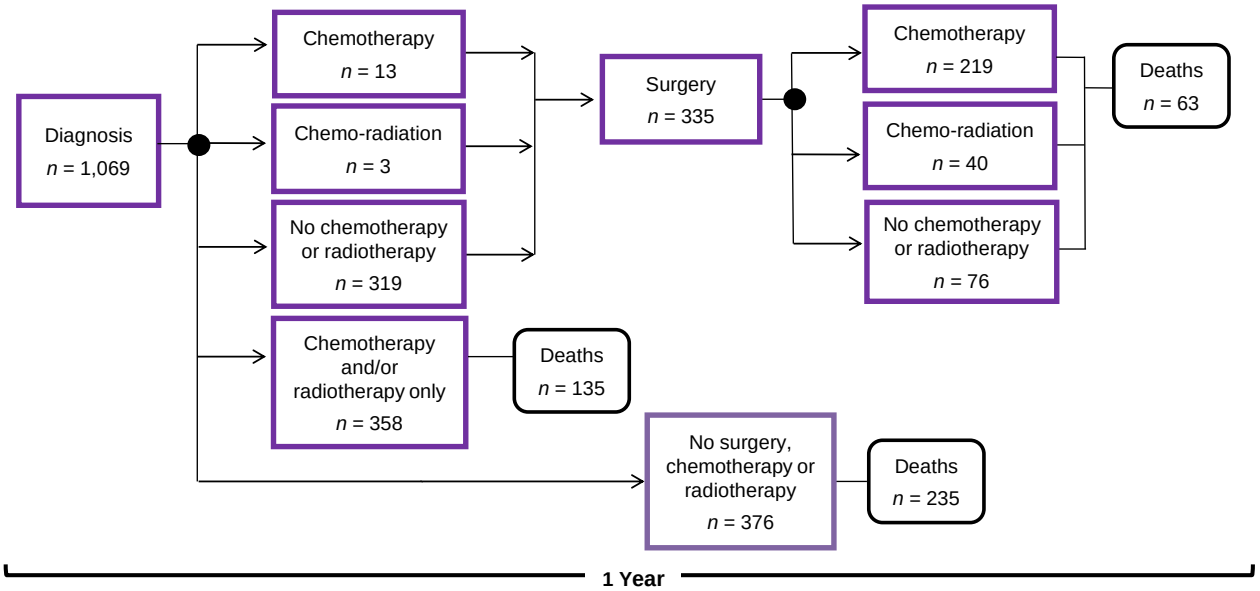
Treatment for non-metastatic patients[4]

Overall for Victoria

For Victorians with non-metastatic pancreatic cancer, within one year of diagnosis, there were:

- 31 per cent who had surgery (Whipple procedure or other pancreatectomy)
  - 1.5 per cent of non-metastatic patients underwent neoadjuvant chemotherapy or chemo-radiation prior to surgery
  - 77 per cent of those undergoing surgery proceeded to adjuvant chemotherapy or chemo-radiation
- 34 per cent who had chemotherapy and/or radiotherapy, but no surgery (Figure 4).

Figure 4: Treatment pathway within one year of non-metastatic pancreatic cancer diagnosis (diagnosed 2011–2015)



Clinical commentary

Pancreatic cancer is a systemic disease and therefore treatment with curative intent requires administration of systemic therapy. The OCP states that even if surgery is deemed curable, chemotherapy should be considered. There were a significant proportion (*n* = 76/335, 23 per cent) of patients who were treated with surgery and did not receive adjuvant systemic therapy. The reasons for this are unclear and need to be explored in more detail.

More than one-third of patients with non-metastatic pancreatic cancer were treated with chemotherapy or chemoradiation alone, which is not considered curative treatment. At least some of these patients will have presented with locally advanced, unresectable (but non-metastatic) disease and will therefore have undergone appropriate treatment. Other patients (at least 12 per cent of all pancreatic cancer presentations – PURPLE Registry) would be expected to have borderline resectable disease and should undergo induction systemic therapy prior to surgery (National Comprehensive Cancer Network guidelines). In our cohort virtually no patients who presented with non-metastatic pancreatic cancer underwent curative surgery following neoadjuvant therapy (1.5 per cent). Patients with borderline resectable disease were therefore either treated with a surgery-first approach or received chemotherapy/chemoradiation but did not progress to surgery.

