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Clinicians' opinions on recommending aspirin to prevent colorectal cancer to Australians aged 50 to 70 years: a qualitative study

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Abstract

Objectives

Australian guidelines recommend all 50 to 70-year-olds without existing contraindications consider taking low-dose aspirin (100 mg – 300 mg per day) for at least 2.5 years to reduce their risk of developing colorectal cancer.

We aimed to explore clinicians' attitudes, practices, knowledge, opinions, and barriers and facilitators to the implementation of these new guidelines.

Methods

Semi-structured interviews were conducted with clinicians to whom the new guidelines may be applicable (familial cancer clinic staff (geneticists, oncologists and genetic counsellors), gastroenterologists, pharmacists, and general practitioners (GPs)).

The Consolidated Framework for Implementation Research (CFIR) underpinned the development of the interview guide. Coding was inductive and themes were developed through consensus between the authors.

Emerging themes were mapped onto the CFIR domains: characteristics of the intervention, outer setting, inner setting, individual characteristics and process.

Results

Sixty-four interviews were completed between March and October 2019. Aspirin was viewed as a safe and cheap option for cancer prevention. GPs were considered by all clinicians as the most important health professionals for implementation of the guidelines. Cancer Council Australia, as a trusted organisation, was an important facilitator to guideline adoption. Uncertainty about aspirin dosage and perceived strength of the evidence, precise wording of the recommendation, previous changes to guidelines about aspirin, and conflicting findings from trials in older populations were barriers to implementation.

Conclusion

Widespread adoption of these new guidelines could be an important strategy to reduce the incidence of bowel cancer, but this will require more active implementation strategies focused on primary care and the wider community.

Strengths and limitations of this study

Up to five short bullet points, no longer than one sentence each, that relate specifically to the methods. They should not include the results of the study.

- We recruited a large and diverse group of participants representing different clinical disciplines, varied length of experience, and work settings.
- We applied an established theoretical framework to study guideline implementation
- We recruited participants only from one state, Victoria, but we believe our findings are likely to be transferable to other Australian clinicians
- We acknowledge that there may be other barriers and facilitators experienced by clinicians from remote locations.

Introduction

In 2019, colorectal cancer (CRC) was the second most commonly diagnosed cancer in Australia in men and women (9,069 cases and 7,329 cases, respectively).[1] In November 2017, Cancer Council Australia updated their guidelines for the prevention of CRC to recommend that all people aged 50-70 who are at average risk of CRC actively consider taking low-dose aspirin to reduce their risk of CRC.[2] Despite the publication of these national guidelines recommending a significant change in CRC prevention strategy, it has not been accompanied by an implementation strategy, rather relying on passive diffusion of the guidelines into clinical practice.

The new guidelines were endorsed by the National Health and Medical Research Council (NHMRC) and adopted by the Royal Australian College of General Practitioners (RACGP). Meta-analyses of randomised controlled trials of low-dose aspirin have demonstrated reduced incidence and mortality from colorectal cancer by 25% and 33% respectively, as well as a 33% reduction in all-cause cancer mortality, when taken for at least 2.5 years.[3] In addition to reducing the risk of colorectal cancer, aspirin also reduces the risk of cardiovascular disease including myocardial infarctions, ischaemic strokes and transient ischaemic attacks by 6% per annum in primary prevention trials[4] However, aspirin can cause side-effects including gastrointestinal haemorrhage, peptic ulcer and haemorrhagic stroke.

This project aimed to explore clinicians' attitudes, practices, knowledge, opinions, and barriers and facilitators to the implementation of these guidelines, with the intention of developing implementation methods to increase the uptake of aspirin for CVD and CRC prevention, and reduce development of colorectal cancer in the Australian population.

Methods

Approach

A qualitative study using semi-structured interviews was conducted with a range of health professionals whom the new guidelines were most likely to directly impact, including gastroenterologists, geneticists, oncologists, genetic counsellors and general practitioners. A constructivist paradigm was used to generate new ideas from participants, using interviews to explore current practice, knowledge and opinions toward recommending aspirin to people at average risk of CRC and potential barriers and facilitators to implementing the guidelines.

Setting and sampling strategy

Purposive sampling was used to achieve maximum variation in profession type, age, gender, years of experience and those working in both rural and urban Victoria, and public and private practice settings. Recruitment was done through personal networks of the authors, as well as snowball sampling through social media posts, emailing and cold calling. As we sent out recruitment messages through different sources all participants opted in on their own. All participants provided written consent. General practitioners, as private practitioners, were reimbursed $100 for their time as this group was the most difficult to recruit. Recruitment of all participants occurred between February and September 2019.

Data collection techniques

A semi-structured interview guide was developed based on the Consolidated Framework for Implementation Research (CFIR)[5] (Figure 1). CFIR is a conceptual framework developed to guide the assessment of implementation contexts. It consists of five constructs representing all areas of a healthcare setting that impact upon the successful implementation of a new intervention.[6] The interview questions were adapted from the online CFIR guide, which provides a list of potentially relevant interview questions for each of the constructs.[5] In this study, the 'intervention' was defined as the national guideline recommending consideration of aspirin for CRC prevention.

The interviews were conducted by three researchers by authors SM, PA and TY who had no existing relationships with the participants. The interviewing researchers disclosed their position in the research to the participants and they were aware why the research was being conducted. Researcher SM who interviewed the general practitioners, geneticists, oncologists and genetic counsellors is a highly experienced female qualitative researcher. Researchers PA who interviewed pharmacists and TY who interviewed gastroenterologists both males were students who were trained in qualitative methods and supervised by the authors. Interviews were audio recorded and transcribed verbatim. Field notes on the time and location were recorded in researchers' notebook following the interviews. Researchers met regularly to review the interview transcripts and discuss data and the emerging themes. Interview transcripts were not returned to participants.

Analysis

Qualitative analysis was managed using NVivo 12[7]. Complete coding was employed by the author who interviewed the participant. For enhanced interpretive rigour, several interviews in each participant group were co-coded by another researcher and progressively checked in regular researcher meetings. The coding for several interviews per clinician type was checked by a second researcher.

After first-level coding, codes were grouped into themes. Themes were then mapped onto the constructs from the CFIR[6]: characteristics of intervention, outer setting, inner setting, characteristics of individuals and process (Figure 1).

Implementation				
Characteristics of Intervention	***Inner Setting***	***Outer Setting***	***Individuals Involved***	***Implementation Process***
- Intervention source - Evidence strength and quality - Relative advantage - Adaptability - Trialability - Complexity - Design quality - Cost	- Structural characteristics - Networks and communications - Culture - Implementation climate	- Patient needs and resources -Cosmopolitanism - Peer pressure - External policies and incentives	- Knowledge and beliefs about the intervention - Self-efficacy - Individual stage of change - Individual identification with organisation - Other personal attributes	- Planning - Engaging - Executing - Reflecting and evaluating

Figure 1. Overview of the Consolidated Framework for Implementation Research. The CFIR provides constructs that have been associated with effective implementation.[6]

Results

Sixty-four participants were interviewed (Table 1). Interviews ranged from 20-50-minutes and were face-to-face in the participants place of work, except for four GPs who were interviewed on the phone. The participants opted in by responding to recruitment messages and none dropped out. All participants were interviewed once. The interviews were conducted in participants' place of work, either in a clinic, pharmacy or hospital consulting room or meeting room. The researcher and participants were the only ones present during the interviews, except for with pharmacists if there were shopkeepers or pharmacy assistants present. We present the results according to the domains of CIFR.

Table 1. Characteristics of participants.

Characteristics	
Mean age (years)	41
Sex, female (n)	35
Profession (n)	
Gastroenterologist	17
Pharmacist	14
General practitioner	16
Familial cancer on (FCC) staff	
Genetic counsellor	10
Geneticists	4
Oncologist	3
Years in profession (n)	
<10	23
10 – 19	22
20 – 29	8
30+	11
Work setting	
General practice (%)	
Bulk-billing clinic	31
Private	69
Hospital (gastroenterologists and FCC staff) (%)	
Public	77
Private	23
Pharmacy (%)	
Hospital	36
Community	64

1. Characteristics of the Intervention

Aspirin

Many participants expressed confusion regarding the dose of aspirin to be used. While some participants were comfortable deciding on a dose within the 100 – 300mg range recommended in the guideline, others felt this range created uncertainty. (Quotations 1a and 1b)

- 1a *"Well I think the range is ambiguous there. The numbers are not ambiguous at all there I suppose but it's just - it's out with normal practice I guess" General Practitioner, 30 years old*
- 1b *"And I think the risk in data coming out is how much is useful, like the dosage. We used to think that a low dose used to be good for other cardiovascular events, but in fact maybe it isn't depending on gender, age and weight." Gastroenterologist, 47 years old*

Aspirin was perceived as cheap, safe and readily available by many participants, who stated this would facilitate their prescribing and patient uptake. With the rising costs of healthcare, participants thought the cheap nature of aspirin facilitated the implementation of the guidelines. (Quotation 1c) Barriers to implementation included concerns about possible side-effects of aspirin such as gastrointestinal bleeding and contraindications in people with multiple comorbidities. (Quotation 1d)

- 1c *"It's cheap, which is the other thing; and, again, in the Australian healthcare system, where there are costs associated with a lot of treatments, to be able to recommend something that is - we're saying safe, the exception being the gastric irritation, and effective, and it's not going to break the bank for them to use it." General practitioner, 62 years*

- 1d *"And in terms of weighing up the side effects from aspirin, we've got the issue of the potential for those individuals who have got other comorbidities whether it's renal or allergies to aspirin or risk of stroke etc etc. You've got to weigh all those factors up before you consider putting someone on aspirin" Gastroenterologist, 59 years old*

CCA guideline

Many participants mentioned the specific phrasing of the guidelines, namely that aspirin should be "actively considered". This language did not sufficiently encourage them to prioritise the recommendation, and implied uncertainty about the strength of evidence. (Quotation 1e)

- 1e *"Because it's not strong, also, perhaps that's something that will be its - not its downfall, but will be negative because we already have a lot of strong guidelines" Geneticist, 32 years old*

