

## **Make the right thing easy to do: using trigger tools for safety and learning in chronic kidney disease.**

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### **Word Count:**

Abstract 349 words

Main Paper 3,697

Tables: 1

Figures: 2

Appendix 2

**Key words:** CKD, primary care, trigger tools, patient safety

### **How this Fits in**

#### **What is already known**

Trigger tools have been used to identify patient safety events in UK primary care since 2009. Their use has been mainly limited to the measurement of the rate of adverse events. They are not widely used in primary care settings.

#### **What this study adds**

Falling eGFR trigger tools based on results in the electronic health record can be easily incorporated into the regular work of general practice. Interview and reflective data illustrated that practice use of the trigger tool supported the patient safety agenda and in addition encouraged team and individual learning about CKD management.

## **Abstract**

### **Background**

An innovative programme to improve identification and management of chronic kidney disease (CKD) in primary care was implemented across three clinical commissioning groups (CCGs) in 2016. This included a falling estimated glomerular filtration rate (eGFR) trigger tool built from data within the electronic health record (EHR). This patient safety tool notifies GP practices when falling eGFR values are identified. By alerting clinicians to patients with possible CKD progression the tool invites clinical review, the option for specialist advice, and written reflection on management.

### **Aim**

To compare practitioner perceptions of trigger tool use and value from interview data, with the written reflections on clinical management recorded within the tools.

### **Method**

Eight semi-structured interviews with 6 GPs, 1 pharmacist and 1 practice manager were recorded and transcribed. Thematic analysis of the interview transcripts was undertaken using framework analysis. The free-text reflective comments recorded in the trigger tools of 1921 cases identified as having a fall in eGFR, were organised by referral category 'yes' and 'no', with each category further stratified by age into 'younger' and 'older' cases. Subsequently the themes arising from the interviews were compared with the descriptive analysis of the reflective comments.

### **Findings**

Three themes emerged from interviews: *Getting started*, *Patient safety* and *Practitioner and Practice learning*. Well organised practices found the tool was readily embedded into workflow and expressed greater motivation for using it. The trigger tool was seen to contribute to patient safety, and as a tool for learning about CKD management, both individually and as a practice. Reflective comments from 1921 trigger tools were examined, these supported the theme of patient safety from the interviews. However the free text data, stratified by age, challenged the expectation that younger cases would have higher referral rates, driven by a higher level of risk for CKD progression.

## **Conclusion**

Building electronic trigger tools from the EHR can identify patients with a falling eGFR prompting review of the eGFR trajectory and management plan. Interview and reflective data illustrated that practice use of the trigger tool supported the patient safety agenda and in addition encouraged team and individual learning about CKD management.

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### **Introduction**

The prevalence of Chronic Kidney Disease (CKD) stages 3-5 in the UK is estimated to be 5-6%. (1, 2) Early identification of people with CKD in primary care, particularly among those with risk factors such as diabetes and hypertension, enables proactive management of blood pressure, cardiovascular risk and lifestyle factors and referral to specialist services where there is evidence of progressive disease.(3)

The UK national CKD audit in primary care demonstrated that on average 70% of biochemically confirmed cases of CKD (stages 3-5) were given a diagnostic Read code. (1) There was wide variation between practices, with the proportion of CKD cases un-coded ranging between 0% to 80%. Other studies have shown varying GP expertise in managing CKD. (4, 5) The second part of the national CKD audit linked hospital data on outcomes to the cases identified in primary care. There were associations between lack of coding in primary care with higher rates of unplanned hospital admissions, acute kidney injury admissions and deaths. (6)

In 2016 three east London CCGs and the local renal unit developed an innovative community kidney service. This system wide change was conceived as a renal learning health system (7), in which data from all parts of the system are transformed into knowledge and used as feedback to improve both the system organisation and clinical performance within it. There are 136 practices within these CCGs, serving a population of 850,000 patients. At the start of the project, practice diagnostic coding for CKD ranged from 20%-80% reflecting the national average. In addition, late referral of patients with progressive CKD to specialist end stage renal disease services, defined as those who needed renal replacement therapy within 3 months of being referred, was 39% compared to the national average of 16.1%.(8) Previous quality initiatives (QI) in the three study CCGs had used prevalence searches – to find and code cases and improve management by regular review, and dashboards to summarise comparative practice data. (9, 10)