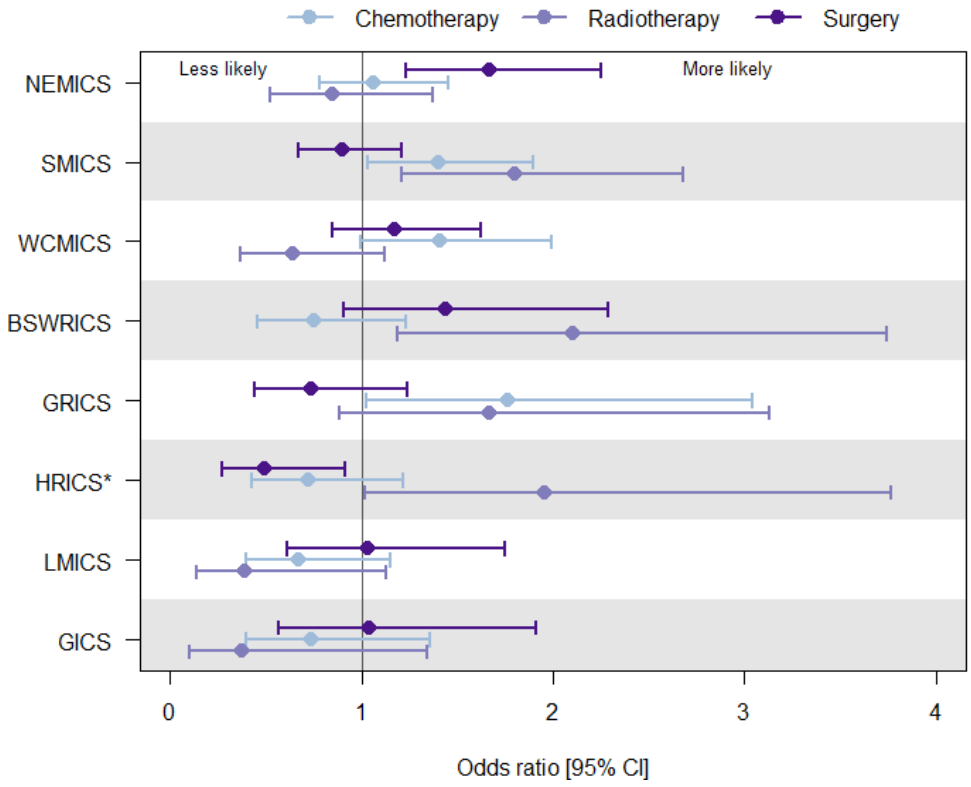
[4] In the 'Treatment for non-metastatic patients' section, pancreatic cancer refers to PDAC only. Cancer diagnoses notified to the VCR by DCO were excluded from this section. Radiotherapy refers to radiotherapy with radical intent.

The currently available statewide data do not provide sufficient information to discriminate which non-metastatic patients have upfront resectable, borderline resectable or locally advanced unresectable pancreatic cancer, and this therefore compromises our ability to comment further on the appropriateness or otherwise of treatment with surgery, chemotherapy or chemoradiation. Prospective classification and state-level identification of patients with pancreatic cancer into resectable, borderline resectable and locally advanced categories must be a statewide priority to help interpret data in the future and to identify variations in care. This is data that should be captured during an MDM discussion.

Treatment by ICS of residence

- There were statistically significant differences in the likelihood of receiving surgery, chemotherapy and radiotherapy between ICS of residence (Figure 5).
- Victorians with pancreatic cancer who lived in NEMICS were 1.67 times more likely to undergo surgery compared with the Victorian average.
- Victorians with pancreatic cancer who lived in SMICS and GRICS were more likely to undergo chemotherapy compared with the Victorian average.
- Victorians with pancreatic cancer who lived in SMICS, BSWRICS and HRICS were more likely to undergo radical radiotherapy compared with the Victorian average.

Figure 5: Likelihood of receiving surgery, chemotherapy and radiotherapy within one year of diagnosis for non-metastatic pancreatic cancer patients by ICS of residence compared with the Victorian average (diagnosed 2011–2015)



Likelihood expressed as odds ratios from a logistic regression model adjusting for age and CCI. Bars represent 95 per cent CI.

** Pancreatic cancer patients who live in HRICS may receive surgery and/or chemotherapy in Albury (NSW) hospitals, and these episodes are not captured in the VAED. Therefore rates of surgery and chemotherapy may be underestimated for HRICS patients.*

