CANCER DIAGNOSED in the

EMERGENCY DEPARTMENT of a REGIONAL HEALTH SERVICE

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ABSTRACT

Objective

Patients diagnosed with cancer in the Emergency Department (ED) have more advanced disease at diagnosis and poorer outcomes. High rates of initial presentation to ED suggest potential problems with access to care. The aim of this project was to interpret findings in regional/rural Victoria and explore implications for practice.

Design

Cross sectional study linking two independent datasets

Setting

Regional city of Geelong and surrounding rural areas in south-west Victoria

Participants

All newly diagnosed cancer patients in 2009

Main outcome measures

Number of cancer patients diagnosed in the ED

Results

One in five newly diagnosed cancer patients present to ED 6 months prior to cancer diagnosis. One in ten is diagnosed as a result of their ED visit. Patients presenting to ED were older, more often male and from disadvantaged areas. Symptoms on presentation included chest complaints, bowel obstruction, abdominal pain, anaemia and generalised

weakness. Cancer diagnosed in the ED is associated with advanced stage and shorter survival.

Conclusion

Reasons for presentation to ED would be multifactorial and include complex cases with coexisting symptoms making diagnosis difficult. The general public appear to have a low level of awareness of alternative primary care services or difficulty accessing such information. Some of the changes towards reducing the number of patients presenting to ED will include patient education.

Keywords:

Diagnosis, cancer, emergency department, symptoms, socio-economically disadvantaged

What this paper adds?

How many cancer patients are diagnosed by emergency admission in a population-based study in regional south-west Victoria.

What is already known on this subject?

International studies report 17% to 29% of cancer patients diagnosed in ED.

Limited Australian data.

BACKGROUND

Patients diagnosed with cancer in the Emergency Department have more advanced disease and poorer outcomes [1-8]. Initial diagnosis of cancer in the ED is not ideal and has been described as a health system failure. Presentation to the ED suggests problems with timeliness of referral for assessment and/or access to care.

Emergency Departments (ED) within Australia are supported by a triage nurse as the first contact point for patients. The nurse will ask for symptoms and perform routine checks and based upon initial consultation the patient will be placed in a triage category. Once admitted to the ED patients are first seen by a senior nurse and then a doctor. All presenting

to public health ED are treated irrespective of whether the patient is an Australian citizenship, permanent resident or a visitor. No health care card is required for treatment.

International studies report initial diagnosis in the ED for colorectal cancer patients as high as 29% in Taiwan[9], 17% in Sweden[1], 18% in United Kingdom[10,11] and 24% in Canada[3]. Sixty-three percent of patients had already visited their doctor with at least one symptom[10] and 69% undergone a colonoscopy [4]. In New Zealand 36% of lung cancer patients were diagnosed in the ED rather than by a respiratory specialist [8]. Studies of all cancers found 5-14% of patients are diagnosed in the ED [5,6] with patients living in remote areas more likely to present. Very few had medical insurance and many reported not having a regular general practitioner [5]. A study in British Columbia reported an ED cancer diagnosis rate of 43% and a predominantly older population responsible for such a high rate [4]. The ageing population in Australia has the potential to follow this trend.

Limited data has been presented within Australia. One in five presented directly to ED [12] in Western Australia and the study population included 30% from regional and remote areas. Symptoms were often not recorded in hospital records on presentation. Twelve percent of lung cancer patients in outer metropolitan Melbourne presented to ED at diagnosis[13]. The Bureau of Health Information and Cancer Institute in New South Wales produced a detailed report on ED presentations and the authors acknowledged that population-based studies in Australia on this topic are rare [14].

The Evaluation of Cancer Outcomes study is unique, capturing all newly diagnosed cancer cases across the south-west region of Victoria [15,16]. Linkage of this data source to ED records has allowed exploration of patient information for those presenting to ED resulting in cancer diagnosis. Within the greater Geelong region, historically there has been a single ED, allowing an accurate assessment of presentations. On average, around 190-200 people attend the University Hospital Geelong Emergency Department on any given day.

