Improving early cancer diagnosis in primary care

SAMUEL W D MERRIEL AND WILLIE HAMILTON

Primary healthcare professionals are in a vital position to help reduce delays to cancer diagnosis, as they can encourage participation in cancer screening programmes and patients often present to their GP practice with symptoms prior to diagnosis. This article discusses some of the measures that can be taken to increase uptake of cancer screening, raise awareness of symptoms of possible cancer, and help identify which patients may benefit from an urgent cancer referral.

Primary care plays a pivotal role in the diagnosis of cancer. The vast majority of patients with cancer will develop symptoms prior to diagnosis, and most present to primary care on one or more occasions before the cancer is identified. GPs, nurses and other primary healthcare professionals can also aid efforts to diagnose cancer earlier in asymptomatic patients through encouraging and facilitating participation in cancer screening programmes.

Improvements in the early diagnosis of cancer have become a policy imperative in the UK, as this is a key element in improving cancer outcomes for patients. This article will summarise the current epidemiology of cancer and cancer-related symptoms in relation to primary care, consider some of the reasons for delays in cancer diagnosis, and suggest ways that primary healthcare professionals and teams can improve the early diagnosis of cancer for their patient populations.

Cancer in the UK

Cancer is a major health problem in high-income countries, including the UK. One in two UK adults will be affected by cancer at some point in their lifetime.¹ In 2017, there were approximately 367,000 new cancer cases diagnosed in the UK,² excluding non-melanoma skin cancers. Compared with other high-income countries with similar healthcare systems, the UK performs relatively poorly in terms of cancer mortality and survival.

The International Cancer Benchmarking Partnership (ICBP) analysed cancer survival data from seven high-income countries (Australia, Canada, Denmark, Ireland, New Zealand,
Norway and the UK) across seven cancer sites (oesophagus, stomach, colon, rectum, pancreas, lung and ovary) for the period 1995–2014. Despite improvements in age-standardised five-year cancer survival across all the cancer sites that were better than most of the included countries, the UK still lagged behind in six out of the seven cancer sites (ahead of only Denmark for oesophageal cancer survival). The authors postulated that stage at diagnosis (probably reflecting a slower diagnostic process), timely access to effective treatment, and the effects of co-morbidity were likely to be the main determinants of these outcomes.2

It is well established that cancer survival is largely dependent on the stage at diagnosis. Cancers diagnosed at an earlier stage (I or II) have more treatment options that are more likely to be successful, and have better overall outcomes, than late-stage cancers (III or IV). The proportion of cancers diagnosed at an early stage in England is increasing, having risen from 43.9% in the last quarter of 2011 to 51.8% in the first quarter of 2018.3 Similar trends are seen in the other nations of the UK.4-6 The NHS Long Term Plan outlines an ambition to reach a target of 75% of cancer patients diagnosed at an early stage by 2028,7 and there is an ‘Early diagnosis of cancer’ Quality Outcomes Framework (QOF) quality improvement domain for GP practices in England in 2020/21.8 Some setback from the COVID-19 pandemic is expected, but whether this will be short-lived or prolonged is uncertain.9

There are different routes a patient may follow to reach a diagnosis of cancer. Patients can be diagnosed after presenting to their GP with symptoms related to the cancer; through a formal cancer screening programme; following presentation to an emergency department with severe symptoms or a complication; or incidentally while being investigated for a different condition. These routes, and the time taken to reach the diagnosis, can be influenced by a number of patient, tumour and health service factors.

Table 1 shows the routes to diagnosis from a study by Elliss-Brookes et al. for almost 740,000 cancer patients in England from 2006–2008, demonstrating that over half of patients with a new cancer were referred to hospital after presenting to their GP and almost one-quarter were diagnosed following an emergency presentation. This study also demonstrated that one-year survival was much lower for patients being diagnosed via an emergency route.10 Furthermore, although diagnoses from emergency presentations overall had worse staging, their additional mortality was more than would have been expected from the adverse staging, suggesting the complication precipitating admission was associated with additional mortality.11

Cancer patients diagnosed at an emergency presentation has become a key outcome measure for cancer diagnosis in the NHS, and the proportion of patients following this route has fallen to under 20% in England in the latest figures12 from 2018/19 – a significant achievement, which is likely to represent diagnostic improvements.

The majority of cancer patients will present to their GP with one or more symptoms prior to diagnosis. Figures from the most recent National Cancer Diagnosis Audit (NCDA) for primary care in the UK in 2014 showed two-thirds of patients had at least one recorded symptom in this time period.13 The prevailing wisdom in decades past was that by the time a patient with cancer develops symptoms, they are already at an advanced stage (and by extension, less likely to be curable). This view led to diagnostic nihilism in some clinicians, who argued that symptomatic diagnosis was therefore of relative unimportance, particularly for lung cancer.