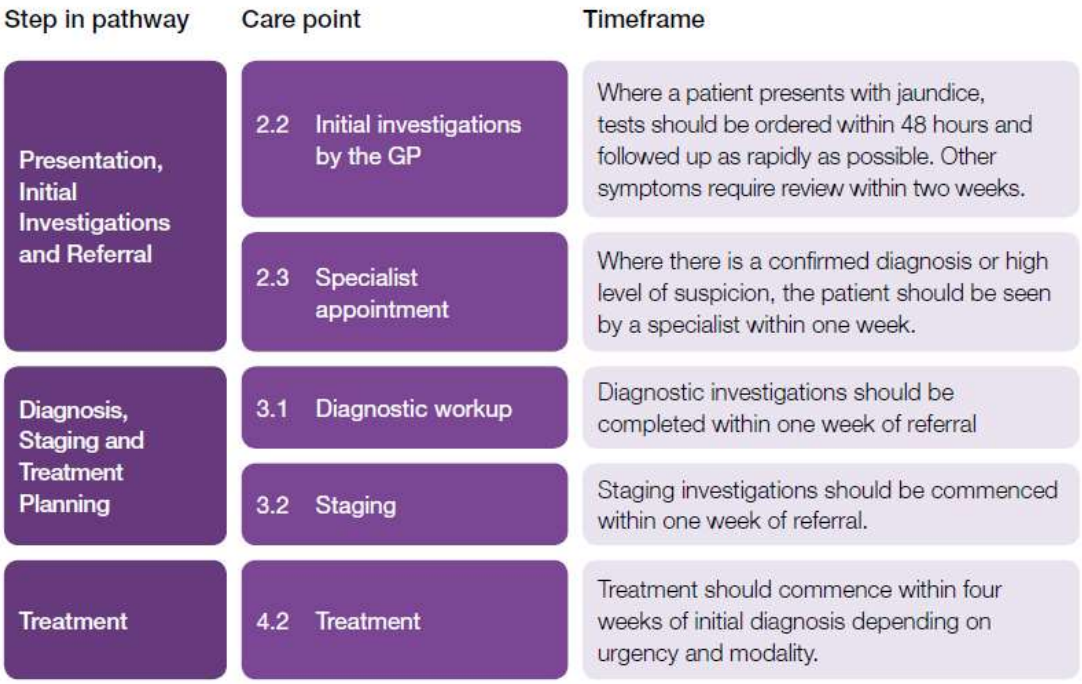
Clinical commentary

There is variation in treatment across the ICS. All ICS and MDMs should be agreeing on and providing the same treatments to pancreatic cancer patients. This data underscores why all patients should be discussed at an MDM to ensure the full range of treatment options are considered. It also strengthens the argument to require prospective characterisation of patients as resectable, borderline resectable and locally advanced because the different treatment modalities are variably appropriate in each subcategory of non-metastatic pancreatic cancer.

Optimal care pathway recommended timeframes

The pancreatic OCP specifies that treatment should begin within four weeks of initial diagnosis (Figure 6).

Figure 6: OCP recommended timeframes for pancreatic cancer care[5]



[5] OCP for people with pancreatic cancer, available from the Cancer Council website <www.cancer.org.au/OCP>.

Timeframes for treatment

- The majority of patients who underwent surgery, without neoadjuvant therapy, began treatment within the recommended four-week time period (Table 5).
- Less than half of Victorians with pancreatic cancer who were treated with chemotherapy and/or radical radiotherapy only, began their treatment within four weeks of diagnosis.

Table 5: Time to treatment for patients with non-metastatic pancreatic cancer (diagnosed 2011–2015)

N	From	To	Time (days) Median [IQR]	Treated within four weeks (%)
13	VCR diagnosis date	Chemotherapy	22 [15 - 46]	69
319	VCR diagnosis date	Surgery	2 [0 - 21.5]	82
358	VCR diagnosis date	Chemotherapy and/or radiotherapy only (no surgery)	35.5 [18 - 64.75]	41
13	Chemotherapy	Surgery	125 [85 - 149]	
219	Surgery	Chemotherapy	55 [47 - 70]	
40	Surgery	Chemo-radiation	56 [46 - 70.5]	

VCR diagnosis date, diagnosis date as recorded by the VCR (see Glossary).

Clinical commentary

The median timeframe of five weeks between diagnosis and beginning chemotherapy and/or radiotherapy only is longer than the recommended OCP timeframe and is an area of concern. It is unclear why there is this delay to beginning treatment, but the possibilities include delays in completing staging investigations (including obtaining tissue diagnosis or completing imaging procedures), delays in discussion at a weekly or fortnightly MDM or delays in accessing oncology outpatient appointments.

The median time to surgery is two days and is well within the OCP timeframe, although this figure is misleading because the date of diagnosis for these cases is often the date of surgical resection as this is when histological confirmation of diagnosis becomes available.

The median time from surgery to chemotherapy or chemo-radiation is approximately two months. Ideally chemotherapy would start within six weeks of surgery; however, patients may take longer than the median time of 13 days to recover from surgery if there are postoperative complications (which there frequently are following the Whipple operation).

Outcomes following surgery

- The median length of stay during a surgery episode was 13 days.
- Ninety per cent of surgery episodes included time spent in an intensive care unit.
- The median time spent in an intensive care unit was 46 hours.
- Thirty, 90 and 365-day mortality rates were low at 2.1 per cent, 2.7 per cent and 19.7 per cent respectively.

Clinical commentary

Compared with the United States and many centres in Europe, virtually all hospitals performing pancreatic resections in Victoria would be considered low-volume hospitals. Regardless, Victorian hospitals are achieving world-class results in terms of 30- and 90-day mortality rates.

