Supplementary Appendix S1: ERICA INTERVIEW SCHEDULE: *GP – intervention arm*

Introduction and consent - (I will be saying a version of the eight points, below)

- Thank you for taking the time to talk to me, I really appreciate your views.
- I am part of the research team at the UoE Medical School investigating how useful our GP computer prompt or 'electronic risk assessment tool (eRAT)' for cancer is or isn't. It is designed to be used by GPs during the consultation and activated when presenting symptoms trigger an alert. This work was devised by Prof Willie Hamilton and his university team.
- This interview aims to find out about your experience of using the eRATs within your patient consultations.
- PLEASE READ AND SIGN THE CONSENT FORM (if not already completed).

The interview part

Training

- Please tell me about the eRAT training:
  - To what degree was it useful?
  - Tell me more about the information you received
    - Was this enough?
    - Was anything missing?
    - Was anything not needed?
    - How did you find understanding the manual instructions?
    - Or understanding what you needed to do when the eRAT activated in the consultation?
    -
  - Tell me more about the positive aspects of the training
  - And what about any negative aspects?

- Please will you tell me to what degree you felt adequately prepared following the training?
  - Please explain further
    - [If prompt is needed] Why was that?

- What recommendations, if any, around the training would you like to share?
  - What, if anything, could be improved?
    - Is there something that we could do to make the process easier for GPs? [Please explain further]
  - Is there anything that we should definitely change? [Please explain further].

Use of eRATs in consultations

- Please tell me about any discussions that took place between you and the practice champion/other colleagues regarding using the eRATs in your consultations?
  - [if yes] What issues were discussed?

    - - the possible impact on patients?
    -
    - [If yes] tell me more about what was said
        - What factors influenced this decision?
    - [If no] tell me more about the reasons for this decision
        - Was it left to each GP to decide for themselves?
    - What discussion was had around whether you would share the use of the tool, if activated, with [certain] patients?
        - What discussion was had on how that would impact patients, either positively or negatively?
            - Please tell me more about this?
            - How did you, as a GP, feel about this?

- How often, roughly, did you experience the eRAT firing?
    - Please tell me to what degree this was acceptable to you?
        - Please explain further? Why was that?
    - In what ways did that impact on your consultation?
        - In terms of flow, time, patient rapport?
        - How did that make you feel?
            - Frustrated, annoyed, relieved, confident?
        - How did that make the patient feel, do you think?
            - Listened to, rushed, neglected, supported, anxious?

- Tell me more about what happened between you and your patient when the eRAT activated
    - What did you decide to discuss with your patient?
    - What factors influenced this?
        - Were they general factors, or patient specific factors?

We are interested to know whether you were mindful of not mentioning it to certain patients due to their likely reaction

        - If so, please tell me a bit more about this type of patient?
            - Why was that?
    - In what ways has using eRATs changed how you communicate with patients?
        - Please give an example
    - In what way might it have changed how you explain your decisions to the patient?
        - Please explain further

- Please tell me a bit more about whether the firing of the eRATs affected your clinical decision making?
    - Were there any positives?
        - Did you find it helpful?

- Any negatives?
  - Was it an annoyance sometimes?
- How did it impact the confidence of your decision to either refer or not refer?
  - In what way? Why?
    - Please give more detail here
- What is your view on whether eRATs fired appropriately?
  - Please expand on that point
  - Please tell me about any discussion between colleagues about this 'appropriate firing' issue.
  - Can you "ignore" or "dismiss" the eRAT when it notifies you of a high risk score?
  - In what circumstances did you do this?
  - How does that make you feel?

- What impact, do you think, did having this tool on your computer influence your referrals?
  - Do you think that your referrals changed in any way?
    - Did your referral rate increase or decrease?
    - Did your referral pattern change regarding who you referred?
    - Please say more about the types of patients who were referred, or not.
    - If changes occurred where these in general, or only for those in whom the prompt had fired for?
  - Please say more about this
  - How did you feel about this?
    - Do you think this is good or bad? Why?

- What are your views on coding patient information?
  - Is this a good thing to be doing? Why/Why not?
  - Tell me what you usually do?
  - How do you enter what the patient is describing to you into the patient record?
    - Where would you record this information within the patient record? (Code or free-text)?
  - When would you record this? (During or at the end of the consultation?)
    - Would the patient be aware or involved with this?
  - How has using the eRATs influenced the way you code?
    - What, if anything, have you changed about the way in which you code information?
    - Please explain further
    - If yes, what are the consequences of these changes?

- Were there any other prompts being activated on your computer – and what effect did this have, do you think?
  - Please explain further
    - How do you feel this influenced your use of the cancer eRATs –
    - Did these other prompts impact on your willingness to use the cancer eRATs? Or to respond to them?
    - Tell me more about 'prompt fatigue'.
    - Is this something you have experienced?