METHODS

Region

Geelong is Victoria's second largest city (60 suburbs) and is a major commercial and residential centre for the Barwon South-West Region (Figure 1). Geelong is a port city located on Corio Bay and the Barwon River. The City of Greater Geelong is the local

government area and the region covers 1,247 square kilometers with a population of 221,515 in 2013. Today, Geelong stands as an emerging health and education hub. However, the average household income for the region has been reported to be lower than the state average. The major public hospital is the University Hospital Geelong that has approximately 1,200 hospital beds and for the study period of 2009 there were 66,000 in patients treated. The ED sees over 47,000 patients a year. Private health services that support the region include Geelong Private and St John of God. Prior to 2013 the only ED servicing the region was at University Hospital Geelong.

Evaluation of Cancer Outcomes Study

The Evaluation of Cancer Outcomes (ECO) study is an initiative that was piloted in 2008 with its first complete year of data in 2009 [15-16]. ECO was the first regional data collection under the Victorian Cancer Outcomes Network project with the aim to extend population-based cancer data to include clinical and treatment information. The Barwon South Western region of Victoria was selected as the pilot region. The study was a collaborative project between the Department of Health (Victoria), the Cancer Council Victoria and the Barwon South Western Regional Integrated Cancer Service.

Data Collection – Evaluation of Cancer Outcomes

A nationally developed and agreed set of clinical cancer data items known as the Victorian Clinical Cancer Registration Dataset was collected. Data was manually and electronically collated from medical records, clinical notes and information systems for all new patients with cancer who presented to hospital for diagnosis or treatment. This included day case patients admitted for a diagnostic biopsy in the operating theatre or radiology department. It also included patients undergoing outpatient chemotherapy or radiotherapy through a hospital. Patients who had previously been diagnosed with cancer but presented in 2009 with recurrence were excluded from this report. Patients who normally reside outside the region were excluded, while residents who were diagnosed outside the region but then returned for treatment were included. Data was integrated into the Regional Aggregated Cancer E-Repository based at Barwon Health.

This article reports on data collected for the region in 2009, the first complete year of the ECO study. Primary tumours were recorded as head and neck, upper gastrointestinal,

colorectal, lung, skin, breast, gynaecological, genitourinary, central nervous system (CNS), thyroid and endocrine, unknown, haematological and other.

Data Collection – Emergency Department

The aim of this project was to link data for the cancer patients to ED admissions. In 2009 the only ED servicing the Greater Geelong region was in central Geelong. We reduced the ECO dataset for the entire Barwon South Western region to those residing within 50km of the Geelong ED (n = 1,307) as this group would be likely to present to the Geelong ED in an emergency situation. ED presentations were identified from an electronic audit of medical records from July 2008 to December 2009 allowing the number of presentations 6 months prior to diagnosis to be assessed for all patients. This study was approved by the Human Research and Ethics Committee of Barwon Health.

Statistical analysis

Patients whose ED visit prompted further investigation resulting in a clinical or histological diagnosis of malignancy were identified. The number of ED admissions was calculated for 6 months prior to the date of cancer diagnosis. Demographics of patients presenting to ED were compared to patients who had not visited ED, using a chi-square statistic and a two-sample t-test statistic. The Index of Relative Socio-Economic Advantage and Disadvantage (IRSAD) scale was linked to residential postcode to analyse any socio-economic association.

RESULTS

There were 1,307 newly diagnosed cancer patients, 59% were male, 73% born in Australia, 40% married and the average age was 67.4yr (SD 14.2yr). The primary tumours for the patients were grouped into 158 breast, 15 CNS, 193 colorectal, 356 genitourinary, 115 upper gastrointestinal, 42 gynaecological, 124 haematological, 40 head and neck, 122 lung, 13 other, 91 skin, 14 thyroid and endocrine and 24 where the primary was unknown.

