Examinining variations in GP decision making: A factorial study using web-based patient vignettes

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### Abbreviations & Glossary of Terms

<table>
<thead>
<tr>
<th>Abbreviation</th>
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<tr>
<td>CAPER</td>
<td>CAncer Prediction in ExeteR</td>
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<tr>
<td>CPD</td>
<td>Continuing Professional Development</td>
</tr>
<tr>
<td>GP</td>
<td>General Practitioner</td>
</tr>
<tr>
<td>ICBP</td>
<td>International Cancer Benchmarking Partnership</td>
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<tr>
<td>IRAS</td>
<td>Integrated Research Application System</td>
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<tr>
<td>NCIN</td>
<td>National Cancer Intelligence Network</td>
</tr>
<tr>
<td>NCWT</td>
<td>National Cancer Waiting Times</td>
</tr>
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<td>NHS REC</td>
<td>National Health Service Research Ethics Committee</td>
</tr>
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<td>NICE</td>
<td>National Institute of Health and Clinical Excellence</td>
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<td>NRES</td>
<td>National Research Ethics Service</td>
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<tr>
<td>NSCLC</td>
<td>Non-small cell lung cancer</td>
</tr>
<tr>
<td>PCRN</td>
<td>Primary Care Research Network</td>
</tr>
<tr>
<td>PI</td>
<td>Principal Investigator</td>
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<td>PPV</td>
<td>Positive Predictive Value</td>
</tr>
<tr>
<td>PRU</td>
<td>Policy Research Unit</td>
</tr>
<tr>
<td>QOF</td>
<td>Quality and Outcomes Framework</td>
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<td>R&amp;D</td>
<td>Research and Development</td>
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<td>UCL</td>
<td>University College London</td>
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CHIEF INVESTIGATOR
I accept ultimate responsibility for the contents of this protocol.

Signed

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RESEARCH GOVERNANCE SPONSOR
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1. Summary

Lung cancer patients in the UK have lower survival rates than patients in other comparable countries. Delays in diagnosing lung cancer may be responsible for this lower survival. The reasons for this delay are manifold but researchers have found the interval between patients’ first presentation to their GP with symptoms and referrals for further investigation can vary. While some patients are referred very quickly, others may visit the GP several times over several months before they are referred. It is not clear why referral delays exist for some patients and not others, or how they vary between GPs.

In order to address the Government’s priority to improve earlier diagnosis of cancer and reduce inequalities, we are seeking to understand how GPs make decisions about which patients they refer for further investigation when patients present with common symptoms that may indicate an increased risk of lung cancer. We will also examine the extent to which their decisions vary depending on patient or GP characteristics.

We will employ an innovative method to study GP behaviour. A sample of GPs will be asked to conduct six simulated virtual patient consultations delivered through an interactive website. They will first watch a short video of patient actors reporting a symptom that might indicate lung cancer. They then seek further information on the ‘patients’ by typing in questions or selecting options on the website. At the end of the ‘consultation’, GPs will record their management decisions. After the six ‘consultations’ they will complete a short survey on the reasons behind their decisions. Because the application is online, GP participate in the study on the computer in their consulting rooms during their working day.

The findings for this study are intended to inform interventions to help GPs in making decisions when patients present with symptoms that may indicate lung cancer.
2. Background

To achieve our ambition that cancer mortality and survival rates should match the best, it will be essential to prevent more cancers developing in the first place and to ensure they are diagnosed while the cancer is at an earlier stage. Tackling inequalities will be fundamental to this.

Improving outcomes: A Strategy for Cancer, Jan 2011, p34

Survival for lung cancer in the UK is lower than comparable countries. Diagnostic delays are thought to play a major role in these poorer survival rates. Allgar and Neal (2005) identify delays in primary care (from first presentation in primary care to referral for further care or diagnostic investigation) as a major factor in the pathway from symptoms to diagnosis of lung cancer.\(^2\) It is important to acknowledge, however, that the extent to which earlier diagnosis could lengthen survival or improve other outcomes in lung cancer has not been quantified and may vary depending on factors such as the stage and size of the cancers detected.\(^3\) Nevertheless, as illustrated in the most recent NICE guidance, early diagnosis is still a priority in lung cancer care.\(^4\)

According to Macleod et al’s systematic review of the literature (2009), there is some evidence of inequalities in diagnostic delays by patient social group. However, these are not consistent across studies.\(^5\) In addition, it is not well understood how nonclinical factors (ie sociodemographic characteristics of the patient or GP; characteristics of the practice/health system; nature of GP-patient interaction) affect GP decision making. This understanding is needed in order to design interventions to improve early diagnosis and reduce any variations due to nonclinical factors.

Using factorial vignette study designs whereby patient characteristics and presentation can be controlled, it is possible to study how GPs’ decisions vary by patient characteristics. Indeed, the International Cancer Benchmarking Partnership is using text-based vignettes to examine international variations in GP referral for lung cancer.\(^6\) However, vignette studies may not provide the same findings as studies of actual practice.\(^7\) As highlighted by Raine (2002), “Written vignettes exclude a host of factors shown to affect physician response, including auditory and visual cues such as the patient’s age, ethnicity, social class, physical appearance, non-verbal behaviour and voice quality, as well as organisational and structural features.”\(^8\) Video technology can overcome some of these limitations - it enables both verbal and non-verbal gestures to be incorporated into
vignettes. A web-based platform can further promote authenticity by enabling GPs to interact with the 'patient' and to view the vignette in their normal clinical context (ie in the surgery). Interactive multimedia vignettes (either CDROM- or web-based) have been used with some success to examine GP decision making with respect to referral for symptoms of depression or suspected cardiac problems. This technology has not been used before to examine decision making with respect to cancer.

3. Study objectives

Aims
To examine the constellation of clinical and socio-demographic characteristics associated with appropriate and inappropriate management decisions with respect to patients with symptoms of suspected lung cancer.

Objectives
To
- Identify factors associated with variation in management decisions
- Examine how management decisions vary by nonclinical characteristics from supply side (GP, service characteristics) and demand side (patient characteristics)
- Understand the reasons behind GP decisions

4. Design and Methods

4.1 Study design
A factorial experiment will be undertaken, introduced to GPs as a study of clinical decision making without reference to lung cancer. This is because primed clinicians may be more likely to refer their patients for more tests.

A web-based survey instrument incorporating video-based vignettes and interactive text will present descriptions of patients with lung cancer symptoms. This will capture clinicians' decisions about how to manage such symptoms. In a subsequent web-based survey, GPs will also be asked about factors that influenced their decision.
4.2 Recruitment strategy

The recruitment strategy is informed by the ICBP study currently underway (personal communication, Hamilton 2011) to ensure that the sampled GP population does not come from the same sample as those selected for the ICBP study (recruited from the South West and North East of England).

We seek to recruit a diverse range of GPs and practices. Practice data from the National Cancer Information Network’s publicly available general practice profiles (conversion from referrals (% urgent referrals that result in a diagnosis of cancer) and rates of cancer detection (% of cancers referred through GP urgent referrals)) will be used to characterise participants in terms of their cancer referral behaviour. In addition, where possible, we will seek diversity in other practice characteristics (i.e. small and large practices in urban and rural locations, with deprived and affluent populations) using data from the National General Practice Profiles (also publicly available).

