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TITLE

How do general practitioners manage patients with cancer symptoms? A video-vignette study.

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ABSTRACT

Objectives: Determine how general practitioners (GPs) manage patients with cancer symptoms.

Design: GPs reviewed 24 video-vignettes and case-notes on patients with cancer symptoms and indicated whether they would refer the patient and/or prescribe medication, and/or undertake further investigation. According to available guidelines, all cases warranted a referral for urgent investigation.

Setting: Australian primary care sector.

Participants: 102 practicing GPs participated in this study, including trainees.

Interventions: The research was part of a larger RCT testing a *pro forma* intervention; however this paper reports on management decisions made throughout the study.

Primary and secondary outcome measures: This paper reports on how the participants would manage the patients depicted in each vignette.

Results In more than one-in-five cases, the patient was not investigated or referred. Patient management varied significantly by cancer type (p<.001). Participants were less likely to manage breast, bladder, endometrial, and lung cancers with a 'prescription only' or 'referral only' option. They were less likely to manage prostate cancer with a 'prescription only', yet more likely to manage it with a 'referral with investigation'. With regard to pancreatic and cervical cancers, participants were more likely to manage these with a 'referral only' or a 'referral with investigation', relative to the management of colorectal cancer. Compared with those who practiced in a major city, participants who practiced in a remote or very remote practice were significantly less likely to opt for a 'prescription only' or a 'referral only', but more likely to manage the patient with an 'investigation only'.

Conclusions: Some patients may receive a delayed cancer diagnosis, even when they present with typical cancer symptoms to a GP who can access relevant diagnostic tests.

Trial registration: Australia and New Zealand Clinical Trials Register (ACTRN12611000760976).

Strengths and limitations of this study:

- Many Western nations position GPs as the gatekeeper to specialist services, while enabling their access to diagnostic tests. This can be particularly helpful in cancer care.
- GPs were invited to review video-vignettes of patients with possible cancer symptoms and decide how they would manage these patients.
- There was limited evidence that appropriate tests would be ordered, and a significant proportion of high-risk cases were not immediately referred for further investigation or specialist opinion.
- The study design did not examine the reasons for the GP decisions.
- Some patients may receive a delayed cancer diagnosis, even when they present with typical cancer symptoms to a GP who can access relevant diagnostic tests.

INTRODUCTION

Australians who experience symptoms do not have direct access to specialists, but are required to consult a general practitioner (GP) or attend an emergency department (1). Akin to other health systems (2), the Australian health system positions GPs as the gatekeeper to specialist services (3).

In Australia, GPs can refer for a range of tests including ultrasounds and CT scans and, with specific indications, some MRI scans. In some Australian jurisdictions, GPs can also directly refer for gastroscopy and colonoscopy. This represents a greater range of tests relative to other health systems, like the United Kingdom (UK). (4).

GP access to diagnostic tests is particularly helpful in cancer care (5). It can optimise the timely receipt of appropriate treatment and as such reduce, if not avert the personal, social, and economic costs of cancer (6-8). Given the complexity of health systems, it can be difficult (if not impossible) to isolate definitive causal relationships between GP diagnostic tests and cancer outcomes (9, 10). However, given research by Shapley and colleagues (11), it is likely to help to identify those patients who require urgent care.

As part of a larger pre-post, randomised control trial of an interactive online referral *pro forma* (12), the study reported here investigated whether Australian GPs are likely to refer a patient with cancer symptoms to a specialist but also what alternative management may be proposed in these circumstances.

METHODS

Following clearance from the relevant ethics committee, the research team recruited GPs in seven Australian states and territories to participate in this study via email, newsletters, and personal contact. Recruitment was facilitated by primary care networks, university departments, research networks, and personal contacts. GPs were eligible to participate if they were currently in practice, including registrars (or vocational trainees), and had internet access. As such, the exact number of GPs who were aware of the project cannot be ascertained.

Participants were invited to consider the symptoms of patients presented as video-vignettes and to determine how they would manage the patient. This was conducted in two phases – before the participants were provided with an interactive referral *pro forma*, and afterwards. The *pro forma* aimed to improve the quantity and quality of patient information communicated between primary and secondary care clinicians. The focus of this paper however, is to determine how GPs respond to patients with different cancer symptoms, regardless of whether this was before or after using the *pro forma*.

Guided by the referral guidelines for suspected cancer of the National Institute for Health and Clinical Excellence (NIHCE) (13), 24 video-vignettes were developed by six GPs, four videos for each of six cancer types (see Table 1). These guidelines were selected as they indicate the need for specialist referral based on specific high-risk presentations; furthermore, at time of study, no equivalent Australia-wide guidelines were available for all cancer types. The video-vignettes comprised a four-minute video monologue delivered by an actor-patient accompanied by case-notes containing the patient's medical history, current medication, allergies, and previous consultations. The video included an off-camera commentary by an actor-doctor describing clinical signs to be found at this visit.

After accessing a secured research website, participants: provided demographic information; received the case-notes of each patient; viewed the video-vignette of the consultation once; and received examination findings. Participants then chose to: (1) prescribe medication; (2) order diagnostic tests; and/or (3) refer the patient to a specialist. Participants documented the prescription, the test, and/or the referral as they would when consulting a *bona fide* patient. Each participant viewed and managed 24 video-vignettes.

Participants were recompensed for their participation and could claim continuing medical education points. Progress through the video-vignettes could be tracked online and reminders were issued to those who had not completed the study after two weeks of inactivity.

Table 1: Cancer Cases

Cancer type	Case details
1. Bladder	76 year old female patient with asymptomatic frank haematuria
2. Breast	35 year old with asymptomatic, firm breast lump and skin dimpling
3. Breast	69 year old with skin changes consistent with Paget's disease of the breast
4. Cervical	34 year old with CIN 2
5. Colorectal	60 year old with unexplained iron deficiency anaemia, abdominal pain and right iliac fossa abdominal mass
6. Endometrial	65 year old with postmenopausal bleeding (PMB)
7. Lung	58 year old lifelong smoker with haemoptysis, breathlessness and weight loss
8. Oesophageal	66 year old with 10kg weight loss and dysphagia for solids
9. Pancreatic	57 year old with 5kg weight loss, jaundice, generalised pruritis and pancreatic mass on abdominal ultrasound scan
10. Prostate	55 year old with PSA of 22, urinary frequency, haematuria, hesitancy and terminal dribbling
11. Lung	49 year old smoker with cervical lymphadenopathy, haemoptysis and 2cm mass on chest x-ray
12. Colorectal	65 year old with rectal bleeding, diarrhoea, fatigue and rectal mass
13. Bladder	65 year old male patient with frank asymptomatic haematuria
14. Breast	38 year old with three-month history of breast lump, dimpling of skin and axillary lymphadenopathy
15. Breast	71 year old with breast lump and *peau d'orange*
16. Cervical	36 year old with CIN 2 and post-coital bleeding
17. Colorectal	62 year old male with two-month history of constipation, abdominal pain, hepatomegaly and iron deficiency anaemia
18. Endometrial	62 year old with several episodes of postmenopausal bleeding
19. Lung	60 year old female with cough, dyspnoea, weight loss, hoarseness, pleural effusion and clubbing
20. Lung	61 year old male with cough, suspicious lesion on chest x-ray and haemoptysis
21. Oesophageal	69 year old male with dysphagia for solids, weight loss, dyspepsia and fatigue
22. Pancreatic	60 year old male with abdominal pain, chronic pancreatitis, weight loss, jaundice and pancreatic mass on abdominal ultra sound scan
23. Prostate	70 year old abnormal digital rectal examination findings, PSA of 25, chronic retention, prostatism and low back pain
24. Colorectal	63 year old female with altered bowel habit, iron deficiency anaemia, abdominal pain, weight loss and rectal bleeding

Statistical Analysis

Descriptive statistics (number and percentage) were used to report participants' management of each scenario, pre- and post-intervention. A multinominal logistic model was used to assess the influence of demographic information and speciality on the ways the participants chose to manage the patient, with particular reference to: 'prescription only', 'investigation(s) only', 'referral only', and 'referral with investigation(s)'. 'Investigation only' was considered the base outcome, and the relative risk ratio of 'prescription only', 'referral only', and 'referral and investigation' are reported. User-defined parsimonious models were constructed in a backward elimination fashion from the full model. The full model included: (1) participants' demographic data – notably, age, gender, country of graduation, number of years since graduation, years of GP experience, Fellowship of the Royal Australian college of General Practitioners (FRACGP), clinic remoteness (4 categories: major cities,

inner regional, outer regional, and remote/very remote), role within their primary practice, patients consulted per week (3 categories: <100, 100-149, ≥150), direct patient care hours per week (4 categories: <11, 11-20, 21-40, ≥41), non-English consultation (no and yes), number of GPs within their primary practice, and number of patient sessions per week; and (2) cancer type. Only variables with $p<.05$ were retained in the final model. The categories of some variables were regrouped as noted, before they were entered into the model, due to their small number. In the regression, pre- and post- intervention data were pooled according to cancer types. Given the lack of independence between participant responses, regression models were adjusted by estimating the cluster effect using the 'vce' option within Stata. *P* values of less than .05 were considered statistically significant. Stata MP 13.1 (StataCorp, Taxes, USA) was used to perform the analysis.

RESULTS

Between August 2011 and August 2012 (inclusive), 102 GPs were recruited. Participants were mainly from Western Australia (46%) and Victoria (25%), with a mean age of 43 years (see Table 2). On average, the participants had 13 years of GP experience – however, 24% were trainees. Most participants primarily practiced in a capital city or another metropolitan area.