One in five presented to ED 6 months prior to their cancer diagnosis (Table 1) and half of these patients were diagnosed with cancer as a result of their visit. Over 40 patients visited ED for each of the tumour streams of colorectal, genitourinary and lung cancers and relative proportions within tumour streams were over 30% for CNS, lung, unknown primary and upper gastrointestinal cancers. The number of repeat visits to ED were summarised and

over 50 visits occurred for colorectal, genitourinary, haematological, lung and upper GI patients. Tumours most likely to be diagnosed with cancer as a result of their ED visit included CNS, lung and unknown primary (Figure 2).

Patients presenting to ED included significantly more males (males 23.5% versus females 17.2%, $p<0.01$) and were older (ED presentation 70.5 $\pm$ 0.9 yr versus no ED presentation 66.6 $\pm$ 0.4 yr, $p<0.01$). Those not born in Australia (n=343) visited ED pre diagnosis at a higher rate (24.2%) compared to patients born in Australia (19.7%) (p=0.07). However, there was no difference in presentation rates for those born in a country where English was not the native language (n=185)(p=0.40). There was no association with marital status (p=0.19). According to the IRSAD socio-economic scale those residing in disadvantaged areas were more likely to visit ED prior to cancer diagnosis (disadvantaged 26.1%; middle group 23.7%; advantaged 18.4%, p = 0.02).

Symptoms on presentation to the ED for patients eventually diagnosed with colorectal cancer included bowel obstruction (n=11), anaemia (n=6), per-rectal bleeding (n=5) and pneumonia or chest pain/infection (n=5). Similarly, symptoms for patients later diagnosed with genitourinary cancer included abdominal pain or backache (n=9) and retention of urine (n=7). For haematological cancer patients, pneumonia or chest pain (n=9) and abdominal or back pain (n=4) was common. Lung cancer patients had symptoms including pneumonia or chest pain (n=12), respiratory distress or infection (n=9), pleural effusion (n=7) and abdominal or back pain (n=6); and for upper gastrointestinal cancer patients symptoms included abdominal or back pain (n=6) and pneumonia or chest pain (n=6).

Patients were divided into three groups: 1) ED visit leading to cancer diagnosis, 2) ED visit not leading to cancer diagnosis and 3) no ED visit. Patients in Group 1 had a shorter survival of 598 days (SE 58 days) compared to 1,119 days (SE 72 days) for Group 2 and 1,367 days (SE 21 days) for Group 3 ($p<0.01$)(Figure 3). Group 1 had a higher proportion with stage IV cancer at diagnosis (57.5%) compared to Group 2 (25.0%) and Group 3 (18.8%).

DISCUSSION

The total number of visits to ED 6 months prior to diagnosis was approximately 400. One in five newly diagnosed cancer patients present to ED prior to cancer diagnosis. One in ten is diagnosed as a result of their visit. Patients presenting were older, more often male and

from disadvantaged areas. Diagnoses on presentation included chest complaints, bowel obstruction, abdominal pain, anaemia and generalised weakness. Cancer diagnosed in the ED was often associated with advanced stage of cancer and shorter survival time.

Early diagnosis improves survival and therefore clear pathways to diagnosis are critical. A detailed report in the UK, using the national cancer data repository, found potential trails to diagnosis included screening programs, general practitioner referral, specialist referral, inpatient, ED presentation and diagnosis by death certificate [17]. For 49% of all cancers general practitioners were involved in the referral process and 23% were diagnosed in the ED [17]. Over 50% of acute leukaemia and brain and CNS cancers were diagnosed in the ED. The UK study reported both the elderly and the very young more likely to be diagnosed and similar to this current study, the more disadvantaged likely to present as an emergency. In both studies, diagnosis was associated with significantly reduced survival. The New South Wales public hospitals report on ED utilisation for 2006 to 2009 stated that 30% of people with cancer visited twelve months prior to cancer diagnosis[14]. For those with colorectal or respiratory cancer, 32% and 44%, respectively, visited the ED the year preceding diagnosis. The New South Wales study found symptoms related to circulatory, respiratory and digestive systems were common. In Western Australia, at a similar time period, one in five lung cancer patients (20%) presented directly to the ED [12] while this study reported 27%. Thirty percent of the Western Australian study population were from a remote or regional area. By contrast our current study is a regional/rural population suggestive that lower rates of presentation occur in metropolitan regions.