The relationship between cancer symptoms and stage at diagnosis has recently been explored by Koo and colleagues, who found that the proportion of patients diagnosed at stage IV varied significantly depending on the symptom at presentation. Only three symptoms (neck lump, chest pain and back pain) were associated with an increased odds of stage IV cancer, whether they were the only presenting symptom or they occurred alongside other symptoms. For 13 of the 20 symptoms assessed in this study, more than half of the patients presenting with them had cancer at stage I–III. The authors concluded that for a number of symptoms that could indicate an undiagnosed cancer, the majority of patients will not have a stage IV cancer at diagnosis.14

### Reasons for delayed diagnosis of cancer in primary care

There are many reasons for a delay in a cancer diagnosis, and these can occur anywhere along the diagnostic journey. Olesen et al. developed a model to break down the cancer diagnostic pathway for symptomatic patients, and categorise the time periods where delay occurs into patient delay, doctor delay or system delay (see Figure 1).15

The patient interval concerns the period of time from when a patient becomes aware of the first symptom that may indicate an underlying cancer, to the point where they consult a GP for the first time. This interval can be influenced by a number of patient factors, such as health literacy, socioeconomic status and cultural beliefs, as well as service factors, such as availability of GP appointments. Published data from the first NCDA in 2010 showed the median recorded patient interval was 10 days, with a range of 0–38 days, and 56% of patients presented “promptly” (which was defined by the study authors as within 14 days of

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**Table 1. Routes to cancer diagnosis in England (2006-2008) for all patients and tumour types (adapted from Elliss-Brookes et al, 2012)**

<table>
<thead>
<tr>
<th>Route to diagnosis</th>
<th>Proportion of cancers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screen-detected</td>
<td>5%</td>
</tr>
<tr>
<td>Two-week wait (2WW) pathway</td>
<td>26%</td>
</tr>
<tr>
<td>GP non-2WW referral</td>
<td>21%</td>
</tr>
<tr>
<td>Other outpatient route</td>
<td>10%</td>
</tr>
<tr>
<td>Elective inpatient</td>
<td>6%</td>
</tr>
<tr>
<td>Emergency presentation</td>
<td>24%</td>
</tr>
<tr>
<td>Post-mortem (death certificate only)</td>
<td>1%</td>
</tr>
<tr>
<td>Unknown</td>
<td>8%</td>
</tr>
</tbody>
</table>

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1. Elliss-Brookes et al. (2012)
2. The relationship between cancer symptoms and stage at diagnosis has recently been explored by Koo and colleagues, who found that the proportion of patients diagnosed at stage IV varied significantly depending on the symptom at presentation. Only three symptoms (neck lump, chest pain and back pain) were associated with an increased odds of stage IV cancer, whether they were the only presenting symptom or they occurred alongside other symptoms. For 13 of the 20 symptoms assessed in this study, more than half of the patients presenting with them had cancer at stage I–III. The authors concluded that for a number of symptoms that could indicate an undiagnosed cancer, the majority of patients will not have a stage IV cancer at diagnosis.

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onset of symptoms). Prompt presentation varied significantly between cancer types, from 74% for bladder cancer to 34% for oro-pharyngeal cancer, which is likely influenced by the specificity of the common symptoms for each cancer type and how alarming they may be to the patient (eg frank haematuria for bladder cancer vs sore throat for oro-pharyngeal cancer).

The primary care interval for cancer diagnosis relates to the time between when a patient first presents with one or more symptoms that could relate to an undiagnosed cancer to a referral from primary to secondary care. This period could include one or more consultations with a GP, with some initial investigations being arranged by the GP, before making a referral for diagnostic testing. It does not relate to cancers diagnosed following an emergency presentation, or those incidentally found from a referral for a different condition. The median primary care interval from the most recent NCDA was five days, with an interquartile range of 0–27 days; 74% of patients had three or fewer GP consultations before being referred, and the most common reasons for having more than three consultations were that symptoms were suggestive of a different diagnosis or a patient’s co-morbidities blurred the picture for the clinician trying to make a diagnosis.