The community kidney service had four components:

- i) A package of IT tools which support practices to identify patients requiring diagnostic coding, improvements to blood pressure and cardiovascular management. Trigger tools, using pathology results from the electronic health record (EHR), are run monthly by practices and identify CKD cases with a falling eGFR. These trigger tool alerts are the focus of this paper.
- ii) Regular practice facilitation on clinical data management offered routinely by the Clinical Effectiveness Group (CEG) supported this package.(11) Additional renal specific clinical facilitation, which focussed on the importance of CKD coding, CVD and BP management, was offered to practices in the lowest decile of CKD coding.
- iii) A virtual CKD hospital clinic enabling nephrologists to see the full primary care EHR, with informed patient consent, and document advice in the shared record. The virtual clinic has a short wait time (approximately 7 days) and triages patients who require further investigation into nephrology out-patient clinics. Less than 20% of referrals require a traditional out-patient appointment.
- iv) An education programme for patients and practitioners. Continuing professional development sessions for GPs and practice nurses were delivered at CCG, cluster and practice level. Patient education sessions for those referred into the service were led by specialist renal nurses. These group and individual sessions, based in community facilities in each CCG, used conversation maps to provide information and encourage lifestyle changes to improve health. (12)

### *Trigger tools*

Triggers are defined as easily identifiable flags, occurrences, or prompts in patient records that alert reviewers to potential adverse events that may otherwise be undetected.(13)

Trigger tools, such as the *IHI Global Trigger Tool for Measuring Adverse Events* (14) are widely used in USA secondary care to estimate the prevalence of errors and harms. In UK primary care trigger tools have also been used to estimate the prevalence of patient safety events.(15) However, the time required for case note reviews, and the relatively low yield of events (around 9%) has limited uptake across general practice.

Adapting the tool to identify patient safety events from focussed searches in the routine clinical data recorded in the EHR is more time efficient, produces a higher rate of potential

errors, and is welcomed by GPs as a safety intervention that identifies patients who otherwise fall 'under the radar of safety'.(13)

### Trigger tool for progressive CKD

This quality improvement programme introduced the falling eGFR trigger tool. This patient safety tool provides a practice alert when a new eGFR value less than 60ml/min/1.73m<sup>2</sup> is preceded by one with a value of 10ml greater. The rationale for introducing this tool is that identification of progressive CKD requires observation of eGFR over time. The tool encourages clinicians to undertake a notes review and examine the graph of eGFR trajectory. It provides a safety 'backstop' for busy clinicians viewing results, and invites reflection on whether clinical review or referral is indicated. The trigger tool is run monthly in participating practices. Figure 1 shows the trigger tool practice interface.

**Figure 1. The falling eGFR trigger tool practice interface. The final column 'Reflection on clinical management', invites clinicians to enter free-text.**

June 2015									
Full Name	EMIS no.	Usual GP	Latest eGFR		Previous eGFR		Fall in eGFR	Referral to CKD community clinic?	Reflection on clinical management
			Value	Date	Value	Date			
Patient Name - 1	EMIS no. 1	SH	45	11-May-2015	55	02-Apr-2015	10	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Patient Name - 2	EMIS no. 2	JP	38	15-May-2015	50	13-Dec-2014	12	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Patient Name - 3	EMIS no. 3	KB	40	23-May-2015	51	19-Aug-2014	11	<input type="checkbox"/> Yes <input type="checkbox"/> No	

May 2015									
Full Name	EMIS no.	Usual GP	Latest eGFR		Previous eGFR		Fall in eGFR	Referral to CKD community clinic?	Reflection on clinical management
			Value	Date	Value	Date			
Patient Name - 1	EMIS no. 1	SH	45	02-Apr-2015	55	02-Apr-2015	10	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Patient Name - 2	EMIS no. 2	JP	38	13-Apr-2015	50	13-Dec-2014	12	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Patient Name - 3	EMIS no. 3	KB	40	19-Apr-2015	51	19-Aug-2014	11	<input type="checkbox"/> Yes <input type="checkbox"/> No	

## **Study aims**

To compare practitioner perceptions of trigger tool use and value from interview data, with the written reflections on clinical management recorded within the tools.