To maximise practice recruitment and GP participation, service support costs will be sought for practice time for the study preparation (eg to ensure GP systems are able to run the application, booking out time in GPs’ diaries to complete each vignette). GPs’ time to complete the vignettes will be reimbursed at £80/hour. We will also provide a certificate upon completion to enable GPs to apply for CPD accreditation. If feasible we will provide feedback to GPs following their participation.

The process of recruitment is described in section 5.

4.2.1. Inclusion criteria

All GPs within participating areas will be invited to participate. GPs registrars who undertake unsupervised consultations and with similar duration appointment to fully qualified GPs will also be eligible to take part.

4.2.2. Exclusion

Trainee GPs (who undertake consultations under supervision and with longer appointment slots).
4.2.3. Consent
Research governance advice obtained indicates that consent is not required. However, on the registration form that GPs need to complete to receive a study login and participate in the study, GPs will be advised that returning this form constitutes consent to take part in the study. (See study documentation in Appendix 2)

4.3 Data collection instruments

4.3.1. GP registration(s)
Before participation, a short registration form will be sent to participants to collect the socio-demographic characteristics of GPs and their professional role (partner/salaried/locum). (See study documentation in Appendix 2)

4.3.2. Vignettes
Each GP will ‘see’ six vignettes. We have constructed 36 descriptions containing all possible combinations of four experimental factors. The first experimental factor represents three levels clinical risk of lung cancer. These levels are:
- High risk (designed to represent appropriate management = order chest x-ray);
- Medium risk (designed to represent appropriate management could be order a chest x-ray or watch & wait with appropriate safety netting) and
- Low risk (designed to represent appropriate management = watch & wait).

The risk profiles have been constructed from a combination of symptoms, ages and smoking status and are shown in Appendix 1. They are based on NICE guidance for management of lung cancer, Rubin et al.’s audit of general practice describing commonly presenting lung cancer symptoms and age-specific positive predictive values supplied by Prof. Willie Hamilton from the CAPER case-control study dataset, which quantified the level of risk associated with different symptom combinations. Each GP will see two vignettes from each level of risk.

The remaining experimental factors are drawn from patient characteristics:
- ethnicity – 3 (white, Afro-Caribbean, South Asian)
- socioeconomic circumstance - 2 (affluent, disadvantaged)
- gender - 2 (male, female)
15 actors representing each of the possible combinations of ethnicity, gender and socioeconomic circumstance have been filmed portraying patients for each of the vignettes.

The content of the vignettes was informed by a literature review, the vignettes used in the International Cancer Benchmarking Partnership (ICBP) qualitative study and in consultation with Willie Hamilton. One of the vignettes also aligns with those to be used by Robinson et al in their qualitative study of GPs' diagnosis of lung cancer in Hull to ensure maximum comparability between PRU studies. The characterisation of patient symptoms, ethnicity and socio-economic circumstances in the vignettes has been informed by a rapid review of the literature, consultations with expert patients and GPs.

Each vignette is displayed using a multimedia application to allow interaction between the GP and patient actor such that the GP can enquire about duration and severity of symptoms, co-morbidity, risk factors and results of investigations (see Figure 4-1). GPs routinely book 8-10 min appointments per patient. We have designed the vignettes so they could be completed in roughly the same amount of time per vignette as a standard face to face consultation.

Figure 4-1. Screen grab showing how a vignette appears in the application and interactive sections

4.3.3. GP decision survey
GPs will be asked to complete a short questionnaire after all six vignettes to capture the factors that influenced their decisions. (See Appendix 2)

4.4 Statistical considerations
All the data items expected to comprise the dataset are listed in Appendix 3.
4.4.1. Outcome measures
Primary outcome: the proportion of patients referred for chest x-ray (or referral to a lung cancer multidisciplinary team), by risk group, and effects on this of patient characteristics (ethnicity, socioeconomic circumstance, and gender), GP characteristics (sociodemographics, position within practice and survey GP responses) and practice characteristics (eg size of registered population, cancer referral ratios, conversion/detection rates).

Secondary outcome: likelihood of lung cancer as a diagnosis (not considered at all, possible, likely, most likely diagnosis).

4.4.2. Sample size
We will contact 600 GPs with an aim of achieving a response from 216. This is sufficient sample size if each GP sees 6 vignettes in total. Thus a total of 1296 vignettes will be viewed. This means that each of the 36 patient combinations will be viewed 36 times. Each risk group will be viewed 432 times, each sex 648 times, each ethnic group 432 times and each circumstance group 648 times. This will give a range of statistical power for various main effect comparisons. For example between two risk groups, assuming a 20% variance inflation factor for clustering of GPs/patients, 432 in each risk group would give 95% power to detect a difference of 10% vs 20% referral. For a difference between circumstance groups, 648 in each group would give 85% power for the smaller difference of 5% vs 10%. Using data from public health intelligence and observational studies of symptoms, we estimate it is reasonable to expect a difference in effect size between 5 and 10%.

4.5 Analysis

4.5.1. Main analysis
Variations in the primary outcome (referral for chest x-ray) will be examined by:
- Level of risk
- Socio-demographic characteristics of the patient (gender, ethnicity, socioeconomic circumstance)
- characteristics of the GP & practice
Analysis will be informed by the findings of the literature review (ie the hypothesis/es that will be tested), but it is envisaged we will conduct a multilevel logistic regression to take account of clustering eg at the level of GP, patient actor, practice or geographical area.
To analyse the secondary outcome (likelihood of lung cancer as a diagnosis estimated by the GP) we shall analyse by multilevel linear regression models, after angular transformation. The same covariates are of interest as for the primary outcome. In particular, how strongly the level of likelihood (not likely, unlikely or probable) relates to the three-level risk group is of interest.

4.5.2. Secondary analyses
The secondary analyses will also be informed by the study's hypotheses, but it is envisaged we will examine further how GPs make decisions through examination of the factors influencing decisions which were captured in the survey after the vignettes (see section 4.3.2).

5. Study procedures

5.1 Recruitment and consent
We will first recruit a small number of GPs first through the educational and training networks of the GP advisor (AB) network in Barnet in order to streamline study recruitment and completion processes. We then plan to recruit the majority of GPs through PCRNs across London and in the North East of England. If necessary, recruitment will be expanded to other geographical areas to ensure we reach the target number of participants.

The process for recruitment is outlined in the flowchart shown in Figure 5-1. Practice research leads (and individual GPs where possible) will be contacted to alert them about the study. Those that express an interest in taking part will be asked to provide details of GPs’ internet access to ensure that participants will be able to view the application fully. Researchers will contact practices where they need to install more updated browser software, and guide them through this process if required.

It is anticipated that set up time will be required for:
- checking and updating browser specifications and if necessary ensure the system can be viewed through any filters/firewalls. This task would be carried out by practice
managers or practice data managers with support by the research team (estimated time 30 minutes).

- GPs to register to receive study login details and familiarise themselves with the study application (ie reading the help file, watching a 3-minute demo video, conversation with research team if required) (estimated time 15 minutes)

Set up times were estimated through initial pilots with GPs in May. Further estimates will be obtained through a second round of piloting in August. Service support costs for practices to undertake this preparation will be sought. Before service support costs can be invoiced, practices will need to confirm that browsers meet the specifications required and GPs have viewed the help files.

### 5.2 Data collection

A flowchart (Figure 5-2) shows how GPs will progress through the study. After receiving an initial invite to participate, GP participants can set a password and login to the website. They will enter a virtual ‘waiting room’, with a list of ‘patients’. Clicking on a ‘patient’ will take the GP into a simulated consultation.