Guidelines on the use of aspirin for disease prevention have changed over time, generating confusion among participants. Historically, aspirin was recommended for primary prevention of cardiovascular disease in certain at-risk patients, but guidelines were later altered, recommending it only for secondary prevention. Participants stated that it is hard to keep up with the latest recommendations, and that this ongoing change in advice caused reluctance to recommend them. (Quotation 1f)

- 1f *"With aspirin, it was always for stroke prevention, and now they're turning around and saying no, we shouldn't be doing it for that! And you sort of wonder, well, is this going to be the same sort of thing? The, one of the issues with medications and guidelines as such is that they keep changing." Pharmacist, 50 years old*

2. Inner Setting

Despite the variety of specialities and workplace types, a common theme emerged of competing demands on clinicians' time limiting their capacity to discuss aspirin for the prevention of CRC. (Quotations 2a, 2b) Pharmacists suggested they could support GPs in counselling patients, given GPs have relatively short consultation times with their patients. Pharmacists commented on the closeness of their location to GP clinics and their potential to reiterate advice about aspirin given by the GP. (Quotation 2c)

- 2a *"I think time's our major challenge. There's just not enough time to… especially that the pace that endoscopy list goes is fast and I think in private it's much faster. Public, even then; even if it's not pace, the patients had an anaesthetic - it's not really an appropriate time to be talking to them about long-term stuff." Gastroenterologist, 50 years old*

- 2b *"So we only actually see people when we can offer genetic testing and the rest of our work is done over the phone or we send letters. We are absolutely flat out at the moment. This is probably the only time today I will be sitting and not running around." Genetic counsellor, 35 years old*

- 2c *"I think, we should, way of promoting it, and probably we should be more proactive with it, GPs tend to not… especially, one of the pharmacies I work at is next to a bulk billing clinic doctors are very much get them in, get them out, and don't spend much time with them. so that's where we can often come in to be that extra person that can either reinforce what the doctor's told them or suggest other things. So, we should be there in the front line, yeah, promoting health." Pharmacist, 50 years old*

3. Outer Setting

Cancer Council Australia was perceived as a trustworthy organisation and this gave greater weight to and trust in the guidelines. (Quotation 3a)

- 3a *"Look as long as this is done by the Cancer Council of Victoria, I'm trusting them so it depends who is it behind, but this is a credible source of information I would have hoped." General Practitioner, 58 years old*

The initial results of the Aspirin in Reducing Events in the Elderly (ASPREE) Trial were published after the Cancer Council Australia national clinical guidelines were released, and shortly before interviews for this study were conducted.[8] The ASPREE trial showed low-dose aspirin provided no benefit in participants aged 70-80 years over a short-term follow up of 4.7 years. Some participants in our study, despite varying degrees of knowledge of the ASPREE trial results, were hesitant to recommend aspirin for people even in the 50 to 70-year-old group covered by the guidelines, due to the findings of the ASPREE trial in an older cohort. (Quotations 3b and 3c).

- 3b *"So that negative study for aspirin in older patients; kind of makes me think- should I be giving it to someone with average risk of colorectal cancer?" Gastroenterologist, 32 years old*
- 3c *"So there was a big study here in Australia, and then a little bit of input from the US done over the last few years, came out last year, the ASPREE study, so I did a talk on it, so I looked at the primary prevention of aspirin in the cardiovascular disease, and it showed that low-dose aspirin for healthy older adults had no impact on primary prevention and cardiovascular risk" Pharmacist, 26 years old*

4. Characteristics of Individuals

Whose role is it to recommend aspirin?

Hospital-based clinicians generally supported the guidelines and saw their role as advocates rather than implementers of the guidelines. (Quotations 4a and 4b) All participants, including GPs, saw that the primary responsibility to implement the aspirin guidelines rested in primary care. (Quotations 4c and 4d)

- 4a *"So, you know I'm a Geneticist. I think talking to GPs and Gastroenterologists would be a much better group [laughs] than Geneticists." Geneticist, 34 years old*
- 4b *"People are still very GP centred, so a lot of, even if we suggest things like this, a lot of people would still then go and talk to their GP before they decided to start something." Pharmacist, 50 years old*
- 4c *"If you understand what I mean, it's absolutely…I agree with those specialists, I do think it is part of the role of the GP to talk about these preventative health issues specifically prescribing aspirin" General practitioner, 28 years old*

- 4d *"It's interesting when new guidelines come out, because guidelines come out all the time, and this is a really - this is our bread and butter as a GP" General practitioner, 48 years old*

Knowledge / awareness of the CCA guidelines

Knowledge and awareness of the guidelines was mixed. The FCC staff were more knowledgeable of the guidelines, specifically as they work with populations at increased risk of CRC, and awareness of recommendations about aspirin use in people with Lynch syndrome. Whereas GPs, pharmacists and gastroenterologists were either unaware or had limited knowledge of the guidelines. (Figure 4. quotations 4e and 4f)

- 4e *"All I know about low-dose aspirin in bowel cancer is that it can be used, but in certain populations, but beyond that, I actually really don't know." Geneticist, 32 years old*
- 4f *"I would say that going across, we have three different clinicians at work and I don't think I've ever heard them recommend aspirin for someone who actually doesn't have something like Lynch syndrome." Genetic counsellor, 57 years old*

5. Process

Implementation of the CCA guidelines

While most participants considered themselves as early adopters, they admitted that clinicians in general would wait before adopting clinical guidelines. (Quotation 5a) Most health professionals agreed that patients would be receptive to taking extra medication such as aspirin for CRC prevention. (Quotation 5b) Nevertheless, a decision aid was thought to be potentially useful to facilitate discussion about the risks and benefits of taking aspirin. (Quotation 5c) Several participants could see how they could discuss aspirin as part of their usual consultation. (Quotation 5d)

- 5a *"Other doctors like to be on the tail end because they've been burnt a few times when things have kind of flipped back the other way." General practitioner, 38 years old*
- 5b *"You know, I think the people who already take tablets for something find it quite easy to beguile an extra tablet. So, someone's already on a cholesterol tablet, they're on a high blood pressure tablet, it's easy for them to add aspirin to that." Gastroenterologist, 60 years old*
- 5c *"Well that (a decision aid) might have been useful for the patient to show them what could happen and how effective it is if they ask." General practitioner, 58 years old*
- 5d *"You know, I appreciate they're guidelines and they're not mandatory, and if it fits in with the way I would practice, I'm happy to sort of incorporate them into what I do." Gastroenterologist, 65 years old*

Discussion

This is the first study to our knowledge to examine the perspectives of a wide range of Australian clinicians about recommending aspirin to reduce bowel cancer risk. Aspirin was considered as readily available, affordable and safe. However, the ambiguity about the recommended dose and perceived strength of the evidence was a concern for several clinicians. The media attention about the ASPREE trial[9] added to the perceived uncertainty about the evidence. Busy work environments meant limited time to spend on prevention. The endorsement from Cancer Council Australia, a nationwide not-for-profit organisation, meant the guidelines were perceived as trustworthy and therefore more likely to be implemented.

FCC staff and gastroenterologists are generally aware of aspirin recommendations for patients at increased CRC risk and suggested that GPs are better placed to discuss aspirin in those at average risk. These hospital specialists felt they could advocate the use of aspirin but the ultimate responsibility for initiation rested in general practice. Pharmacists similarly felt they could facilitate

the process but would not initiate discussions about aspirin. GPs agreed that this was part of their role, for example when discussing bowel cancer screening, but had limited awareness of the guidelines.

There is often a large investment of time, resources and clinical expertise involved in producing national clinical guidelines, however, there is typically no accompanying strategy to implement them.[10,11] Between 2003 and 2007, 313 clinical practice guidelines were produced in Australia by over 80 guideline producers[12], but with limited clinical uptake. [13,14]

The uptake of guidelines into clinical practice is influenced by several factors including the guideline characteristics, ease of implementation, clarity of the guidelines and individual clinicians' familiarity with the intervention and evidence.[15] Our study highlights several of these factors which could act as barriers to widespread implementation of the aspirin guidelines. Superficially, one might expect recommending a familiar, low cost, over-the-counter drug would be easily implemented. But lack of clarity, partly due to the specific wording of the recommendation, could alter perceptions of the evidence and jeopardise uptake of the guideline.

Uncertainties amongst clinicians about the evidence for aspirin in disease prevention is exacerbated by changes in recommendations about its use in cardiovascular disease. The Cancer Council Australia guideline specifically considered the evidence as it relates to preventing colorectal cancer. It did not discuss related evidence of reduced incidence and mortality from other cancers[3] or for the primary prevention of cardiovascular disease.[16] The US Preventative Services Taskforce recommends aspirin for CRC prevention only in people who are also at moderately increased risk of cardiovascular disease.[17] In addition, their recommendations about its use are stronger for people aged 50 to 59 years, compared with those aged 60 to 69 years because the risk of serious side-effects from aspirin increases with age.

There was little awareness amongst many participants of the additional effects of aspirin on all-cancer incidence and mortality, but this is an important additional consideration for patients when making informed decisions about taking aspirin. Clinicians in our study recognised the potential benefit of a decision aid to support discussions about taking aspirin. There is strong evidence to show that decision aids can support informed decision making, particularly when decisions require weighing up benefits and risks which are preference sensitive.[18] Patients need to understand the potential benefits of aspirin in terms of reduced incidence and death from cancer and cardiovascular disease, and harms from gastrointestinal and intracranial haemorrhage. In a vignette study testing graphical approaches to communicating these harms and benefits from aspirin, over 70% of Australian patients aged 50-70 were willing to take aspirin for disease prevention.[19] The use of a decision aid has the potential to inform the clinicians, which would enhance the clarity of the recommendation, and facilitate a discussion about the aspirin guidelines with patients.

Implications & limitations

In this in-depth qualitative study, we recruited a large sample of diverse participants representing different clinical disciplines, varied length of experience, and work settings. Although we recruited participants only from Victoria, we believe our findings are likely to be transferable to other Australian clinicians although we acknowledge that there may be other barriers and facilitators experienced by clinicians from remote locations.