## **Methods**

Eight semi-structured interviews with practice staff were carried out. Free-text data from the reflection column on 1921 completed trigger tools from all practices in two participating CCGs were collected and analysed. Using both data sets enabled us to compare the practitioner *perceptions* of the trigger tools (from the face-to-face interviews) with the *actions* of clinicians (based on the reflective comments).

### *Interviews*

Practices known to the research team were contacted by the researchers to request participation in the study, providing a purposive sample. Interviews were conducted face-to-face in the participant's practice using the structure-process-outcome framework (16) as an interview guide. The interview questions are shown in Appendix 1. Interviews were digitally recorded with participants' consent and transcribed verbatim.

A framework analysis approach(17, 18) was adopted, whereby a descriptive or conceptual label is assigned to excerpts of raw data (coding). Two members of the research team independently coded the text to ensure trustworthiness of the data, (18) then worked together to group the codes into clearly defined categories, which subsequently became the analytic framework. (17)

### *Reflection data*

Reflective comments over a 2-year period (Jan 2016 -Dec 2017) were extracted from the trigger tools. Comments were categorised by age of the patient as 'Younger' (aged ≤60 years) and 'Older' (aged ≥80 years), based on existing preconceptions about the data. These age bands were chosen because progressive CKD in younger people may have more serious outcomes, and may be less well recognised in primary care. (19)

A qualitative description (QD) approach to analysis was adopted. This allows for low inference descriptions of the data which was suitable for reflective comments which were often very brief. (20, 21)

The QD method included an iterative process of reading the comments to identify themes, until a saturation point was reached. There was generally one theme per entry, and sometimes a theme was not ascribed due to the comment's brevity. (see Appendix 2 for examples of reflective data) This analysis lends itself to Sandelowski's approach to QD, (22) in that arrangement of the data should reflect the research aim. In this case a key aim was to characterise the variation in use of the trigger tool between younger and older groups. Two other members of the research team reviewed the themes to enhance rigour.(23)

#### *Comparison of reflection and interview data*

Comparing themes from both the data sets enabled us to compare GP perceptions of the tool with actions documented in the trigger tool. The themes from the transcripts, on occasion, were challenged by the themes that emerged from the reflective comments.