Table 2: Participant Demographics (*n*=102)

	Participants		National Comparison
	Mean	**SD**	
Age (yrs)	43	11.8	50.5[a]
Years after graduation	19	11.3	
Years as GP	13	11.1	
GPs in primary practice	8	4.1	
GP sessions/week	6	3.0	
	№	**%**	
Male	58	56.9	60.9%[b]
Graduated in Australia	73	71.6	65.9%[b]
GP registrar	24	23.5	3.8%[c]
FRACGP	58	56.9	56.8[e]
Accredited practice	101	99.0	88.6[e]
Position			
Principal	21	20.6	
Non-principal	63	61.8	
Other	18	17.6	
State			
New South Wales	13	12.7	33.1%[b]
Queensland	7	6.8	19.5%[b]
Victoria	25	24.5	25.1%[b]
South Australia	7	6.9	8.4%[b]
Tasmania	1	1.0	2.6%[b]
Western Australia	47	46.1	9.1%[b]
Australian Capital Territory	2	2.0	1.5%[b]
Region of primary practice			
Capital city	49	48.0	66.3[e]
Other metropolitan area	38	37.3	7.6[e]
Large rural area	5	4.9	6.7[e]
Small rural area	6	5.9	7.1[e]
Other rural area	3	2.9	10.6[e]
Remote centre	1	1.0	0.6[e]
Remoteness of the region			
Major city	73	71.6	71.5%[b]

	Participants		National Comparison
Inner regional area	15	14.7	18.9%[b]
Outer regional area	10	9.8	7.8%[b]
Remote area	3	2.9	1.2%[b]
Very remote area	1	1.0	0.6%[b]
Patients consulted/week			
<100	49	48.0	
100-149	30	29.4	
150-199	20	19.6	
>199	3	3.0	
Direct patient care hours/week			
<11	11	10.8	1.2%[e]
11-20	21	20.6	12.2%[e]
21-40	47	46.1	53%[e]
41-60	20	19.6	32.1%[e]
>60	3	2.9	1.4%[e]
Non-English patient consultations			
0%	84	82.3	72.6%[e]
<25%	17	16.7	21.7%[e]
25-50%	0	0	2.9%[e]
>50%	1	1.0	2.8%[e]

[a] *Sourced from Britt and colleagues (14) and the Australian Institute of Health and Welfare (15)*
[b] *Sourced from Britt and colleagues (14)*
[c] *Sourced from General Practice Education and Training Limited (16)*
[d] *Sourced from the Primary Health Care Research & Information Service (17)*
[e] *Compared to GPs involved in Britt and colleagues (14)*

Patient management varied by cancer case. Before the intervention, relatively few participants managed the patient with a 'prescription only' (range=1.0-10.8%, mean=2.8%, see Table 3). After the intervention, more chose to manage the patient with a 'prescription' (9.8-32.6%, mean=21.5%) or an 'investigation only' (range=25.0-71.7%, mean=43.5%). Regression results suggest clinic remoteness was the only demographic factor significantly associated with the management of the patients (p<.001 of overall Wald test after regression).

Table 3: GP Management Decisions[a]

Cancer	Prescription Only		Investigation(s) Only		Referral Only		Referred with Investigation(s)	
Pre Intervention (n=102)	№	%	№	%	№	%	№	%
1. Bladder	1	1.0	58	56.9	16	15.7	27	26.5
2. Breast	3	2.9	71	69.6	15	14.7	13	12.7
3. Breast	11	10.8	53	52.0	16	15.7	22	21.6
4. Cervical	4	3.9	3	2.9	72	70.6	23	22.5
5. Colorectal	2	2.0	19	18.6	66	64.7	15	14.7
6. Endometrial	3	2.9	39	38.2	33	32.4	27	26.5
7. Lung	1	1.0	58	56.9	12	11.8	31	30.4
8. Oesophageal	1	1.0	23	22.5	49	48.0	29	28.4
9. Pancreatic	2	2.0	11	10.8	55	53.9	34	33.3
10. Prostate	1	1.0	13	12.7	65	63.7	23	22.5
Total	29	2.8	348	34.1	399	39.1	244	23.9
Post Intervention (n=92)								
11. Lung	25	27.2	38	41.3	18	19.6	11	12.0

Cancer	Prescription Only		Investigation(s) Only		Referral Only		Referred with Investigation(s)	
12. Colorectal	35	38.0	20	21.7	30	32.6	7	7.6
13. Bladder	15	16.3	54	58.7	9	9.8	14	15.2
14. Breast	13	14.1	56	60.9	8	8.7	15	16.3
15. Breast	14	15.2	57	62.0	9	9.8	12	13.0
16. Cervical	20	21.7	33	35.9	19	20.7	20	21.7
17. Colorectal	21	22.8	34	37.0	21	22.8	16	17.4
18. Endometrial	15	16.3	46	50.0	12	13.0	19	20.7
19. Lung	9	9.8	66	71.7	5	5.4	12	13.0
20. Lung	18	19.6	42	45.7	15	16.3	17	18.5
21. Oesophageal	26	28.3	29	31.5	18	19.6	19	20.7
22. Pancreatic	30	32.6	23	25.0	29	31.5	10	10.9
23. Prostate	14	15.2	36	39.1	16	17.4	26	28.3
24. Colorectal	22	23.9	26	28.3	22	23.9	22	23.9
Total	277	21.5	560	43.5	231	17.9	220	17.1

[a] *Percentages may not total 100% due to rounding*

Patient management also varied significantly by cancer type (p<.001 of overall Wald test, see Table 4). Compared to the management of colorectal cancer symptoms participants were less likely to manage breast, bladder, endometrial, and lung cancer symptoms with a 'prescription' or 'referral only'. They were less likely to manage prostate cancer with a 'prescription only', yet more likely to manage it with a 'referral with investigation'. With regard to pancreatic and cervical cancers, participants were more likely to manage these with a 'referral only' or a 'referral with investigation', relative to the management of colorectal cancer. Compared with those who practiced in a major city, participants who practiced in a remote or very remote practice were significantly less likely to opt for a 'prescription' or a 'referral only', yet more likely to manage the patient with an 'investigation only' (see Table 4). The investigations and treatment options suggested are presented in Table 5.

Table 4: Factors associated with GP Cancer Management (n=2308)

Video	rrr [95% CI] Prescription Only vs. Investigation(s) Only		rrr [95% CI] Referral Only vs. Investigation(s) Only		rrr [95% CI] Referral with Investigation(s) vs. Investigation(s) Only	
Cancer (colorectal, rrr=1)						
Breast	0.21	[0.14,0.32][c]	0.14	[0.09,0.22][c]	0.42	[0.28,0.65][c]
Bladder	0.17	[0.10,0.30][c]	0.16	[0.09,0.27][c]	0.60	[0.37,0.95][a]
Endometrial	0.26	[0.15,0.46][c]	0.37	[0.23,0.60][c]	0.88	[0.57,1.36]
Prostate	0.38	[0.20,0.73][b]	1.18	[0.82,1.71]	1.65	[1.05,2.60][a]
Pancreatic	1.17	[0.68,2.02]	1.78	[1.10,2.86][a]	2.15	[1.30,3.56][b]
Cervical	0.83	[0.51,1.36]	1.82	[1.30,2.54][c]	1.98	[1.30,3.02][c]
Lung	0.32	[0.21,0.46][c]	0.17	[0.11,0.26][c]	0.57	[0.39,0.83][b]
Oesophageal	0.64	[0.42,0.99][a]	0.92	[0.63,1.34]	1.52	[1.01,2.29][a]
Clinic remoteness (major city, rrr=1)						
Inner regional	0.84	[0.44,1.62]	0.46	[0.29,0.73][c]	0.82	[0.38,1.75]
Outer regional	0.57	[0.17,1.95]	1.13	[0.50,2.51]	1.15	[0.50,2.64]
Remote/very remote	0.05	[0.01,0.25][c]	0.42	[0.26,0.67][c]	0.41	[0.09,1.83]

[a] p<.05; [b] p<.01; [c] p<.001 Results are relative risk ratios (rrr) for the participant groups whose management were 'prescription only', 'referral only', or 'referral with investigation' compared to those who selected 'investigations only' (rrr=1). Results were derived from one multinomial logistic regression with the adjustment of clustering effect due to assessment of different cancers made by the same participant

Table 5: Investigations Requested and Prescriptions per Cancer Type

Cancer Type	Investigations	Prescriptions Ordered
Breast	Mammogram, fine-needle biopsy, full-blood count, renal function test, liver function test, ultrasound scan	Antifungals, antibiotic tablets or creams, steroid creams, antihistamines
Lung	CT scan/chest x-ray, ultrasound scan, fine-needle aspiration, bronchoscopy, spirometry, lung biopsy, full-blood count, renal function test, liver function test , coagulation studies, ferritin, sputum microscopy and culture/cytology, Mantoux test.	Steroid tablets, antibiotics, diuretics, codeine, steroid inhalers, beta agonist inhalers
Prostate	Urine microscopy and culture, urine cytology, PSA, CT, ultrasound scan, full-blood count, renal function, liver function test, x-ray	Opiates, paracetamol, nonsteroidal anti-inflammatory tablets, alpha blockers, 5-alpha reductase enzyme inhibitors
Bladder	Urine microscopy and culture, urine cytology, PSA, CT, ultrasound scan, full-blood count, renal function, liver function test, intravenous pyelogram	Nil
Colorectal	Colonoscopy/gastroscopy, CT/ultrasound scan, stool culture and sensitivity, cytology, faecal occult blood test, full-blood count, renal function test, liver function test, erythrocyte sedimentation rate, iron studies, lipase, calcium, magnesium, phosphate	Paracetamol, iron supplements, iron injections, laxatives, antispasmodics, vitamin C, opiates
Pancreatic	Full-blood count, renal function test, liver function test, blood glucose, coagulation profile, amylase, lipase, bilirubin, CT, ultrasound scan/bone scan	Paracetamol, codeine, opiates, cholestyramine, vitamin B12, proton pump inhibitors
Oesophageal	Barium swallow/chest x-ray, CT/ultrasound scan, gastroscopy, full-blood count, renal function test, liver function test, iron studies, coagulation studies, urea breath test/H pylori serology.	Anti-emetics, food supplements, proton pump inhibitors