GPs will not see all their 6 ‘patients’ at one sitting. Instead, each week 2 new patients will become available for them to perform a ‘consultation’. GPs will be asked to remain involved in the study for a period of at least 3 weeks. Participating practices will be asked to schedule a ‘consultation’ during one of GPs’ appointment slots in their regular working day. Seeing the ‘patient’ as part of their routine clinic will be more realistic than completing all 6 ‘consultations’ at once, as it is unlikely that a GP would see several patients with symptoms resulting the same diagnosis in a row. This will hopefully reduce the likelihood of the GP being primed to refer for tests for lung cancer every time. After 6 consultations, GPs will complete a short survey. They will then receive a form to sign from the research team to pay £80 for their participation.

GPs involvement in the study is expected to take an hour in total (7-10 minutes per consultation with an additional 5-10 min to complete the survey). If GPs do not complete each stage of the study illustrated on the flowchart within the expected time frame, they will receive up to two email reminders and a follow up call to identify any problems. If there is still not response at this stage, they will be considered to have dropped out of the study.
Figure 5-1. Flowchart of recruitment process
Assessment of safety

There are no safety issues attached to this study since there will be no intervention in individual cases.
7. Direct access to data and documents

The investigator(s)/institution(s) will permit study-related monitoring, audits, and review by authorised governance bodies, and will allow direct access to source data/documents if required.

UCL recognise that there is an obligation to archive study-related documents at the end of the study (as such end is defined within this protocol). The Chief Investigator confirms that he/she will archive the study master file at UCL for insert 20 years from the study end.

8. Ethical and legal issues

Approval from an ethics committee is not required because study participants are healthcare professionals, recruited by virtue of their professional role (GAfREC, paragraph 1.90).13

We will however seek sponsorship through UCL. We will also seek to obtain NIHR Portfolio adoption and local R&D approvals to maximise opportunities for recruitment through Primary Care Research Networks.

9. Committees and oversight

Updates on the project will be shared with the PRU through the regular PRU meetings.

Additional scientific and clinical input has been provided by those working on related PRU project streams at key stages of preparation and data collection:

- Professor Willie Hamilton (University of Exeter)/ Professor Greg Rubin (Durham University) - conducting a vignette study (delivered using a web-based platform) examining variations in GP referral behaviour for lung cancer
- Professor Una MacLeod, Dr Trish Green and Spencer Robinson (Hull York Medical School) conducting an in-depth qualitative study with GPs into early diagnosis and Primary Care

Mr Dave Ardron, Chair of the National Cancer Research Institute Consumer Liaison Group, has provided an expert carer's perspective input throughout the study. He has also coordinated input on the vignette designs from other experts on the patient perspective who
have been diagnosed with lung cancer themselves or are caring for someone with lung cancer.

Dr Anjali Bajekal GP, and Dr Mike Gocman, GP from the Primary Care Cancer Society advised on the study design and clinical authenticity of the vignettes from a GP perspective and piloted the application.

Since this study does not involve intervention in patients, a data monitoring and safety committee is unnecessary. Any remaining governance, conduct or ethics issues will be dealt with by the steering committee.

10. **Side effects and adverse events**

   Not applicable

11. **Financing and insurance**

   The study will be financed by the PRU Programme Grant. There are no serious insurance/indemnity issues.

12. **Administrative aspects**

   Other administrative aspects will be co-ordinated by the PRU and will adhere to current regulations concerning Research Governance.
13. Documentation

The following documentation (documents in bold in Appendix 2) will be submitted for R&D approval.

- **Participant Flowchart** (summarising GPs involvement in the study)
- **Practice (GP) invite** (to be sent initially from the PCRN)
- **Expression of interest form** (to be sent from the PCRN)
- **GP flyer** (available for distribution at GP events)
- **Participant information sheet** (to be sent with registration form following expressions of interest from GPs)
- **GP registration form** (online form, screen grabs shown, (to be sent with participant information sheet)
- **Post vignettes survey** (online form, screen grabs shown, administered after vignettes are completed)
- **Web-based application – demonstration & instructions for use** (to be sent following registration)
- Confirmation of funding and peer review comments from PRU application
- Signed protocol
- Signed agreement with sponsor
- Signed, abbreviated CVs for: RR JS, RS SD

**Investigator file**

In addition, the co-ordinator and PI will maintain an investigator file, which will include the following study documents:

- Correspondence
- Data log
- Delegation of duty log
- PI/Staff details

14. Publication policy

Results will be published in peer-reviewed medical journals, after submission to and approval by the Policy Liaison Officer responsible for the PRU.
Appendix 1. Risk and sociodemographic profiles for all patients

**Risk level 1: “Watch and wait” (or refer for other conditions) (PPV≤1%)**

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<tr>
<th>Patient id</th>
<th>Risk profile</th>
<th>Description</th>
<th>Gender</th>
<th>Ethnicity</th>
<th>Socioeconomic</th>
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<tr>
<td>1</td>
<td>1</td>
<td>60, Non-smoker</td>
<td>M</td>
<td>W</td>
<td>P</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>Breathlessness, Fatigue</td>
<td>F</td>
<td>B</td>
<td>P</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>Duration: 10 days</td>
<td>M</td>
<td>B</td>
<td>P</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>60y, Smoker</td>
<td>F</td>
<td>S</td>
<td>P</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>Cough, Chest pain</td>
<td>M</td>
<td>S</td>
<td>P</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>Duration: 10 days</td>
<td>F</td>
<td>W</td>
<td>P</td>
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<td>7</td>
<td>2</td>
<td>60y, Smoker</td>
<td>M</td>
<td>W</td>
<td>R</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>Cough, Chest pain</td>
<td>F</td>
<td>B</td>
<td>R</td>
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<tr>
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**Risk level 2: either ‘watch and wait’ (with safety-netting) or refer for chest X-ray appropriate (PPV~2%)**

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<tr>
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<td>85y, Smoker</td>
<td>F</td>
<td>S</td>
<td>P</td>
</tr>
</tbody>
</table>

**Risk level 3: immediate referral for chest X-ray appropriate (PPV≥4%)**

<table>
<thead>
<tr>
<th>Patient id</th>
<th>Risk profile</th>
<th>Description</th>
<th>Gender</th>
<th>Ethnicity</th>
<th>Socioeconomic</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>5</td>
<td>60y, Smoker</td>
<td>M</td>
<td>W</td>
<td>R</td>
</tr>
<tr>
<td>26</td>
<td>5</td>
<td>Breathlessness, Fatigue</td>
<td>F</td>
<td>B</td>
<td>R</td>
</tr>
<tr>
<td>27</td>
<td>5</td>
<td>Duration: &gt;1 month</td>
<td>M</td>
<td>S</td>
<td>P</td>
</tr>
<tr>
<td>28</td>
<td>5</td>
<td>85y, Smoker</td>
<td>F</td>
<td>W</td>
<td>P</td>
</tr>
<tr>
<td>29</td>
<td>5</td>
<td>Chest pain, Weight loss</td>
<td>M</td>
<td>B</td>
<td>P</td>
</tr>
<tr>
<td>30</td>
<td>5</td>
<td>Duration: &gt;1 month</td>
<td>F</td>
<td>S</td>
<td>R</td>
</tr>
<tr>
<td>31</td>
<td>6</td>
<td>85y, Smoker</td>
<td>M</td>
<td>W</td>
<td>P</td>
</tr>
<tr>
<td>32</td>
<td>6</td>
<td>Chest pain, Weight loss</td>
<td>F</td>
<td>B</td>
<td>P</td>
</tr>
<tr>
<td>33</td>
<td>6</td>
<td>Duration: &gt;1 month</td>
<td>M</td>
<td>S</td>
<td>R</td>
</tr>
<tr>
<td>34</td>
<td>6</td>
<td>60y, Smoker</td>
<td>F</td>
<td>W</td>
<td>R</td>
</tr>
<tr>
<td>35</td>
<td>6</td>
<td>Duration: &gt;1 month</td>
<td>M</td>
<td>B</td>
<td>P</td>
</tr>
<tr>
<td>36</td>
<td>6</td>
<td>60y, Smoker</td>
<td>F</td>
<td>S</td>
<td>P</td>
</tr>
</tbody>
</table>

