Availability of cancer decision-support tools: A cross-sectional survey of UK primary care

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Abstract (250/250 words)

Background Decision-support tools quantify the risk of undiagnosed cancer in symptomatic patients, and may help general practitioners (GPs) when making referrals.

Aims: To quantify the availability and use of cancer decision-support tools (QCancer® and Risk Assessment Tools). To explore the association between tool availability and two-week-wait referrals for suspected cancer.

Design and setting: Cross-sectional postal survey in UK primary care.

Methods: 4,600 GPs from a random sample of 975 UK general practices were invited to participate. Outcome measures included the proportions of UK general practices where: (1) cancer decision-support tools are available, and (2) at least one GP uses the tool. Weighted least-squares linear regression with robust errors tested the association between tool availability and number of two-week-wait referrals, adjusting for practice size, sex, age and index of multiple deprivation.

Results: 476 GPs in 227 practices responded (response rates: practitioner, 10.3%; practice, 23.3%). Cancer decision-support tools were available in 83/227 (36.6%, 95% confidence interval 30.3% to 43.1%) practices. Tools were available and likely to be used in 38/227 (16.7%, 12.1% to 22.2%) practices. In sub-group analyses of 172 English practices, there was no difference in mean two-week-wait referral rate between practices with tools and those without (mean adjusted difference in referrals per 100,000: 3.1, -5.5 to +11.7).

Conclusions: This is the first survey of cancer decision-support tool availability and use. It suggests that the tools are an underused resource in the UK. Given the cost of cancer investigation, a randomised controlled trial of such clinical decision-support aids would be appropriate.

How this fits in

Clinical decision-support tools quantify the risk of an undiagnosed cancer in symptomatic patients and may help GPs improve their selection of patients for investigation for suspected cancer. The tools are an integral part of the National Cancer Strategy, yet their uptake in general practice is unknown. Our survey - the first of the availability and use of cancer decision-support tools in the UK - reports that the paper-based and electronic tools are available to GPs in approximately one-third

(36.6%, 95% CI 30.3% to 43.1%) of UK practices and likely to be used in 16.7% (95% CI 12.1% to 22.2%).

Introduction

Diagnosing cancer quickly after patients develop symptoms is a UK priority (1). National guidelines help UK general practitioners (GPs) select which patients warrant referral and investigation for suspected cancer (2–4). This "gatekeeper" system may cause diagnostic delay (5); for example, two-week-wait referrals for suspected cancer are less likely when patients present with "low-risk but not no-risk" than when they have "alarm" symptoms (6). Clinical decision-support tools for cancer quantify the risk of an undiagnosed cancer in symptomatic patients (7). Two main types are available: Risk Assessment Tools (RATs) and QCancer® (8,9). RATs are available for 18 specific cancer sites, and use symptoms and test results to estimate the risk of cancer (8,10–17). QCancer® uses symptoms, test results and patient risk factors for six specific cancer sites (9,18–22), plus one for each sex estimating the overall risk of cancer (23,24). RATs were distributed to all 10,000 general practices in England in 2012 as mousemats and flipcharts (1). QCancer® is freely accessible on the internet (http://www.qcancer.org/).

In 2013, both RATs and QCancer® were incorporated into GP software systems and renamed collectively as "**electronic clinical decision-support tools for cancer**". For simplicity, they are hereafter called "cancer tools". RATs were integrated into the GP software system Vision (INPS, London), and QCancer® into EMIS Web (Egton Medical Information Systems, Leeds). Together, EMIS Web and Vision had 62% of the market share of GP IT systems in 2015 (25).