Cancer Type	Investigations	Prescriptions Ordered
Cervical	Vaginal swab MCS/pap smear, human papilloma virus cytology, urine culture and sensitivity, chlamydia, gonorrhoea PCR, human immune deficiency virology, hepatitis B, hepatitis C, syphilis serology, VDRL, full-blood count, renal function test, liver function test, ferritin, ultrasound scan/CT, colposcopy/endoscopy	Nil
Endometrial	US pelvic/vaginal, full-blood count, renal function test, liver function test, iron studies, coagulation studies, pap smear/swab, urine culture and sensitivity, x-ray, CT, hysteroscopy	Oestrogen replacement vaginal pessaries

DISCUSSION

Findings

According to the NIHCE guidelines, all cases in this study warranted a specialist review within two weeks (13). The research results suggest that in more than one-in-five cases, the patient was not investigated or referred, despite symptoms that were highly suggestive of cancer. In some cases, the indication for the drugs prescribed as per Table 5 was unclear and in the case of endometrial cancer, the prescription of oestrogen replacement therapy may have actually advanced cancer progression (18).

Compared to cases presenting with colorectal symptoms participants were more likely to refer a patient presenting with symptoms of pancreatic, prostate, or cervical cancer, with or without further investigation. These cases included relatively more objective signs of pathology sourced from a laboratory and/or radiological report. This suggests that, despite the UK guidelines, these participants may have been reticent to refer patients without further investigation – this was particularly the case for breast, bladder, endometrial, and lung cancers where the patient presented with signs and symptoms, without confirmatory laboratory tests. Notably, in the case of lung cancer, a suspicious lesion on a chest x-ray did not appear to warrant immediate referral in most cases.

The participants appeared to have different views on how to manage patients with cancer symptoms – and the reason for these opinions could not be gleaned (e.g., x-ray for endometrial cancer). This might suggest the participants collectively recognised both the advantages and disadvantages associated with further investigation. The former may include the efficient use of limited diagnostic and subsequent specialist services. This may be particularly advantageous for patients who do not reside in close proximity to specialist services. This was suggested by the study results, as participants who practiced in rural and remote locations were more likely to request further investigation prior to referral; yet research suggests cancer outcomes in these locations are worse than in metropolitan areas (19). The disadvantages associated with locally conducted investigation may include the financial cost to the patient, as well as delayed specialist advice and care (20).

Strengths and weaknesses of the study

A key strength of this study is consistency in both the cases reviewed by the participants and the way they reviewed the cases. Furthermore, participants were unaware of the case content before commencing the study. As such, participants did not simply include GPs with a particular interest in cancer care.

However, the study is limited in three ways. First, it did not enable interaction between the participant and the patient, or the participant and the specialist. Such communication is likely to promote effective patient care. Second, data were not collected on review plans to better understand the participants' perspectives on the case. This may be particularly relevant for the option, 'investigation only', where a subsequent review may help to confirm a diagnosis and lead to referral. Third, as the participants differed from GPs who practice in Australia, the generalisability of the findings is limited. Despite these limitations, the results from this study reveal an important need to examine how patient outcomes are affected by the ways that GPs respond to patients' cancer symptoms.

Comparison with other literature

Although the findings from this study may cause concern, the study is limited by the use of video-vignettes, which prevented participants from interacting with the patient or their families. Such interactions may increase the prospect of referral (21). Research also suggests that a cancer diagnosis can be missed where there are: atypical presentations, non-specific presentations, very low prevalence rates, co-morbidities, and/or perceptual features (22). All cases in this study were typical and devoid of distracting features. Furthermore, participants were more inclined to manage the patient with investigations or a referral when using the interactive referral *pro forma*. As the *pro forma* required detailed patient information, participants may have been prompted to request additional evidence – like that of a pathology report – before referring the patient to a specialist. The risk in this case is of false negative investigation findings.

Implications for clinicians and policymakers

Results from this study suggest that some patients may receive a delayed cancer diagnosis, even when they present with typical cancer symptoms to a GP who can access relevant diagnostic tests. There was limited evidence that appropriate tests would be ordered, and a significant proportion of cases were not immediately referred for further investigation or specialist opinion. Therefore, better cancer outcomes may not be solely explained by GP access to investigations – but rather, to other factors that were beyond the scope of this study. These may include expedient access to specialists via the private healthcare sector or different systems of care.

Future directions

Research is required to understand how GPs filter and use clinical information to determine the management of patients who present with cancer symptoms. Research is also required to identify efficient and effective referral pathways for these patients are they traverse the health system and progress along the care continuum.

CONCLUSION

Patients may receive a delayed cancer diagnosis, even when they present with typical cancer symptoms to a GP who can access relevant diagnostic tests. Although this may be partly improved through improved access to diagnostic tests, there are likely to be additional elements that influence the ways in which potential cancer symptoms are identified and managed within the context of primary care.

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Competing interests: Nil

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Data sharing statement: Technical appendix, statistical code, and dataset available from the Dryad repository, DOI: [include DOI for dataset here]. (TBA)

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TITLE

How do general practitioners manage patients with cancer symptoms? A video-vignette study.

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ABSTRACT

Objectives: Determine how general practitioners (GPs) manage patients with cancer symptoms.

Design: GPs reviewed 24 video-vignettes and case-notes on patients with cancer symptoms and indicated whether they would refer the patient and/or prescribe medication, and/or undertake further investigation. According to available guidelines, all cases warranted a referral to a specialist or further investigations.

Setting: Australian primary care sector.

Participants: 102 practicing GPs participated in this study, including trainees.

Interventions: The research was part of a larger RCT testing a referral *pro forma*; however this paper reports on management decisions made throughout the study.

Primary and secondary outcome measures: This paper reports on how the participants would manage the patients depicted in each vignette.

Results In more than one-in-five cases, the patient was not investigated or referred. Patient management varied significantly by cancer type (p<.001). For two key reasons, colorectal cancer was the chosen referent category. First, it represents a prevalent type of cancer. Second, in this study, colorectal cancer symptoms were managed in a similar proportion of option – that is, prescription, referral, or investigation. Compared with colorectal cancer participants were less likely to manage breast, bladder, endometrial, and lung cancers with a 'prescription only' or 'referral only' option. They were less likely to manage prostate cancer with a 'prescription only', yet more likely to manage it with a 'referral with investigation'. With regard to pancreatic and cervical cancers, participants were more likely to manage these with a 'referral only' or a 'referral with investigation'.

Conclusions: Some patients may receive a delayed cancer diagnosis, even when they present with typical cancer symptoms to a GP who can access relevant diagnostic tests.

Trial registration: Australia and New Zealand Clinical Trials Register (ACTRN12611000760976).

Strengths and limitations of this study:

- Many Western nations position GPs as the gatekeeper to specialist services, while enabling their access to diagnostic tests. This can be particularly helpful in cancer care.
- GPs were invited to review video-vignettes of patients with possible cancer symptoms and decide how they would manage these patients.
- There was limited evidence that appropriate tests would be ordered, and a significant proportion of high-risk cases were not immediately referred for further investigation or specialist opinion.
- The study design did not examine the reasons for the GP decisions.
- Some patients may receive a delayed cancer diagnosis, even when they present with typical cancer symptoms to a GP who can access relevant diagnostic tests.

INTRODUCTION

Australians who experience symptoms do not have direct access to specialists, but are required to consult a general practitioner (GP) or attend an emergency department (1). Akin to other health systems (2), the Australian health system positions GPs as the gatekeeper to specialist services (3).

In Australia, GPs can refer for a range of tests including ultrasounds and CT scans and, with specific indications, some MRI scans. In some Australian jurisdictions, GPs can also directly refer for gastroscopy and colonoscopy. This represents a greater range of tests relative to other health systems, like the United Kingdom (UK). (4).

GP access to diagnostic tests is particularly helpful in cancer care (5). It can optimise the timely receipt of appropriate treatment and as such reduce, if not avert the personal, social, and economic costs of cancer (6-8). Given the complexity of health systems, it can be difficult (if not impossible) to isolate definitive causal relationships between GP diagnostic tests and cancer outcomes (9, 10). However, GP access to diagnostic tests is likely to help to identify those patients who require urgent care (11).

As part of a larger pre-post, randomised control trial of an interactive online referral *pro forma* (12), the review of data reported here focused on how Australian GPs manage patients with cancer symptoms. The intervention tested in the original trial did not aim to guide GP referral, investigation, or prescribing practices – as such, its focus is not germane to the focus of this review, which encompasses data from both phases (12).

METHODS

Following clearance from the relevant ethics committee, the research team recruited GPs in seven Australian states and territories to participate in this study via email, newsletters, and personal contact. Recruitment was facilitated by primary care networks, university departments, research networks, and personal contacts. GPs were eligible to participate if they were currently in practice, including registrars (or vocational trainees), and had internet access. As such, the exact number of GPs who were aware of the project cannot be ascertained.