    - How did that make you feel? Please say more…

- What are your final comments, recommendations or advice that you can give us in terms of the cancer eRAT tools?
    - We are interested to hear about any training or general clinical relevance that you feel that they might have?
    - Such as how useful do you think they are?
        - Please explain further?
    - What would you say about them being implemented in GP systems across the UK?

Is there anything else you would like to add?

Thank you for taking part in this interview.

Table S1: Supportive Quotes and Themes

	Explanation	Quote	Participant
Theme 1: "The Armory"			
A clever hidden layer	This theme describes an overarching perspective of the tool: providing a layer of protection against missing a cancer diagnosis. It is clever, yet also concealed from the patient.	*"part of our working armoury"*	GP03
		"we might use this as an additional part of our armoury to then be able to consider the thresholds of which to kind of investigate patients further"	GP15
		"a clever person that spots things that you miss, because you're thinking about so many other things."	GP09
Armour has a cost	The additional armor of the eRAT comes with costs or trade-offs: it raises patient anxiety and prolongs the time needed to deal with the eRAT, particularly when the risk level is perceived to be low. Participants spoke directly about the trade-offs involved in distinguishing the signal from the noise. They speculated that if the signal-to-noise ratio was not high enough, it could result in alert fatigue and disengagement with eRATs.	*"it's really very difficult to sort out the actual signal from the noise."*	GP15
		"we don't want to worry them unnecessarily."	GP03
		"…checking so that it was picking up something that was definitely relevant to that patient and not already actioned, otherwise I think you would get a disengagement from that, because if you did that for three or four patients, then the next time you might not bother."	GP05
		"so eRAT pop up at one-point or a two-point something percent…I'd be like, "I don't have time for that right now"	GP13
		"after a while if… those messages just kept coming…your resistance to them would gradually go down and down and down, and after a while you'd be like, what? Not really noticing. And that might be problematic, to be fair."	GP15
"If only to confirm"	Participants spoke of the eRAT as simultaneously reassuring and redundant. They recognised the intended benefit of the eRAT, and could feel reassured when it was triggered. Despite this, there were no accounts of it being instrumental in detecting a cancer that would have otherwise been missed. This led to some complicated feelings of dissonance, where participants did not feel that they had ever helped, but at the same time felt very anxious about disabling the eRAT alerts (which can be done for specific patients with particular alerts).	*"I find it helpful if only to confirm, you know, my suspicion that actually I think this patient needs to be referred … its activated, you know, according to those codes"*	GP08
		"…at the moment, it hasn't really changed my care. Although, it only takes one patient to change that and it can matter a huge amount for that patient."	GP07
		"I can ignore that prompt because I'm satisfied that those features that are triggering it have already been reviewed, actioned or referred…"	GP02
		"And then I did think, right, okay, I need to exclude or stop these from popping up again in the future…and then when I did that, I thought, oh God, if I've done that and then they come back late and they've got something that really is obvious, would I have excluded looking at it? So then I stopped doing that. I know that... that's a bit psychological, isn't it? It's a bit... I don't know what it	GP17

		tells you about me…so I must have trusted it in some way, but I didn't want to exclude it the whole time."	
Alternative explanations for triggers	Clinicians provided a variety of reasons for disregarding or not responding to the eRAT warnings. There was a reliance on "gut feeling", or a cancer could have already been diagnosed, or the patient could already be on the 2WW pathway. Clinicians described alerts that did not lead to further investigation, as they already had a plausible alternative explanation for the triggers of the alert. Clinicians perceived that certain triggers, such as anemia and hematuria, were more common. They were confident in disregarding the eRAT trigger if the parameter that had initially triggered the eRAT had normalised, or had been present for an extended period.	*"There has been times, yeah, when it's come up with a risk, and then, when I... and when I've gone back through the patient notes then, I feel like I can justify that... it's not, therefore, it... it reduces my concern."*	GP16
		"ultimately its clinical acumen, I guess, all the training we do, and I would always rely on that more."	GP01
		"or the fact that somebody had had, you know, platelets that were raised five years ago, but they've had four tests every year since and they've been normal, probably would mean that that doesn't need to be flagged up."	GP10
		"Some are very short lived or part of an acute illness, so you wouldn't necessarily want that to influence a risk score. So, if you have a cold and a cough for a week and I record that you have a cough… so, you don't want to cause harm by investigating people inappropriately either."	GP05
		"The most common ones are if they've had a dip for urine at some point, it comes up as risk of bladder cancer, and the other if they are anaemic and they're elderly"	GP07
		"I've often gone and checked the anaemia, and it might be that it's resolved now or it might be that it's somebody with CKD"	GP07
		"And it might make me look and see when was the hematuria recorded, and have we already dealt with it? And what I find often is yes, we've dealt with it, and it might have just been an infective [cause] and we've treated that and then we've checked that there's no further hematuria. And what I... and so then what I feel is that I'm doubling work. So that's… you know, that aspect of it is not helpful."	GP11
Armour for other clinicians	Some participants felt that the tool was not useful for clinicians trained since 2015 (when the last cancer diagnosis guidelines changed). There was also a perception that it might be more useful in practices with less continuity of care.	*"I qualified in 2018, I finished my GP training, so the last NICE guidance update on suspected cancer was just like, real, right there while I was doing my training. So, it's really at the forefront of… of my mind, it was a relevant part of my… my training, so it's… that's not going to change for me, the… this resetting of the threshold and all of the various different categories."*	GP02
		"We know them, and we know their families etc… if you were in a bigger practice, and you were seeing patients who you'd never met before, I imagine that might be a little bit more difficult"	GP16