Reducing delays to cancer diagnosis

GP practices can aid efforts to improve the early diagnosis of cancer for their patients in a number of ways (see Table 2). National screening programmes for cervical, breast and bowel cancer are all currently available to sections of the UK population. Cancer screening programmes aim to detect cancer in asymptomatic patients to increase early diagnosis and treatment, although their cost effectiveness is dependent on reaching a minimum level of participation. Participation rates vary between screening programmes in the UK, with 57.7% of eligible participants taking up bowel cancer screening in 2017/18 compared to 71.1% for cervical cancer and 71.4% for breast cancer. Participation is increasing for bowel cancer, static for breast cancer, and declining for cervical cancer. Measures that GP practices could take to increase participation for their patients include text message reminders, extended hours appointments for cervical screening for women who work during business hours, and targeted support for patients groups with low uptake (eg patients with learning difficulties, mental health problems, or from black and minority ethnic backgrounds).

The public’s symptom awareness is a factor that can affect the patient interval in the cancer diagnostic journey. NHS England started the ‘Be Clear on Cancer’ campaign in 2012. It aims to increase earlier presentation of possible cancer symptoms by educating the public about which symptoms to look out for and emphasising that it is legitimate to talk to GPs about these symptoms. Evaluations of these campaigns for lung and bowel cancer symptoms showed an increase in public awareness of key symptoms, with no clear evidence of lowering barriers to visiting their GP. There was, however, a demonstrated increase in urgent GP cancer referrals and a shift to earlier stage diagnosis of lung cancers following the campaign. These findings appear slightly contradictory, and work is ongoing to identify and address barriers to accessing GPs for patients with possible cancer symptoms.
Cancer-focused charities, such as Cancer Research UK, and tumour-specific charities, such as Prostate Cancer UK, have a wide range of electronic and paper-based information materials that are targeted at public education. GP practices and pharmacies could display these materials in waiting areas and disseminate them via social media accounts to improve cancer symptom awareness in their local populations.

Clinicians assessing symptomatic patients in primary care consultations have a range of resources to help them identify patients with a possible cancer that may require further investigation and/or referral for diagnostic tests. The Suspected Cancer: Recognition and Referral guidance from NICE (NG12) outlines symptoms, signs and investigation results that warrant a two-week wait (2WW) suspected cancer referral.20 Risk stratification and decision support tools are being developed to help clinical assessment of symptomatic patients. The CAPER studies, led by Prof Willie Hamilton, developed a range of tumour-specific risk assessment tools (RATs), which show the positive predictive value (PPV) of a symptom or combination of symptoms for an undiagnosed cancer (see Figure 2).21 The use of RATs and their impact on cancer diagnoses in primary care is currently under investigation in the ERICA trial (www.theericatrial.co.uk).

The QCancer score (www.qcancer.org), developed by Professor Julia Hippisley-Cox and colleagues at QResearch,22 calculates the risk of an undiagnosed cancer for an individual patient across a range of tumour sites (see Figure 3). The risk calculator has been developed and validated in primary care.

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**Figure 2.** Risk assessment tool (RAT) for colorectal cancer, developed from the CAPER studies. The first row shows the positive predictive values (PPVs) for a single symptom (with 95% CIs), with subsequent rows showing the PPV for a given symptom combination. From Hamilton et al, 200921

**Figure 3.** A QCancer® score for a 65-year-old male with nocturia and a family history of prostate cancer (screenshot from www.qcancer.org on 20 August 2020)
patient databases, but its impact on clinician decision-making and patient outcomes is not known. A recent review in the British Journal of General Practice concluded more work is needed to find the optimal method for implementing decision support tools for cancer diagnosis in primary care.23

GP practices can gain a greater understanding of their own performance in cancer diagnosis through participation in the NCDA (www.cancerresearchuk.org/health-professional/diagnosis/national-cancer-diagnosis-audit). Practices are provided with a list of their patients with a cancer diagnosis in the relevant national cancer registry over the audit period. Clinicians then review the patient’s records and enter data into a secure online platform. At the conclusion of the audit, practices receive a report on their cancer diagnostic performance and suggestions for improvement. Facilitators from Cancer Research UK are also available to attend practice meetings and help to understand their results from the NCDA.

Summary
Improving the early diagnosis of cancer in the UK will help with efforts to close the cancer survival gap in the UK population relative to other comparable countries. Given most cancers occur in patients who present to their GP with symptoms before receiving a diagnosis, and some cancer screening is delivered through GP practices, primary care is a key setting for early cancer diagnosis initiatives to be implemented. A range of possible measures can be taken to increase participation in cancer screening, raise awareness of symptoms of possible cancer among populations, and support clinical decision making to identify which patients may benefit from an urgent cancer referral for diagnostic testing.

References

Declaration of interests
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Dr Samuel W D Merriel is a GP and Clinical Senior Research Fellow at the University of Exeter and Professor Willie Hamilton is Professor of Primary Care Diagnostics at the University of Exeter.