Surgery volumes

- The number of Whipple procedures and pancreatectomies conducted in low-volume (for Victoria) health services decreased over the last three financial years (Table 6).
- The number of low-volume health services performing resections also decreased.
- Hazard ratio estimates were consistent, with better overall survival for patients having surgery in health services with higher volumes; however, this was not statistically significant (Table 7).

Table 6: Low-volume (≤ three surgeries per year) pancreatic surgery in Victorian health services, financial years 2014–15 to 2016–17

	2014-15	2015-16	2016-17
Number of resections performed in low volume health services	17	9	6
Number of low volume health services	10	6	4

Table 7: Relative risk of death following pancreatic surgery by hospital volume (diagnosed 2011–2015)

Variable	Level	N	Univariable model		Multivariable model*	
			Hazard ratio (95% CI)	P-value	Hazard ratio (95% CI)	P-value
Hospital annual volume	Below median volume (<7 resections)	44	1	0.486	1	0.363
	Median volume and above (≥7 resections)	371	0.87 (0.60-1.27)		0.83 (0.56-1.23)	

Relative risk expressed as hazard ratios from a Cox proportional hazard model. Hospital volume calculated from the annual number of Whipple procedures and pancreatectomies performed in a hospital for patients of any diagnosis (cancer and non-cancer patients).

** Adjusted for age (categorical), CCI, sex, metastatic disease status at surgery and admission type.*

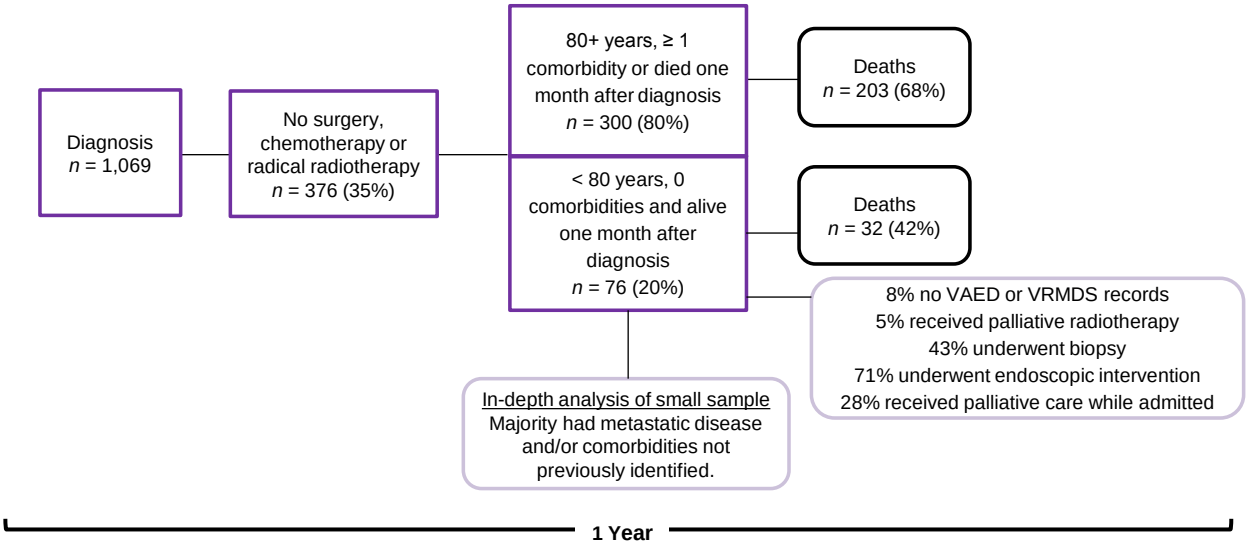
Clinical commentary

Very low volume pancreatic resection surgery does not seem to be an issue in Victoria because centralisation of surgery appears to be happening over time, and death following pancreatic surgery is rare. The very low volume centres are self-selecting themselves and no longer appear to be performing pancreatic resections, and surgical volumes at most centres performing this type of surgery now are generally 10 or more per year, which is an appropriate number.

Low rates of treatment

- Between 2011 and 2015, 376 (35 per cent) Victorians with non-metastatic pancreatic cancer did not have surgery, intravenous chemotherapy or radical radiotherapy within one year of diagnosis. Of these, 235 (63 per cent) patients died within one year of their diagnosis (Figure 7).
- Compared with those who received surgery, intravenous chemotherapy and/or radiotherapy, those who did not were more likely to be older and have more comorbid conditions.

Figure 7: Flow chart of non-metastatic pancreatic cancer patients who did not receive surgery, intravenous chemotherapy or radiotherapy within one year of diagnosis (diagnosed 2011–2015)



Clinical commentary

Less aggressive treatment strategies or palliative treatment may have been selected for older patients, patients with a poor prognosis (those who died shortly after diagnosis) or patients with significant comorbidities.