The national guidelines on aspirin represent an important new approach to reducing the incidence and mortality of bowel cancer in Australia. But the absence of a strategic and more active implementation plan, means these guidelines are less likely to be translated into clinical practice.[20] Specific implementation strategies for general practice are necessary to increase the awareness and uptake of these guidelines. This could be supplemented by approaches to raise awareness in the community about the role of aspirin and tools to facilitate discussions between GPs and patients and support informed choices about CRC prevention.

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Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	
Occupation	3	What was their occupation at the time of the study?	
Gender	4	Was the researcher male or female?	
Experience and training	5	What experience or training did the researcher have?	
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	
Sample size	12	How many participants were in the study?	
Non-participation	13	How many people refused to participate or dropped out? Reasons?	
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	
Field notes	20	Were field notes made during and/or after the inter view or focus group?	
Duration	21	What was the duration of the inter views or focus group?	
Data saturation	22	Was data saturation discussed?	
Transcripts returned	23	Were transcripts returned to participants for comment and/or	

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	
Description of the coding tree	25	Did authors provide a description of the coding tree?	
Derivation of themes	26	Were themes identified in advance or derived from the data?	
Software	27	What software, if applicable, was used to manage the data?	
Participant checking	28	Did participants provide feedback on the findings?	
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	
Data and findings consistent	30	Was there consistency between the data presented and the findings?	
Clarity of major themes	31	Were major themes clearly presented in the findings?	
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

Once you have completed this checklist, please save a copy and upload it as part of your submission. DO NOT include this checklist as part of the main manuscript document. It must be uploaded as a separate file.

SPQR checklist for Clinicians' opinions on recommending aspirin to prevent colorectal cancer to Australians aged 50 to 70 years: a qualitative study

Standards for Reporting Qualitative Research (SRQR)*

http://www.equator-network.org/reporting-guidelines/srqr/

	Page/line no(s).
Title and abstract	
Title - Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	Page 1/ line 1-3
Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	Page 2/ line 35-62
Introduction	
Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	Page 3/ line 75-90
Purpose or research question - Purpose of the study and specific objectives or questions	Page 3/ line 91-94
Methods	
Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**	Page 3/ line 99 Page 3/ line 100
Researcher characteristics and reflexivity - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	Page 4/ lines 120 - 126
Context - Setting/site and salient contextual factors; rationale**	Page 3/ line 105
Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**	Page 3/ line 104
Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	Page 10 / line 345 - 347

Data collection methods - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**	Page 3/ line 113
Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	Page 4/ line 126
Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	Page 5/ line 143 and line 151
Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	Page 4/ line 126
Data analysis - Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	Page 4/ line 128-129/ line 131-138
Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	Page 4/ line 134- 135

Results/findings

Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	Page 5-8/ line 143 - 280
Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	Page 5-8/ line 143 - 280

Discussion

Integration with prior work, implications, transferability, and contribution(s) to the field - Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	Page 8- 9/ line 282 - 327
Limitations - Trustworthiness and limitations of findings	Page 9/ line 334 - 340

Other

Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	Page 10/ line 359 - 361
Funding - Sources of funding and other support; role of funders in data collection, interpretation, and reporting	Page 10/ line 357 - 358

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Clinicians' opinions on recommending aspirin to prevent colorectal cancer to Australians aged 50 to 70 years: a qualitative study

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Clinicians' opinions on recommending aspirin to prevent colorectal cancer to Australians aged 50 to 70 years: a qualitative study

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Abstract

Objectives

Australian guidelines recommend all 50 to 70-year-olds without existing contraindications consider taking low-dose aspirin (100 mg – 300 mg per day) for at least 2.5 years to reduce their risk of developing colorectal cancer.

We aimed to explore clinicians', practices, knowledge, opinions, and barriers and facilitators to the implementation of these new guidelines.

Methods

Semi-structured interviews were conducted with clinicians to whom the new guidelines may be applicable (familial cancer clinic staff (geneticists, oncologists and genetic counsellors), gastroenterologists, pharmacists, and general practitioners (GPs)).

The Consolidated Framework for Implementation Research (CFIR) underpinned the development of the interview guide. Coding was inductive and themes were developed through consensus between the authors.

Emerging themes were mapped onto the CFIR domains: characteristics of the intervention, outer setting, inner setting, individual characteristics and process.

Results

Sixty-four interviews were completed between March and October 2019. Aspirin was viewed as a safe and cheap option for cancer prevention. GPs were considered by all clinicians as the most important health professionals for implementation of the guidelines. Cancer Council Australia, as a trusted organisation, was an important facilitator to guideline adoption. Uncertainty about aspirin dosage and perceived strength of the evidence, precise wording of the recommendation, previous changes to guidelines about aspirin, and conflicting findings from trials in older populations were barriers to implementation.

Conclusion

Widespread adoption of these new guidelines could be an important strategy to reduce the incidence of bowel cancer, but this will require more active implementation strategies focused on primary care and the wider community.

Strengths and limitations of this study

Up to five short bullet points, no longer than one sentence each, that relate specifically to the methods. They should not include the results of the study.

- We recruited a large and diverse group of participants representing different clinical disciplines, varied length of experience, and work settings.
- We applied an established theoretical framework to study guideline implementation
- We recruited participants only from one state, Victoria, but we believe our findings are likely to be transferable to other Australian clinicians
- We acknowledge that there may be other barriers and facilitators experienced by clinicians from remote locations.

Introduction

In 2019, colorectal cancer (CRC) was the second most commonly diagnosed cancer in Australia in men and women (9,069 cases and 7,329 cases, respectively).[1] In November 2017, Cancer Council Australia updated their guidelines for the prevention of CRC to recommend that all people aged 50-70 who are at average risk of CRC actively consider taking low-dose aspirin to reduce their risk of CRC.[2] Despite the publication of these national guidelines recommending a significant change in CRC prevention strategy, it has not been accompanied by an implementation strategy, rather relying on passive diffusion of the guidelines into clinical practice.

The new guidelines were endorsed by the National Health and Medical Research Council (NHMRC) and adopted by the Royal Australian College of General Practitioners (RACGP). Meta-analyses of randomised controlled trials of low-dose aspirin have demonstrated reduced incidence and mortality from colorectal cancer by 25% and 33% respectively, as well as a 33% reduction in all-cause cancer mortality, when taken for at least 2.5 years.[3] In addition to reducing the risk of colorectal cancer, aspirin also reduces the risk of cardiovascular disease (CVD) including myocardial infarctions, ischaemic strokes and transient ischaemic attacks by 6% per annum in primary prevention trials[4] However, aspirin can cause side-effects including gastrointestinal haemorrhage, peptic ulcer and haemorrhagic stroke.

This project aimed to explore clinicians', practices, knowledge, opinions, and barriers and facilitators to the implementation of these guidelines, with the intention of developing implementation methods to increase the uptake of aspirin for CVD and CRC prevention, and reduce development of colorectal cancer in the Australian population.

Methods

Approach

A qualitative case study using semi-structured interviews was conducted with a range of health professionals whom the new guidelines were most likely to directly impact, including gastroenterologists, geneticists, oncologists, genetic counsellors and general practitioners. A constructivist paradigm was used to generate new ideas from participants, using interviews to explore current practice, knowledge and opinions toward recommending aspirin to people at average risk of CRC and potential barriers and facilitators to implementing the guidelines.

Setting and sampling strategy

Recruitment was done through personal networks of the authors, as well as snowball sampling through social media posts, emailing through the Familial Cancer Centre (FCC) staff email list in the Parkville Precinct and cold calling general practices through the University of Melbourne's Department of General Practice Victorian Research and Education Network database. From these different sources of participants, we purposively sampled to achieve maximum variation in profession type, age, gender, years of experience and those working in both rural and urban Victoria, and public and private practice settings. As we sent out recruitment messages through different sources all participants opted in on their own. All participants provided written consent. General practitioners, as private practitioners, were reimbursed $100 for their time as this group was the most difficult to recruit. Recruitment of all participants occurred between February and September 2019.

Data collection techniques

A semi-structured interview guide was developed based on the Consolidated Framework for Implementation Research (CFIR)[5] (Table 1). CFIR is a conceptual framework developed to guide the assessment of implementation contexts. It consists of five domains and 39 constructs representing all areas of a healthcare setting that impact upon the successful implementation of a new intervention.[6] The five overarching CFIR domains covers aspects of the design and cost or the intervention

characteristics, aspects of organisations and how they operate in the inner setting, individuals within the organisations or characteristics of individuals like the culture and leadership, how outside organisations or outer settings and beliefs, and implementation processes impact upon successful implementation of an intervention.

The interview questions were adapted from the online CFIR guide, which provides a list of potentially relevant interview questions for each of the constructs.[5] In this study, the 'intervention' was defined as the national guideline recommending consideration of aspirin for CRC prevention. [Supplementary Section 1].

The interviews were conducted by three researchers by authors SM, PA and TY who had no existing relationships with the participants. The interviewing researchers disclosed their position in the research to the participants and they were aware why the research was being conducted. Researcher SM who interviewed the general practitioners, geneticists, oncologists and genetic counsellors is a highly experienced female qualitative researcher. Researchers PA who interviewed pharmacists and TY who interviewed gastroenterologists both were male students who were trained in qualitative methods and supervised by experienced qualitative researchers (SM, JM, JE). . Interviews were audio recorded and transcribed verbatim. Field notes on the time and location were recorded in researchers' notebook following the interviews. Researchers met regularly to review the interview transcripts and discuss data and the emerging themes. Interview transcripts were not returned to participants.

Analysis

Qualitative transcript data were managed using NVivo 12[7]. The interviews for each type of participant; FCC staff, GPs, gastroenterologists and pharmacists were initially analysed separately. Complete coding of each interview was conducted by the author who interviewed the participant where everything that was spoken by the participants was organised into specific topics. At the first level of coding codes were produced inductively for each of the participant professional groups upon completion . For enhanced interpretive rigour, several interviews in each participant group were co-coded by another researcher and progressively checked in regular researcher meetings. The coding for several interviews per participant type was checked by a second researcher.

After first-level coding, codes were grouped into themes. Thematic analysis was employed at this level where themes emerged from the first-level coding through discussions between the researchers. About 20 themes per professional group type were defined. Themes from each professional group type were discussed between the researchers brought together if they could be. Themes were then mapped onto the domain and constructs from the CFIR[6]: characteristics of intervention, outer setting, inner setting, characteristics of individuals and process (Table 1).