There is little research on the clinical utility of cancer tools, or on their availability and uptake in UK primary care (7). A recent qualitative study of a convenience sample of 126 GPs aimed to improve the understanding of how GPs use cancer tools. The study reported that 18.3% of GPs used either a RAT or QCancer®, but that overall awareness of these tools was low [Chisnell et al. submitted]. A cohort study compared the numbers of cancer investigations and diagnoses before and after the

introduction of colorectal and lung RATs to 165 general practices in England. The introduction of RATs was associated with increased diagnostic activity and additional diagnoses of lung and colorectal cancer (26). A 2×2 design trial of a GP intervention, which included the colorectal and lung RATs, found no evidence that it was associated with faster time to diagnosis of cancer in rural Australia (27). No studies have investigated the association between use of cancer decision-support tools and use of the UK's urgent referral pathway for suspected cancer. Understanding this association is important for two reasons: (1) the impact of increased referrals on resources; and (2) use of the two-week-wait referral pathway is associated with improved cancer outcomes (28).

Therefore, the primary aims of this study were to identify the proportions of general practices and of GPs with access to cancer tools, and, where there is access to tools, what proportions of practices actually use them. The secondary aim was to investigate any association between a practice's access to cancer tools and referral activity for suspected cancer.

Two main measures of cancer referral activity are available in the Public Health England dataset. The first is a diagnostic process indicator – the age- and sex-standardised number of referrals adjusted for practice size – and is reliable at the practice level (29). This indicator is suitable for assessing whether use of the tools is associated with increased number of referrals and potential impact on resources. The second is a diagnostic outcome indicator – the proportion of patients undergoing a two-week-wait referral who are subsequently diagnosed with cancer (conversion rate). However, the small numbers of cancers diagnosed per practice make this measure unreliable (29), so we decided against using it as an outcome measure for investigating the association between use of tools and cancer outcomes.

Methods

This was a cross-sectional postal survey in UK primary care. The questionnaire was planned using the best practice guidelines for survey design, and was further reviewed and edited by the originators of RATs (Hamilton) and QCancer® (Hippisley-Cox and Coupland). Images of the paper-based tools and screenshots of the electronic cancer tools were included to ease their identification. Questionnaires included a general practice identifier, but not the name of the responding GP. The questionnaire was piloted with five GPs for its clarity and design. To measure tool usage, GPs were asked how likely they would be to consult desktop or electronic tools in a patient with symptoms of possible cancer, using a four-point Likert scale: very likely, likely, unlikely and very unlikely (30). Participants were asked to select any aspects of the tools they found helpful, from a list of positive aspects of lung and colorectal cancer RATs reported previously (26,31,32). Participants were also asked to rank in order of usefulness the three main interactive functions of the electronic tools: ***Alert/prompt*** cancer risk scores appear automatically once a patient's electronic notes are opened, if there is a risk of any individual cancer ≥2%; ***Symptom checker*** GPs can request a patient's cancer risk; and ***Searches/report*** GPs can search records and produce summaries of patients ranked by cancer risk. The questionnaire, covering letter and information sheet are available from the authors. The questionnaire had no free text comments section; however, any written comments, or comments sent by email or phone, were recorded (see Supplementary material).

The survey was administered by a commercial firm, Binley's (www.binleys.com). It was conducted at the practice level, reflecting how practice software decisions are generally made. The invited population was general practices in the UK and clinically active GP partners/principals, sessional GPs (including salaried and locum GPs) and GP registrars. For 5% precision, assuming a population proportion of 50% of practices with access to a tool and adjusting for the clustered design, we estimated a sample size of 392 general practices was required at the 95% confidence level. We estimated a 40% response rate, so obtained a random probability sample of 975 general practices

from Binley's (33). Questionnaires were sent to all GPs (n=4,350) and registrars (n=250) in these practices in July 2017, with a follow-up questionnaire for non-responding practices one month later. The data collection stopped 14 weeks after reminders were issued. To incentivise participation, a charitable donation of £7.50 (to Cancer Research UK and Macmillan Cancer Support equally) was made for the first 400 replies.

Analyses

If any single GP reported that they had access to cancer tools, it was assumed that this was true for all other GPs at that practice. We used simple descriptive statistics for access to and use of cancer tools. For completeness, GP- and practice-level responses are reported. Survey responses from English practices were linked to the Public Health England dataset. Referral activity was measured using the practices' age- and sex-adjusted number of two-week-wait referrals for suspected cancer per 100,000 head of population (29). The association between practice tool availability and two-week-wait referral rate was estimated using weighted least-squares regression with robust errors, adjusted for the practice's index of multiple deprivation (34–37).