Further investigation of a sample of the 76 patients aged under 80 years without apparent comorbidities revealed a range of reasons they may not have been suitable for surgery, such as comorbidities not captured in the CCI (including serious mental health issues and chronic hepatitis infections) and subsequent discovery of metastatic disease.

Patient flow – surgery

- Ninety-three per cent of surgery for Victorians with non-metastatic pancreatic cancer was conducted in metropolitan ICS (Table 8).
- Sixty-three per cent of Victorians with non-metastatic pancreatic cancer had surgery at a health service within their ICS of residence.

Table 8: Non-metastatic pancreatic cancer patient flow for surgery (diagnosed 2011–2015)

	ICS of treatment							
ICS of residence	**NEMICS**	**SMICS**	**WCMICS**	**BSWRICS**	**GRICS**	**HRICS**	**LMICS**	**GICS**
NEMICS	77 (79%)	16 (17%)	4 (4%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
SMICS	3 (4%)	70 (89%)	6 (7%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
WCMICS	17 (26%)	6 (9%)	43 (65%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
BSWRICS	6 (20%)	2 (7%)	7 (23%)	15 (50%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
GRICS	4 (22%)	7 (39%)	7 (39%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
HRICS	4 (36%)	2 (18%)	5 (46%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
LMICS	10 (50%)	2 (10%)	7 (35%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (5%)
GICS	2 (14%)	0 (0%)	3 (22%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	9 (64%)

Example for reading table: 89 per cent of patients living in SMICS had surgery at a health service in SMICS.

Patient flow – chemotherapy

- Seventy-nine per cent of first chemotherapy admissions for Victorians with non-metastatic pancreatic cancer occurred in a metropolitan ICS health service (Table 9).
- Seventy-seven per cent of Victorians with non-metastatic pancreatic cancer had their first chemotherapy admission at a health service within their ICS of residence.

Table 9: Non-metastatic pancreatic cancer patient flow for first chemotherapy (diagnosed 2011–2015)

	ICS of treatment							
ICS of residence	**NEMICS**	**SMICS**	**WCMICS**	**BSWRICS**	**GRICS**	**HRICS**	**LMICS**	**GICS**
NEMICS	107 (72%)	23 (16%)	18 (12%)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
SMICS	8 (4%)	162 (91%)	9 (5%)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
WCMICS	20 (16%)	7 (5%)	101 (78%)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1%)
BSWRICS	1 (2%)	2 (5%)	1 (2%)	38 (91%)	0 (0)	0 (0)	0 (0)	0 (0)
GRICS	5 (11%)	8 (17%)	4 (8%)	0 (0)	29 (62%)	0 (0)	1 (2%)	0 (0)
HRICS	6 (18%)	2 (6%)	6 (18%)	1 (3%)	0 (0)	17 (52%)	1 (3%)	0 (0)
LMICS	3 (8%)	2 (6%)	9 (26%)	0 (0)	0 (0)	2 (6%)	17 (48%)	2 (6%)
GICS	0 (0)	0 (0)	3 (12%)	0 (0)	0 (0)	0 (0)	1 (4%)	21 (84%)

Example for reading table: 91 per cent of patients living in SMICS had their first chemotherapy at a health service in SMICS

Clinical commentary

Regional pancreatic cancer patients come to metropolitan Melbourne for their resectional surgery, whereas patients are more likely to be treated in their local ICS catchment for chemotherapy. This is appropriate and sensible treatment and is assumed to be most likely consistent with a patient's preference of receiving treatment close to home where possible and safe.

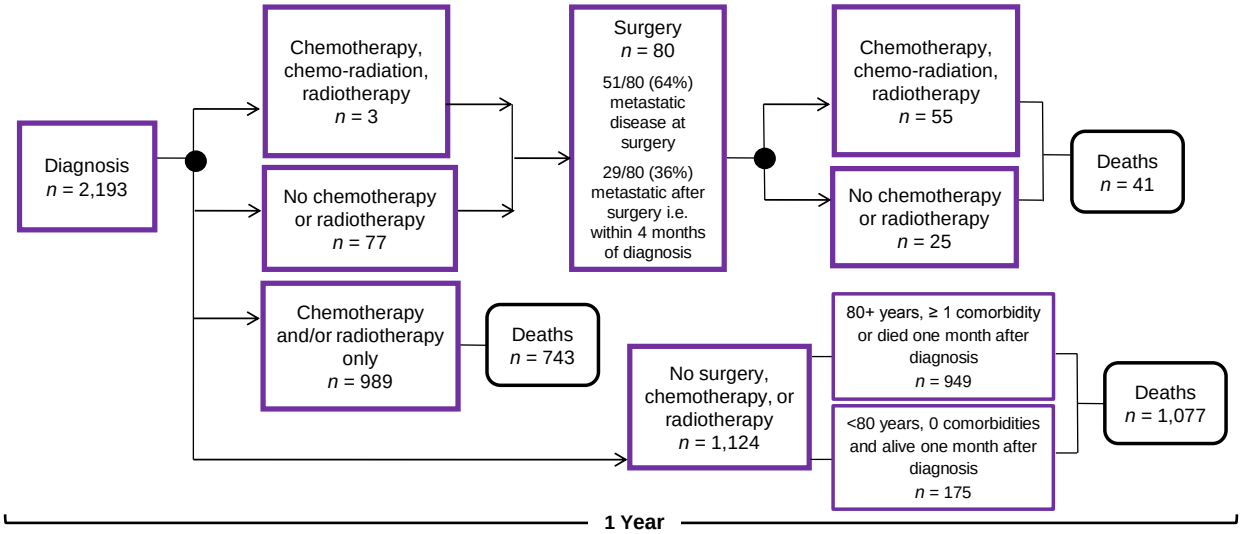
Treatment for metastatic patients[6]