Table 1. Overview of the Consolidated Framework for Implementation Research. The CFIR provides constructs that have been associated with effective implementation.[6]

Characteristics of Intervention	***Inner Setting***	***Outer Setting***	***Individuals Involved***	***Implementation Process***
- Intervention source - Evidence strength and quality - Relative advantage - Adaptability - Trialability - Complexity - Design quality - Cost	- Structural characteristics - Networks and communications - Culture - Implementation climate	- Patient needs and resources -Cosmopolitanism - Peer pressure - External policies and incentives	- Knowledge and beliefs about the intervention - Self-efficacy - Individual stage of change - Individual identification with organisation - Other personal attributes	- Planning - Engaging - Executing - Reflecting and evaluating

Patient and public involvement

No patient involvement.

Results

Sixty-four participants were interviewed (Table 2). Interviews ranged from 20-50 minutes and were face-to-face in the participants place of work (clinic, pharmacy or hospital consulting or meeting room), except for four GPs who were interviewed over the phone. The researcher and participants were the only ones present during the interviews, except for with pharmacists if there were shopkeepers or pharmacy assistants present. The results are presented according to the domains of CFIR (Table 3).

Table 2. Characteristics of participants.

Characteristics	
Mean age (years)	41
Sex, female (n)	35
Profession (n)	
Gastroenterologist	17
Pharmacist	14
General practitioner	16
Familial cancer on (FCC) staff	
Genetic counsellor	10
Geneticists	4
Oncologist	3
Years in profession (n)	
<10	23
10 – 19	22
20 – 29	8
30+	11
Work setting	
General practice (%)	
Bulk-billing clinic	31
Private	69
Hospital (gastroenterologists and FCC staff) (%)	
Public	77
Private	23
Pharmacy (%)	
Hospital	36
Community	64

Table 3. Results of themes from interviews with 64; general practitioners (GPs), gastroenterologists, familial cancer clinic staff (FCC staff), and pharmacists mapped onto the Consolidated Framework for Implementation Research.

Characteristics of Intervention	***Inner Setting***	***Outer Setting***	***Individuals Involved***	***Implementation Process***
-The participants expressed confusion around the aspirin dosing (100-300 mg) -Some facilitators to aspirin implementation included; the low cost, availability and safety -The 'actively considered' wording of the guidelines implied some uncertainty about the strength of the evidence -The aspirin guidelines have changed over time which presents as a barrier to implementation	- Participants agreed that having limited time would be a barrier to implementation as they are usually very busy - Pharmacists specifically saw their role to support what the GPs advise, and thought they should reiterate this to patients	- As the guidelines were first published by the Cancer Council Australia, they were more trustworthy - The ASPREE trial although it was a study done in the elderly (70 – 80-year-old) population, it introduced some hesitancy even for the 50 – 70-year-old population - The guidelines have changed a lot over time for CVD	- Geneticists, pharmacists and gastroenterologists saw their role as advocates of the guidelines - All clinicians agreed that it is GPs role to implement the guidelines into general practice, GPs agreed it was their role - FCC staff were aware of the guidelines, but other clinicians had limited knowledge	- Participants thought of themselves as early adopters but agreed that it takes time for most clinicians to implement new interventions - Participants agreed that patients would be receptive to the recommendations - A decision aid would be helpful in facilitating a discussion with patients

1. Characteristics of the Intervention

Aspirin

Many participants expressed confusion regarding the dose of aspirin recommended for colorectal cancer prevention. While some participants were comfortable deciding on a dose within the 100 – 300mg range specified in the guidelines, others felt that this does range indicated uncertainty in the guidelines. (Quotations 1a and 1b)

- 1a *"Well I think the range is ambiguous there. The numbers are not ambiguous at all there I suppose but it's just - it's out with normal practice I guess" General Practitioner, 30 years old*
- 1b *"And I think the risk in data coming out is how much is useful, like the dosage. We used to think that a low dose used to be good for other cardiovascular events, but in fact maybe it isn't depending on gender, age and weight." Gastroenterologist, 47 years old*

Aspirin was perceived as cheap, safe and readily available by many participants, who stated this would facilitate their prescribing and patient uptake. With the rising costs of healthcare, participants thought the cheap nature of aspirin facilitated the implementation of the guidelines. (Quotation 1c) Barriers to implementation included concerns about possible side-effects of aspirin such as gastrointestinal bleeding and contraindications in people with multiple comorbidities. (Quotation 1d)

- 1c *"It's cheap, which is the other thing; and, again, in the Australian healthcare system, where there are costs associated with a lot of treatments, to be able to recommend something that is - we're saying safe, the exception being the gastric irritation, and effective, and it's not going to break the bank for them to use it." General practitioner, 62 years*
- 1d *"And in terms of weighing up the side effects from aspirin, we've got the issue of the potential for those individuals who have got other comorbidities whether it's renal or*

allergies to aspirin or risk of stroke etc etc. You've got to weigh all those factors up before you consider putting someone on aspirin" Gastroenterologist, 59 years old

CCA guideline

Many participants mentioned the specific phrasing of the guidelines, namely that aspirin should be "actively considered". This language did not sufficiently encourage them to prioritise the recommendation, and implied uncertainty about the strength of evidence. (Quotation 1e)

- 1e *"Because it's not strong, also, perhaps that's something that will be its - not its downfall, but will be negative because we already have a lot of strong guidelines" Geneticist, 32 years old*

2. Inner Setting

Despite the variety of specialities and workplace types, a common theme emerged of competing demands on clinicians' time limiting their capacity to discuss aspirin for the prevention of CRC. (Quotations 2a, 2b) Pharmacists suggested they could support GPs in counselling patients, given GPs have relatively short consultation times with their patients. Pharmacists commented on the closeness of their location to GP clinics and their potential to reiterate advice about aspirin given by the GP. (Quotation 2c)

- 2a *"I think time's our major challenge. There's just not enough time to… especially that the pace that endoscopy list goes is fast and I think in private it's much faster. Public, even then; even if it's not pace, the patients had an anaesthetic - it's not really an appropriate time to be talking to them about long-term stuff." Gastroenterologist, 50 years old*

- 2b *"So we only actually see people when we can offer genetic testing and the rest of our work is done over the phone or we send letters. We are absolutely flat out at the moment. This is probably the only time today I will be sitting and not running around." Genetic counsellor, 35 years old*

- 2c *"I think, we should, way of promoting it, and probably we should be more proactive with it, GPs tend to not… especially, one of the pharmacies I work at is next to a bulk billing clinic doctors are very much get them in, get them out, and don't spend much time with them. so that's where we can often come in to be that extra person that can either reinforce what the doctor's told them or suggest other things. So, we should be there in the front line, yeah, promoting health." Pharmacist, 50 years old*

3. Outer Setting

Cancer Council Australia was perceived as a trustworthy organisation and this gave greater weight to and trust in the guidelines. (Quotation 3a)

- 3a *"Look as long as this is done by the Cancer Council of Victoria, I'm trusting them so it depends who is it behind, but this is a credible source of information I would have hoped." General Practitioner, 58 years old*

The initial results of the Aspirin in Reducing Events in the Elderly (ASPREE) Trial were published after the Cancer Council Australia national clinical guidelines were released, and shortly before interviews for this study were conducted.[8] The ASPREE trial showed low-dose aspirin provided no benefit in participants aged 70-80 years over a short-term follow up of 4.7 years.[9] Some participants in our study, despite varying degrees of knowledge of the ASPREE trial results, were hesitant to recommend aspirin for people even in the 50 to 70-year-old group covered by the guidelines, due to the findings of the ASPREE trial despite being conducted in a different age cohort. (Quotations 3b and 3c).

- 3b *"So that negative study for aspirin in older patients; kind of makes me think- should I be giving it to someone with average risk of colorectal cancer?" Gastroenterologist, 32 years old*

- 3c *"So there was a big study here in Australia, and then a little bit of input from the US done over the last few years, came out last year, the ASPREE study, so I did a talk on it, so I looked at the primary prevention of aspirin in the cardiovascular disease, and it showed that low-dose aspirin for healthy older adults had no impact on primary prevention and cardiovascular risk" Pharmacist, 26 years old*

Guidelines on the use of aspirin for disease prevention have changed over time, generating confusion among participants. Historically, aspirin was recommended for primary prevention of cardiovascular disease in certain at-risk patients, but guidelines were later altered, recommending it only for secondary prevention.[10,11] Participants stated that it is hard to keep up with the latest recommendations, and that this ongoing change in advice caused reluctance to recommend them. (Quotation 3d)

- 3d *"With aspirin, it was always for stroke prevention, and now they're turning around and saying no, we shouldn't be doing it for that! And you sort of wonder, well, is this going to be the same sort of thing? The, one of the issues with medications and guidelines as such is that they keep changing." Pharmacist, 50 years old*

4. Characteristics of Individuals

Whose role is it to recommend aspirin?