Participants were invited to consider the symptoms of patients presented as video-vignettes and to determine how they would manage the patient. This was conducted in two phases – before the participants were provided with an interactive referral *pro forma*, and afterwards. The *pro forma* aimed to improve the quantity and quality of patient information communicated between primary and secondary care clinicians. The focus of this paper however, is to determine how GPs respond to patients with different cancer symptoms, regardless of whether this was before or after using the *pro forma*.

Guided by the referral guidelines for suspected cancer of the National Institute for Health and Clinical Excellence (NICE) (13), 24 video-vignettes were developed by six GPs, four videos for each of six cancer types (see Table 1). These guidelines were selected as they indicate the need for specialist referral based on specific high-risk presentations; furthermore, at time of study, no equivalent Australia-wide guidelines were available for all cancer types. The video-vignettes comprised a four-minute video monologue delivered by an actor-patient accompanied by case-notes containing the patient's medical history, current medication, allergies, and previous consultations. The video included an off-camera commentary by an actor-doctor describing clinical signs to be found at this visit.

After accessing a secured research website, participants: provided demographic information; received the case-notes of each patient; viewed the video-vignette of the consultation once; and received examination findings. Participants then chose to: (1) prescribe medication; (2) order diagnostic tests; and/or (3) refer the patient to a specialist. Participants documented the

prescription, the test, and/or the referral as they would when consulting a *bona fide* patient. Each participant viewed and managed 24 video-vignettes.

Participants were recompensed for their participation and could claim continuing medical education points. Progress through the video-vignettes could be tracked online and reminders were issued to those who had not completed the study after two weeks of inactivity.

Table 1: Cancer Cases

	Cancer type	Case details
1.	Bladder	76 year old female patient with asymptomatic frank haematuria
2.	Breast	35 year old with asymptomatic, firm breast lump and skin dimpling
3.	Breast	69 year old with skin changes consistent with Paget's disease of the breast
4.	Cervical	34 year old with CIN 2
5.	Colorectal	60 year old with unexplained iron deficiency anaemia, abdominal pain and right iliac fossa abdominal mass
6.	Endometrial	65 year old with postmenopausal bleeding (PMB)
7.	Lung	58 year old lifelong smoker with haemoptysis, breathlessness and weight loss
8.	Oesophageal	66 year old with 10kg weight loss and dysphagia for solids
9.	Pancreatic	57 year old with 5kg weight loss, jaundice, generalised pruritis and pancreatic mass on abdominal ultrasound scan
10.	Prostate	55 year old with PSA of 22, urinary frequency, haematuria, hesitancy and terminal dribbling
11.	Lung	49 year old smoker with cervical lymphadenopathy, haemoptysis and 2cm mass on chest x-ray
12.	Colorectal	65 year old with rectal bleeding, diarrhoea, fatigue and rectal mass
13.	Bladder	65 year old male patient with frank asymptomatic haematuria
14.	Breast	38 year old with three-month history of breast lump, dimpling of skin and axillary lymphadenopathy
15.	Breast	71 year old with breast lump and *peau d'orange*
16.	Cervical	36 year old with CIN 2 and post-coital bleeding
17.	Colorectal	62 year old male with two-month history of constipation, abdominal pain, hepatomegaly and iron deficiency anaemia
18.	Endometrial	62 year old with several episodes of postmenopausal bleeding
19.	Lung	60 year old female with cough, dyspnoea, weight loss, hoarseness, pleural effusion and clubbing
20.	Lung	61 year old male with cough, suspicious lesion on chest x-ray and haemoptysis
21.	Oesophageal	69 year old male with dysphagia for solids, weight loss, dyspepsia and fatigue
22.	Pancreatic	60 year old male with abdominal pain, chronic pancreatitis, weight loss, jaundice and pancreatic mass on abdominal ultra sound scan
23.	Prostate	70 year old abnormal digital rectal examination findings, PSA of 25, chronic retention, prostatism and low back pain
24.	Colorectal	63 year old female with altered bowel habit, iron deficiency anaemia, abdominal pain, weight loss and rectal bleeding

Statistical Analysis

Descriptive statistics (number and percentage) were used to report participants' management of each scenario, pre- and post-intervention. A multinominal logistic model was used to assess the influence of demographic information and speciality on the ways the participants chose to manage the patient, with particular reference to: 'prescription only', 'investigation(s) only', 'referral only', and 'referral with investigation(s)'. 'Investigation only' was selected as the base outcome, and the relative risk ratio of 'prescription only', 'referral only', and 'referral and investigation' are reported. User-defined parsimonious models were constructed in a backward elimination fashion from the full

model. The full model included: (1) participants' demographic data – notably, age, gender, country of graduation, number of years since graduation, years of GP experience, Fellowship of the Royal Australian college of General Practitioners (FRACGP), clinic remoteness (4 categories: major cities, inner regional, outer regional, and remote/very remote), role within their primary practice, patients consulted per week (3 categories: <100, 100-149, ≥150), direct patient care hours per week (4 categories: <11, 11-20, 21-40, ≥41), non-English consultation (no and yes), number of GPs within their primary practice, and number of patient sessions per week; and (2) cancer type. Only variables with $p<.05$ were retained in the final model. The categories of some variables were regrouped as noted, before they were entered into the model, due to their small number. In the regression, pre- and post- intervention data were pooled according to cancer types. Given the lack of independence between participant responses, regression models were adjusted by estimating the cluster effect using the 'vce' option within Stata. *P* values of less than .05 were considered statistically significant. Stata MP 13.1 (StataCorp, Taxes, USA) was used to perform the analysis.

RESULTS

Between August 2011 and August 2012 (inclusive), 102 GPs were recruited. Participants were mainly from Western Australia (46%) and Victoria (25%), with a mean age of 43 years (see Table 2). On average, the participants had 13 years of GP experience – however, 24% were trainees. Most participants primarily practiced in a capital city or another metropolitan area.

Table 2: Participant Demographics (*n*=102)

	Participants		National Comparison
	Mean	**SD**	
Age (yrs)	43	11.8	50.5[a]
Years after graduation	19	11.3	
Years as GP	13	11.1	
GPs in primary practice	8	4.1	
GP sessions/week	6	3.0	
	№	**%**	
Male	58	56.9	60.9%[b]
Graduated in Australia	73	71.6	65.9%[b]
GP registrar	24	23.5	3.8%[c]
FRACGP	58	56.9	56.8[e]
Accredited practice	101	99.0	88.6[e]
Position			
Principal	21	20.6	
Non-principal	63	61.8	
Other	18	17.6	
State			
New South Wales	13	12.7	33.1%[b]
Queensland	7	6.8	19.5%[b]
Victoria	25	24.5	25.1%[b]
South Australia	7	6.9	8.4%[b]
Tasmania	1	1.0	2.6%[b]
Western Australia	47	46.1	9.1%[b]
Australian Capital Territory	2	2.0	1.5%[b]
Region of primary practice			
Capital city	49	48.0	66.3%[e]
Other metropolitan area	38	37.3	7.6%[e]
Large rural area	5	4.9	6.7%[e]
Small rural area	6	5.9	7.1%[e]

	Participants		National Comparison
Other rural area	3	2.9	10.6%[e]
Remote centre	1	1.0	0.6%[e]
Remoteness of the region			
Major city	73	71.6	71.5%[b]
Inner regional area	15	14.7	18.9%[b]
Outer regional area	10	9.8	7.8%[b]
Remote area	3	2.9	1.2%[b]
Very remote area	1	1.0	0.6%[b]
Patients consulted/week			
<100	49	48.0	
100-149	30	29.4	
150-199	20	19.6	
>199	3	3.0	
Direct patient care hours/week			
<11	11	10.8	1.2%[e]
11-20	21	20.6	12.2%[e]
21-40	47	46.1	53%[e]
41-60	20	19.6	32.1%[e]
>60	3	2.9	1.4%[e]
Non-English patient consultations			
0%	84	82.3	72.6%[e]
<25%	17	16.7	21.7%[e]
25-50%	0	0	2.9%[e]
>50%	1	1.0	2.8%[e]

[a] *Sourced from Britt and colleagues (14) and the Australian Institute of Health and Welfare (15)*
[b] *Sourced from Britt and colleagues (14)*
[c] *Sourced from General Practice Education and Training Limited (16)*
[d] *Sourced from the Primary Health Care Research & Information Service (17)*
[e] *Compared to GPs involved in Britt and colleagues (14)*

Patient management varied by cancer case. Before the intervention, relatively few participants managed the patient with a 'prescription only' (range=1.0-10.8%, mean=2.8%, see Table 3). After the intervention, more chose to manage the patient with a 'prescription' (9.8-32.6%, mean=21.5%) or an 'investigation only' (range=25.0-71.7%, mean=43.5%). Of all the demographic data pertaining to the doctors, the only factor that appeared to influence their decisions was the geographical location of their practice (p<.001 of overall Wald test after regression).