Overall for Victoria

For Victorians with metastatic pancreatic cancer, within one year of diagnosis, there were:

- 4 per cent who had surgery (Whipple procedure or pancreatectomy)
- 45 per cent who had intravenous chemotherapy and/or radiotherapy (including palliative), but no surgery, of whom:
  - 84 per cent had chemotherapy
  - 11 per cent had chemo-radiation
  - 5 per cent had radiotherapy
- 1,123 (51 per cent) who had no surgery, intravenous chemotherapy or radiotherapy, of whom:
  - 1,077 (96 per cent) died within a year of diagnosis (Figure 8).

Figure 8: Treatment pathway within one year of metastatic pancreatic cancer diagnosis (diagnosed 2011–2015)



Clinical commentary

Figure 8 shows overall appropriate care of patients with metastatic disease at diagnosis.

There were a small number of patients who underwent surgery (*n* = 80/2,193, 4 per cent), which would not be considered appropriate for metastatic disease if that were known preoperatively. However, of these 80 patients, two-thirds (*n* = 51) were only found to have metastatic disease at the time of surgery, and the remaining 29 patients developed metastases within four months of surgery (and were therefore defined as metastatic at diagnosis in this cohort).

More than half of patients diagnosed with metastatic disease did not receive any active anti-tumour treatment (*n* = 1,124, 51 per cent). Of these patients, the majority were aged over 80 and/or with comorbidities (*n* = 949, 84 per cent). The remaining patients aged under 80 without comorbidities who were not actively treated proceeded directly to palliative care in 76 per cent of cases and can therefore be assumed to be in the terminal phases of the illness when diagnosed.

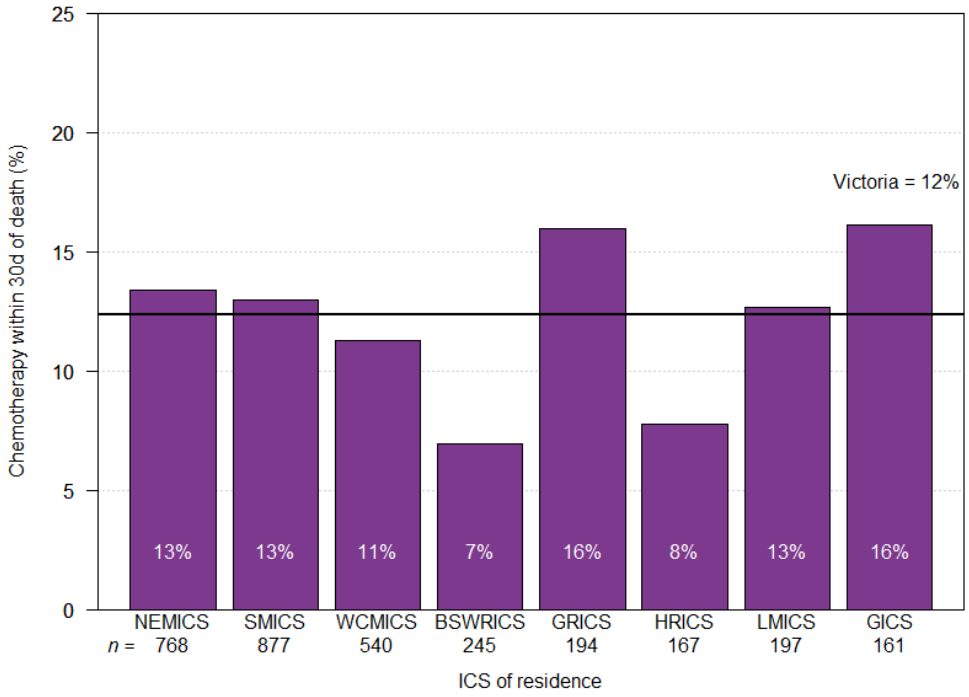
[6] In the 'Treatment for metastatic patients' section, pancreatic cancer refers to PDAC only. Cancer diagnoses notified to the VCR by DCO were excluded from this section. Radiotherapy refers to radiotherapy of radical and palliative intent.