Simininski et al described why primary care patients in New South Wales elect to go to the ED rather than a general practitioner [18]. Patients' preference was for all tests to be performed at the same site and patients were concerned about the seriousness, urgency or complex nature of their symptoms. Older patients expressed that financial concerns were an important factor in their decision and also the timeliness of general practitioner appointments. Lowthian et al examined 10 year trends in total presentations to the ED for Melbourne with a 32% increase in presentations from 2000 to 2008 [19]. The authors expressed that the current models of care are not meeting the needs of the patients. The waiting times and the length of stay for chronic conditions are often long and yet presentation for the elderly was increased nearly 4 times that of younger age groups.

Reasons for presentation to ED would be multifactorial and include complex cases with coexisting symptoms making diagnosis difficult. ED presentation of cancer is associated with socio-economic disadvantaged areas, suggestive that some of the barriers to primary care are financial. ED presentations in metropolitan Melbourne have increased from 2000 to 2008 [19] and with the increasing ageing population a similar trend from 2008 to 2015 is likely. To predict a similar pattern for regional Victoria is not unreasonable. . While the numbers and percentages of our findings are substantial for cancer patients, unfortunately, these presentations are only a small percentage (< 2%) of the total number of patients who present to ED. Therefore any changes to the model of care probably need to occur outside of the ED. Some of the change towards reducing the number of patients presenting to ED will include patient education. The general public appear to have a low level of awareness of alternative primary care services after hours or difficulty accessing such information. Education is the key.

Table 1: Total number of newly diagnosed cancer patients in the region for 2009. Of these patients the number whose 1) ED visit led to cancer diagnosis and 2) ED visit not leading to cancer diagnosis.

Tumour Stream	Newly diagnosed cancer patients number	ED visit led to cancer diagnosis number (%)	ED visit not leading to cancer diagnosis number (%)	Total repeat visits
Breast	158	6 (3.8%)	3 (1.9%)	14
CNS	15	5 (33.3)	0	6
Colorectal	193	31 (16.1)	15 (7.8)	55
Genitourinary	356	23 (6.5)	42 (11.8)	91
Gynaecological	42	2 (4.8)	6 (14.3)	10

Haematological	124	21 (16.9)	13 (10.5)	50
Head and Neck	40	4 (10.0)	5 (12.5)	11
Lung	122	33 (27.1)	13 (10.7)	69
Other	13	0	1 (7.7)	1
Skin	91	1 (1.1)	3 (3.3)	8
Thyroid and Endocrine	14	0	1 (7.1)	1
Unknown Primary	24	7 (29.2)	1 (4.1)	16
Upper gastrointestinal	115	22 (19.1)	15 (13.0)	64
TOTAL	1,307	155 (11.9)	118 (9.0)	398

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Figure 1. Percentage of patients presenting to ED and, 1) ED visit led to cancer diagnosis and 2) visit not leading to cancer diagnosis.

Figure 2: Time to death for Group 1) ED visit led to cancer diagnosis, Group 2) ED visit did not lead to cancer diagnosis and Group 3) patients who did not present to ED prior to cancer diagnosis. All significantly different at $p < 0.001$.