Hospital-based clinicians generally supported the guidelines and saw their role as advocates rather than implementers of the guidelines. (Quotations 4a and 4b) All participants, including GPs, saw that the primary responsibility to implement the aspirin guidelines rested in primary care. (Quotations 4c and 4d)

- 4a *"So, you know I'm a Geneticist. I think talking to GPs and Gastroenterologists would be a much better group [laughs] than Geneticists." Geneticist, 34 years old*

- 4b *"People are still very GP centred, so a lot of, even if we suggest things like this, a lot of people would still then go and talk to their GP before they decided to start something." Pharmacist, 50 years old*

- 4c *"If you understand what I mean, it's absolutely…I agree with those specialists, I do think it is part of the role of the GP to talk about these preventative health issues specifically prescribing aspirin" General practitioner, 28 years old*

- 4d *"It's interesting when new guidelines come out, because guidelines come out all the time, and this is a really - this is our bread and butter as a GP" General practitioner, 48 years old*

Knowledge / awareness of the CCA guidelines

Knowledge and awareness of the guidelines was mixed. The FCC staff were more knowledgeable of the guidelines, specifically as they work with populations at increased risk of CRC, and awareness of recommendations about aspirin use in people with Lynch syndrome. Whereas GPs, pharmacists and gastroenterologists were either unaware or had limited knowledge of the guidelines. (Quotations 4e and 4f)

- 4e *"All I know about low-dose aspirin in bowel cancer is that it can be used, but in certain populations, but beyond that, I actually really don't know." Geneticist, 32 years old*

- 4f *"I would say that going across, we have three different clinicians at work and I don't think I've ever heard them recommend aspirin for someone who actually doesn't have something like Lynch syndrome." Genetic counsellor, 57 years old*

5. Process

Implementation of the CCA guidelines

While most participants considered themselves as early adopters, they admitted that clinicians in general would wait before adopting new clinical guidelines. (Quotation 5a) Most health professionals agreed that patients would be receptive to taking extra medication such as aspirin for CRC prevention. (Quotation 5b) Nevertheless, a decision aid was thought to be potentially useful to facilitate discussion about the risks and benefits of taking aspirin. (Quotation 5c) Several participants could see how they could discuss aspirin as part of their usual consultation. (Quotation 5d)

- 5a *"Other doctors like to be on the tail end because they've been burnt a few times when things have kind of flipped back the other way." General practitioner, 38 years old*
- 5b *"You know, I think the people who already take tablets for something find it quite easy to beguile an extra tablet. So, someone's already on a cholesterol tablet, they're on a high blood pressure tablet, it's easy for them to add aspirin to that." Gastroenterologist, 60 years old*
- 5c *"Well that (a decision aid) might have been useful for the patient to show them what could happen and how effective it is if they ask." General practitioner, 58 years old*
- 5d *"You know, I appreciate they're guidelines and they're not mandatory, and if it fits in with the way I would practice, I'm happy to sort of incorporate them into what I do." Gastroenterologist, 65 years old*

Discussion

This is the first study to our knowledge to examine the perspectives of a wide range of Australian clinicians about recommending aspirin to reduce bowel cancer risk. Aspirin was considered as readily available, affordable and safe. However, the ambiguity about the recommended dose and perceived strength of the evidence was a concern for several clinicians. The media attention about the ASPREE trial[12] added to the perceived uncertainty about the evidence. Busy work environments meant limited time to spend on prevention. The endorsement from Cancer Council Australia, a nationwide not-for-profit organisation, meant the guidelines were perceived as trustworthy and therefore more likely to be implemented.

FCC staff and gastroenterologists are generally aware of aspirin recommendations for patients at increased CRC risk and suggested that GPs are better placed to discuss aspirin in those at average risk. These hospital specialists felt they could advocate the use of aspirin but the ultimate responsibility for initiation rested in general practice. Pharmacists similarly felt they could facilitate the process but would not initiate discussions about aspirin. GPs agreed that this was part of their role, for example when discussing bowel cancer screening, but had limited awareness of the guidelines.

There is often a large investment of time, resources and clinical expertise involved in producing national clinical guidelines, however, there is typically no accompanying strategy to implement them.[13,14] Between 2003 and 2007, 313 clinical practice guidelines were produced in Australia by over 80 guideline producers[15], but with limited clinical uptake. [16,17]

The uptake of guidelines into clinical practice is influenced by several factors including the guideline characteristics, ease of implementation, clarity of the guidelines and individual clinicians' familiarity with the intervention and evidence.[18] Our study highlights several of these factors which could act as barriers to widespread implementation of the aspirin guidelines. Superficially, one might expect

recommending a familiar, low cost, over-the-counter drug would be easily implemented. But lack of clarity, partly due to the specific wording of the recommendation, could alter perceptions of the evidence and jeopardise uptake of the guideline.

Uncertainties amongst clinicians about the evidence for aspirin in disease prevention is exacerbated by changes in recommendations about its use in cardiovascular disease. The Cancer Council Australia guideline specifically considered the evidence as it relates to preventing colorectal cancer. It did not discuss related evidence of reduced incidence and mortality from other cancers[3] or for the primary prevention of cardiovascular disease.[19] The US Preventative Services Taskforce recommends aspirin for CRC prevention only in people who are also at moderately increased risk of cardiovascular disease.[20] In addition, their recommendations about its use are stronger for people aged 50 to 59 years, compared with those aged 60 to 69 years because the risk of serious side-effects from aspirin increases with age.

There was little awareness amongst many participants of the additional effects of aspirin on all-cancer incidence and mortality, but this is an important additional consideration for patients when making informed decisions about taking aspirin. Clinicians in our study recognised the potential benefit of a decision aid to support discussions about taking aspirin. There is strong evidence to show that decision aids can support informed decision making, particularly when decisions require weighing up benefits and risks which are preference sensitive.[21] Patients need to understand the potential benefits of aspirin in terms of reduced incidence and death from cancer and cardiovascular disease, and harms from gastrointestinal and intracranial haemorrhage. In a vignette study testing graphical approaches to communicating these harms and benefits from aspirin, over 70% of Australian patients aged 50-70 were willing to take aspirin for disease prevention.[22] The use of a decision aid has the potential to inform the clinicians which addresses a major barrier to implementation, as GPs have limited awareness of the guidelines. A decision aid would enhance the clarity of the recommendation and facilitate a discussion about the aspirin guidelines with patients.

Implications & limitations

In this in-depth qualitative study, we recruited a large sample of diverse participants representing different clinical disciplines, varied length of experience, and work settings. Although we recruited participants only from Victoria, we believe our findings are likely to be transferable to other Australian clinicians although we acknowledge that there may be other barriers and facilitators experienced by clinicians from remote locations.

The national guidelines on aspirin represent an important new approach to reducing the incidence and mortality of bowel cancer in Australia. But the absence of a strategic and more active implementation plan, means these guidelines are less likely to be translated into clinical practice.[23] Specific implementation strategies for general practice are necessary to increase the awareness and uptake of these guidelines. Our findings suggest that a stronger statement of recommendation and clarity about dosage are required. Engagement with pharmacists is also necessary to ensure they are aware of the guidelines and are prepared to endorse any advice from someone's GP about using aspirin. These implementation strategies could be supplemented by approaches to raise awareness in the community about the role of aspirin and decision aids to facilitate discussions between GPs and patients and support informed choices about CRC prevention.

Author statement:

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Data availability: De-identified participant transcripts are available upon request and are stored in the University of Melbourne secure two-step verification cloud which is only accessible by a University laptop and VPN. If you would like to request transcript data, please contact the first author.

Competing interests: JE and FM were members of the Cancer Council Australia guideline development group which recommends the use of low dose aspirin for the prevention of colorectal cancer.

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Supplementary Materials

Clinicians' opinions on recommending aspirin to prevent colorectal cancer to Australians aged 50 to 70 years: a qualitative study

S1. Interview schedule

Clinicians' interviews will be guided by the following schedule which only provides general areas to be covered.

****Remind them that you'll be recording the interview and START recording**

DEMOGRAPHICS

- Age, gender, years of practice, specialization, place(s) of work: clinic(s) or hospital(s)

INTRODUCE CANCER COUNCIL GUIDELINES

*(Show **laminated version** of summary / recommendations)*

- Are you aware of the new guidelines? What is your understanding of the aspirin recommendations?
- Are you aware of guidelines that recommend prescribing aspirin to prevent bowel cancer?

OPINION ON GUIDELINES

- *If aware of guidelines*: what is your professional opinion of them?
- What are your thoughts underpinning the evidence around these guidelines?
- What do you think about using aspirin to prevent bowel cancer?
- Are you aware of the potential benefits and harms of using aspirin to prevent bowel cancer?
- Do you have clinical experience with the harms of using aspirin?

CURRENT PRACTICE/ PREVENTION

- When you consult with patients, what bowel cancer and cardiovascular disease prevention strategies do you incorporate into the consultation?
- Do you think this is part of your role as a general practitioner?
    - *If not:* whose role do you think it is?
- Do you currently recommend aspirin to patients?
- Which patients would you and would you not consider recommending aspirin to? Why?
    - Specific conditions, prevention?
    - How about those with or without a family history (e.g. Lynch syndrome)?

PATIENT OPINION

- What do think your patients would feel about using aspirin preventively?
- Have you had any feedback from patients about their experience of using aspirin preventively?

PATIENT EDUCATION

- How would you go about explaining the benefits and potential harms of taking aspirin?
- What supportive information would you use and why?

INTRODUCE EXPECTED FREQUENCY TREES

*Show clinician the **2** expected frequency trees – **incidence** and **mortality.** Provide **evidence** for where the **numbers come from.** Emphasise it was developed for people aged **50-70.***

- What do you think about the EFT?
- Would the decision aid be helpful in these discussions with pts?

NEW GUIDELINE IMPLEMENTATION: ROUTINE PRACTICE

- Generally, when there is a new guideline, how do you find out about it?
- How do you incorporate new guidelines into practice?
- What challenges do you encounter when implementing new guidelines?
    - Private vs public
- How does your clinic/hospital implement new guidelines?
- Are you more likely to be early adopter or late adopter for new guidelines? Do you tend to wait to see what your colleagues are doing before starting to adopt new recommendations?

COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	
Occupation	3	What was their occupation at the time of the study?	
Gender	4	Was the researcher male or female?	
Experience and training	5	What experience or training did the researcher have?	
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	
Sample size	12	How many participants were in the study?	
Non-participation	13	How many people refused to participate or dropped out? Reasons?	
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	
Field notes	20	Were field notes made during and/or after the inter view or focus group?	
Duration	21	What was the duration of the inter views or focus group?	
Data saturation	22	Was data saturation discussed?	
Transcripts returned	23	Were transcripts returned to participants for comment and/or	

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	
Description of the coding tree	25	Did authors provide a description of the coding tree?	
Derivation of themes	26	Were themes identified in advance or derived from the data?	
Software	27	What software, if applicable, was used to manage the data?	
Participant checking	28	Did participants provide feedback on the findings?	
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	
Data and findings consistent	30	Was there consistency between the data presented and the findings?	
Clarity of major themes	31	Were major themes clearly presented in the findings?	
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

Once you have completed this checklist, please save a copy and upload it as part of your submission. DO NOT include this checklist as part of the main manuscript document. It must be uploaded as a separate file.