Key to abbreviations used: PPV=positive predictive value; M=male, F=female, W=white, B=Black, S=South Asian, R=rich, P=poor
Appendix 2: Study documentation

GP decision making study participant flowchart

**RECRUITMENT & SET UP**
- GPs receive email invite to take part in study
- Interested practices/GPs contacted by UCL: ensure practice IT compatible with study application, address queries
- GP completes registration form, watches study demo & reads guidance on using application
- GP emailed study invite

**PARTICIPATION**
- Week 1: complete 2 simulated consultations
- Week 2: complete 2 simulated consultations
- Week 3: complete 2 simulated consultations & survey
- Payment & certificate of participation sent

V1: 25 July 2012

UCL Department of Applied Health Research, 1-19 Torrington Place, London WC1E 7HB
How do GPs make decisions?

DPEARMENT OF HEALTH-FUNDED STUDY
RECRUITING GPs NOW

GPs are often the first port of call for a health problem. Sometimes the diagnosis is obvious but often GPs face situations where there is real, but low, likelihood of disease.

The ways in which GPs make decisions when faced with these situations are not well understood. However, they can have big implications for patient outcomes and health service costs.

How do you make these decisions?

- Take part in an online study of GP decision making processes using interactive vignettes
- Participation takes 1 hour in total (over 3 weeks)
- You can complete it at your desk
- On completion you will be reimbursed for your time (£80) and receive a certificate for CPD

To register your interest in taking part or to receive more information, email gpstudy@ucl.ac.uk or call Dr Jessica Sheringham (020 76798286) or Rachel Sequeira (020 7679 8257)

The study does not require ethics approval but has UCL sponsorship (ref: XXXX) and has been approved by R&D (ref: XXXX)
## Participant information sheet: PCRN one page standard summary sheet for GPs

To be sent with invitation email

<<PCRN, LOCAL NHS R&D & UCL/PRU LOGOS – TO BE ADDED IF REQUIRED>>

<table>
<thead>
<tr>
<th>Title</th>
<th>An online study of GP decision-making</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIHR CRN Ref</td>
<td>#</td>
</tr>
<tr>
<td>Type of study</td>
<td>Online study of GP decision-making using interactive multimedia patient vignette</td>
</tr>
<tr>
<td>Study Overview</td>
<td>This study will examine determinants of GP decision making using a novel, interactive multimedia application. Study participants will be randomly allocated 6 ‘patients’ (actors) and will conduct virtual consultations with them online. At the end of the 6 ‘consultations’, there is a short survey to complete. The study will take place online at the participant’s practice over three occasions. Participants can decide when to login to complete the ‘consultations’. It is expected to take up to an hour in total. Practising GPs will be the participants (no patients will be involved in this study).</td>
</tr>
<tr>
<td>Principal Investigator(s)</td>
<td>Professor Rosalind Raine, University College London</td>
</tr>
<tr>
<td>Recruitment sites, PCTs</td>
<td>London wide; North West region</td>
</tr>
<tr>
<td>Research site (where participants are consented &amp; assessed)</td>
<td>As the study is delivered via the Internet, set up and participation in the study will take place at the participant’s practice.</td>
</tr>
<tr>
<td>Participant Recruitment End date</td>
<td>End of September 2013</td>
</tr>
<tr>
<td>Target Recruitment</td>
<td>238 GPs</td>
</tr>
<tr>
<td>Study Objectives</td>
<td>This study aims to explore the determinants of GPs’ decision making - it aims to examine the extent to which decisions vary in different situations.</td>
</tr>
<tr>
<td>GP involvement</td>
<td>GPs will express interest in the study through PCRN-GL. Details of interested GPs will be passed to the study team who will contact the GP to explain the study further. If necessary, the study team will contact practice managers to ensure practice computers are compatible with the study application. GPs complete a registration form to receive a study login and guidance on using the application. Once GPs login, they complete up to 2 virtual ‘consultations’ at a time. When they have completed 6 ‘consultations’ in total, they complete a survey. The total estimated time for participation is 1 hour per participant. Once all data have been collected and analysed, participants will receive feedback on their own and others’ decision-making processes. This will provide a learning opportunity and will count towards CPD goals.</td>
</tr>
<tr>
<td>Eligibility Criteria</td>
<td>Fully qualified practising General Practitioners and GP registrars who undertake unsupervised consultations of similar length to fully qualified GPs in the London area and in the North West of England.</td>
</tr>
<tr>
<td>Ethical and NHS Permissions</td>
<td>Ethical permission for this study is not required but UCL sponsorship and local NHS permissions are in place. Primary care organisations should ask for a local copy of approval and permission documents at the time of continuing their future involvement in the study.</td>
</tr>
</tbody>
</table>
Dear

Please find below a notification for a Department of Health-funded study, now seeking GPs in <<NAME AREA>>. Kindly read the attached information and fill out the reply form below. If you are interested or undecided, we will send additional information on the mentioned study.

The GP decisions study
GPs are often the first port of call for a health problem. Sometimes the diagnosis is obvious but often GPs face situations where there is real, but low, likelihood of disease. The ways in which GPs make decisions when faced with these situations are not well understood. However, they can have big implications for patient outcomes and health service costs.

This online study will examine GP decision making using vignettes delivered by a novel, interactive multimedia application. Practising GPs will be the participants (no patients will be involved in this study). Study participants will be randomly allocated 6 ‘patients’ (actors) and will conduct virtual consultations with them online. At the end of the 6 ‘consultations’, there is a short survey to complete. The study will take place online at the participant’s practice over three occasions. Participants can decide when to login to complete the ‘consultations’. It is expected to take up to an hour in total.

Payments to Practice (Service Support Costs) for study preparation
Service support costs have been sought for study preparation to ensure practice browsers are sufficiently up to date to view the vignettes and to provide GPs with information on using the application.

Payments and CPD to GPs for taking part
On completion GPs will be reimbursed for your time (£80) and will receive a certificate for CPD.

Ethical Approval
Ethical approval is not required for this study. Local RM&G permissions for this study have been obtained (ref:XXX)

Please answer the following questions regarding your interest in the study and reply to Selina Gann: s.gann@qmul.ac.uk

GP decision making study. Protocol version 1.11 28 January 2013
Would GPs in this practice be interested in participating in this study?

| Yes/no | One or more GPs in this practice are interested to take part |
| Yes/no | One or more GPs in this practice are interested to take part but we would like further information about the study in order to decide |

Please provide information on the practice and a key contact

<table>
<thead>
<tr>
<th>Practice name</th>
<th>Contact Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td>Email address</td>
</tr>
<tr>
<td></td>
<td>Phone</td>
</tr>
</tbody>
</table>

No. GP partners | Yes/no | Are you a registered training practice?