Palliative care[7]

Overall for Victoria

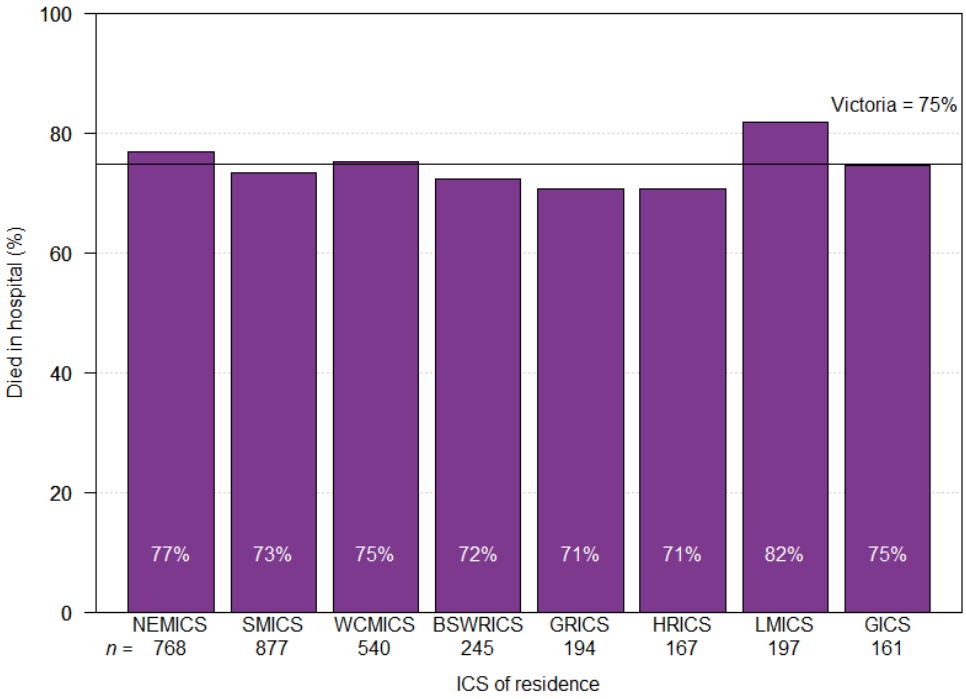
- Statewide data on palliative care services for pancreatic cancer patients was not available at the time of the Pancreatic Cancer Summit.
- In Victoria, 12 per cent of pancreatic cancer patients received intravenous chemotherapy in the last 30 days of life, ranging from 7 per cent to 16 per cent across ICS (Figure 9).
- Seventy-five per cent of deaths of Victorians with pancreatic cancer occurred while in a Victorian hospital, and this ranged from 71 per cent to 82 per cent between ICS (Figure 10).

Figure 9: Percentage of pancreatic cancer patients who received intravenous chemotherapy within 30 days of death, by ICS of residence (diagnosed 2011–2015)



[7] In the 'Palliative care' section, pancreatic cancer refers to PDAC only. Cancer diagnoses notified to the VCR by DCO were excluded from this section.

Figure 10: Percentage of pancreatic cancer patients whose place of death was a Victorian hospital (diagnosed 2011–2015)



Clinical commentary

Data on place of death were used to illustrate possible issues in the use of palliative care services across Victoria. For pancreatic cancer, 75 per cent of deaths occurred in a hospital, higher than for oesophagogastric (71 per cent) and colorectal (68 per cent) cancers. The OCP specifies that palliative care should be timely and may require referral at diagnosis. This is especially relevant for pancreatic cancer given 61 per cent of patients present with metastatic disease, over half of whom do not proceed to any form of active anti-cancer treatment as seen in preceding sections. This means that 28 per cent of all patients with pancreatic cancer in this period were only treated by palliative care physicians. Palliative care physicians are therefore a core member of the team and should be present at MDMs. Subsequent discussions with palliative care physicians suggest that timeliness of contact with palliative care services could reduce the proportion of pancreatic cancer patients who die in hospital. Similarly, active chemotherapeutic treatment to within 30 days of death may be inappropriate palliative care for patients with terminal disease. Pleasingly, there were only 12 per cent of patients treated in this way up to the time of death.

Acknowledgements

The data, analysis and commentary provided in this report represent a joint effort by numerous key contributors from the following groups.