Table 3: GP Management Decisions[a]

Cancer	Prescription Only		Investigation(s) Only		Referral Only		Referred with Investigation(s)	
Pre Intervention (n=102)	№	%	№	%	№	%	№	%
1. Bladder	1	1.0	58	56.9	16	15.7	27	26.5
2. Breast	3	2.9	71	69.6	15	14.7	13	12.7
3. Breast	11	10.8	53	52.0	16	15.7	22	21.6
4. Cervical	4	3.9	3	2.9	72	70.6	23	22.5
5. Colorectal	2	2.0	19	18.6	66	64.7	15	14.7
6. Endometrial	3	2.9	39	38.2	33	32.4	27	26.5
7. Lung	1	1.0	58	56.9	12	11.8	31	30.4
8. Oesophageal	1	1.0	23	22.5	49	48.0	29	28.4
9. Pancreatic	2	2.0	11	10.8	55	53.9	34	33.3
10. Prostate	1	1.0	13	12.7	65	63.7	23	22.5

Cancer	Prescription Only		Investigation(s) Only		Referral Only		Referred with Investigation(s)	
Total	29	2.8	348	34.1	399	39.1	244	23.9
Post Intervention (*n*=92)								
11. Lung	25	27.2	38	41.3	18	19.6	11	12.0
12. Colorectal	35	38.0	20	21.7	30	32.6	7	7.6
13. Bladder	15	16.3	54	58.7	9	9.8	14	15.2
14. Breast	13	14.1	56	60.9	8	8.7	15	16.3
15. Breast	14	15.2	57	62.0	9	9.8	12	13.0
16. Cervical	20	21.7	33	35.9	19	20.7	20	21.7
17. Colorectal	21	22.8	34	37.0	21	22.8	16	17.4
18. Endometrial	15	16.3	46	50.0	12	13.0	19	20.7
19. Lung	9	9.8	66	71.7	5	5.4	12	13.0
20. Lung	18	19.6	42	45.7	15	16.3	17	18.5
21. Oesophageal	26	28.3	29	31.5	18	19.6	19	20.7
22. Pancreatic	30	32.6	23	25.0	29	31.5	10	10.9
23. Prostate	14	15.2	36	39.1	16	17.4	26	28.3
24. Colorectal	22	23.9	26	28.3	22	23.9	22	23.9
Total	277	21.5	560	43.5	231	17.9	220	17.1

[a] *Percentages may not total 100% due to rounding*

Patient management also varied significantly by cancer type ($p<.001$ of overall Wald test, see Table 4). Colorectal cancer symptoms were managed almost equally across the choice of options with a similar proportion managed with each of the three options. Compared to the management of colorectal cancer symptoms participants were less likely to manage breast, bladder, endometrial, and lung cancer symptoms with a 'prescription' or 'referral only'. They were less likely to manage prostate cancer with a 'prescription only', yet more likely to manage it with a 'referral with investigation'. With regard to pancreatic and cervical cancers, participants were more likely to manage these with a 'referral only' or a 'referral with investigation', relative to the management of colorectal cancer. Compared with those who practiced in a major city, participants who practiced in a remote or very remote practice were significantly less likely to opt for a 'prescription' or a 'referral only', yet more likely to manage the patient with an 'investigation only' (see Table 4). The investigations and treatment options suggested are presented in Table 5.

Table 4: Factors associated with GP Cancer Management (*n*=2308)

Video	rrr [95% CI] Prescription Only vs. Investigation(s) Only		rrr [95% CI] Referral Only vs. Investigation(s) Only		rrr [95% CI] Referral with Investigation(s) vs. Investigation(s) Only	
Cancer (colorectal, rrr=1)						
Breast	0.21	[0.14,0.32][c]	0.14	[0.09,0.22][c]	0.42	[0.28,0.65][c]
Bladder	0.17	[0.10,0.30][c]	0.16	[0.09,0.27][c]	0.60	[0.37,0.95][a]
Endometrial	0.26	[0.15,0.46][c]	0.37	[0.23,0.60][c]	0.88	[0.57,1.36]
Prostate	0.38	[0.20,0.73][b]	1.18	[0.82,1.71]	1.65	[1.05,2.60][a]
Pancreatic	1.17	[0.68,2.02]	1.78	[1.10,2.86][a]	2.15	[1.30,3.56][b]
Cervical	0.83	[0.51,1.36]	1.82	[1.30,2.54][c]	1.98	[1.30,3.02][c]
Lung	0.32	[0.21,0.46][c]	0.17	[0.11,0.26][c]	0.57	[0.39,0.83][b]
Oesophageal	0.64	[0.42,0.99][a]	0.92	[0.63,1.34]	1.52	[1.01,2.29][a]
Clinic remoteness (major city, rrr=1)						

Video	rrr [95% CI]		rrr [95% CI]		rrr [95% CI]	
Inner regional	0.84	[0.44,1.62]	0.46	[0.29,0.73][c]	0.82	[0.38,1.75]
Outer regional	0.57	[0.17,1.95]	1.13	[0.50,2.51]	1.15	[0.50,2.64]
Remote/very remote	0.05	[0.01,0.25][c]	0.42	[0.26,0.67][c]	0.41	[0.09,1.83]

[a] p<.05; [b] p<.01; [c] p<.001 Results are relative risk ratios (rrr) for the participant groups whose management were 'prescription only', 'referral only', or 'referral with investigation' compared to those who selected 'investigations only' (rrr=1). Results were derived from one multinomial logistic regression with the adjustment of clustering effect due to assessment of different cancers made by the same participant

Table 5: Investigations Requested and Prescriptions per Cancer Type

Cancer Type	Investigations	Prescriptions Ordered
Breast	Mammogram, fine-needle biopsy, full-blood count, renal function test, liver function test, ultrasound scan	Antifungals, antibiotic tablets or creams, steroid creams, antihistamines
Lung	CT scan/chest x-ray, ultrasound scan, fine-needle aspiration, bronchoscopy, spirometry, lung biopsy, full-blood count, renal function test, liver function test , coagulation studies, ferritin, sputum microscopy and culture/cytology, Mantoux test.	Steroid tablets, antibiotics, diuretics, codeine, steroid inhalers, beta agonist inhalers
Prostate	Urine microscopy and culture, urine cytology, PSA, CT, ultrasound scan, full-blood count, renal function, liver function test, x-ray	Opiates, paracetamol, nonsteroidal anti-inflammatory tablets, alpha blockers, 5-alpha reductase enzyme inhibitors
Bladder	Urine microscopy and culture, urine cytology, PSA, CT, ultrasound scan, full-blood count, renal function, liver function test, intravenous pyelogram	Nil
Colorectal	Colonoscopy/gastroscopy, CT/ultrasound scan, stool culture and sensitivity, cytology, faecal occult blood test, full-blood count, renal function test, liver function test, erythrocyte sedimentation rate, iron studies, lipase, calcium, magnesium, phosphate	Paracetamol, iron supplements, iron injections, laxatives, antispasmodics, vitamin C, opiates
Pancreatic	Full-blood count, renal function test, liver function test, blood glucose, coagulation profile, amylase, lipase, bilirubin, CT, ultrasound scan/bone scan	Paracetamol, codeine, opiates, cholestyramine, vitamin B12, proton pump inhibitors
Oesophageal	Barium swallow/chest x-ray, CT/ultrasound scan,	Anti-emetics, food supplements, proton pump

Cancer Type	Investigations	Prescriptions Ordered
	gastroscopy, full-blood count, renal function test, liver function test, iron studies, coagulation studies, urea breath test/H pylori serology.	inhibitors
Cervical	Vaginal swab MCS/pap smear, human papilloma virus cytology, urine culture and sensitivity, chlamydia, gonorrhoea PCR, human immune deficiency virology, hepatitis B, hepatitis C, syphilis serology, VDRL, full-blood count, renal function test, liver function test, ferritin, ultrasound scan/CT, colposcopy/endoscopy	Nil
Endometrial	US pelvic/vaginal, full-blood count, renal function test, liver function test, iron studies, coagulation studies, pap smear/swab, urine culture and sensitivity, x-ray, CT, hysteroscopy	Oestrogen replacement vaginal pessaries

DISCUSSION

Findings

According to the NICE guidelines, all cases in this study warranted a specialist review within two weeks (13). The research results suggest that in more than one-in-five cases, the patient was not investigated or referred, despite symptoms that were highly suggestive of cancer. In some cases, the indication for the drugs prescribed as per Table 5 was unclear and in the case of endometrial cancer, the prescription of oestrogen replacement therapy may have actually advanced cancer progression (18).

Compared to cases presenting with colorectal symptoms participants were more likely to refer a patient presenting with symptoms of pancreatic, prostate, or cervical cancer, with or without further investigation. These cases included relatively more objective signs of pathology sourced from a laboratory and/or radiological report. This suggests that, despite the UK guidelines, these participants may have been reticent to refer patients without further investigation – this was particularly the case for breast, bladder, endometrial, and lung cancers where the patient presented with signs and symptoms, without confirmatory laboratory tests. Notably, in the case of lung cancer, a suspicious lesion on a chest x-ray did not appear to warrant immediate referral in most cases.

The participants appeared to have different views on how to manage patients with cancer symptoms – and the reason for these opinions could not be gleaned (e.g., x-ray for endometrial cancer). This might suggest the participants collectively recognised both the advantages and disadvantages associated with further investigation. The former may include the efficient use of limited diagnostic and subsequent specialist services. This may be particularly advantageous for patients who do not reside in close proximity to specialist services. This was suggested by the study results, as participants who practiced in rural and remote locations were more likely to request further investigation prior to referral; yet research suggests cancer outcomes in these locations are worse

than in metropolitan areas (19). The disadvantages associated with locally conducted investigation may include the financial cost to the patient, as well as delayed specialist advice and care (20).

Strengths and weaknesses of the study

A key strength of this study is consistency in both the cases reviewed by the participants and the way they reviewed the cases. Furthermore, participants were unaware of the case content before commencing the study. As such, participants did not simply include GPs with a particular interest in cancer care.