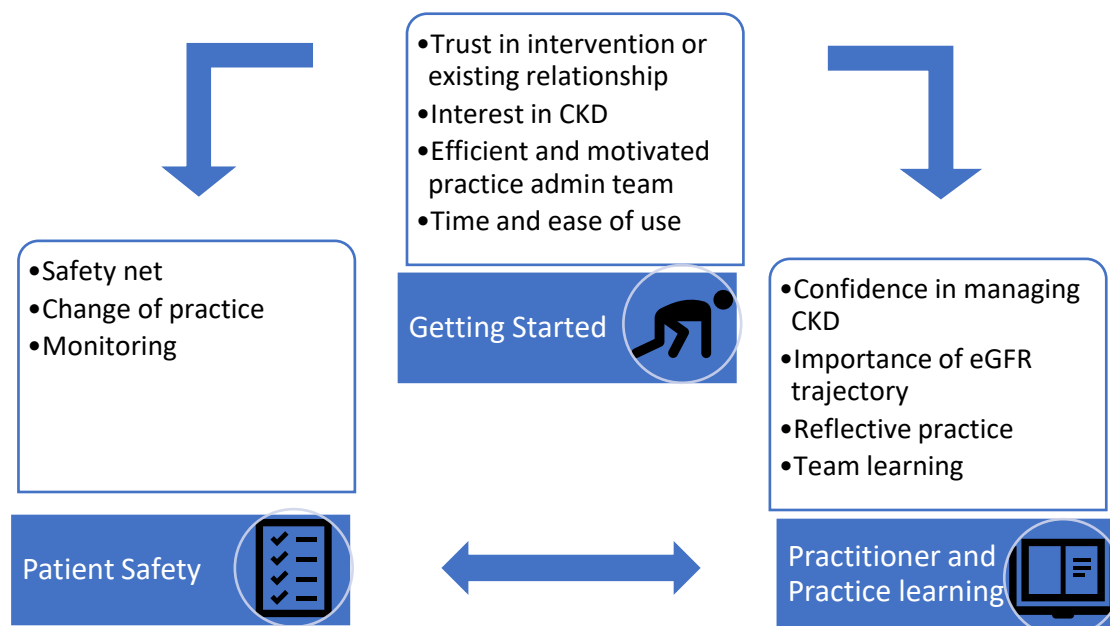
## **Results**

### *Interview data*

The purposive sample of eight practitioners included six GPs, one pharmacist and one practice manager. Including the views of a range of staff was important as processes for running the trigger tools vary across practices. Figure 2 shows the analytic framework (17) of themes and subthemes.



**Figure 2. Interview themes and subthemes**



### Theme 1: Getting started

Firstly, the existing trust and working relationship with the Clinical Effectiveness Group (11) was seen to be important in getting started with trigger tool implementation. One GP stated the reason for installing the trigger tool was because of the value that previous CEG interventions had brought

*“So, I’m more likely to try things out actually because I know there will be some value or some use to it. It’s not going to be just an aimless tick boxing exercise, there is a point to it.” (GP)*

The analysis highlighted key practice elements needed to gain maximum benefit from using the trigger tool. Good practice organisation, a strong core administrative team and an existing safety culture were all cited as reasons for getting started.

*“..it works because we’ve got a great administrator called [Name], and she just owns the process....I think it’s actually, what appealed to [Name] is that she was quite compelled by the safety element of it....” (GP)*

A further driver for implementation and sustainability was the short time it took to review each patient, with one GP saying that the whole process was streamlined and took just 2-3 minutes per patient. Another said of current systems

*“it (can) involve me writing a form, picking up the phone, sending a message, it’s just it takes time. ...if you can be of free of the administrative stuff I’ll make better clinical decisions....” (GP)*

One interviewee alluded to barriers affecting the use of the trigger tool, with uncertainty on whether a patient’s eGFR had been adjusted for the Black ethnicity correction.

## Theme 2: Trigger tool for safety

Many interviewees cited the importance of the trigger tool acting as a safety net, even though practice systems (such as EMIS) have the capability to run graphs of kidney function over time to identify progressive kidney disease.

*“We look at this tool so if there are patients who are likely to decline there is a safety net.” (GP)*

and

*“I mean clinical governance wise it’s, it feels safe, I’m looking for clinical safety and this gives us clinical safety in this little, particular area.” (GP)*

A change of practice, such as prompting the clinician to undertake a medication review, was evident, with the pharmacist saying that patients were called up for repeat blood tests following review of the trigger, amendments to medications such as metformin, as well as checking the patient is coded for CKD. Another important issue raised was a possible change to proactive patient management rather than relying on reactive care. The trigger tool has prompted this interviewee to:

*“...let’s go and have a look at your notes and see what’s happening. That’s really different to how we practice, which tends to be quite on the back foot, so you’re reacting to something all the time. And actually, to do something pro-active and really use the record...” (GP)*

### Theme 3: Trigger tool for learning

Practice staff reflected on an improved degree of confidence in managing CKD:

*“About the importance of a healthy kidney and how to do it. And that, I think that was, for me that was the greatest learning experience really and it’s like it’s diabetes and blood pressure and medication and when we need to refer.” (GP)*

and felt more at ease in referring/ requesting tests:

*“Absolutely. So, I think I’m a lot more confident in requesting things in terms of investigations now.” (GP)*

Some GPs recognised the change in practice as a result of using the tool, with more attention to the patients’ eGFR trajectory:

*“...they’re not looking at eGFR as an isolated thing anymore, they’re very much, when you look at your blood test results you’re just looking at trajectories all the time.” (GP)*

Some interviewees cited the usefulness of the trigger tool to reflect on clinical practice

*“...if there was anything so for example that was prescribed that could have caused it? Or whether there was any intercurrent illness?” (Pharmacist)*

The impact of the trigger tool on practice team learning was also evident with interviewees describing ways in which colleagues had acted on recommendations from the CKD lead-clinician:

*“So I think this is, this made, I think a big difference for us... if you send a clinician a practice note to remind them of a drop in the eGFR, then to see a few weeks later that they actually had acted upon it...” (GP)*

The impact on working relationships and shared patient care were evident if the patients highlighted by the trigger tools were then discussed in a practice team meeting:

*“So I think that’s a great benefit because you end up talking about it in the clinical meetings and I think, I think it’s stirred up or created greater awareness, I think, amongst us.” (GP)*

### **Trigger tool reflective data**

Reflective data were collated from 1921 completed trigger tools from two CCGs over a two-year period (January 2016 to December 2017). Generally, these free-text data varied from being very brief to quite detailed, with the latter providing more potential for identifying emerging themes. In a sample of 1000 records from 79 practices, 92% of reflections were completed, 64% resulted in actions and 10% resulted in referrals to the virtual CKD secondary care clinic. Table 1 shows the free-text data categorised by age group and grouped by whether the drop in eGFR is >15 or >25ml/min.

**Table 1. Summary of clinical activity and referrals recorded in free-text reflections over 2 years in 79 practices.**

	<b>Younger (&lt;60 years)</b>	<b>Older (&gt;80 years)</b>
<b>All cases</b>		
<b>N</b>	1016	905
<b>Referred N (%)</b>	81 (8)	70 (8)
<b>Action (%) (review, retest, medication review)</b>	696 (69)	567 (63)
<b>eGFR drop &gt;15</b>		
<b>N (%)</b>	542 (53)	362 (40)
<b>Referred N (%)</b>	35 (6)	27 (7)
<b>eGFR drop &gt;25</b>		
<b>N (%)</b>	173 (17)	91 (10)
<b>Referred N (%)</b>	11 (6)	3 (3)

Categorisation of the reflection data, by age and referral, enabled the observation of potential variations in clinical management of patients, including the comparison of younger versus older patients. Both age groups had a referral rate of 8% overall. Over 50% of cases had a fall exceeding 10mls/min/1.73m<sup>2</sup>, however even with eGFR drops of >15 and

>25mls/min/1.73m<sup>2</sup> the referral rates remained similar. Referral rates were also similar across age groups regardless of the size of fall in eGFR.

In the *Younger- Referred* group, reflection data describe cases where referral was undertaken for safety:

*'immediate repeat has been requested but will refer for safety'* and

*'SLE nephritis, need to keep renal informed, may just be normal fluctuation, recent MI.'*

In this group, the most common reflections were about the need for blood pressure and blood sugar control (10/81 cases).

In the *Younger-Not Referred* group there is an emphasis on repeat tests and monitoring, this was often presented as a reason for deferring a decision to refer. Some data describe improvements in eGFR on retesting, suggesting unknown, but transient, reasons for the drop in eGFR:

*'Under review, may refer at later stage if persistent problem'*.

*'repeat blood test showed improvement in renal function'*,

In this group, the most common reflections were about control of risk factors, and the fall in eGFR being the first ever drop, with expectation of recovery.