Please provide information on computers and internet access in the practice

<table>
<thead>
<tr>
<th>Yes/no/I don’t know</th>
<th>Is there access to broadband internet in the practice?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes/no/I don’t know</td>
<td>Is there access to MS Windows XP or above (for PCs, for Macs: Mac OS X 10.5 or above) in the practice?</td>
</tr>
<tr>
<td>Yes/no/I don’t know</td>
<td>Is there access to any of the following browsers in the practice: Internet Explorer 9, Google Chrome 10 or Mozilla Firefox 3.5 or above?</td>
</tr>
<tr>
<td>Yes/no/I don’t know</td>
<td>Are there any firewalls or other restrictions on internet access in place in your practice?</td>
</tr>
</tbody>
</table>

Note: This information will help us to support you in ensuring GPs can access the study application without problems.
Participant registration form

This form is web-based and available on: https://opinio.ucl.ac.uk/s?s=19775. A screen grab follows. A link will be sent to GPs once an expression of interest received and once it is confirmed that the vignettes can be viewed on practice computers.
GP decision-making study: Registration form

Thank you for agreeing to take part in this study of GP decision-making. To receive your login details, please complete this short form.

By returning this form you also give your consent to take part on the study. Your information will be stored securely and used for the purposes of this study only. No identifiable information will be shared beyond the study team.

1. Full name

2. Practice name

3. Please enter your email address. Note: this is the address we will use to send your login details.

4. Gender
   - Male
   - Female
   - I prefer not to say

5. Age band
   - 25-34 years
   - 35-44 years
   - 45-54 years
   - 55-64 years
   - 65 years or over
   - I prefer not to say

6. Ethnicity
   - select from list below

7. How many years since you qualified as a GP?
   - Less than 2 years ago
   - 2-5 years ago
   - 5-10 years ago
   - 10-20 years ago
   - More than 20 years ago

8. Please select your role in the practice
   - salaried GP
   - partner
   - locum
   - trainee

9. How many sessions do you work as a GP in an average week?
   - 1-4
   - 5-6
   - 7-8
   - 9-10

100% Finish
Study of GP decision making processes

Participant Information Sheet

Thank you for agreeing to take part in this web-based research study. Please read this
leaflet, which tells you about the study and what it involves, and do not hesitate to email us
at gpstudy@ucl.ac.uk if you are unclear about anything or would like further information.
This study is being carried out by researchers at University College London, working with
<<sitename>>, with funding from the Department of Health.

1. Why are we doing the study?
When patients feel unwell or experience a painful or unusual symptom, the GP is often the
first contact so the decisions that GPs make during these consultations is a major influence
on patients’ outcomes. However, the factors that influence these decisions are poorly
understood. In this study we are seeking to understand how GPs make decisions when
faced with a set of patient characteristics. Ultimately, the learning from this study should
inform interventions (for example educational initiatives or decision aids) to help GPs
in making decisions.

2. What is involved?
The study will use a web-based application to provide 6 simple, simulated consultations
using patient actors. Participation involves:

- **Registration**: you (or a practice representative) will need to complete a short form with
  basic information about your practice and yourself. You will then receive login detailed
  by email and instructions on how to use the web-based application.

- **Simulated consultations**: when you log into the application, you will see ‘patients’ in a
  virtual ‘waiting room’ (Note: not all 6 patients will be visible initially). By clicking on a
  patient, you enter a ‘consultation’, which starts with a video presentation by the ‘patient’.
  You can find out more about this ‘patient’ by asking questions or clicking on links. At the
  end of each ‘consultation’ you need to enter your management decision for this ‘patient’.

- **Short survey**: after you have completed all 6 consultations, you enter a short survey
  about decision-making in your real, every-day practice.
  Each ‘consultation’ should take 7-10 minutes with 5 minutes to complete the survey. It is
  anticipated, therefore, that your entire involvement should take no more than 60 minutes.

3. Does my practice need special computers or software to access the application?
No. You will need broadband internet access, a reasonably up to date browser (eg Internet
Explorer 9, Mozilla Firefox 3.5 or above) and MS Windows XP. If your practice computer
system does not meet these requirements or you are not sure, email gpstudy@ucl.ac.uk.
4. **Is it a test?**
   No: the study is not a test of GPs' abilities. Rather than seeking the 'right answer', we are interested in what you would actually do faced with different scenarios. In some of the scenarios you will see, an optimal management plan may not be clear.

5. **What are the benefits of taking part?**
   By participating in the study, you are helping to inform an important area of health service delivery. All GPs will be reimbursed £80 for their time on completion of the 6 vignettes and survey. Furthermore, according to RCGP guidelines participation in a research study is eligible for continuing professional development (CPD).

6. **Do I have to take part?**
   No: if you decide at any point during the study that you do not wish to take part, just email gpstudy@ucl.ac.uk. If you have not completed the study within 3 weeks, you will receive reminders by email.

7. **What will happen with my information?**
   All the information you give for this research and your contact details will be kept strictly confidential. The handling, processing, storage and destruction of data collected will be conducted in accordance with the Data Protection Act (1998).

8. **What will happen to the results of the study?**
   We will send a summary of the aggregated findings to your practice. We will also send aggregated results of the study so you can see what decisions other participants made in response to the profiles you saw.

9. **What do I do if I wish to make a complaint about the research?**
   If you wish to complain about any aspect of the research, contact the Chief Investigator, Rosalind Raine, email: r.raine@ucl.ac.uk, tel: 020 76791713. If you feel you do not receive a satisfactory response and you wish to take the matter further you should contact the UCLH Complaints Manager giving the project title and the Chief Investigator’s contact details at: Complaints Department, 2nd Floor West, 250 Euston Road, London NW1 2PQ Tel: 0845 1555 000 ext. 3413 Fax: 020 7380 9595

10. **Contacts for further information**
    If you have any questions about the study, please contact the researchers, Dr Jessica Sheringham or Ms Rachel Sequeira: Dept Applied Health Research, 1-19 Torrington Place, London WC1E 7HB ☏ 020 7679 8286 ☏ gpstudy@ucl.ac.uk

    Thank you for taking the time to read about this study
Web-based application – demonstration & instructions for use

A short demonstration of the web-based application is available on
http://www.ucl.ac.uk/stream/media/swatch?v=0c2b97c0eac6

Virtual Patient application: quick guide

This is a brief introduction to the Virtual Patient application. For troubleshooting or more detailed information about any of these steps, please view the complete guide following this.

The waiting room (for more information see page 3)
Once logged in you will be in the ‘waiting room’. Here you will see a list of patients. To begin a consultation with a patient click on their name.

The consulting room (for more information see page 4-7)
You then enter the ‘consulting room’. Here you conduct a simulated consultation with the patient. You have several options to find out information about this patient, as shown below:

1) Asking questions
Type questions you wish you ask the patient in this box. An initial question is already given.

2) Examining the patient
Select examinations or bedside tests from this drop-down list.

3) Patient information sidebar
Clicking on a heading enables you to view information from the patient’s medical records.