However, the study is limited in a four key ways. First, it did not enable interaction between the participant and the patient, or the participant and the specialist. Such communication is likely to promote effective patient care. Second, data were not collected on review plans to better understand the participants' perspectives on the case. This may be particularly relevant for the option, 'investigation only', where a subsequent review may help to confirm a diagnosis and lead to referral. Third, as the participants differed from GPs who practice in Australia, the generalisability of the findings is limited. Similarly, the number of participants from very remote areas was limited to four participants. Finally, data were not collected on participants' reasons for their selected patient management strategy. Despite these limitations, the results from this study reveal an important need to examine how patient outcomes are affected by the ways that GPs respond to patients' cancer symptoms.

Comparison with other literature

Although the findings from this study may cause concern, the study is limited by the use of video-vignettes, which prevented participants from interacting with the patient or their families. Such interactions may increase the prospect of referral (21). Research also suggests that a cancer diagnosis can be missed where there are: atypical presentations, non-specific presentations, very low prevalence rates, co-morbidities, and/or perceptual features (22). All cases in this study were typical and devoid of distracting features. Furthermore, participants were more inclined to manage the patient with investigations or a referral when using the interactive referral *pro forma*. As the *pro forma* required detailed patient information, participants may have been prompted to request additional evidence – like that of a pathology report – before referring the patient to a specialist. The risk in this case is of false negative investigation findings. Furthermore, a recent report on delayed cancer diagnoses noted a 'lack of reporting culture in primary care compared with acute hospitals… [As such] any analysis will show only a small proportion of incidents in primary care, and from general practice in particular'. (23) This may explain the limited literature on potential delays to cancer diagnosis within primary care. The data presented here suggest a risk of delay. The review also concluded that some of the factors that contribute to practitioner delay included: symptom misattribution and/or no examination or investigation of malignancy. The data presented in this paper support these conclusions.

Implications for clinicians and policymakers

Results from this study suggest that some patients may receive a delayed cancer diagnosis, even when they present with typical cancer symptoms to a GP who can access relevant diagnostic tests. There was limited evidence that appropriate tests would be ordered, and a significant proportion of cases were not immediately referred for further investigation or specialist opinion. Therefore, better cancer outcomes may not be solely explained by GP access to investigations – but rather, to other factors that were beyond the scope of this study. These may include expedient access to specialists via the private healthcare sector or different systems of care.

Future directions

Research is required to understand how GPs filter and use clinical information to determine the management of patients who present with cancer symptoms. Research is also required to identify

efficient and effective referral pathways for these patients are they traverse the health system and progress along the care continuum.

CONCLUSION

Patients may receive a delayed cancer diagnosis, even when they present with typical cancer symptoms to a GP who can access relevant diagnostic tests. Although this may be partly improved through improved access to diagnostic tests, there are likely to be additional elements that influence the ways in which potential cancer symptoms are identified and managed within the context of primary care.

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How do general practitioners manage patients with cancer symptoms? A video-vignette study.

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TITLE

How do general practitioners manage patients with cancer symptoms? A video-vignette study.

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ABSTRACT

Objectives: Determine how general practitioners (GPs) manage patients with cancer symptoms.

Design: GPs reviewed 24 video-vignettes and case-notes on patients with cancer symptoms and indicated whether they would refer the patient and/or prescribe medication, and/or undertake further investigation. According to available guidelines, all cases warranted a referral to a specialist or further investigations.

Setting: Australian primary care sector.

Participants: 102 practicing GPs participated in this study, including trainees.

Interventions: The research was part of a larger RCT testing a referral *pro forma*; however this paper reports on management decisions made throughout the study.

Primary and secondary outcome measures: This paper reports on how the participants would manage the patients depicted in each vignette.

Results In more than one-in-five cases, the patient was not investigated or referred. Patient management varied significantly by cancer type (p<.001). For two key reasons, colorectal cancer was the chosen referent category. First, it represents a prevalent type of cancer. Second, in this study, colorectal cancer symptoms were managed in a similar proportion of option – that is, prescription, referral, or investigation. Compared with colorectal cancer participants were less likely to manage breast, bladder, endometrial, and lung cancers with a 'prescription only' or 'referral only' option. They were less likely to manage prostate cancer with a 'prescription only', yet more likely to manage it with a 'referral with investigation'. With regard to pancreatic and cervical cancers, participants were more likely to manage these with a 'referral only' or a 'referral with investigation'.

Conclusions: Some patients may receive a delayed cancer diagnosis, even when they present with typical cancer symptoms to a GP who can access relevant diagnostic tests.

Trial registration: Australia and New Zealand Clinical Trials Register (ACTRN12611000760976).

Strengths and limitations of this study:

- Many Western nations position GPs as the gatekeeper to specialist services, while enabling their access to diagnostic tests. This can be particularly helpful in cancer care.
- GPs were invited to review video-vignettes of patients with possible cancer symptoms and decide how they would manage these patients.
- There was limited evidence that appropriate tests would be ordered, and a significant proportion of high-risk cases were not immediately referred for further investigation or specialist opinion.
- The study design did not examine the reasons for the GP decisions.
- Some patients may receive a delayed cancer diagnosis, even when they present with typical cancer symptoms to a GP who can access relevant diagnostic tests.

INTRODUCTION

Australians who experience symptoms do not have direct access to specialists, but are required to consult a general practitioner (GP) or attend an emergency department (1). Akin to other health systems (2), the Australian health system positions GPs as the gatekeeper to specialist services (3).

In Australia, GPs can refer for a range of tests including ultrasounds and CT scans and, with specific indications, some MRI scans. In some Australian jurisdictions, GPs can also directly refer for gastroscopy and colonoscopy. This represents a greater range of tests relative to other health systems, like the United Kingdom (UK). (4).

GP access to diagnostic tests is particularly helpful in cancer care (5). It can optimise the timely receipt of appropriate treatment and as such reduce, if not avert the personal, social, and economic costs of cancer (6-8). Given the complexity of health systems, it can be difficult (if not impossible) to isolate definitive causal relationships between GP diagnostic tests and cancer outcomes (9, 10). However, GP access to diagnostic tests is likely to help to identify those patients who require urgent care (11).

As part of a larger pre-post, randomised control trial of an interactive online referral *pro forma* (12), the review of data reported here focused on how Australian GPs manage patients with cancer symptoms. The intervention tested in the original trial did not aim to guide GP referral, investigation, or prescribing practices – as such, its focus is not germane to the focus of this review, which encompasses data from both phases (12).

METHODS

Following clearance from the relevant ethics committee, the research team recruited GPs in seven Australian states and territories to participate in this study via email, newsletters, and personal contact. Recruitment was facilitated by primary care networks, university departments, research networks, and personal contacts. GPs were eligible to participate if they were currently in practice, including registrars (or vocational trainees), and had internet access. As such, the exact number of GPs who were aware of the project cannot be ascertained.

Participants were invited to consider the symptoms of patients presented as video-vignettes and to determine how they would manage the patient. This was conducted in two phases – before the participants were provided with an interactive referral *pro forma*, and afterwards. The *pro forma* aimed to improve the quantity and quality of patient information communicated between primary and secondary care clinicians. The focus of this paper however, is to determine how GPs respond to patients with different cancer symptoms, regardless of whether this was before or after using the *pro forma*.

Guided by the 2005 referral guidelines for suspected cancer of the National Institute for Health and Clinical Excellence (NICE) (13), 24 video-vignettes were developed by six GPs, four videos for each of six cancer types (see Table 1). These guidelines were selected as they indicate the need for specialist referral based on specific high-risk presentations; furthermore, at time of study, no equivalent Australia-wide guidelines were available for all cancer types. The video-vignettes comprised a four-minute video monologue delivered by an actor-patient accompanied by case-notes containing the patient's medical history, current medication, allergies, and previous consultations. The video included an off-camera commentary by an actor-doctor describing clinical signs to be found at this visit.

After accessing a secured research website, participants: provided demographic information; received the case-notes of each patient; viewed the video-vignette of the consultation once; and received examination findings. Participants then chose to: (1) prescribe medication; (2) order diagnostic tests; and/or (3) refer the patient to a specialist. Participants documented the

prescription, the test, and/or the referral as they would when consulting a *bona fide* patient. Each participant viewed and managed 24 video-vignettes.

Participants were recompensed for their participation and could claim continuing medical education points. Progress through the video-vignettes could be tracked online and reminders were issued to those who had not completed the study after two weeks of inactivity.