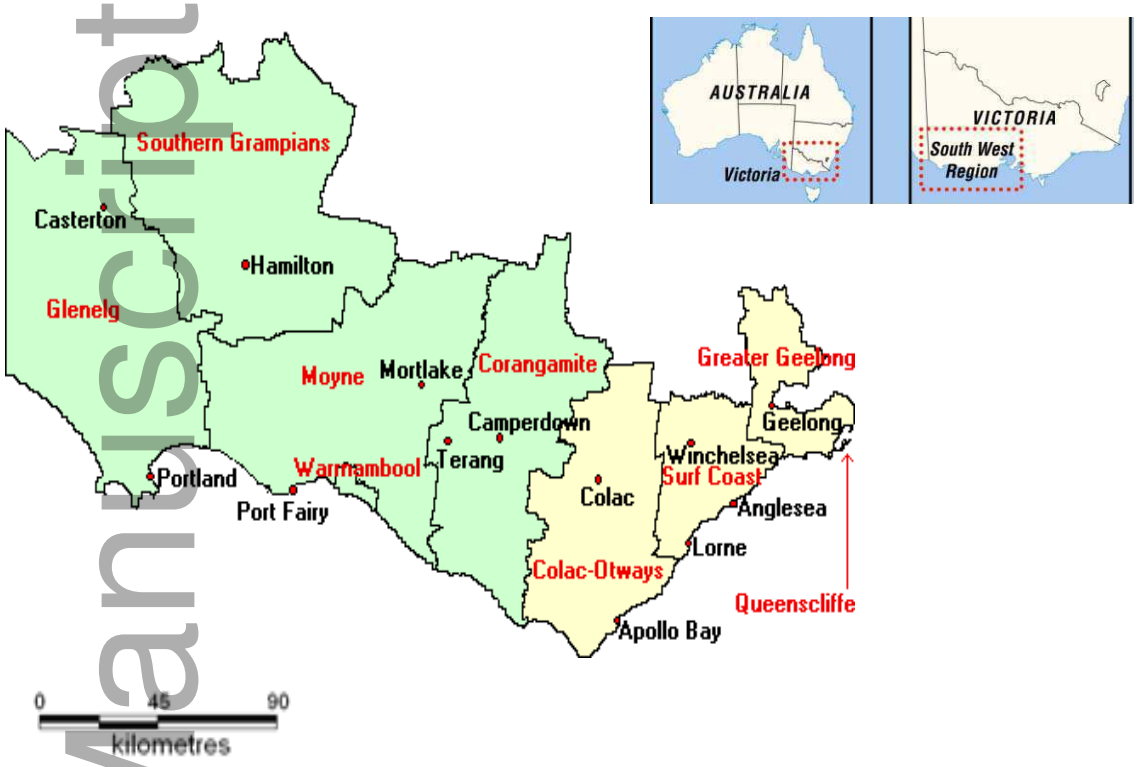
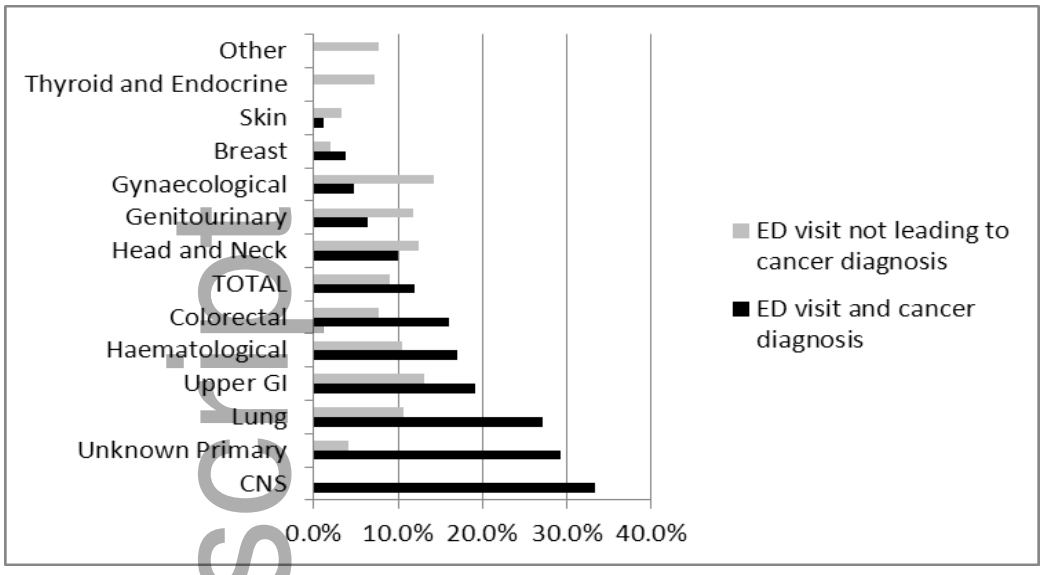
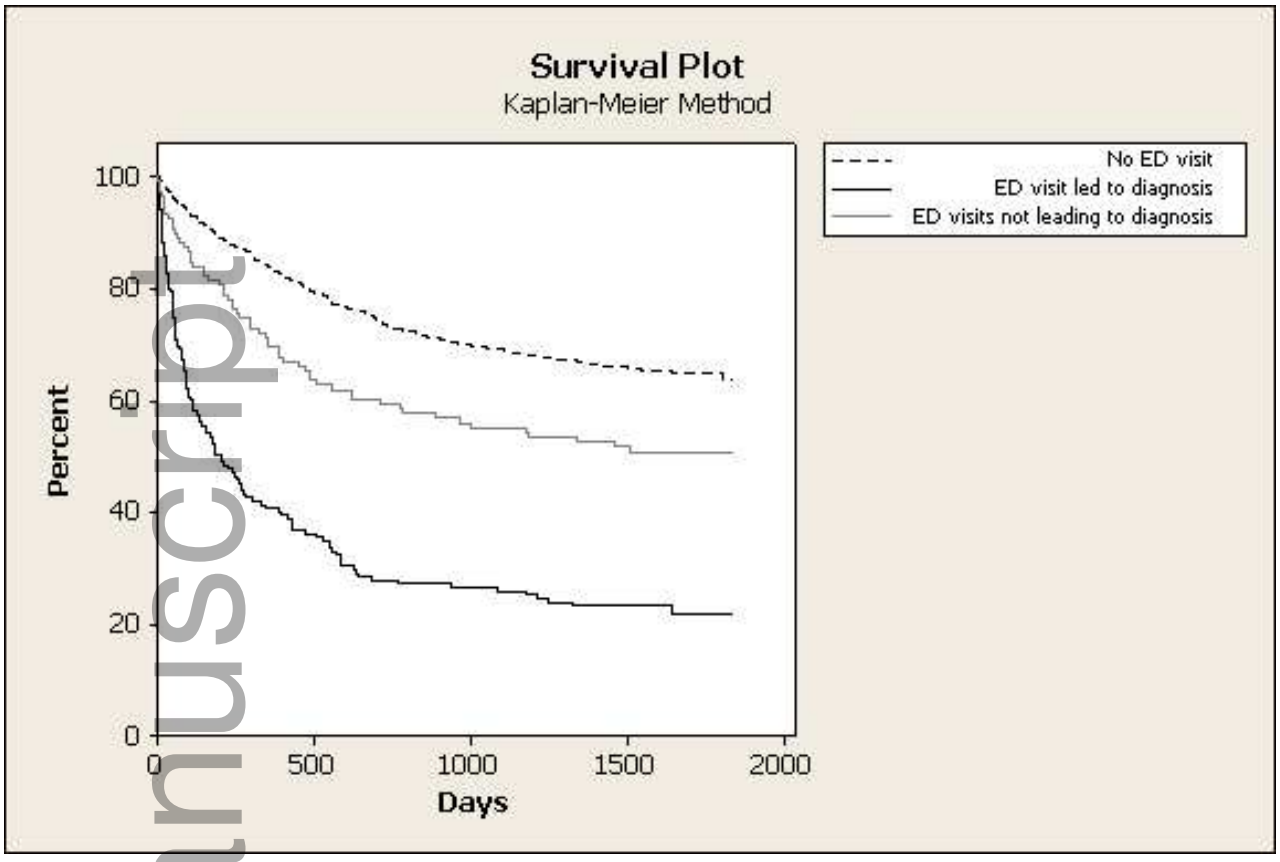


Figure 1:

Greater Geelong in the Barwon South Western Region, Victoria





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