4) Historical notes
Notes from the patient’s most recent GP visits are available here.

New notes
Any new notes you make during the consultation will be added here.

Begin by asking the initial question “What seems to be the trouble” by clicking ‘Ask’. An initial video plays and the yellow bar will display the symptom the patient has presented with.

After this type your own questions into the question box and click ‘Ask’ or press return.
To ask a follow-up question about the current symptom/topic (see yellow bar below the question box), you must include that symptom/topic name within or after your question.

To ask about additional symptoms or topics the patient might have you do not need to name the current symptom. If you ask about an additional symptom which the patient has the yellow bar will change, and you can then ask follow-up questions about that symptom.

The ‘asking questions’ section of the help file contains detailed guidance on how to get the best out of this function.

You can use the other functions shown above to gain additional information about the patient.

**The final note** *(for more information see page 8)*

When you have finished questioning and examining the patient, click the ‘make the final note’ button to take you to the screen where you make your final management decision. You must enter a most likely diagnosis and management plan in order to complete the consultation.

**Virtual Patient application: complete guide and troubleshooting**

Welcome to the Virtual Patient application.

This interactive application replicates some aspects of a consultation but, obviously, it differs fundamentally from a real consultation. Therefore in some situations it may not respond as you would expect. This user guide gives some hints and tips to help you get the most from the system.

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  - Making a management plan 39
**After completion** 40
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**Trouble-shooting: frequently asked questions** 40

The demonstration video is available to view online at: [http://www.ucl.ac.uk/stream/media/swatch?v=0c2b97c0eac6](http://www.ucl.ac.uk/stream/media/swatch?v=0c2b97c0eac6)
Computer requirements

In order for the application to display and run correctly the computer you use will need:

For PCs:  Ms Windows XP or above  
Supported browsers: Internet Explorer 9 or above  
Mozilla Firefox 3.5 or above  
Google Chrome 10 or above  
Apple Safari 5 or above

For Macs:  Mac OS X 10.5 or above  
Supported browsers: Mozilla Firefox 3.5 or above  
Apple Safari 5 or above

All computers:  An internet connection (standard ADSL/broadband as a minimum)  
Flash player installed

Getting started

Logging on

Follow the link provided in your registration email. You should see this page:

Enter your username (given in initial registration email) and the password you have selected, and click the button to log into the application.

If you have forgotten your password click on 'contact support' (circled) to get in touch with us at gpstudy@ucl.ac.uk

Waiting room
Once you are logged in you will enter the ‘waiting room’. Here you will see a list of the patients you are currently able to consult. More patients will be added during the study until you have seen 6 vignettes in total.

To consult with a patient click on their name.

**Consulting room overview**

Once you have clicked on a patient you will enter the consulting room. Here you conduct a simulated consultation with the patient. You have several options to find out information about this patient. Note that you can ask questions, perform examinations or click on the patient information at any time during the consultation.

A display of the full consulting room is shown below – you may need to scroll down to see each some of these. Each area is discussed briefly here: a more comprehensive overview is given on the following pages.
The consultation

Beginning the consultation

To start the consultation, ask your first question. This is already displayed in the ‘ask questions’ box – “What seems to be the trouble?” – you just need to click ‘ask’.

A short video will then play in which the patient will answer your question. Their presenting symptom will also be displayed in the yellow bar below.
You can now ask the patient further questions. You do this by typing questions into the ‘ask questions’ box and clicking ‘ask’ (or pressing return on your keyboard). You may wish to ask a number of different types of questions.

1) **Questions within a symptom**

   Once a patient has told you they have a symptom (e.g. knee pain) you can ask further questions about that symptom. The current symptom or topic the patient is talking about is displayed in the yellow bar. Questions can be open or more specific, **but must always include the current symptom or topic**.

   The current symptom name can be included in your question in two different ways:
   - *as part of the question*: e.g. What makes the knee pain worse?
   - *after the question*: e.g. What makes it worse? knee pain

2) **Enquiring about other symptoms**

   You may also wish to ask the patient if they have any other symptoms. To do this you **do not need to include the current symptom's name**, for example you could simply ask “Do you have headaches?”

   The answer may be positive or negative. If it is negative you will stay within the current symptom or topic. However if you ask about a symptom which the patient does have, you will now move into this symptom and the current symptom/topic text in the yellow bar will change to show this. Further questions can be asked about this symptom by following the “questions within a symptom” instructions.

   Note: all three of these questions would yield the same response from the patient

3) **Asking about more general topics**

   You can ask about more general topics in the same way as asking about a new symptom: for example “Do you have a job?” Again the current symptom/topic text in the yellow bar will change to reflect this.

   If a topic or symptom you think is key does not yield a satisfactory answer when asking about it in isolation (as in point 2/3) consider also asking a specific question about it within a symptom – that is using the current symptom/topic name in the
yellow bar (as in point 1). For example “Are you sleeping well?” will yield a vague response, whilst “Does your knee pain affect your sleep” will be more specific.

**Returning to a previous symptom**

If you have moved out of a symptom, but still wish to ask additional questions about it, then you can return to it by asking about this symptom again. For example to return to an initial symptom of knee pain ask “Do you have knee pain?” and you will see the initial video again.

**Making notes**

You can make notes of anything a patient says in the ‘your note’ box to the right of the video display. Type your comment in here, click ‘add’ to save it, and it will appear in the ‘new notes’ section. You must click add before asking the next question or your comment will be lost.

**Conducting examinations**

You can also perform a number of examinations or bedside tests on the patient. To do this, select an option from the drop-down menu and click ‘add’ (tests are listed alphabetically, followed by examinations). Your findings will be summarised where the videos are displayed.
You can also make a note of examination results. However note that clicking 'add' alone will not do this – as for asking questions you will need to type your comments and then ‘add’.

**Reviewing patient notes and records**

You can view further information about the patient by clicking on categories in the ‘patient information’ sidebar, such as significant medical history.
Note that these will disappear from view when the cursor is moved away. You can also scroll down the screen to view notes from the patient’s most recent GP visits.

The final note
When you have finished questioning and examining the patient, click the ‘make the final note’ button to take you to the screen where you make your final management decision.

Giving your differential diagnosis
Enter your impressions of the patient’s diagnosis here: most likely, also likely and unlikely but possible.

Making a management plan
In the final box enter how you would propose to manage the patient.

Note that the vignette cannot be completed until you have given both a most likely diagnosis and a management plan.
When you have completed your final note click ‘finish’ to end the vignette.

**After completion**

**Finishing vignettes**

When you have successfully completed a vignette you will return to the ‘waiting room’. The completed vignette will no longer show in your list of patients.

When you have completed your sixth and final vignette you will receive a link to the post-consultation survey.

Please follow this link and complete the survey. When you have done this, you will have completed the study.

**Trouble-shooting: frequently asked questions**

**I have forgotten my password.**

Please contact us by clicking ‘contact support’ link in top right corner of the screen (or emailing us directly at gpstudy@ucl.ac.uk) and we will send you a link to reset it.

**I don’t know what my username is.**

This is stated in your initial registration email. If you remain uncertain then contact us (by clicking ‘contact support’ or by emailing gpstudy@ucl.ac.uk directly).

**My screen does not look like the pictures in the help file or video.**
Please contact us at gpstudy@ucl.ac.uk as soon as possible, as your computer may some additional software.