Table 1: Cancer Cases

	Cancer type	Case details
1.	Bladder	76 year old female patient with asymptomatic frank haematuria
2.	Breast	35 year old with asymptomatic, firm breast lump and skin dimpling
3.	Breast	69 year old with skin changes consistent with Paget's disease of the breast
4.	Cervical	34 year old with CIN 2
5.	Colorectal	60 year old with unexplained iron deficiency anaemia, abdominal pain and right iliac fossa abdominal mass
6.	Endometrial	65 year old with postmenopausal bleeding (PMB)
7.	Lung	58 year old lifelong smoker with haemoptysis, breathlessness and weight loss
8.	Oesophageal	66 year old with 10kg weight loss and dysphagia for solids
9.	Pancreatic	57 year old with 5kg weight loss, jaundice, generalised pruritis and pancreatic mass on abdominal ultrasound scan
10.	Prostate	55 year old with PSA of 22, urinary frequency, haematuria, hesitancy and terminal dribbling
11.	Lung	49 year old smoker with cervical lymphadenopathy, haemoptysis and 2cm mass on chest x-ray
12.	Colorectal	65 year old with rectal bleeding, diarrhoea, fatigue and rectal mass
13.	Bladder	65 year old male patient with frank asymptomatic haematuria
14.	Breast	38 year old with three-month history of breast lump, dimpling of skin and axillary lymphadenopathy
15.	Breast	71 year old with breast lump and *peau d'orange*
16.	Cervical	36 year old with CIN 2 and post-coital bleeding
17.	Colorectal	62 year old male with two-month history of constipation, abdominal pain, hepatomegaly and iron deficiency anaemia
18.	Endometrial	62 year old with several episodes of postmenopausal bleeding
19.	Lung	60 year old female with cough, dyspnoea, weight loss, hoarseness, pleural effusion and clubbing
20.	Lung	61 year old male with cough, suspicious lesion on chest x-ray and haemoptysis
21.	Oesophageal	69 year old male with dysphagia for solids, weight loss, dyspepsia and fatigue
22.	Pancreatic	60 year old male with abdominal pain, chronic pancreatitis, weight loss, jaundice and pancreatic mass on abdominal ultra sound scan
23.	Prostate	70 year old abnormal digital rectal examination findings, PSA of 25, chronic retention, prostatism and low back pain
24.	Colorectal	63 year old female with altered bowel habit, iron deficiency anaemia, abdominal pain, weight loss and rectal bleeding

Statistical Analysis

Descriptive statistics (number and percentage) were used to report participants' management of each scenario, pre- and post-intervention. A multinominal logistic model was used to assess the influence of demographic information and speciality on the ways the participants chose to manage the patient, with particular reference to: 'prescription only', 'investigation(s) only', 'referral only', and 'referral with investigation(s)'. 'Investigation only' was selected as the base outcome, and the relative risk ratio of 'prescription only', 'referral only', and 'referral and investigation' are reported. User-defined parsimonious models were constructed in a backward elimination fashion from the full

model. The full model included: (1) participants' demographic data – notably, age, gender, country of graduation, number of years since graduation, years of GP experience, Fellowship of the Royal Australian college of General Practitioners (FRACGP), clinic remoteness (4 categories: major cities, inner regional, outer regional, and remote/very remote), role within their primary practice, patients consulted per week (3 categories: <100, 100-149, ≥150), direct patient care hours per week (4 categories: <11, 11-20, 21-40, ≥41), non-English consultation (no and yes), number of GPs within their primary practice, and number of patient sessions per week; and (2) cancer type. Only variables with $p<.05$ were retained in the final model. The categories of some variables were regrouped as noted, before they were entered into the model, due to their small number. In the regression, pre- and post- intervention data were pooled according to cancer types. Given the lack of independence between participant responses, regression models were adjusted by estimating the cluster effect using the 'vce' option within Stata. *P* values of less than .05 were considered statistically significant. Stata MP 13.1 (StataCorp, Taxes, USA) was used to perform the analysis.

RESULTS

Between August 2011 and August 2012 (inclusive), 102 GPs were recruited. Participants were mainly from Western Australia (46%) and Victoria (25%), with a mean age of 43 years (see Table 2). On average, the participants had 13 years of GP experience – however, 24% were trainees. Most participants primarily practiced in a capital city or another metropolitan area.

Table 2: Participant Demographics (*n*=102)

	Participants		National Comparison
	Mean	**SD**	
Age (yrs)	43	11.8	50.5[a]
Years after graduation	19	11.3	
Years as GP	13	11.1	
GPs in primary practice	8	4.1	
GP sessions/week	6	3.0	
	№	**%**	
Male	58	56.9	60.9%[b]
Graduated in Australia	73	71.6	65.9%[b]
GP registrar	24	23.5	3.8%[c]
FRACGP	58	56.9	56.8[e]
Accredited practice	101	99.0	88.6[e]
Position			
Principal	21	20.6	
Non-principal	63	61.8	
Other	18	17.6	
State			
New South Wales	13	12.7	33.1%[b]
Queensland	7	6.8	19.5%[b]
Victoria	25	24.5	25.1%[b]
South Australia	7	6.9	8.4%[b]
Tasmania	1	1.0	2.6%[b]
Western Australia	47	46.1	9.1%[b]
Australian Capital Territory	2	2.0	1.5%[b]
Region of primary practice			
Capital city	49	48.0	66.3%[e]
Other metropolitan area	38	37.3	7.6%[e]
Large rural area	5	4.9	6.7%[e]
Small rural area	6	5.9	7.1%[e]

	Participants		National Comparison
Other rural area	3	2.9	10.6%[e]
Remote centre	1	1.0	0.6%[e]
Remoteness of the region			
Major city	73	71.6	71.5%[b]
Inner regional area	15	14.7	18.9%[b]
Outer regional area	10	9.8	7.8%[b]
Remote area	3	2.9	1.2%[b]
Very remote area	1	1.0	0.6%[b]
Patients consulted/week			
<100	49	48.0	
100-149	30	29.4	
150-199	20	19.6	
>199	3	3.0	
Direct patient care hours/week			
<11	11	10.8	1.2%[e]
11-20	21	20.6	12.2%[e]
21-40	47	46.1	53%[e]
41-60	20	19.6	32.1%[e]
>60	3	2.9	1.4%[e]
Non-English patient consultations			
0%	84	82.3	72.6%[e]
<25%	17	16.7	21.7%[e]
25-50%	0	0	2.9%[e]
>50%	1	1.0	2.8%[e]

[a] *Sourced from Britt and colleagues (14) and the Australian Institute of Health and Welfare (15)*
[b] *Sourced from Britt and colleagues (14)*
[c] *Sourced from General Practice Education and Training Limited (16)*
[d] *Sourced from the Primary Health Care Research & Information Service (17)*
[e] *Compared to GPs involved in Britt and colleagues (14)*

Patient management varied by cancer case. Before the intervention, relatively few participants managed the patient with a 'prescription only' (range=1.0-10.8%, mean=2.8%, see Table 3). After the intervention, more chose to manage the patient with a 'prescription' (9.8-32.6%, mean=21.5%) or an 'investigation only' (range=25.0-71.7%, mean=43.5%). Of all the demographic data pertaining to the doctors, the only factor that appeared to influence their decisions was the geographical location of their practice (p<.001 of overall Wald test after regression).

Table 3: GP Management Decisions[a]

Cancer	Prescription Only		Investigation(s) Only		Referral Only		Referred with Investigation(s)	
Pre Intervention (n=102)	№	%	№	%	№	%	№	%
1. Bladder	1	1.0	58	56.9	16	15.7	27	26.5
2. Breast	3	2.9	71	69.6	15	14.7	13	12.7
3. Breast	11	10.8	53	52.0	16	15.7	22	21.6
4. Cervical	4	3.9	3	2.9	72	70.6	23	22.5
5. Colorectal	2	2.0	19	18.6	66	64.7	15	14.7
6. Endometrial	3	2.9	39	38.2	33	32.4	27	26.5
7. Lung	1	1.0	58	56.9	12	11.8	31	30.4
8. Oesophageal	1	1.0	23	22.5	49	48.0	29	28.4
9. Pancreatic	2	2.0	11	10.8	55	53.9	34	33.3
10. Prostate	1	1.0	13	12.7	65	63.7	23	22.5

Cancer	Prescription Only		Investigation(s) Only		Referral Only		Referred with Investigation(s)	
Total	29	2.8	348	34.1	399	39.1	244	23.9
Post Intervention (*n*=92)								
11. Lung	25	27.2	38	41.3	18	19.6	11	12.0
12. Colorectal	35	38.0	20	21.7	30	32.6	7	7.6
13. Bladder	15	16.3	54	58.7	9	9.8	14	15.2
14. Breast	13	14.1	56	60.9	8	8.7	15	16.3
15. Breast	14	15.2	57	62.0	9	9.8	12	13.0
16. Cervical	20	21.7	33	35.9	19	20.7	20	21.7
17. Colorectal	21	22.8	34	37.0	21	22.8	16	17.4
18. Endometrial	15	16.3	46	50.0	12	13.0	19	20.7
19. Lung	9	9.8	66	71.7	5	5.4	12	13.0
20. Lung	18	19.6	42	45.7	15	16.3	17	18.5
21. Oesophageal	26	28.3	29	31.5	18	19.6	19	20.7
22. Pancreatic	30	32.6	23	25.0	29	31.5	10	10.9
23. Prostate	14	15.2	36	39.1	16	17.4	26	28.3
24. Colorectal	22	23.9	26	28.3	22	23.9	22	23.9
Total	277	21.5	560	43.5	231	17.9	220	17.1

[a] *Percentages may not total 100% due to rounding*

Patient management also varied significantly by cancer type ($p<.001$ of overall Wald test, see Table 4). Colorectal cancer symptoms were managed almost equally across the choice of options with a similar proportion managed with each of the three options. Compared to the management of colorectal cancer symptoms participants were less likely to manage breast, bladder, endometrial, and lung cancer symptoms with a 'prescription' or 'referral only'. They were less likely to manage prostate cancer with a 'prescription only', yet more likely to manage it with a 'referral with investigation'. With regard to pancreatic and cervical cancers, participants were more likely to manage these with a 'referral only' or a 'referral with investigation', relative to the management of colorectal cancer. Compared with those who practiced in a major city, participants who practiced in a remote or very remote practice were significantly less likely to opt for a 'prescription' or a 'referral only', yet more likely to manage the patient with an 'investigation only' (see Table 4). The investigations and treatment options suggested are presented in Table 5.