SPQR checklist for Clinicians' opinions on recommending aspirin to prevent colorectal cancer to Australians aged 50 to 70 years: a qualitative study

Standards for Reporting Qualitative Research (SRQR)*

http://www.equator-network.org/reporting-guidelines/srqr/

	Page/line no(s).
Title and abstract	
Title - Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	Page 1/ line 1-3
Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	Page 2/ line 35-62
Introduction	
Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	Page 3/ line 75-90
Purpose or research question - Purpose of the study and specific objectives or questions	Page 3/ line 91-94
Methods	
Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**	Page 3/ line 99 Page 3/ line 100
Researcher characteristics and reflexivity - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	Page 4/ lines 120 - 126
Context - Setting/site and salient contextual factors; rationale**	Page 3/ line 105
Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**	Page 3/ line 104
Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	Page 10 / line 345 - 347

Data collection methods - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**	Page 3/ line 113
Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	Page 4/ line 126
Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	Page 5/ line 143 and line 151
Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	Page 4/ line 126
Data analysis - Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	Page 4/ line 128-129/ line 131-138
Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	Page 4/ line 134- 135

Results/findings

Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	Page 5-8/ line 143 - 280
Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	Page 5-8/ line 143 - 280

Discussion

Integration with prior work, implications, transferability, and contribution(s) to the field - Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	Page 8- 9/ line 282 - 327
Limitations - Trustworthiness and limitations of findings	Page 9/ line 334 - 340

Other

Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	Page 10/ line 359 - 361
Funding - Sources of funding and other support; role of funders in data collection, interpretation, and reporting	Page 10/ line 357 - 358

BMJ Open

Clinicians' opinions on recommending aspirin to prevent colorectal cancer to Australians aged 50 to 70 years: a qualitative study

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Clinicians' opinions on recommending aspirin to prevent colorectal cancer to Australians aged 50 to 70 years: a qualitative study

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Abstract

Objectives

Australian guidelines recommend all 50 to 70-year-olds without existing contraindications consider taking low-dose aspirin (100 mg – 300 mg per day) for at least 2.5 years to reduce their risk of developing colorectal cancer.

We aimed to explore clinicians', practices, knowledge, opinions, and barriers and facilitators to the implementation of these new guidelines.

Methods

Semi-structured interviews were conducted with clinicians to whom the new guidelines may be applicable (familial cancer clinic staff (geneticists, oncologists and genetic counsellors), gastroenterologists, pharmacists, and general practitioners (GPs)).

The Consolidated Framework for Implementation Research (CFIR) underpinned the development of the interview guide. Coding was inductive and themes were developed through consensus between the authors.

Emerging themes were mapped onto the CFIR domains: characteristics of the intervention, outer setting, inner setting, individual characteristics and process.

Results

Sixty-four interviews were completed between March and October 2019. Aspirin was viewed as a safe and cheap option for cancer prevention. GPs were considered by all clinicians as the most important health professionals for implementation of the guidelines. Cancer Council Australia, as a trusted organisation, was an important facilitator to guideline adoption. Uncertainty about aspirin dosage and perceived strength of the evidence, precise wording of the recommendation, previous changes to guidelines about aspirin, and conflicting findings from trials in older populations were barriers to implementation.

Conclusion

Widespread adoption of these new guidelines could be an important strategy to reduce the incidence of bowel cancer, but this will require more active implementation strategies focused on primary care and the wider community.

Strengths and limitations of this study

Up to five short bullet points, no longer than one sentence each, that relate specifically to the methods. They should not include the results of the study.

- We recruited a large and diverse group of participants representing different clinical disciplines, varied length of experience, and work settings.
- We applied an established theoretical framework to study guideline implementation
- We recruited participants only from one state, Victoria, but we believe our findings are likely to be transferable to other Australian clinicians
- We acknowledge that there may be other barriers and facilitators experienced by clinicians from remote locations.

Introduction

In 2019, colorectal cancer (CRC) was the second most commonly diagnosed cancer in Australia in men and women (9,069 cases and 7,329 cases, respectively).[1] In November 2017, Cancer Council Australia updated their guidelines for the prevention of CRC to recommend that all people aged 50-70 who are at average risk of CRC actively consider taking low-dose aspirin to reduce their risk of CRC.[2] Despite the publication of these national guidelines recommending a significant change in CRC prevention strategy, it has not been accompanied by an implementation strategy, rather relying on passive diffusion of the guidelines into clinical practice.

The new guidelines were endorsed by the National Health and Medical Research Council (NHMRC) and adopted by the Royal Australian College of General Practitioners (RACGP). Meta-analyses of randomised controlled trials of low-dose aspirin have demonstrated reduced incidence and mortality from colorectal cancer by 25% and 33% respectively, as well as a 33% reduction in all-cause cancer mortality, when taken for at least 2.5 years.[3] In addition to reducing the risk of colorectal cancer, aspirin also reduces the risk of cardiovascular disease (CVD) including myocardial infarctions, ischaemic strokes and transient ischaemic attacks by 6% per annum in primary prevention trials.[4] However, aspirin can cause side-effects including gastrointestinal haemorrhage, peptic ulcer and haemorrhagic stroke.

This project aimed to explore clinicians', practices, knowledge, opinions, and barriers and facilitators to the implementation of these guidelines, with the intention of developing implementation methods to increase the uptake of aspirin for CVD and CRC prevention and reduce development of colorectal cancer in the Australian population.

Methods

Approach

A qualitative case study using semi-structured interviews was conducted with a range of health professionals whom the new guidelines were most likely to directly impact, including gastroenterologists, geneticists, oncologists, genetic counsellors and general practitioners. A constructivist paradigm was used to generate new ideas from participants, using interviews to explore current practice, knowledge and opinions toward recommending aspirin to people at average risk of CRC and potential barriers and facilitators to implementing the guidelines.

Setting and sampling strategy

Recruitment was done through personal networks of the authors, as well as through social media posts, emailing through the Familial Cancer Centre (FCC) staff email list in the Parkville Precinct and cold calling general practices through the University of Melbourne's Department of General Practice Victorian Research and Education Network database. From these different sources of participants, we purposively sampled to achieve maximum variation in profession type, age, gender, years of experience and those working in both rural and urban Victoria, and public and private practice settings. As we sent out recruitment messages through different sources all participants opted in on their own. All participants provided written consent. General practitioners, as private practitioners, were reimbursed $100 for their time as this group was the most difficult to recruit. Recruitment of all participants occurred between February and September 2019.

Data collection techniques

A semi-structured interview guide was developed based on the Consolidated Framework for Implementation Research (CFIR)[5] (Table 1). CFIR is a conceptual framework developed to guide the assessment of implementation contexts. It consists of five domains and 39 constructs representing all areas of a healthcare setting that impact upon the successful implementation of a new intervention.[6] The five overarching CFIR domains covers aspects of the design and cost or the intervention

characteristics, aspects of organisations and how they operate in the inner setting, individuals within the organisations or characteristics of individuals like the culture and leadership, how outside organisations or outer settings and beliefs, and implementation processes impact upon successful implementation of an intervention.

The interview questions were adapted from the online CFIR guide, which provides a list of potentially relevant interview questions for each of the constructs.[5] In this study, the 'intervention' was defined as the national guideline recommending consideration of aspirin for CRC prevention. [Supplementary Section 1].

The interviews were conducted by three researchers by authors SM, PA and TY who had no existing relationships with the participants. The interviewing researchers disclosed their position in the research to the participants and they were aware why the research was being conducted. Researcher SM who interviewed the general practitioners, geneticists, oncologists and genetic counsellors is a highly experienced female qualitative researcher. Researchers PA who interviewed pharmacists and TY who interviewed gastroenterologists both were male students who were trained in qualitative methods and supervised by experienced qualitative researchers (SM, JM, JE). Interviews were audio recorded and transcribed verbatim. Field notes on the time and location were recorded in researchers' notebook following the interviews. Researchers met regularly to review the interview transcripts and discuss data and the emerging themes. Interview transcripts were not returned to participants.

Analysis

Qualitative transcript data were managed using NVivo 12[7]. The interviews for each type of participant; FCC staff, GPs, gastroenterologists and pharmacists were initially analysed separately. Complete coding of each interview was conducted by the author who interviewed the participant where everything that was spoken by the participants was organised into specific topics. At the first level of coding codes were produced inductively for each of the participant professional groups upon completion . For enhanced interpretive rigour, several interviews in each participant group were co-coded by another researcher and progressively checked in regular researcher meetings. The coding for several interviews per participant type was checked by a second researcher.

After first-level coding, codes were grouped into themes. Thematic analysis was employed at this level where themes emerged from the first-level coding through discussions between the researchers. About 20 themes per professional group type were defined. Themes from each professional group type were discussed between the researchers and brought together if they could be. Themes were then mapped onto the domain and constructs from the CFIR[6]: characteristics of intervention, outer setting, inner setting, characteristics of individuals and process (Table 1).

Table 1. Overview of the Consolidated Framework for Implementation Research. The CFIR provides constructs that have been associated with effective implementation.[6]

Characteristics of Intervention	***Inner Setting***	***Outer Setting***	***Individuals Involved***	***Implementation Process***
- Intervention source - Evidence strength and quality - Relative advantage - Adaptability - Trialability - Complexity - Design quality - Cost	- Structural characteristics - Networks and communications - Culture - Implementation climate	- Patient needs and resources -Cosmopolitanism - Peer pressure - External policies and incentives	- Knowledge and beliefs about the intervention - Self-efficacy - Individual stage of change - Individual identification with organisation - Other personal attributes	- Planning - Engaging - Executing - Reflecting and evaluating

Patient and public involvement

No patient involvement.

Results

Sixty-four participants were interviewed (Table 2). Interviews ranged from 20-50 minutes and were face-to-face in the participants place of work (clinic, pharmacy or hospital consulting or meeting room), except for four GPs who were interviewed over the phone. The researcher and participants were the only ones present during the interviews, except for with pharmacists if there were shopkeepers or pharmacy assistants present. The results are presented according to the domains of CFIR (Table 3).

Table 2. Characteristics of participants (N=64).