The *Older-Referred* group highlights the complexity of managing patients with multi-morbidity:

*'recent significant drop, in line with other health deterioration...advice has been sought from nephrologists to help with further decisions'* and

*'Fluctuating eGFR on downward trajectory, likely related to age and diabetes and diuretics being used for CCF.'*

The most common reflections in this group concerned age appropriate eGFR decline (7/70 cases).

The *Older-Not Referred* group, in common with the younger group, had an emphasis on repeat tests and monitoring:

*'Patient elderly and eGFR repeated and rose again to 66. BP diastolic readings are low, so perfusion may be low. Will repeat again in 1/12 and if remains low then will refer.'*

Other reflections recorded a review of the eGFR trajectory over time:

*'Fluctuating eGFR – current value same as 2011. Over 5 years has been as low as 41 and 63 highest value. Referral unlikely helpful at this stage – decision for continued monitoring.'*

These recorded actions reflect some of the themes from the interviews, in particular the sub-themes of monitoring in the *Not Referred* groups and the trigger tool as safety net in the *Referred* groups.

## **Discussion**

### *Main findings*

Evidence from the interviews indicate that overall, practices welcomed the falling eGFR trigger tool. For most practices it was rapidly embedded into workflow with resulting sustainability. Over the three years of the project >90% of the tools have had a free text comment. This is in contrast with other quality improvement interventions that often report challenges in sustaining longer-term change. (24) This study also identified the importance of practice organisation and motivated administrative support to enable rapid uptake, and of trust in the clinical value of the intervention.

Our study has utilised two types of data (practitioner perspectives and practitioner actions/reflections on the trigger tool) which has enabled a richer understanding of how the trigger tools are used in practice. Reflection data highlighted cases of poorly controlled diabetes/hypertension for the *Young Referred* group, while many older referrals reflected gaining specialist support for a known plan. Generally, the *Not Referred* groups showed that GPs had implemented a clinical management plan involving repeat tests and monitoring.

The free text data stratified by age challenged the research group's expectation that younger cases would have higher referral rates, driven by an established higher level of risk for progression. (19) In fact referral rates for each cohort were similar, suggesting an equal distribution of concern for younger and older patients.

### *Comparison with existing literature*

Few studies have examined the use of e-alerts based on routine primary care records to detect progressive kidney disease. The most comparable work is that of Kennedy et al (25), which describes a population surveillance system using laboratory data to enable early detection of patients at high risk of progressive CKD, with eGFR graph review carried out by laboratory staff. This intervention has seen evidence of spread and sustainability since 2010 (26), with 12 sites running the intervention for more than one year, 8 for more than two years and 2 sites running for more than three years. A study by Holmes *et al* on the use of an e-alerts for acute kidney injury (AKI) in Welsh primary care, (27) suggests that outcomes were better for patients with AKI identified in primary care settings if the alert resulted in a repeated measure of kidney function within the next seven days.

Jeffries *et al* (28) explored the implementation of a 'socio-technological' intervention, in the form of electronic medicines optimisation system (EMOS) run by a CCG. Their study, like ours, acknowledged that practices need a strong core administration to adopt such safety tools. Their finding that practice engagement was compromised by concerns about access to data and perceptions of ownership of the system relate to the importance of local context described in our study. Developing the trust required for busy practices to engage with an innovation, and allow data sharing, requires QI organisations embedded in the infrastructure of local practice.

Sustaining a quality improvement intervention is often a challenge for health services. Convincing clinicians and managers that there is a problem, and getting data collection and monitoring systems right, are critical to success.(29) The trigger tool appears to be well-received by GPs because current systems do not alert practitioners to falling eGFR trajectories, and the tool is quick and easy to use. As one interviewee commented "*you've got to make the right thing easy to do.*"

### *Strengths and limitations*

A strength of this project is that the tools were used in all practices across three east London CCGs without any selection. The interviews included administrative staff as well as GPs which provided a balanced view of how the tools were used in practices.