Results

Sample characteristics

Responses were received from 473 GPs and 3 GP registrars in 227 practices. The response rate at the practice level was 23.3% and at the practitioner level, 10.3%. Responding practices had a median of 6 GPs (interquartile range (IQR), 4 to 8), of whom a median of 2 (IQR 1 to 3) responded. The mean within-practice response rate was 43.7% (95% confidence interval 39.3% to 48.1%). Unprompted comments indicated that lack of time (n=12) and lack of awareness of the tools (n=6) were the most common reasons for non-response. 294 (61.8%) of responders had been practising for 11 years or more; 299 (62.8%) were working between 5 and 8 sessions per week (Supplementary Table 1). EMIS Web was the most frequently used IT software (96/227, 42.3%), followed by TPP SystmOne (74/227,

32.6%) and INPS Vision (32/227, 14.1%), largely matching the national market share of these software packages (Supplementary Table 2).The distribution of practices by Index of Multiple Deprivation was broadly representative of practices in the UK (data not shown).

Access to a paper-based cancer tool in mousemat or flipchart form was reported by 63 of the 476 (13.2%) GPs. At the practice level, tools were available in 51 of the 227 (22.5%, 95% CI 17.2 to 28.5%) practices (Table 1). The "other" tools are listed in Supplementary Table 3, and consist of national guidelines or summaries thereof, which do not quantify the risk of undiagnosed cancer. Of the 63 GPs with access to a mouse mat or flip chart, 39 (61.9%) reported that they were unlikely or very unlikely to use it during a consultation with a patient with possible symptoms of cancer. The participants' choices from a selected list of helpful aspects of the paper-based cancer tools are reported in Table 2.

The electronic cancer tool was downloaded or activated on the IT system of 58 of 476 GPs (12.2%) (Table 3), equating to a practice level of 42/227 (19.0%, 14.0% to 24.6%). Practices using EMIS Web and INPS Vision were equally likely to have downloaded/activated the software (n=32/96, 33.3% EMIS Web, n=10/32, 31.3% INPS Vision) (Table 4). Of the 476 GPs, 174 (36.6%) were unaware of electronic tools, and 39 (8.2%) reported that they would like to have them but that they are not available for their system.

Of the 58 GPs with access to the electronic cancer tools, 17 (29.3%) reported having integrated it into their practice, and 9 (15.5%) having received training. Only 5 GPs had both received training and had integrated the tool into their practice. At the practice level, training had been received by at least one GP in 6 (14.3%) practices with access to the tool. The tool was integrated into the practice of at least one GP in 15 (35.7%) practices.

The "alert prompt" and "symptom checker" functions were deemed the most useful by 16 (27.6%) and 14 (24.1%) of the 58 GPs with access to the tool, respectively. Two-thirds (39/58,

67%) reported that they would be unlikely or very unlikely to use an electronic cancer tool to assess a patient whose symptoms may represent cancer. The participants' choices from a selected list of helpful aspects of the electronic cancer tools are reported in Table 2.

Overall, of the 476 GPs, 112 (23.5%, 95% CI 19.7% to 27.6%) had access to a cancer tool in either paper or electronic format, or both. At the practice level, this equates to at least one GP with access in 83 practices (36.6%, 30.3% to 43.1%). Of the 227 general practices, 38 (16.7%, 12.1% to 22.2%) contained at least one GP who had access to the tools and was likely or very likely to use them.

Association between use of tools and two-week-wait referral activity

Of the 172 practices in England with published two-week-wait referral and conversion rates, 68 had access to either a paper or electronic cancer tool. There was no difference in mean two-week-wait referral rate between practices with or without access to either type of tool, after adjusting for index of multiple deprivation (mean difference 3.1 referrals per 100,00, –5.5 to +11.7, per 100,000) (Table 5).