**My clinician and/or practice details are incorrect.**
Please contact us using the ‘contact support’ link in the top right corner of the screen, or by emailing us directly at gpstudy@ucl.ac.uk.

**There are no patients in the waiting room.**
For this study you will perform six consultations in total. This will be over a 3 week period, with two new patients becoming available each week - once you have completed these two patients no more will be visible until the next week. However if you believe that some new patients should already have been added, but they are not visible, do contact us by clicking on the ‘contact support’ link or emailing gpstudy@ucl.ac.uk directly.

**I’ve asked a question but received a text error message – what is going on?**
This may be for a number of reasons:
- You are exploring within a symptom but have not used the symptom name in your question. This can be resolved by typing the current symptom/topic named in the yellow bar at some point in or after your question.
- You are asking about a new topic or symptom which is not listed in the computer’s database. In this case try asking about this topic or symptom within a symptom (i.e. using the current symptom/topic name in the question).
- The information is not available. This either means that it is available elsewhere (check the ‘patient information’ sidebar) or that it is not relevant to the consultation.

**The patient says they don’t understand my question.**
This will happen if your question does not make sense, or if the patient has no answer. If you receive this response unexpectedly (and think your question is reasonable) then check that you are within the correct symptom. If you still receive this answer it means the patient has no relevant information to give you.

**The patient’s response does not make sense.**
Check the following:
- Have you included the current symptom name (if asking further about a specific symptom)? If not, typing this after your question may generate a meaningful answer.
- Are you within the symptom/topic you expect to be given your question? Use the text in the yellow bar to confirm this.
- Have you made a typing error? The system recognise some typos but not all. Resolving any errors may well solve the problem.

**Having to include the current symptom name is fiddly, can I leave it out?**
Unfortunately not – the application will not work correctly and you may not receive appropriate answers to your questions.
I want to perform an examination/bedside test which is not available. State this in your management plan on the ‘final note’ page.

I cannot see the patient's recent consultation history. Scroll down to the bottom of the page – this is displayed under ‘Historical notes’.

The patient has said something which contradicts their medical records. The patient’s medical records are up to date.

I cannot submit my final note and complete the vignette. Check that you have entered a most likely diagnosis and a management plan in the appropriate boxes – these answers are mandatory. Note that these answers both need to be at least 3 characters long: if you are still having trouble despite entering an answer in these boxes then check that the answers are longer than 3 characters.

I receive an error message when I try to submit the final note. Check the following:
- Have you entered a most likely diagnosis and management plan?
- Are these at least 3 characters long?
- Is your management plan all typed on one line – unfortunately responses separated by pressing the ‘return’ key on the keyboard will not be recognised.

I need to leave a consultation part way through. This is not ideal, but we understand it may occasionally be unavoidable. Just log out. When you log in again and return to the waiting room your patient will still be present. Simply click their name to recommence the consultation. Any notes you have made will be saved. Note that if you log out part way through making your ‘final note’ none of the information you have entered will be retained when you log in again.

I have a question which is not answered here. Do contact us at gpstudy@ucl.ac.uk, or by using the ‘contact support’ link in the top right corner of the screen.

3 top tips for using the Virtual Patient application

1) Start the consultation by clicking ‘Ask’ when the initial question is displayed in the question box
2) Always include the current symptom or topic name if asking a questions related to this symptom
3) Remember to check which symptom or topic you are currently in by checking the yellow bar
Post-consultation survey

This survey is web-based and available on: https://opinio.ucl.ac.uk/s?s=20054. Screen grabs are shown below.

Welcome to the decision making survey

Thank you for completing these six vignettes.
We would now like to ask you some questions.

This survey has three sections:
I - Decision making in these vignettes
II - Decision making in your everyday practice
III - Your clinical experience, responsibilities and lifestyle

Start

We would like to know how you made decisions in these vignettes

1. Did you refer to any other source(s) of information when completing the vignettes? Tick as many boxes as apply.
   - GP or hospital colleague
   - NICE guidelines
   - Other, local, guidelines
   - Textbook or website
   - None of the above

2. If you saw similar patients (to those in the vignettes) in your day-to-day practice, would you have referred to any of the following sources of information? Tick as many as apply.
   - GP or hospital colleague
   - NICE guidelines
   - Other, local, guidelines
   - Textbook or website
   - None of the above

20%
We would now like to know how you make decisions in your day-to-day practice

Please think about the patients you saw in the last month who you considered referring for simple procedures (such as ultrasound or X-ray) and/or to secondary care. There are no right or wrong answers, we are keen to understand what you actually do.

The following non-clinical factors may influence your decision to refer:

3 To what extent do the factors listed below influence the likelihood that you will refer a patient? Select one answer for each statement.

- The patient reports difficulties taking time off work for an appointment/diagnostic test
- The patient is a carer
- You are concerned that the patient may have side effects from the diagnostic test
- The referral/appointment/diagnostic test would be against the patient’s religious or cultural beliefs
- The diagnostic test is unlikely to give an accurate result for this patient
- If the diagnostic test is positive there are limited effective treatment options available for the patient

4 To what extent do the factors listed below influence the likelihood that you will refer a patient? Select one answer for each statement.

- The patient has a low level of spoken English
- The consultation is taking place via an interpreter
- The patient will require an interpreter for their appointment/diagnostic test
- The patient is concerned about overusing the health service
- The patient does not have a source of transport to or from the appointment/diagnostic test
- The patient’s mobility is poor
- The patient is concerned that it is expensive to travel to the appointment/diagnostic test

5 To what extent do these factors influence the likelihood that you will refer a patient? Select one answer for each statement.

- The patient is unable to recognize the seriousness of their symptom(s)
- The patient does not express their symptom(s) clearly
- You are concerned that the patient may have difficulties weighing up the consequences of different management options
- The patient is unwilling to discuss certain differential diagnoses
- The patient does not ask about other management options available
- The patient has independently researched their symptom(s) before their consultation
- The patient does not know what services are available to them
- The patient says that they do not expect the diagnostic test to be accurate
6. To what extent do these factors influence the likelihood that you will refer a patient? Select one answer for each statement.

<table>
<thead>
<tr>
<th>Factor</th>
<th>More likely to refer in most cases</th>
<th>More likely to refer in some cases</th>
<th>No more or less likely to refer</th>
<th>Less likely to refer in some cases</th>
<th>Less likely to refer in most cases</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>The patient does not appear distressed about their symptom(s)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>The patient appears anxious about the referral/diagnostic test</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>The patient appears concerned about the diagnosis and its treatment</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>You know the patient well and are familiar with their past medical history</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>The patient frequently attends with non-serious complaints</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>The patient has previously failed to turn up to primary care appointment</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>The patient has not complied with medical advice in the past (e.g. did not take medication as prescribed)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

7. To what extent do these factors influence the likelihood that you will refer a patient? Select one answer for each statement.

<table>
<thead>
<tr>
<th>Factor</th>
<th>More likely to refer in most cases</th>
<th>More likely to refer in some cases</th>
<th>No more or less likely to refer</th>
<th>Less likely to refer in some cases</th>
<th>Less likely to refer in most cases</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is not clear which test would be most appropriate to diagnose this patient's symptoms</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Younger patients are at higher risk of serious disease, and the patient is young</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Women are at higher risk of serious disease, and the patient is female</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Non-white patients are at higher risk of serious disease, and the patient’s ethnicity is not white</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Poorer patients are at higher risk of serious disease, and the patient is not affluent</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>The patient’s lifestyle puts them at higher risk of serious disease</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Your appointments are running late</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

8. What clinical experience have you had in the following specialties? Select as many as appropriate.

<table>
<thead>
<tr>
<th>Specialty</th>
<th>○</th>
<th>○</th>
<th>○</th>
<th>○</th>
<th>○</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency medicine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geriatrics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oncology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychiatry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory medicine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. Do you have any budgetary responsibility?