Pancreatic Summit Working Party

Dr Rob Blum

Prof. Christopher Christophi (Co-Chair)

Mr Dan Croagh

Mr David Deutscher

Mr Adrian Fox

Prof. Peter Gibbs

Mr George Kalogeropoulos

Dr Richard Khor

A/Prof. Brian Le

Dr Belinda Lee

Mr Mehrdad Nikfarjam

Dr Charles Pilgrim (Co-Chair)

Dr Babak Tamjid

A/Prof. Niall Tebbutt

A/Prof. Ben Thomson

A/Prof. Valery Usatoff

Prof. John Zalcberg

Data analysis

Dr Luc te Marvelde

Ms Ella Stuart

Victorian Tumour Summits Project team

Ms Mirela Matthews

Ms Amy Sutherland

Ms Megan Dendle

We also gratefully acknowledge the providers of the Victorian Cancer Registry data, Victorian Admitted Episodes Dataset and the Victorian Radiotherapy Minimum Dataset, as well as the Centre for Victorian Data Linkage for performing the linkages between the Victorian Cancer Registry and administrative datasets.

To view the pancreatic summit data presentation and related documents, visit the Pancreatic Cancer Summit 2017 webpage <http://www.nemics.org.au/page/Improving_cancer_care/VICS_and_other_ICS/Victorian_tumour_stream_network_summits/Pancreatic_Cancer_Summit/>.

Abbreviations

CCI	Charlson Comorbidity Index (see Glossary)
CI	confidence interval
CVDL	The Centre for Victorian Data Linkage
DCO	death certificate only (see Glossary)
ICS	Integrated Cancer Service
IQR	interquartile range
IRSD	Index of Relative Socio-Economic Disadvantage
MDM	multidisciplinary meeting
OCP	optimal care pathway
PDAC	pancreatic ductal adenocarcinoma
SES	socioeconomic status (see Glossary)
VAED	Victorian Admitted Episodes Dataset
VCR	Victorian Cancer Registry
VRMDS	Victorian Radiotherapy Minimum Data Set

Victorian Integrated Cancer Services

BSWRICS	Barwon South Western Regional Integrated Cancer Service
GICS	Grampians Integrated Cancer Service
GRICS	Gippsland Regional Integrated Cancer Services
HRICS	Hume Regional Integrated Cancer Service
LMICS	Loddon Mallee Integrated Cancer Service
NEMICS	North Eastern Melbourne Integrated Cancer Service
SMICS	Southern Melbourne Integrated Cancer Service
WCMICS	Western and Central Melbourne Integrated Cancer Service

Glossary

Admission type	The category of admission (planned, emergency) relating to the episode of care.
Charlson Comorbidity Index (CCI)	An index measuring the number of comorbid conditions a patient has at diagnosis, which may influence their prognosis. Data on patient comorbidities were extracted from diagnosis codes of admitted episodes in the year prior to 30 days after the patient's pancreatic cancer diagnosis date. Patients without admitted episodes were assumed to have no comorbidities. The CCI was calculated for each patient according to Quan et al. 2011[7] (excluding cancer and metastases) and grouped into four categories (0, 1, 2 and 3+). Conditions included in the index: • AIDS/HIV • Congestive heart failure • Chronic pulmonary disease • Dementia • Diabetes with chronic complications • Hemiplegia or paraplegia • Mild liver disease • Moderate/severe liver disease • Renal disease • Rheumatic disease
Country of birth	The VCR assigns country of birth to each patient at the time of their cancer diagnosis. Country of birth has been grouped into: 'English speaking' – Australia, New Zealand, United Kingdom, United States, Canada – and 'Non-English speaking' – all other countries.
Death certificate only (DCO)	A method of cancer notification to the VCR whereby the death certificate provides the only notification of a person's cancer to the registry.
Metastatic patients	Patients who were classified as having metastatic cancer at the time of their diagnosis. Metastatic cancer was determined by VCR TNM-M (M1), admitted episodes in the VAED, between 30 days prior and four months after diagnosis date, which contained metastatic diagnosis codes (neoplasm and morphology codes) or palliative care flags.
Non-metastatic patients	Patients who were classified as not having metastatic cancer at the time of their diagnosis. Non-metastatic cancer was determined by an absence of metastatic indicators in associated VCR and VAED variables (see **Metastatic patients**).
Socioeconomic status (SES)	A measure of a person's economic and social position within society, which tends to be positively associated with better health. In this report SES is based on the Index of Relative Socio-Economic Disadvantage (IRSD) included in the Socio-Economic Index of Areas published by the Australian Bureau of Statistics. Victorians were assigned an IRSD score using their residential address at the time of their diagnosis. IRSD scores have been grouped into quintiles (1 – most disadvantaged, 5 – least disadvantaged).
VCR diagnosis date	The date of the pathology report or other investigative report where the diagnosis of cancer was first confirmed to the Victorian Cancer Registry.