Discussion

Summary

This is the first UK-wide survey of the availability of cancer tools. These tools, in paper or electronic format, are available to GPs in approximately one-third (36.6%, 95% CI 30.3% to 43.1%) of UK practices. The proportion of general practices where at least one GP had access to the tools and was likely or very likely to use them was 16.7% (95% CI 12.1% to 22.2%). There are no current plans to re-release paper-based tools, with the expectation that the electronic version will become the norm. Therefore, the 19.0% (14.0% to 24.6%) with access to the electronic version may be the more important measure. Currently, the tools are only available via EMIS Web and INPS Vision, and approximately one-third of the practices using these software systems had opted to download or activate them. The software will shortly be

integrated into SystmOne, with approximately 33% of the UK market share. Between them, EMIS Web, SystmOne and INPS Vision represent over 95% of the GP software systems available (25); therefore, in the near future it is reasonable to assume that nearly all GPs could access tools, should they choose to download/activate them.

It could be argued that use of the tools risks overwhelming secondary care resources; however, we found no evidence of an association between tool availability and an increase in the number of two-week-wait referrals at the practice level. The inability to find differences may be because the tools have only been available for a short while and are not yet embedded in clinical practice. To assess the effectiveness of the tools future studies will need to consider the two-week-wait referrals and the impact these have on stage at diagnosis and survival. Our finding that the tools are an underused resource in the UK suggests that there is potential to explore the effectiveness of these tools on appropriate referrals to improve cancer outcomes within a randomised controlled trial.

Strengths and limitations

Our selection of a 40% response rate had seemed reasonable, based on a reported value of 61% (95% confidence interval 59% to 63%) in 2011, and adjusted downward to reflect the current workload crisis in general practice (33,38). However, our achieved sample was smaller than planned, resulting in wide confidence intervals. The low response rate probably reflects high GP workload, as volunteered by practice managers and reported elsewhere (38) (Chisnell et al. submitted). Responder bias is important to consider, given our low response rate. Our study would overestimate tool availability if responders are more likely than non-responders to have access to the tools. However, the proportion of practices with computer systems supporting electronic tools was not overrepresented in our sample: 57% of responding practices had Vision and EMIS systems – very similar to the national picture of 62%. This suggests that the response rate is unrelated to access to tools via the software used

at the practice, and that the effect of responder bias on the estimates of tool availability and use is likely to be small. The possibility remains that responses to questions about use of the tools may have been influenced by GPs' cognitive biases. Furthermore, it could be argued that practices that have chosen to access the cancer tools are more engaged in the early cancer diagnosis framework than practices who have not. This might be expected to lead to overestimates of the association between use of the tools and the number of two-week-wait referrals.

Comparison with existing literature

There is no comparable literature on practice-level availability and use of cancer tools for cancer in the UK or elsewhere. Chisnell et al. (submitted) reported that use of cancer tools was low (18.3% of GPs), but this estimate is at the GP level.

Our finding of low levels of use of cancer tools are supported by qualitative studies reporting that the cancer tool's screen alerts increase the risk of disuse through "prompt fatigue" (31,32), and generally low levels of awareness (Chisnell et al submitted).

Implications for research and/or practice

This study and previous qualitative work suggests that improvements in design and training of tools may increase uptake (26,32,39). Any training should encourage GPs to maximise symptom recording in a patient's medical record, using a code rather than text fields. This is because the algorithms rely on coded data, and omission of data recorded in text fields is associated with bias (40).

As the levels of tool uptake are relatively low, it remains possible to carry out a randomised controlled trial to assess whether these tools are genuinely helpful in improving the selection of patients for investigation and to assess the impact on resource use in a cost-effectiveness framework. The potential benefits of improved patient selection include better targeting of

investigation resources, earlier diagnosis and reduced treatment costs (26,39,41–46). Such a trial should include a study of barriers to use, and ways to overcome them.

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