Characteristics	
Mean age (years)	41
Sex, female (n)	35
Profession (n)	
Gastroenterologist	17
Pharmacist	14
General practitioner	16
Familial cancer on (FCC) staff	
Genetic counsellor	10
Geneticists	4
Oncologist	3
Years in profession (n)	
<10	23
10 – 19	22
20 – 29	8
30+	11
Work setting	
General practice (%)	
Bulk-billing clinic	31
Private	69
Hospital (gastroenterologists and FCC staff) (%)	
Public	77
Private	23
Pharmacy (%)	
Hospital	36
Community	64

Table 3. Results of themes from interviews with; general practitioners (GPs), gastroenterologists, familial cancer clinic staff (FCC staff), and pharmacists mapped onto the Consolidated Framework for Implementation Research.

Characteristics of Intervention	***Inner Setting***	***Outer Setting***	***Individuals Involved***	***Implementation Process***
-The participants expressed confusion around the aspirin dosing (100-300 mg) -Some facilitators to aspirin implementation included; the low cost, availability and safety -The 'actively considered' wording of the guidelines implied some uncertainty about the strength of the evidence -The aspirin guidelines have changed over time which presents as a barrier to implementation	- Participants agreed that having limited time would be a barrier to implementation as they are usually very busy - Pharmacists specifically saw their role to support what the GPs advise, and thought they should reiterate this to patients	- As the guidelines were first published by the Cancer Council Australia, they were more trustworthy - The ASPREE trial although it was a study done in the elderly (70 – 80-year-old) population, it introduced some hesitancy even for the 50 – 70-year-old population - The guidelines have changed a lot over time for CVD	- Geneticists, pharmacists and gastroenterologists saw their role as advocates of the guidelines - All clinicians agreed that it is GPs role to implement the guidelines into general practice, GPs agreed it was their role - FCC staff were aware of the guidelines, but other clinicians had limited knowledge	- Participants thought of themselves as early adopters but agreed that it takes time for most clinicians to implement new interventions - Participants agreed that patients would be receptive to the recommendations - A decision aid would be helpful in facilitating a discussion with patients

1. Characteristics of the Intervention

Aspirin

Many participants expressed confusion regarding the dose of aspirin recommended for colorectal cancer prevention. While some participants were comfortable deciding on a dose within the 100 – 300mg range specified in the guidelines, others felt that this does range indicated uncertainty in the guidelines. (Quotations 1a and 1b)

- 1a *"Well I think the range is ambiguous there. The numbers are not ambiguous at all there I suppose but it's just - it's out with normal practice I guess" General Practitioner, 30 years old*
- 1b *"And I think the risk in data coming out is how much is useful, like the dosage. We used to think that a low dose used to be good for other cardiovascular events, but in fact maybe it isn't depending on gender, age and weight." Gastroenterologist, 47 years old*

Aspirin was perceived as cheap, safe and readily available by many participants, who stated this would facilitate their prescribing and patient uptake. With the rising costs of healthcare, participants thought the cheap nature of aspirin facilitated the implementation of the guidelines. (Quotation 1c) Barriers to implementation included concerns about possible side-effects of aspirin such as gastrointestinal bleeding and contraindications in people with multiple comorbidities. (Quotation 1d)

- 1c *"It's cheap, which is the other thing; and, again, in the Australian healthcare system, where there are costs associated with a lot of treatments, to be able to recommend something that is - we're saying safe, the exception being the gastric irritation, and effective, and it's not going to break the bank for them to use it." General practitioner, 62 years*
- 1d *"And in terms of weighing up the side effects from aspirin, we've got the issue of the potential for those individuals who have got other comorbidities whether it's renal or*

allergies to aspirin or risk of stroke etc etc. You've got to weigh all those factors up before you consider putting someone on aspirin" Gastroenterologist, 59 years old

CCA guideline

Many participants mentioned the specific phrasing of the guidelines, namely that aspirin should be "actively considered". This language did not sufficiently encourage them to prioritise the recommendation, and implied uncertainty about the strength of evidence. (Quotation 1e)

- 1e *"Because it's not strong, also, perhaps that's something that will be its - not its downfall, but will be negative because we already have a lot of strong guidelines" Geneticist, 32 years old*

2. Inner Setting

Despite the variety of specialities and workplace types, a common theme emerged of competing demands on clinicians' time limiting their capacity to discuss aspirin for the prevention of CRC. (Quotations 2a, 2b) Pharmacists suggested they could support GPs in counselling patients, given GPs have relatively short consultation times with their patients. Pharmacists commented on the closeness of their location to GP clinics and their potential to reiterate advice about aspirin given by the GP. (Quotation 2c)

- 2a *"I think time's our major challenge. There's just not enough time to… especially that the pace that endoscopy list goes is fast and I think in private it's much faster. Public, even then; even if it's not pace, the patients had an anaesthetic - it's not really an appropriate time to be talking to them about long-term stuff." Gastroenterologist, 50 years old*

- 2b *"So we only actually see people when we can offer genetic testing and the rest of our work is done over the phone or we send letters. We are absolutely flat out at the moment. This is probably the only time today I will be sitting and not running around." Genetic counsellor, 35 years old*

- 2c *"I think, we should, way of promoting it, and probably we should be more proactive with it, GPs tend to not… especially, one of the pharmacies I work at is next to a bulk billing clinic doctors are very much get them in, get them out, and don't spend much time with them. so that's where we can often come in to be that extra person that can either reinforce what the doctor's told them or suggest other things. So, we should be there in the front line, yeah, promoting health." Pharmacist, 50 years old*

3. Outer Setting

Cancer Council Australia was perceived as a trustworthy organisation and this gave greater weight to and trust in the guidelines. (Quotation 3a)

- 3a *"Look as long as this is done by the Cancer Council of Victoria, I'm trusting them so it depends who is it behind, but this is a credible source of information I would have hoped." General Practitioner, 58 years old*

The initial results of the Aspirin in Reducing Events in the Elderly (ASPREE) Trial were published after the Cancer Council Australia national clinical guidelines were released, and shortly before interviews for this study were conducted.[8] The ASPREE trial showed low-dose aspirin provided no benefit in participants aged 70-80 years over a short-term follow up of 4.7 years.[9] Some participants in our study, despite varying degrees of knowledge of the ASPREE trial results, were hesitant to recommend aspirin for people even in the 50 to 70-year-old group covered by the guidelines, due to the findings of the ASPREE trial despite being conducted in a different age cohort. (Quotations 3b and 3c).

- 3b *"So that negative study for aspirin in older patients; kind of makes me think- should I be giving it to someone with average risk of colorectal cancer?" Gastroenterologist, 32 years old*

- 3c *"So there was a big study here in Australia, and then a little bit of input from the US done over the last few years, came out last year, the ASPREE study, so I did a talk on it, so I looked at the primary prevention of aspirin in the cardiovascular disease, and it showed that low-dose aspirin for healthy older adults had no impact on primary prevention and cardiovascular risk" Pharmacist, 26 years old*

Guidelines on the use of aspirin for disease prevention have changed over time, generating confusion among participants. Historically, aspirin was recommended for primary prevention of cardiovascular disease in certain at-risk patients, but guidelines were later altered, recommending it only for secondary prevention.[10,11] Participants stated that it is hard to keep up with the latest recommendations, and that this ongoing change in advice caused reluctance to recommend them. (Quotation 3d)

- 3d *"With aspirin, it was always for stroke prevention, and now they're turning around and saying no, we shouldn't be doing it for that! And you sort of wonder, well, is this going to be the same sort of thing? The, one of the issues with medications and guidelines as such is that they keep changing." Pharmacist, 50 years old*

4. Characteristics of Individuals

Whose role is it to recommend aspirin?

Hospital-based clinicians generally supported the guidelines and saw their role as advocates rather than implementers of the guidelines. (Quotations 4a and 4b) All participants, including GPs, saw that the primary responsibility to implement the aspirin guidelines rested in primary care. (Quotations 4c and 4d)

- 4a *"So, you know I'm a Geneticist. I think talking to GPs and Gastroenterologists would be a much better group [laughs] than Geneticists." Geneticist, 34 years old*

- 4b *"People are still very GP centred, so a lot of, even if we suggest things like this, a lot of people would still then go and talk to their GP before they decided to start something." Pharmacist, 50 years old*

- 4c *"If you understand what I mean, it's absolutely…I agree with those specialists, I do think it is part of the role of the GP to talk about these preventative health issues specifically prescribing aspirin" General practitioner, 28 years old*

- 4d *"It's interesting when new guidelines come out, because guidelines come out all the time, and this is a really - this is our bread and butter as a GP" General practitioner, 48 years old*

Knowledge / awareness of the CCA guidelines

Knowledge and awareness of the guidelines was mixed. The FCC staff were more knowledgeable of the guidelines, specifically as they work with populations at increased risk of CRC, and awareness of recommendations about aspirin use in people with Lynch syndrome. Whereas GPs, pharmacists and gastroenterologists were either unaware or had limited knowledge of the guidelines. (Quotations 4e and 4f)

- 4e *"All I know about low-dose aspirin in bowel cancer is that it can be used, but in certain populations, but beyond that, I actually really don't know." Geneticist, 32 years old*

- 4f *"I would say that going across, we have three different clinicians at work, and I don't think I've ever heard them recommend aspirin for someone who actually doesn't have something like Lynch syndrome." Genetic counsellor, 57 years old*

5. Process

Implementation of the CCA guidelines

While most participants considered themselves as early adopters, they admitted that clinicians in general would wait before adopting new clinical guidelines. (Quotation 5a) Most health professionals agreed that patients would be receptive to taking extra medication such as aspirin for CRC prevention. (Quotation 5b) Nevertheless, a decision aid was thought to be potentially useful to facilitate discussion about the risks and benefits of taking aspirin. (Quotation 5c) Several participants could see how they could discuss aspirin as part of their usual consultation. (Quotation 5d)

- 5a *"Other doctors like to be on the tail end because they've been burnt a few times when things have kind of flipped back the other way." General practitioner, 38 years old*
- 5b *"You know, I think the people who already take tablets for something find it quite easy to beguile an extra tablet. So, someone's already on a cholesterol tablet, they're on a high blood pressure tablet, it's easy for them to add aspirin to that." Gastroenterologist, 60 years old*
- 5c *"Well that (a decision aid) might have been useful for the patient to show them what could happen and how effective it is if they ask." General practitioner, 58 years old*
- 5d *"You know, I appreciate they're guidelines and they're not mandatory, and if it fits in with the way I would practice, I'm happy to sort of incorporate them into what I do." Gastroenterologist, 65 years old*

Discussion

This is the first study to our knowledge to examine the perspectives of a wide range of Australian clinicians about recommending aspirin to reduce bowel cancer risk. Aspirin was considered as readily available, affordable and safe. However, the ambiguity about the recommended dose and perceived strength of the evidence was a concern for several clinicians. The media attention about the ASPREE trial[12] added to the perceived uncertainty about the evidence. Busy work environments meant limited time to spend on prevention. The endorsement from Cancer Council Australia, a nationwide not-for-profit organisation, meant the guidelines were perceived as trustworthy and therefore more likely to be implemented.