A Circular Paradox	Some participants recognised a circular paradox within the eRATs: given the high awareness of the cancer guidelines, an eRAT warning is likely to be for an already addressed risk. Participants discussed exploring the triggers causing the warning and recognising that they are present due to the clinicians' own clinical coding. They coded it because they already perceived the symptoms as significant; cancer had already been taken into consideration. Because clinicians are both responsible for inputting clinical codes and receiving the eRAT warning, they understand that the reliability of the eRAT is directly dependent on the accuracy of their clinical coding.	*"So, I think it's quite nice to click on the, you know, why is it giving you that… that sort of percentage and see the boxes so that it has ticked, and thinking well actually, that's the boxes subconsciously in my own mind that I'd ticked already to… to get to that sort of point of referral really."*	GP08
		"I guess the problem about it is that when I'm… if I'm coding things which have a significant impact on a… on a possible diagnosis, I'm actually already working towards that diagnosis."	GP15
		"I'm already looking for those things, in which case you haven't added much, or I'm not looking for those things, in which case… it sounds weird, but how are you going to know to look for those things to tell me I need to look for…"	GP15
		"Massive variability. Completely unreliable"	GP05
		"Symptoms such as diarrhoea. There's no way on God's earth we are coding that regularly…"	GP10
Theme 2: "Three Heads On"			
A Third Actor	Participants identified the eRAT as a third actor in the consultation. The traditional model of a primary care consultation involves two main actors: the patient and the clinician. The eRAT possesses its own agency within the consultation, with its own intelligence and agenda. This dynamic introduced a more intricate consultation process, potentially resulting in conflicting agendas among the actors.	*"a clever person that spots things that you miss, because you're thinking about so many other things."*	GP09
		"unsuspecting patient and an AI and a doctor"	GP09
		"I think you have to be having almost three heads on suddenly. Thinking about, what could the computer be telling me? What can the patient be telling me and what am I thinking?	GP09
		"where does the responsibility lie?"	GP09
Primacy of patients agenda	Participants felt that the patient's agenda was a fulcrum around which a consultation should pivot. They valued the concept of patient-led consultations and recognised that the eRAT could challenge this if the patient's presenting complaint was not related to a cancer diagnosis. Some participants felt that the patient's agenda should entirely trump all others, and that the eRAT is an unexpected and unwelcome distraction from this central duty	*"…we have got other software like, 'See the Signs', which basically, it works differently to what you do with the E-RATs because it still relies on the clinician putting in their concerns, and then the software says, yes, high risk, low risk, suggest referral, or don't suggest referral. So, that still puts the clinician in the driving seat, whereas e-RATs is probably taking more of the driving seat and suggesting things to the clinician, so it's another way of doing it."*	GP01
		"I kind of ignored it, because I just had my own patients' agenda to deal with"	GP14
		"There's so many things that we are asked to do at the moment, which take you away from why the patient has actually come to	GP14