The large number of free text reflections allowed us to gain a real impression of how patients were managed. The reflection data provided additional evidence to support the 'Trigger tool as a learning tool' and 'Patient safety' themes derived from the interviews. The reflection data also challenged the research group's preconception that younger patients would be referred more frequently than older patients, in view of their greater risk of CKD progression (19).

The free text reflection data was anonymised, hence it was not possible to track the clinical impact of the trigger tools on individual clinical outcomes.

### *Implications for practice and further research*

Practice use of the falling eGFR trigger tool supports the patient safety agenda, as the tool highlights the trajectories of kidney function rather than the latest result which is often viewed in isolation. (25) In addition, the study identifies much 'hidden care' undertaken by GPs which may have an impact on CKD progression. This is in contrast to reports of "tensions around the management of people with CKD", and uncertainty around the benefits of disclosure of a CKD diagnosis (30), which suggest there is continuing ambivalence in the identification and management of people with early CKD.

Trigger tools have additional benefits beyond safety. Themes from the interviews identified practice team learning, including upskilling of clinicians in CKD management, examples of reflective practice and promotion of team working. Another UK study (31) suggested that trigger tools can enable care teams to refocus their learning and improvement efforts, whilst a previous study in east London (13) found that trigger tools engaged clinicians in ongoing reflective work around clinical safety.

### ***Conclusion***

Our study has shown that a falling eGFR trigger tool can be used effectively across unselected practices in an inner urban area. The tool was seen as easy to use, and supported the patient safety initiative, as well as promoting a team learning approach to CKD. Such tools are an effective use of data within the electronic health record and have applications in other domains of practice.



**Funding**

This study was supported by an *Innovating for Improvement* grant from the Health Foundation.

**Ethical approval**

Ethical approval was not required for this service evaluation. All patient-level data are anonymised. All GPs in the participating east London practices consented to the use of their anonymised patient data for research and development for patient benefit.

**Competing interests**

The authors have declared no competing interests.

**Acknowledgements**

The authors are grateful to all the GP practices in East London that give consent for data sharing to improve care for patients. We are also grateful to the GPs and other practice staff who agreed to be interviewed for the study.

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## Appendix 1: Interview questions

Question category	Questions and prompts
Structure	<p><b>How did you get started with the trigger tools?</b>  <i>Prompt: did you discuss the worth of running the searches, whose idea was it?</i></p> <p><b>How are trigger tools organised in your practice? Who is responsible for them?</b>  <i>Prompt: Are there any alerts, are they regular, do you prioritise the task or is it something at the bottom of your list?</i></p>
Process	<p><b>How do you work with the trigger tool?</b>  <i>Prompts - how long does it take, how often are you running the tool?</i></p> <p><b>Are there any drivers/barriers to using the trigger tools?</b>  <i>Prompts – is it sustainable?</i></p>
Outcome	<p><b>Are there any benefits in using the tool?</b>  <i>Prompts – any specific cases where it has benefitted patients, any personal benefits, any use in other specialities? Is the reflection part useful?</i></p>

## Appendix 2

Examples of reflective data extracted from the falling eGFR trigger tool.

Age group	Age	Latest eGFR	Previous eGFR	Referred?	Reflection	Theme
Younger	60	59	75	Yes	He has been referred to the community CKD clinic. His BP is well controlled on medications.	<i>Control of risk factors</i>
	51	47	79	No	fit healthy relatively young pt, ?why had low eGFR on one occ, repeat is normal	<i>Repeat as one eGFR</i>
	57	53	73	No	DM - good control, good BP on ACEi - plan is to rpt GFR end june check trajectory	<i>Monitor</i>
Older	85	54	75	Yes	Will refer/drop unaccounted for	<i>Drop unaccounted for</i>
	84	55	73	Yes	eGFR gone down despite well controlled diabetes and BP. Patient is now 84years old, should we be doing more?	<i>Advice sought</i>
	86	52	73	No	pt is palliative care, bloods were done routinely by comm matron but not clinically indicated and therefore decision was made not for further action- end stage dementia.	<i>End of life</i>