   In your practice? ○     ○
   As part of a clinical commissioning group? ○     ○

Do you smoke? Select one answer.

   ○ Current smoker
   ○ Ex-smoker
   ○ Never smoked

III - Your clinical experience, responsibilities and lifestyle

Finally, we would like to ask you a few questions about your clinical experience, responsibilities and lifestyle.
### Appendix 3

**Anticipated dataset for analysis**

<table>
<thead>
<tr>
<th>Type</th>
<th>Variable</th>
<th>Format</th>
<th>Values or value range</th>
<th>Method of collection</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EXPLANATORY VARIABLES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practice characteristics</td>
<td>Region</td>
<td>categorical</td>
<td>NW, Lon, EoE</td>
<td>routinely available</td>
</tr>
<tr>
<td></td>
<td>Borough</td>
<td>freetext</td>
<td>practice mgr/lead GP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>main contact</td>
<td>freetext</td>
<td>Email, phone, address, no partners</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contact details</td>
<td>freetext</td>
<td>expressions of interest form (sent to all practices</td>
<td></td>
</tr>
<tr>
<td></td>
<td>size</td>
<td>continuous</td>
<td>approached to take part)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Training practice?</td>
<td>Binary</td>
<td>Yes/ no</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Registered population</td>
<td>continuous</td>
<td>1000-10,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of partners</td>
<td>continuous</td>
<td>1 to 20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>area SE profile</td>
<td>Categorical</td>
<td>IMD score/quintile</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cancer referral ratio</td>
<td>continuous</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cancer detection rates</td>
<td>continuous</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cancer conversion rates</td>
<td>continuous</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>GP characteristics</td>
<td>Years since qualification</td>
<td>categorical</td>
<td></td>
<td>registration form</td>
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<tr>
<td></td>
<td>Age band</td>
<td>categorical</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td>Binary</td>
<td>Male female</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ethnicity</td>
<td>categorical</td>
<td>W, AC, SA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>sessions worked per week</td>
<td>categorical</td>
<td>Salaried/partner/locum</td>
<td></td>
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<tr>
<td>Vignette patient characteristics</td>
<td>Age</td>
<td>Binary</td>
<td>60 or 80</td>
<td>Determined by research factorial design</td>
</tr>
<tr>
<td></td>
<td>DOB</td>
<td>Date</td>
<td></td>
<td>researchers (entered in the system)</td>
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<tr>
<td></td>
<td>Gender</td>
<td>Binary</td>
<td>Male female</td>
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</tr>
<tr>
<td></td>
<td>Ethnicity</td>
<td>Categorical</td>
<td>W, AC, SA</td>
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<tr>
<td></td>
<td>Socioeconomic</td>
<td>Binary</td>
<td>Af, poor</td>
<td></td>
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<tr>
<td></td>
<td>Occupation</td>
<td>Freetext</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Risk profile</td>
<td>Categorical</td>
<td>High, medium, low Chest pain, breathlessness, SOB, haemoptysis, fatigue, weight loss</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Volunteered symptom (VS)</td>
<td>Categorical (or binary)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Duration (VS)</td>
<td>Categorical</td>
<td>&lt;3w, 2-4w, 4+w</td>
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</tr>
<tr>
<td></td>
<td>Asked symptom (AS)</td>
<td>Categorical (or binary)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Duration (AS)</td>
<td>Categorical</td>
<td>&lt;3w, 2-4w, 4+w</td>
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</tr>
<tr>
<td>Characteristic</td>
<td>Type</td>
<td>Description</td>
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<td></td>
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<tr>
<td>-----------------------------------</td>
<td>--------</td>
<td>--------------------------------------------------</td>
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</tr>
<tr>
<td>Smoking status</td>
<td>Binary</td>
<td>Smoker, non-smoker</td>
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<td>Alcohol units</td>
<td>Continuous</td>
<td>0-50 (? Upper limit to be confirmed)</td>
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<tr>
<td>BMI</td>
<td>Continuous</td>
<td>18-40 (approx limit)</td>
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<td>Comorbidities</td>
<td>Categorical</td>
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<td></td>
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<td>Presentation history</td>
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<td>Data completion characters</td>
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<tr>
<td>Login</td>
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<td>Date and time</td>
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<td>Date and time</td>
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<tr>
<td>Completion</td>
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<td>Date and time</td>
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<td></td>
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<td>Gp survey responses</td>
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<td>source(s) of information when completing the vignettes</td>
<td>categorical</td>
<td>GP/NICE/textbook/Other/none</td>
<td></td>
<td></td>
</tr>
<tr>
<td>source(s) of information in day-to-day practice</td>
<td>categorical</td>
<td>GP/NICE/textbook/Other/none</td>
<td></td>
<td></td>
</tr>
<tr>
<td>time off work</td>
<td>categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
<td></td>
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<tr>
<td>caregiver</td>
<td>categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
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<td>side effects</td>
<td>categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
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<tr>
<td>religious or cultural beliefs</td>
<td>categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
<td></td>
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<td>test accuracy</td>
<td>categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
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<td>effective treatment options</td>
<td>categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
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<td>spoken English</td>
<td>categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>interpreter - consultation</td>
<td>categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>interpreter - test</td>
<td>categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>patient concerns - overuse</td>
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<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>patient transport</td>
<td>categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
<td></td>
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<td>patient mobility</td>
<td>categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>patient costs</td>
<td>categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
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<td>recognise serious</td>
<td>categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
<td></td>
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<td>express clearly</td>
<td>categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
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<tr>
<td>weigh consequences</td>
<td>categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
<td></td>
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<tr>
<td>unwilling to discuss</td>
<td>categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Referral Factors (Continued)</td>
<td>Type</td>
<td>Measure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------</td>
<td>---------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other options</td>
<td>Categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independent research</td>
<td>Categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Services available</td>
<td>Categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient confidence in tests</td>
<td>Categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient distress</td>
<td>Categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxious about test</td>
<td>Categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stigma</td>
<td>Categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past medical history</td>
<td>Categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequent attender</td>
<td>Categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DNA previously</td>
<td>Categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non compliant</td>
<td>Categorical</td>
<td>Likert scale: 'more likely' to 'less likely'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unclear which test</td>
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<tr>
<td>Practice</td>
<td>Binary</td>
<td>yes/no</td>
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<tr>
<td>Clinical commissioning group</td>
<td>Binary</td>
<td>yes/no</td>
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<td>Smoker</td>
<td>Categorical</td>
<td>yes/no/ex</td>
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**Clinical Experience**

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**Budgetary Responsibility**

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<td>Clinical commissioning group</td>
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**Health Behaviour**

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### OUTCOME VARIABLES

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<td>heart failure - yes/no</td>
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<td>Probability</td>
<td>COPD - yes/no</td>
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<td>Decision made</td>
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Reference List