Table 4: Factors associated with GP Cancer Management (*n*=2308)

Video	rrr [95% CI] Prescription Only vs. Investigation(s) Only		rrr [95% CI] Referral Only vs. Investigation(s) Only		rrr [95% CI] Referral with Investigation(s) vs. Investigation(s) Only	
Cancer (colorectal, rrr=1)						
Breast	0.21	[0.14,0.32][c]	0.14	[0.09,0.22][c]	0.42	[0.28,0.65][c]
Bladder	0.17	[0.10,0.30][c]	0.16	[0.09,0.27][c]	0.60	[0.37,0.95][a]
Endometrial	0.26	[0.15,0.46][c]	0.37	[0.23,0.60][c]	0.88	[0.57,1.36]
Prostate	0.38	[0.20,0.73][b]	1.18	[0.82,1.71]	1.65	[1.05,2.60][a]
Pancreatic	1.17	[0.68,2.02]	1.78	[1.10,2.86][a]	2.15	[1.30,3.56][b]
Cervical	0.83	[0.51,1.36]	1.82	[1.30,2.54][c]	1.98	[1.30,3.02][c]
Lung	0.32	[0.21,0.46][c]	0.17	[0.11,0.26][c]	0.57	[0.39,0.83][b]
Oesophageal	0.64	[0.42,0.99][a]	0.92	[0.63,1.34]	1.52	[1.01,2.29][a]
Clinic remoteness (major city, rrr=1)						

Video	rrr [95% CI]		rrr [95% CI]		rrr [95% CI]	
Inner regional	0.84	[0.44,1.62]	0.46	[0.29,0.73][c]	0.82	[0.38,1.75]
Outer regional	0.57	[0.17,1.95]	1.13	[0.50,2.51]	1.15	[0.50,2.64]
Remote/very remote	0.05	[0.01,0.25][c]	0.42	[0.26,0.67][c]	0.41	[0.09,1.83]

[a] p<.05; [b] p<.01; [c] p<.001 Results are relative risk ratios (rrr) for the participant groups whose management were 'prescription only', 'referral only', or 'referral with investigation' compared to those who selected 'investigations only' (rrr=1). Results were derived from one multinomial logistic regression with the adjustment of clustering effect due to assessment of different cancers made by the same participant

Table 5: Investigations Requested and Prescriptions per Cancer Type

Cancer Type	Investigations	Prescriptions Ordered
Breast	Mammogram, fine-needle biopsy, full-blood count, renal function test, liver function test, ultrasound scan	Antifungals, antibiotic tablets or creams, steroid creams, antihistamines
Lung	CT scan/chest x-ray, ultrasound scan, fine-needle aspiration, bronchoscopy, spirometry, lung biopsy, full-blood count, renal function test, liver function test , coagulation studies, ferritin, sputum microscopy and culture/cytology, Mantoux test.	Steroid tablets, antibiotics, diuretics, codeine, steroid inhalers, beta agonist inhalers
Prostate	Urine microscopy and culture, urine cytology, PSA, CT, ultrasound scan, full-blood count, renal function, liver function test, x-ray	Opiates, paracetamol, nonsteroidal anti-inflammatory tablets, alpha blockers, 5-alpha reductase enzyme inhibitors
Bladder	Urine microscopy and culture, urine cytology, PSA, CT, ultrasound scan, full-blood count, renal function, liver function test, intravenous pyelogram	Nil
Colorectal	Colonoscopy/gastroscopy, CT/ultrasound scan, stool culture and sensitivity, cytology, faecal occult blood test, full-blood count, renal function test, liver function test, erythrocyte sedimentation rate, iron studies, lipase, calcium, magnesium, phosphate	Paracetamol, iron supplements, iron injections, laxatives, antispasmodics, vitamin C, opiates
Pancreatic	Full-blood count, renal function test, liver function test, blood glucose, coagulation profile, amylase, lipase, bilirubin, CT, ultrasound scan/bone scan	Paracetamol, codeine, opiates, cholestyramine, vitamin B12, proton pump inhibitors
Oesophageal	Barium swallow/chest x-ray, CT/ultrasound scan,	Anti-emetics, food supplements, proton pump

Cancer Type	Investigations	Prescriptions Ordered
	gastroscopy, full-blood count, renal function test, liver function test, iron studies, coagulation studies, urea breath test/H pylori serology.	inhibitors
Cervical	Vaginal swab MCS/pap smear, human papilloma virus cytology, urine culture and sensitivity, chlamydia, gonorrhoea PCR, human immune deficiency virology, hepatitis B, hepatitis C, syphilis serology, VDRL, full-blood count, renal function test, liver function test, ferritin, ultrasound scan/CT, colposcopy/endoscopy	Nil
Endometrial	US pelvic/vaginal, full-blood count, renal function test, liver function test, iron studies, coagulation studies, pap smear/swab, urine culture and sensitivity, x-ray, CT, hysteroscopy	Oestrogen replacement vaginal pessaries

DISCUSSION

Findings

According to the 2005 NICE guidelines, all cases in this study warranted a specialist review within two weeks (13). The research results suggest that in more than one-in-five cases, the patient was not investigated or referred, despite symptoms that were highly suggestive of cancer. In some cases, the indication for the drugs prescribed as per Table 5 was unclear and in the case of endometrial cancer, the prescription of oestrogen replacement therapy may have actually advanced cancer progression (18).

Compared to cases presenting with colorectal symptoms participants were more likely to refer a patient presenting with symptoms of pancreatic, prostate, or cervical cancer, with or without further investigation. These cases included relatively more objective signs of pathology sourced from a laboratory and/or radiological report. This suggests that, despite the UK guidelines, these participants may have been reticent to refer patients without further investigation – this was particularly the case for breast, bladder, endometrial, and lung cancers where the patient presented with signs and symptoms, without confirmatory laboratory tests. Notably, in the case of lung cancer, a suspicious lesion on a chest x-ray did not appear to warrant immediate referral in most cases.

The participants appeared to have different views on how to manage patients with cancer symptoms – and the reason for these opinions could not be gleaned (e.g., x-ray for endometrial cancer). This might suggest the participants collectively recognised both the advantages and disadvantages associated with further investigation. The former may include the efficient use of limited diagnostic and subsequent specialist services. This may be particularly advantageous for patients who do not reside in close proximity to specialist services. This was suggested by the study results, as participants who practiced in rural and remote locations were more likely to request further investigation prior to referral; yet research suggests cancer outcomes in these locations are worse

than in metropolitan areas (19). The disadvantages associated with locally conducted investigation may include the financial cost to the patient, as well as delayed specialist advice and care (20).

Strengths and weaknesses of the study

A key strength of this study is consistency in both the cases reviewed by the participants and the way they reviewed the cases. Furthermore, participants were unaware of the case content before commencing the study. As such, participants did not simply include GPs with a particular interest in cancer care.

However, the study is limited in a four key ways. First, it did not enable interaction between the participant and the patient, or the participant and the specialist. Such communication is likely to promote effective patient care. Second, data were not collected on review plans to better understand the participants' perspectives on the case. This may be particularly relevant for the option, 'investigation only', where a subsequent review may help to confirm a diagnosis and lead to referral. Third, as the participants differed from GPs who practice in Australia, the generalisability of the findings is limited. Similarly, the number of participants from very remote areas was limited to four participants. Finally, data were not collected on participants' reasons for their selected patient management strategy. Despite these limitations, the results from this study reveal an important need to examine how patient outcomes are affected by the ways that GPs respond to patients' cancer symptoms.

Comparison with other literature

Although the findings from this study may cause concern, the study is limited by the use of video-vignettes, which prevented participants from interacting with the patient or their families. Such interactions may increase the prospect of referral (21). Research also suggests that a cancer diagnosis can be missed where there are: atypical presentations, non-specific presentations, very low prevalence rates, co-morbidities, and/or perceptual features (22). All cases in this study were typical and devoid of distracting features. Furthermore, participants were more inclined to manage the patient with investigations or a referral when using the interactive referral *pro forma*. As the *pro forma* required detailed patient information, participants may have been prompted to request additional evidence – like that of a pathology report – before referring the patient to a specialist. The risk in this case is of false negative investigation findings. Furthermore, a recent report on delayed cancer diagnoses noted a 'lack of reporting culture in primary care compared with acute hospitals… [As such] any analysis will show only a small proportion of incidents in primary care, and from general practice in particular'. (23) This may explain the limited literature on potential delays to cancer diagnosis within primary care. The data presented here suggest a risk of delay. The review also concluded that some of the factors that contribute to practitioner delay included: symptom misattribution and/or no examination or investigation of malignancy. The data presented in this paper support these conclusions.

Implications for clinicians and policymakers

Results from this study suggest that some patients may receive a delayed cancer diagnosis, even when they present with typical cancer symptoms to a GP who can access relevant diagnostic tests. There was limited evidence that appropriate tests would be ordered, and a significant proportion of cases were not immediately referred for further investigation or specialist opinion. Therefore, better cancer outcomes may not be solely explained by GP access to investigations – but rather, to other factors that were beyond the scope of this study. These may include expedient access to specialists via the private healthcare sector or different systems of care.

Future directions

Research is required to understand how GPs filter and use clinical information to determine the management of patients who present with cancer symptoms. Research is also required to identify

efficient and effective referral pathways for these patients are they traverse the health system and progress along the care continuum.

CONCLUSION

Patients may receive a delayed cancer diagnosis, even when they present with typical cancer symptoms to a GP who can access relevant diagnostic tests. Although this may be partly improved through improved access to diagnostic tests, there are likely to be additional elements that influence the ways in which potential cancer symptoms are identified and managed within the context of primary care.

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