FCC staff and gastroenterologists are generally aware of aspirin recommendations for patients at increased CRC risk and suggested that GPs are better placed to discuss aspirin in those at average risk. These hospital specialists felt they could advocate the use of aspirin but the ultimate responsibility for initiation rested in general practice. Pharmacists similarly felt they could facilitate the process but would not initiate discussions about aspirin. GPs agreed that this was part of their role, for example when discussing bowel cancer screening, but had limited awareness of the guidelines.

There is often a large investment of time, resources and clinical expertise involved in producing national clinical guidelines, however, there is typically no accompanying strategy to implement them.[13,14] Between 2003 and 2007, 313 clinical practice guidelines were produced in Australia by over 80 guideline producers[15], but with limited clinical uptake. [16,17]

The uptake of guidelines into clinical practice is influenced by several factors including the guideline characteristics, ease of implementation, clarity of the guidelines and individual clinicians' familiarity with the intervention and evidence.[18] Our study highlights several of these factors which could act as barriers to widespread implementation of the aspirin guidelines. Superficially, one might expect

recommending a familiar, low cost, over-the-counter drug would be easily implemented. But lack of clarity, partly due to the specific wording of the recommendation, could alter perceptions of the evidence and jeopardise uptake of the guideline.

Uncertainties amongst clinicians about the evidence for aspirin in disease prevention is exacerbated by changes in recommendations about its use in cardiovascular disease. The Cancer Council Australia guideline specifically considered the evidence as it relates to preventing colorectal cancer. It did not discuss related evidence of reduced incidence and mortality from other cancers[3] or for the primary prevention of cardiovascular disease.[19] The US Preventative Services Taskforce recommends aspirin for CRC prevention only in people who are also at moderately increased risk of cardiovascular disease.[20] In addition, their recommendations about its use are stronger for people aged 50 to 59 years, compared with those aged 60 to 69 years because the risk of serious side-effects from aspirin increases with age.

There was little awareness amongst many participants of the additional effects of aspirin on all-cancer incidence and mortality, but this is an important additional consideration for patients when making informed decisions about taking aspirin. Clinicians in our study recognised the potential benefit of a decision aid to support discussions about taking aspirin. There is strong evidence to show that decision aids can support informed decision making, particularly when decisions require weighing up benefits and risks which are preference sensitive.[21] Patients need to understand the potential benefits of aspirin in terms of reduced incidence and death from cancer and cardiovascular disease, and harms from gastrointestinal and intracranial haemorrhage. In a vignette study testing graphical approaches to communicating these harms and benefits from aspirin, over 70% of Australian patients aged 50-70 were willing to take aspirin for disease prevention.[22] The use of a decision aid has the potential to inform the clinicians which addresses a major barrier to implementation, as GPs have limited awareness of the guidelines. A decision aid would enhance the clarity of the recommendation and facilitate a discussion about the aspirin guidelines with patients.

Implications & limitations

In this in-depth qualitative study, we recruited a large sample of diverse participants representing different clinical disciplines, varied length of experience, and work settings. Although we recruited participants only from Victoria, we believe our findings are likely to be transferable to other Australian clinicians although we acknowledge that there may be other barriers and facilitators experienced by clinicians from remote locations.

The national guidelines on aspirin represent an important new approach to reducing the incidence and mortality of bowel cancer in Australia. But the absence of a strategic and more active implementation plan, means these guidelines are less likely to be translated into clinical practice.[23] Specific implementation strategies for general practice are necessary to increase the awareness and uptake of these guidelines. Our findings suggest that a stronger statement of recommendation and clarity about dosage are required. Engagement with pharmacists is also necessary to ensure they are aware of the guidelines and are prepared to endorse any advice from someone's GP about using aspirin. These implementation strategies could be supplemented by approaches to raise awareness in the community about the role of aspirin and decision aids to facilitate discussions between GPs and patients and support informed choices about CRC prevention.

Author statement:
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Competing interests: JE and FM were members of the Cancer Council Australia guideline development group which recommends the use of low dose aspirin for the prevention of colorectal cancer.

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Supplementary Materials

Clinicians' opinions on recommending aspirin to prevent colorectal cancer to Australians aged 50 to 70 years: a qualitative study

S1. Interview schedule

Clinicians' interviews will be guided by the following schedule which only provides general areas to be covered.

****Remind them that you'll be recording the interview and START recording**

DEMOGRAPHICS

- Age, gender, years of practice, specialization, place(s) of work: clinic(s) or hospital(s)

INTRODUCE CANCER COUNCIL GUIDELINES

*(Show **laminated version** of summary / recommendations)*

- Are you aware of the new guidelines? What is your understanding of the aspirin recommendations?
- Are you aware of guidelines that recommend prescribing aspirin to prevent bowel cancer?

OPINION ON GUIDELINES

- *If aware of guidelines*: what is your professional opinion of them?
- What are your thoughts underpinning the evidence around these guidelines?
- What do you think about using aspirin to prevent bowel cancer?
- Are you aware of the potential benefits and harms of using aspirin to prevent bowel cancer?
- Do you have clinical experience with the harms of using aspirin?

CURRENT PRACTICE/ PREVENTION

- When you consult with patients, what bowel cancer and cardiovascular disease prevention strategies do you incorporate into the consultation?
- Do you think this is part of your role as a general practitioner?
    - *If not:* whose role do you think it is?
- Do you currently recommend aspirin to patients?
- Which patients would you and would you not consider recommending aspirin to? Why?
    - Specific conditions, prevention?
    - How about those with or without a family history (e.g. Lynch syndrome)?

PATIENT OPINION

- What do think your patients would feel about using aspirin preventively?
- Have you had any feedback from patients about their experience of using aspirin preventively?

PATIENT EDUCATION

- How would you go about explaining the benefits and potential harms of taking aspirin?
- What supportive information would you use and why?

INTRODUCE EXPECTED FREQUENCY TREES

*Show clinician the **2** expected frequency trees – **incidence** and **mortality.** Provide **evidence** for where the **numbers come from.** Emphasise it was developed for people aged **50-70.***

- What do you think about the EFT?
- Would the decision aid be helpful in these discussions with pts?

NEW GUIDELINE IMPLEMENTATION: ROUTINE PRACTICE

- Generally, when there is a new guideline, how do you find out about it?
- How do you incorporate new guidelines into practice?
- What challenges do you encounter when implementing new guidelines?
    - Private vs public
- How does your clinic/hospital implement new guidelines?
- Are you more likely to be early adopter or late adopter for new guidelines? Do you tend to wait to see what your colleagues are doing before starting to adopt new recommendations?

COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	
Occupation	3	What was their occupation at the time of the study?	
Gender	4	Was the researcher male or female?	
Experience and training	5	What experience or training did the researcher have?	
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	
Sample size	12	How many participants were in the study?	
Non-participation	13	How many people refused to participate or dropped out? Reasons?	
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	
Field notes	20	Were field notes made during and/or after the inter view or focus group?	
Duration	21	What was the duration of the inter views or focus group?	
Data saturation	22	Was data saturation discussed?	
Transcripts returned	23	Were transcripts returned to participants for comment and/or	

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	
Description of the coding tree	25	Did authors provide a description of the coding tree?	
Derivation of themes	26	Were themes identified in advance or derived from the data?	
Software	27	What software, if applicable, was used to manage the data?	
Participant checking	28	Did participants provide feedback on the findings?	
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	
Data and findings consistent	30	Was there consistency between the data presented and the findings?	
Clarity of major themes	31	Were major themes clearly presented in the findings?	
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

Once you have completed this checklist, please save a copy and upload it as part of your submission. DO NOT include this checklist as part of the main manuscript document. It must be uploaded as a separate file.

SPQR checklist for Clinicians' opinions on recommending aspirin to prevent colorectal cancer to Australians aged 50 to 70 years: a qualitative study

Standards for Reporting Qualitative Research (SRQR)*

http://www.equator-network.org/reporting-guidelines/srqr/

	Page/line no(s).
Title and abstract	
Title - Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	Page 1/ line 1-3
Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	Page 2/ line 35-62
Introduction	
Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	Page 3/ line 75-90
Purpose or research question - Purpose of the study and specific objectives or questions	Page 3/ line 91-94
Methods	
Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**	Page 3/ line 99 Page 3/ line 100
Researcher characteristics and reflexivity - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	Page 4/ lines 120 - 126
Context - Setting/site and salient contextual factors; rationale**	Page 3/ line 105
Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**	Page 3/ line 104
Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	Page 10 / line 345 - 347

Data collection methods - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**	Page 3/ line 113
Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	Page 4/ line 126
Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	Page 5/ line 143 and line 151
Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	Page 4/ line 126
Data analysis - Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	Page 4/ line 128-129/ line 131-138
Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	Page 4/ line 134- 135

Results/findings

Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	Page 5-8/ line 143 - 280
Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	Page 5-8/ line 143 - 280

Discussion

Integration with prior work, implications, transferability, and contribution(s) to the field - Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	Page 8- 9/ line 282 - 327
Limitations - Trustworthiness and limitations of findings	Page 9/ line 334 - 340

Other

Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	Page 10/ line 359 - 361
Funding - Sources of funding and other support; role of funders in data collection, interpretation, and reporting	Page 10/ line 357 - 358