	of the clinician: to keep the consultation patient-centered.	*see you or why you're speaking to them on the phone, and it's another thing. We've kind of had enough of that."*	
		"I still heavily rely on what the patient has come in with and what symptoms are driving the consultation more than anything, especially if it's a complete curveball and the patient in front of me is not showing anything to suggest that particular thing."	GP01
Challenge to clinicians' identity	Some participants felt that the eRATs challenged a clinician's role in the consultation. They believed that the responsibility of diagnosis rests with clinicians, and this could be undermined by the presence of this additional actor. One participant (GP15) reflected on the 3% risk threshold (which NICE guidelines state should prompt a cancer referral) and arrived at a nihilistic conclusion. They felt that the minimal risk level for referral allows clinicians to refer almost any case, diminishing its significance. However, if they do not refer, clinicians are likely to be correct. This leads to an automatic and thoughtless referral process that transforms a medical decision into an administrative one.	*" you can refer what you like, because three percent means, basically, you are going to be wrong 97% of the time, so who cares?"* *"…maybe there's an element of arrogance in there… because the truth about is it that if you're going for a 3% level of risk, actually I'm usually going to be right, if I ignore you."* *"if referring becomes almost a spinal level reflex, which is what we're sort of asking for when you have something like a risk that just pops up, if it becomes a spinal level reflex, well there are a few things. One, is that you actually don't need a doctor for that, you can run it as an administrative exercise, you then say to all the patients you've had a 3% risk, we're referring you, no matter what."*	GP15
		"One of the GPs felt like it was... it... it was almost, sometimes, undermining her clinical decision making, and sort of opposite end of the spectrum to me, that it wasn't helpful."	GP16
		"*if we just turn it into, you know, computer says yes, computer says no, at this level, what does this do to… you know, to our patients?"*	GP15
		"*if we just turn it into, you know, computer says yes, computer says no, at this level, what does this do to… you know, to our patients?"*	GP15
Theme 3: Whose risk is it anyway?			
"Hard and fast": is numerical risk a useful thing to discuss with patients?	There were conflicting views on whether to share eRAT warnings with the patient. Some felt communicating the unfiltered result validated any subsequent action, enhanced transparency, and shared responsibility for that action. A more prevalent view was that the risk should not be shared with the patient, and there is no need for the patient to know about it. There was a perception that presenting	*"I love the transparency, being able to just explain that to the patient, and I think that almost shares responsibility as well."*	GP16
		"I don't think there are any occasions where I specifically said, 'I've got an alert here that suggests you might be at high risk of…', so no, I didn't use that language with anybody."	GP05
		"Okay, I will not have used it as a number"	GP15
		"I love the transparency of it. What I don't like is that it takes extra time just explaining all of that."	GP16
		"So, I wouldn't normally converse in percentage terms with patients."	GP01

	unfiltered quantitative risk would be poorly understood, potentially causing unnecessary anxiety. It was believed that consultations would require more time to address this issue. The use of numerical risk was viewed as limiting the clinician's freedom in decision-making and communicating those decisions. One participant recognised a conflict in the early diagnosis paradigm. Referral at a 3% risk is necessary to improve detection rates, but the number is also used to reassure the patient. There is hesitation in mentioning cancer at all at this low probability.	*"if you suddenly started to say figures and percentages, it won't really register."*	GP12
		"[The eRAT] gives you the opportunity to put a slightly more hard and fast figure on it, you know, that's maybe something that you could use with a patient if you felt [it] appropriate – I feel patients get very hung up on numbers sometimes, so I try not to… try not to get myself nailed down too much…"	GP13
		"…whenever I do a two week wait, I'll… I'll tell them that more than 97% are not going to have cancer at the point of referral, so we don't miss anything, yeah. You have to mention cancer, because it comes in all the correspondence they get… whatever it's reassuring or not…	GP13
Who is the risk score for?	Some participants felt they should discuss the eRAT output with patients based on the principles of patient autonomy. In contrast, some individuals believed that the information should be included in their clinical evaluation and did not necessarily have to be disclosed directly to the patient. The clinicians are happier discussing the clinical features that trigger the eRAT than the numerical results.	*"absolutely, the patient should be involved in that decision, and because that is their... is... is their information, it's their risk."*	GP16
		"*I don't raise it with them, I just take it as part of my clinical assessment. I don't say that we've had this thing that's flashed up*."	GP06
		"…like, this is for me to use, it's not for the patient to use…"	GP09
		"I think of it as like a result on the screen that I don't have to translate for the patient."	GP09
		"*mention the clinical things that it has highlighted"*	GP10
Is numerical risk even appropriate?	Participants recognised that eRATs operate based on clinical codes. There was concern that eRATs convert inherently subjective information (the patients' reported symptoms) into something quantitative. There was a sense that coding is suitable for more definitive data, and clinical judgment was necessary to translate patient symptoms into clinical codes. The numerical output of the eRAT is thus a product of a forced categorisation of subjective symptoms. This diminishes the clinician's confidence in the eRAT trigger.	*"I don't necessarily always code symptoms… because when you code something, it's more restrictive, it doesn't quite fit neatly with what you want and what the patient's saying to you…"*	GP13
		"it's [coding] very good for… particularly for sort of very objective things or quantitative things that you can clearly define, it's harder for some symptoms the patients describe"	GP13
		"if you want to put PR bleeding you can't, it came up as rectal haemorrhage which sounds very dramatic, and it's not a rectal haemorrhage… that's where your clinical judgement comes into it"	GP12